



# POSTAL BOOK PACKAGE 2026

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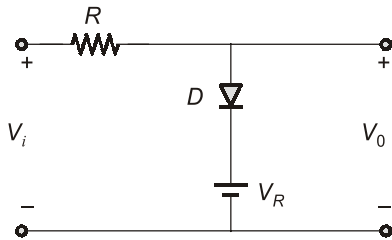
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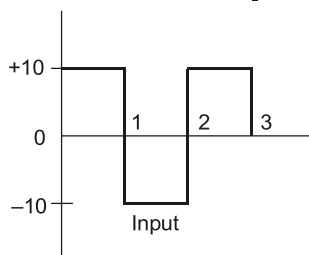
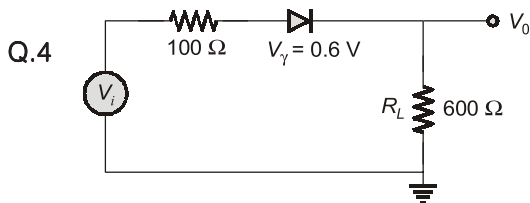
# Diode Circuit and Power Supply

## MCQ and NAT Questions

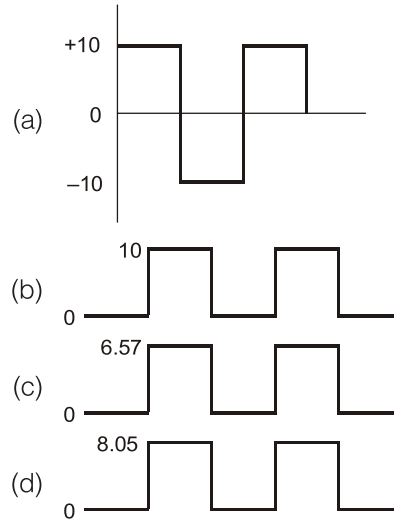
- Q.1** The voltage across diode at temperature  $T_1$  is 0.76 V. If temperature is increased by  $20^\circ\text{C}$  at constant current the new voltage across diode is  
 (a) 0.65 V (b) 0.81 V  
 (c) 0.71 V (d) 0.7 V
- Q.2** A diode whose terminal characteristics are related as  $i_D = I_s e^{V/V_T}$ , where  $I_s$  is the reverse saturation current and  $V_T$  is thermal voltage ( $V_T = 25\text{ mV}$ ), is biased at  $I_D = 4\text{ mA}$ . Its dynamic resistance is  
 (a)  $12.5\ \Omega$  (b)  $50\ \Omega$   
 (c)  $6.25\ \Omega$  (d)  $25\ \Omega$
- Q.3** In the circuit shown below the input  $V_i$  has positive and negative swings.  $V_o$  is the output.



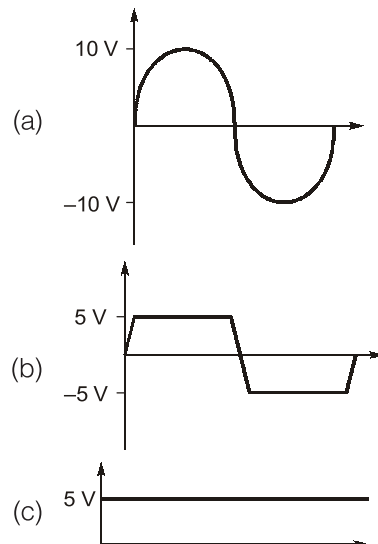
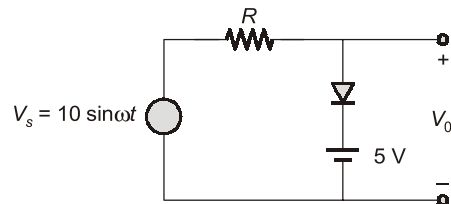
- (a)  $V_o = 0$  for negative  $V_i$   
 (b)  $V_o = V_R$  for positive  $V_i$   
 (c)  $V_o = V_R$  for  $V_i > V_R$   
 (d)  $V_o = V_R$  for all  $V_i$

