

## DEPARTMENT OF ELECTRONIC AND ELECTRICAL ENGINEERING

Spring Semester 2011 (30 minutes)

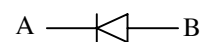
## EEE 103 ANALOGUE CIRCUITS MID TERM TEST

Answer **ALL** questions. The numbers given after each section of a question indicate the relative weighting of that section.

**REGISTRATION NUMBER:**.....

WRITE YOUR ANSWERS ON THIS QUESTION PAPER

- 1 State the direction of conventional forward current flow (ie, "A to B" or "B to A") through the diode of figure 1. **{1 mark}**

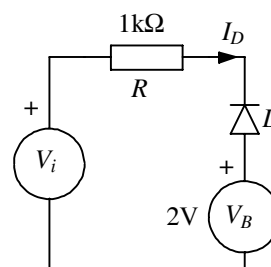


**figure 1**

Q1 Ans

- 2 In the circuit of figure 2 the diode has a forward voltage drop of 0.7V. At what value of  $V_i$  is the diode on the point of changing state from conducting to non-conducting? What is the value of  $I_D$  for  $V_i = 6V$  and  $V_i = -6V$ ? **{4 marks}**

Q2 Ans



**figure 2**

- 3 In figure 3,  $D$  has a forward voltage drop of  $0.7\text{ V}$  and  $V_i$  is a triangular waveform with a peak value of  $3\text{ V}$  as shown. Sketch the voltage waveform you would expect to see at  $V_O$  on the same axes as those used for  $V_i$  in the Q3 answer box. Label peak values of  $V_O$ . {3 marks}

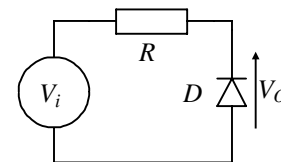
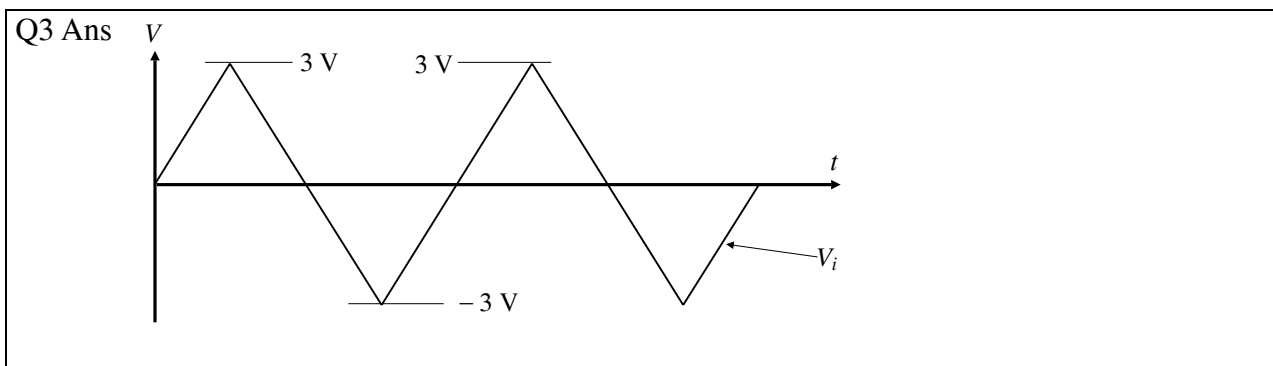


figure 3



- 4 Sketch the curve  $V(t) = 4e^{-t/\tau} - 1$  for  $t > 0$  and label its important features. {3 marks}



- 5 In figure 5 there are five circuit shapes that you have come across. In the Q5 answer box, associate each circuit with the appropriate name from the following list;

half wave rectifier, clipping circuit, clamping circuit, zener diode regulator, full wave rectifier, voltage doubler, peak detector. {5 marks}

Q5 Ans

circuit (a) is a .....  
 circuit (b) is a .....  
 circuit (c) is a .....  
 circuit (d) is a .....  
 circuit (e) is a .....

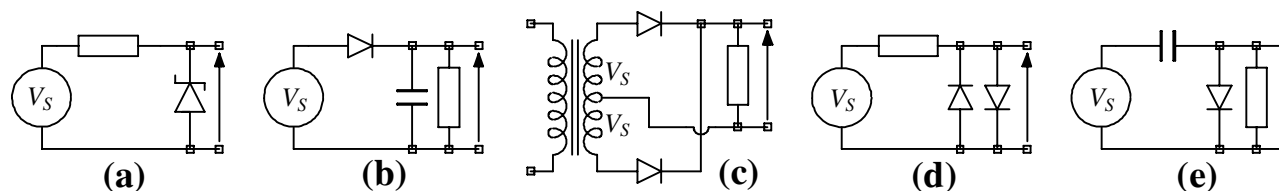
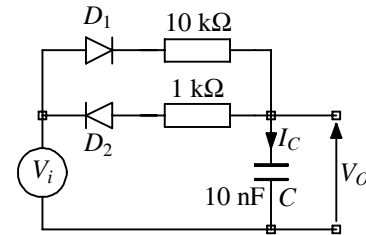


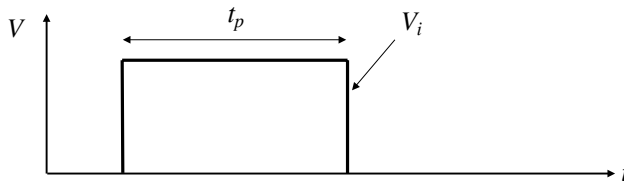
Figure 5

- 6 The diodes in figure 6 have a forward voltage drop of zero. On the axes in the **Q6** answer box, sketch the response of the circuit of figure 6 to the input pulse shown. Write down the rising and falling edge time constants in the boxes provided. Assume that the pulse width,  $t_p$ , is large in comparison to the circuit time constants. **{3 marks}**



**figure 6**

**Q6 Ans**



rising edge time constant =

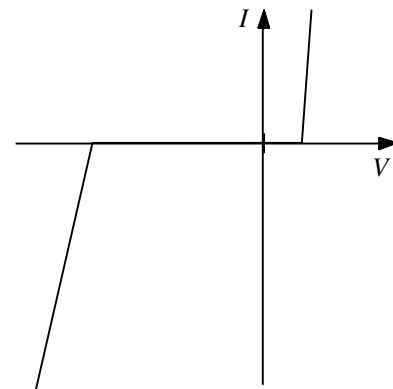
falling edge time constant =

- 7 For the circuit of figure 6, write down equations that will describe the response,  $V_O(t)$ , of the circuit to the rising and falling edges of the input pulse and evaluate the peak values of  $I_C$ . **{4 marks}**

**Q7 Ans**

- 8 Annotate the  $I$ - $V$  Zener diode characteristic of figure 8 with the 0.7V forward turn on voltage and the reverse (Zener) breakdown voltage. Indicate the region of the characteristic normally used for Zener diode applications. Draw the circuit symbol of a Zener diode. **{4 marks}**

**Q8 symbol**



**figure 8**

END OF TEST