



UNIVERSITY OF COLOMBO, SRI LANKA



UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

BACHELOR OF COMPUTER SCIENCE

Academic Year 2008/2009 – Second Year Examination – Semester 1

SCS2006 – Analogue and Digital Electronics

(2 HOURS)

Answer all the questions

No. of Pages = 4

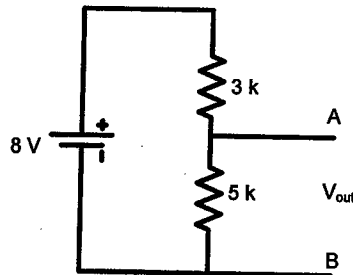
No. of Questions = 4

1.

- (a). Is it advisable to plug 1100 W kettle in to a 5 A main supply wall socket? Justify your answer.

[5 marks]

- (b). When an unknown resistance (R) is connected to the output (A,B), its voltage is observed to decrease to 80% of the value when nothing is connected to it. What is the value of the resistance R?



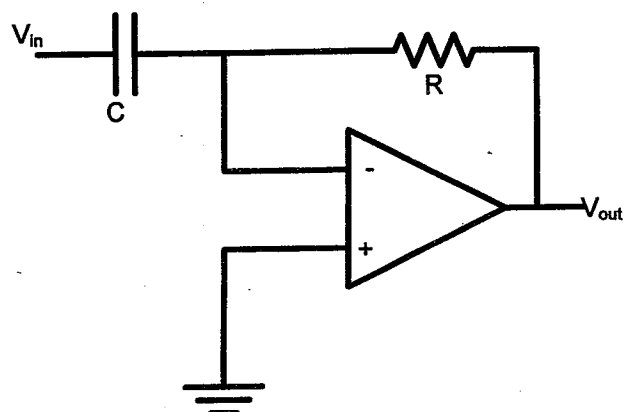
[5 marks]

- (c). A certain signal is characterized by the expression $v = 5 \sin (0.0628 t)$. The argument of the sin function is in radians and time is in seconds. Find followings

- (i). Average voltage
- (ii). Peak-to-peak voltage
- (iii). Rms voltage

[5 marks]

- (d). Consider the following circuit and find the relationship between V_{out} and V_{in} .



(Hints: 1. Apply golden rules.

2. Current through a capacitor can be given as $i = C \frac{dV}{dt}$, where C is capacitance, V is voltage across the capacitor and t is time.)

[10 marks]

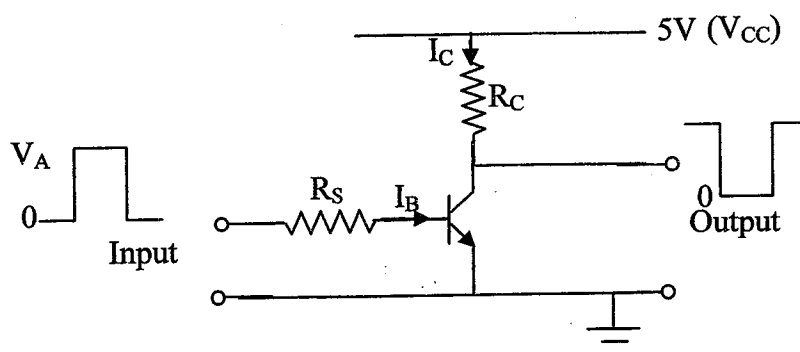
2.