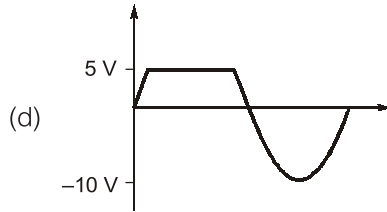


The output waveform is

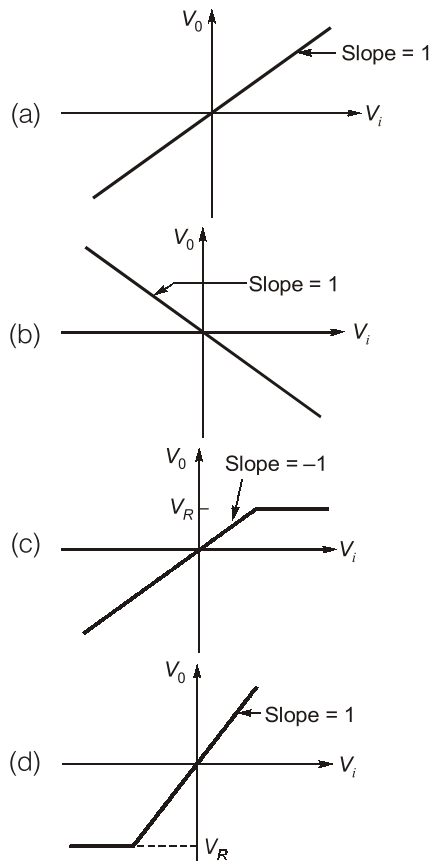
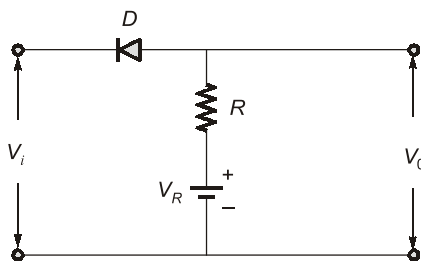


- Q.5** For the circuit shown below assuming ideal diode, the output waveform  $V_o$  is

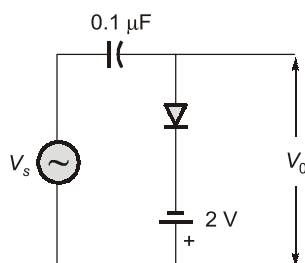




**Q.6** The transfer characteristic of the network shown below is represented as

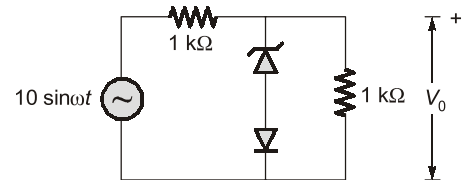


**Q.7** For an input of  $V_s = 5 \sin \omega t$ , (assuming ideal diode), circuit shown below will behave as a



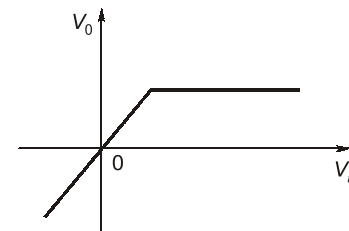
- (a) clipper, sine wave clipped at  $-2 \text{ V}$
- (b) clamper, sine wave clamped at  $-2 \text{ V}$
- (c) clamper, sine wave clamped at zero volt
- (d) clipper, sine wave clipped at  $2 \text{ V}$

**Q.8** The cut-in voltage of diode  $D$  shown in figure is  $0.65 \text{ V}$ , while breakdown voltage of the Zener Diode is  $3 \text{ V}$ . Diode is considered to be ideal. The value of peak output voltage  $V_o$ .



- (a)  $3 \text{ V}$  in the positive half cycle and  $0.65 \text{ V}$  in the negative half cycle.
- (b)  $3.65 \text{ V}$  in the positive half cycle and  $-5 \text{ V}$  in the negative half cycle.
- (c)  $3 \text{ V}$  in positive half cycle and  $-5 \text{ V}$  in the negative half cycle
- (d)  $-3.65 \text{ V}$  in positive half cycle and  $5 \text{ V}$  in the negative half cycle

**Q.9** The voltage transfer characteristic as shown in the figure will relate to a

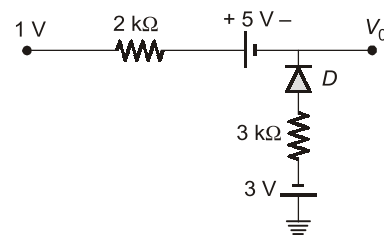


- 1. voltage regulator
- 2. half-wave rectifier
- 3. full-wave rectifier

Which of the above is/are correct?

