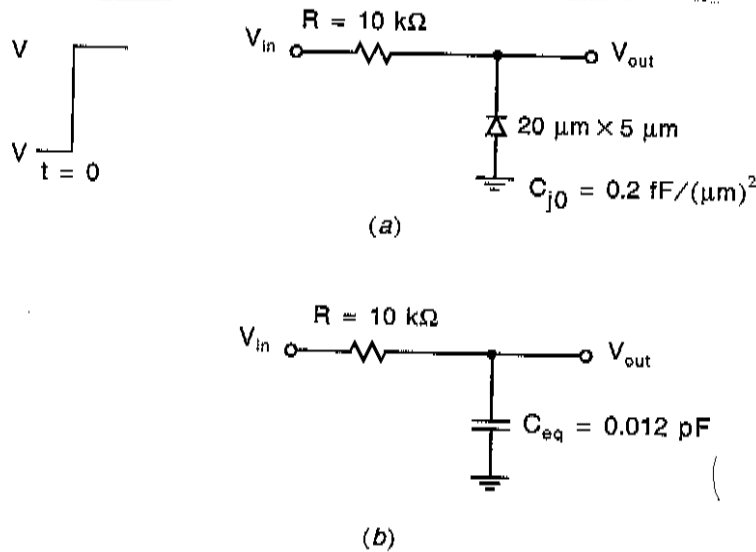


## MICROELECTRÓNICA

### Exercício 2 - Familiarização com o Programa SPICE Cálculo da capacidade numa junção p-n

For the circuit shown in Fig. 1.3, where a reverse-biased diode is being charged from 0 V to 5 V, through a 10-k $\Omega$  resistor, calculate the time required to charge the diode from 0 V to 3.5 V. Assume that  $C_{j0} = 0.2 \text{ fF}/(\mu\text{m})^2$  and that the diode has an area of  $20 \mu\text{m} \times 5 \mu\text{m}$ . Compare your answer to that obtained using SPICE. Repeat the question for the case of the diode being discharged from 5 V to 1.5 V.



**Fig. 1.3** (a) The circuit used in Example 1.6; (b) its RC approximate equivalent.

**Solution**  $t_{70\%} = 1.2\tau = 0.13 \text{ ns}$

As a check, the circuit of Fig. 1.3(a) was analyzed using SPICE. The input data file was as follows:

```
R 1 2 10k
D 0 2 DMOD
*
VIN 1 0 dc 2.5 PULSE (0 5 0 10p 10p 0.49n 1.0n)
*
.MODEL DMOD D(CJO=0.02E-12)
*
.OPTIONS NUMDGT=5 ITL1=500
.WIDTH OUT=80
.TRAN 0.01n 1.0n
.PRINT TRAN V(2)
.END
```