



1-d	2-b	3-b	4-a	5-c	6-c	7-c	8-a	9-b	10-d
9-c	10-b		11-d	12-a	13-d	14-b			
15-a	16-a	17-b	18-a	19-c	20-b				
21-a	22-b	23-c	24-a	25-b	26-d				
27-c	28-c	29-b	30-b	31-d	32-a				

S-1

$$\frac{24-15}{470} = 19,15 \text{ mA}$$

S-2-

$$\frac{40-15}{470} = 53,19 \text{ mA}$$

S-3

$$\frac{24-15}{440,5} = 20,15 \text{ mA}$$

S-4

$$V_0 = 24 \text{ V}$$

S-5

$$\frac{24-15}{470} = 19,15 \text{ mA}$$

$$\frac{15}{1,5 \text{ K}\Omega} = 10 \text{ mA}$$

$$I_2 = 9,15 \text{ mA}$$

S-6

$$\frac{24-15}{470} = 19,15 \text{ mA}$$

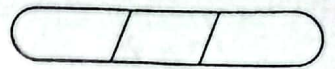
S-7 =

$$\frac{24-15}{440,5} = 20,15 \text{ mA}$$

S-8

$$9,15 \text{ mA} < 21 \text{ mA} \quad \text{Zener não regula}$$

tilibra



S-9

$$\frac{20-15}{330} = 15,15 \text{ mA} \quad \frac{15}{15k\Omega} = 1 \text{ mA} \quad I_z = I_s - I_L = 14,15 \text{ mA}$$

S-10

$$15 + 19,9,15 = 15,13 \text{ V}$$

S-12

$$14, (12,34 - 3,83) = 119 \text{ mV}$$