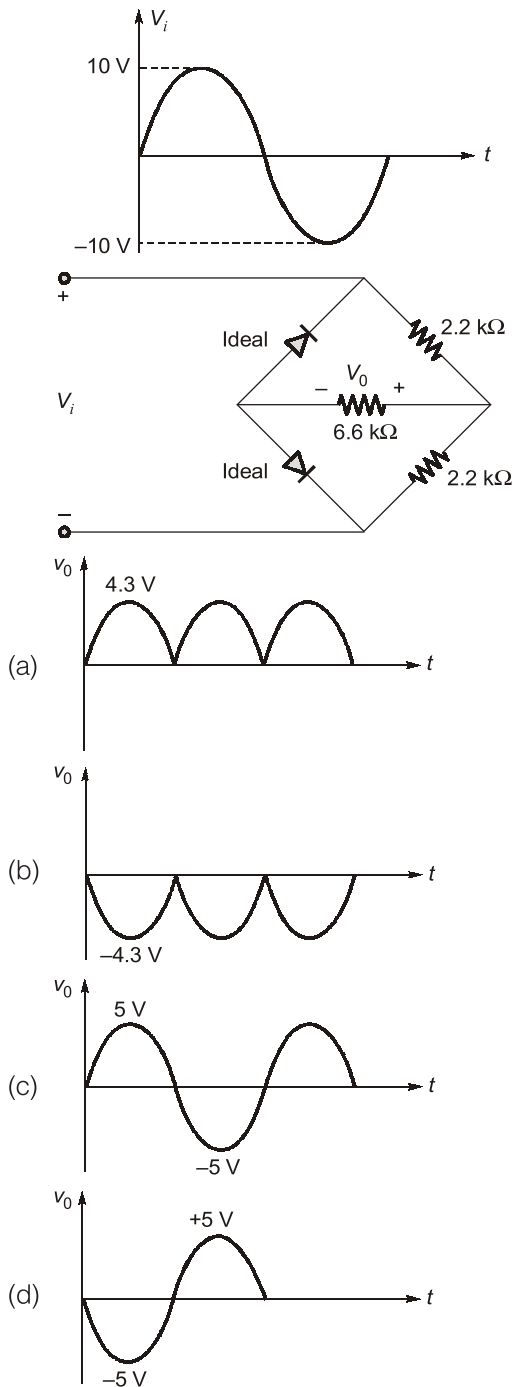
- (a) 1 only
- (b) 2 only
- (c) 1 and 2
- (d) 1 and 3

**Q.10** What is the output voltage  $V_o$  for the circuit shown below assuming an ideal diode?

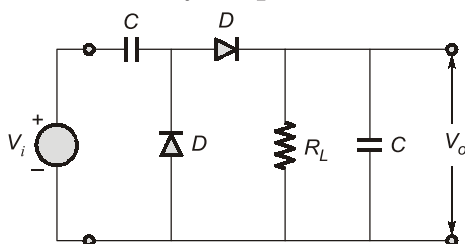


- (a)  $-\frac{18}{5} \text{ V}$
- (b)  $\frac{18}{5} \text{ V}$
- (c)  $-\frac{13}{5} \text{ V}$
- (d)  $\frac{13}{5} \text{ V}$

Q.11 The correct waveform for output ( $V_o$ ) for below network is

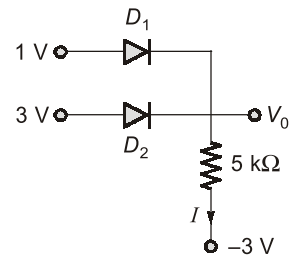


Q.12 Consider the below circuit, for  $V_i = V_m \sin \omega t$ , the output voltage  $V_o$  for  $R_L \rightarrow \infty$  will be



- (a) Zero  
(b)  $V_m$   
(c)  $2 V_m$   
(d)  $-V_m$

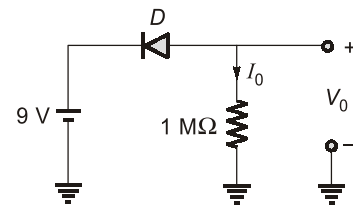
Q.13 Consider the circuit shown in the figure below



If diode  $D_1$  and  $D_2$  are made up of same material with the cut-in voltage  $V_g = 0.7 \text{ V}$ , then the value of current  $I$  is equal to

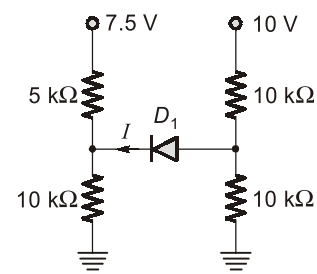
- (a)  $0.46 \text{ mA}$   
(b)  $0.99 \text{ mA}$   
(c)  $0.59 \text{ mA}$   
(d)  $1.06 \text{ mA}$

Q.14 Consider the diode circuit shown in the figure below:



The diode in the circuit is a large high-current silicon device whose reverse leakage current is reasonably independent of voltage appearing on the diode. If  $V_o = 1 \text{ V}$  at  $20^\circ \text{C}$ , then the value of output voltage at  $40^\circ \text{C}$  is equal to \_\_\_\_\_ V.