- (a). Complete the following table

Mode	Bias of EB junction	Bias of CB junction
Active		
Saturation		
Cut off		

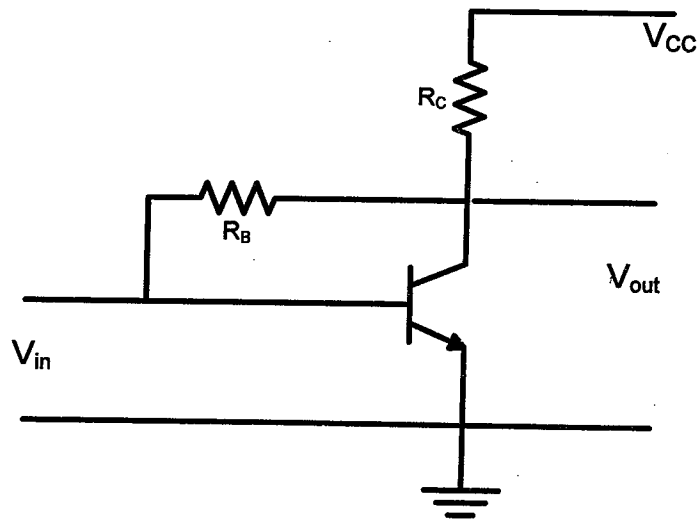
[5 marks]

- (b). Find suitable values for the resistors (R_S , R_C) of the following circuit in order to make it a switching circuit. ($\beta=100$, $I_C = 20$ mA)



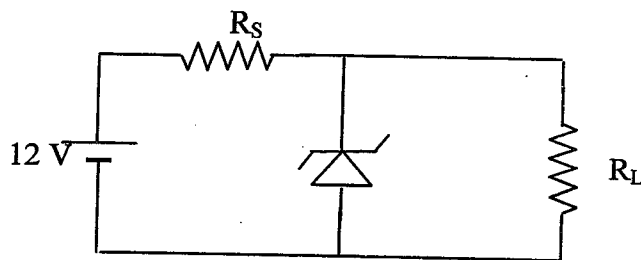
[5 marks]

- (a). Explain, what will happen to the thermal stabilization of the following transistor bias arrangement if R_C is replaced with an inductive load.



(b). The zener diode in the circuit shown below has following specifications. [5 marks]

- Zener voltage = 5 V
- Minimum zener current that must be maintained in order to ensure proper operation of the diode = 2 mA
- Maximum allowable power dissipation of the diode = 1W.



- Find the maximum current that can be sent safely through the zener diode.
- Calculate the smallest possible value for R_L .
- If R_L is a variable resistor and its resistance can be increased up to infinity, calculate a suitable value for R_S .

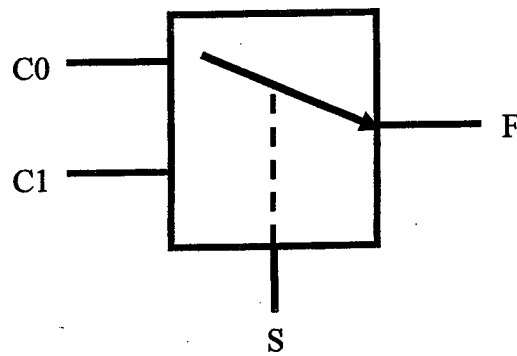
3. [10 marks]

(c). What is the major difference between a combinational and a sequential logic circuit?

[5 marks]

(d). Draw the truth table of a 1-bit 2-channel multiplexer. (assume C_0 , C_1 , S as inputs and F as output)

[5 marks]



(e). Draw the schematic diagram for a 1-bit 2-channel multiplexer.

[5 marks]

(f). With the help of the device designed in the part (a) or otherwise design 1-bit 4-channel multiplexer.

[10 marks]

4. Function of a positive going transition type clocked D flip-flop is represented in the truth table given below.

<i>clk</i>	<i>Q</i>
When a rising edge occurred	<i>D</i>
Otherwise	<i>Q</i>

(g). What are meant by the “Direct clear” and “Direct set” inputs?

[5 marks]

(h). Write down the truth table for a T (toggle) flip-flop and with the help of a D flip-flop or otherwise design a T flip-flop.

[5 marks]

(i). Design a 3 bit asynchronous counter.

[7 marks]

(j). Draw the timing diagram for 5 clock pulses, for all outputs.

[8 marks]