Q.15 Consider the circuit shown in the figure below



If the cut-in voltage of the diode  $D_1$  is equal to  $0.7 \text{ V}$ , then the value of current flowing through the diode is equal to \_\_\_\_\_ mA.

Q.16 A  $700 \text{ mW}$  maximum power dissipation diode at  $25^\circ \text{C}$  has  $5 \text{ mW}/^\circ \text{C}$  de-rating factor. If the forward voltage drop remains constant at  $0.7 \text{ V}$ , the maximum forward current at  $65^\circ \text{C}$  is

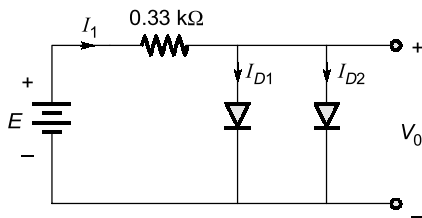
- (a)  $700 \text{ mA}$   
(b)  $714 \text{ mA}$   
(c)  $1 \text{ A}$   
(d)  $1 \text{ mA}$

**Q.35** A full wave rectifier delivers DC power of 50 W to a load of 200  $\Omega$ . If the ripple factor is 1%, the AC ripple voltage across the load is

- (a)  $\frac{1}{2}$  V (b) 1 V  
(c)  $\frac{2}{3}$  V (d)  $\frac{3}{2}$  V

**Multiple Select Questions (MSQs)**

**Q.36** For the circuit shown below :

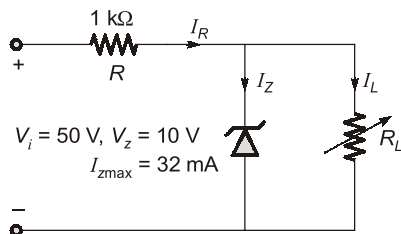


(where  $E = 10$  V)

Which of the following statement is correct?

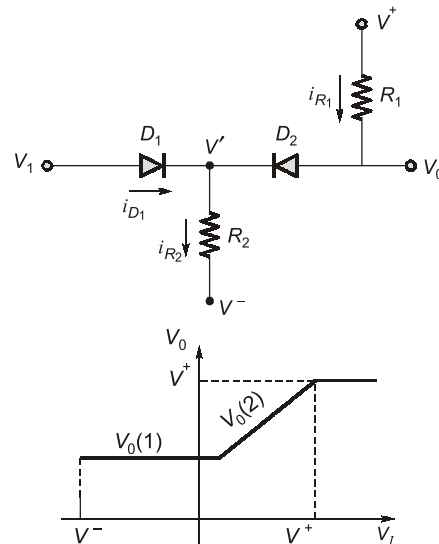
- (a)  $I_1 > I_{D1} > I_{D2}$  (b)  $I_{D1} < I_{D2} < I_1$   
(c)  $I_{D1} = I_{D2} = \frac{I_1}{2}$  (d)  $I_1 = 28.18$  mA

**Q.37** For the network shown below, which of the following option(s) is/are correct regarding the range of  $R_L$  and  $I_L$  that will result in  $V_{R_L}$  being maintained at 10 V.



- (a)  $R_{L \min} = 250 \Omega$  (b)  $I_{L \min} = 8$  mA  
(c)  $R_{L \max} = 1.25$  k $\Omega$  (d)  $I_R = 40$  mA

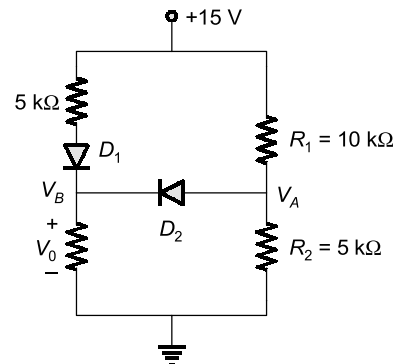
**Q.38** For the circuit shown below :



Assume the circuit parameters are  $R_1 = 5$  k $\Omega$ ,  $R_2 = 10$  k $\Omega$ ,  $V_\gamma = 0.7$  V,  $V^+ = +5$  V and  $V^- = -5$  V

- (a) For  $V_1 = 0$ ,  $i_{R1} = 0.62$  mA  
(b) For  $V_1 = 4$  V,  $i_{R1} = 0.2$  mA  
(c) For  $V_1 = 4$  V,  $i_{R2} = 0.83$  mA  
(d) For  $V_1 = 4$  V,  $i_{D1} = 0.63$  mA

**Q.39** For the circuit shown below :



Which of the following are correct?

- (a)  $V_A = 7.62$  V (b)  $V_B = 6.92$  V  
(c)  $V_A = 5$  V (d)  $V_B = 9.53$  V

■■■■

**Answers Diode Circuit and Power Supply**

- |            |                  |                  |            |         |         |         |
|------------|------------------|------------------|------------|---------|---------|---------|
| 1. (c)     | 2. (c)           | 3. (c)           | 4. (d)     | 5. (d)  | 6. (c)  | 7. (b)  |
| 8. (b)     | 9. (a)           | 10. (a)          | 11. (a)    | 12. (c) | 13. (d) | 14. (4) |
| 15. (0)    | 16. (b)          | 17. (a)          | 18. (a)    | 19. (c) | 20. (c) | 21. (a) |
| 22. (b)    | 23. (b)          | 24. (b)          | 25. (a)    | 26. (d) | 27. (c) | 28. (a) |
| 29. (c)    | 30. (c)          | 31. (d)          | 32. (c)    | 33. (d) | 34. (c) | 35. (b) |
| 36. (c, d) | 37. (a, b, c, d) | 38. (a, b, c, d) | 39. (c, d) |         |         |         |

## Explanations Diode Circuit and Power Supply

1. (c)

$$\frac{dV_D}{dT} = -2.5 \text{ mV}^\circ\text{C}$$

$$\Delta V_D = 20 \times (-2.5 \text{ mV}) = -0.05 \text{ V}$$

$$\therefore V_D + \Delta V_D = V_2 = 0.71 \text{ V}$$

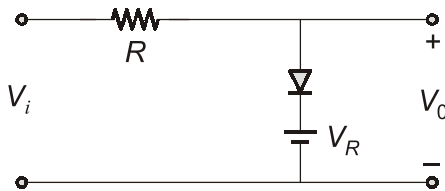
2. (c)

$$\frac{1}{r_d} = \frac{\partial I_D}{\partial V} = \frac{I_D}{V_T}$$

$r_d$ : dynamic resistance.

$$\therefore r_d = \frac{V_T}{I_D} = \frac{25}{4} = 6.25 \Omega$$

3. (c)



Considering ideal diode :

for  $V_i < V_R$ , diode is OFF hence there is no current through  $R$  and  $V_0 = V_i$ .

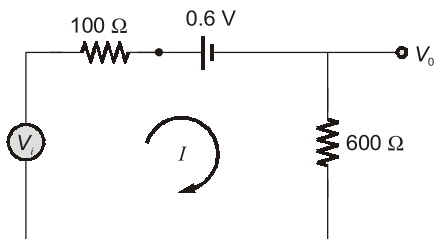
For  $V_i > V_R$ , diode is ON hence

$$V_0 = V_R$$

(as diode will act as short circuit)

4. (d)

For  $0 \leq t \leq 1$ , diode is ON



$$I = \frac{V_i - 0.6}{100 + 600} = \frac{10 - 0.6}{700}$$

$$= 0.01343 \text{ A}$$

$$\therefore V_0 = 600 \times 0.01343 = 8.058 \text{ V}$$

for  $1 < t < 2$ , diode is OFF, there will be no current in the circuit and hence

$$V_0 = 0 \text{ V}$$

Hence output waveform can be given as shown below:

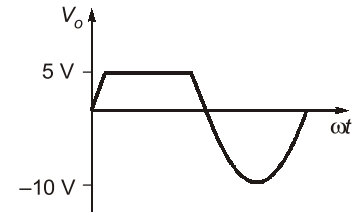


5. (d)

For  $0 \leq V_i < V_R$  = diode is OFF  $\Rightarrow V_0 = V_i$

For  $V_R \leq V_i \Rightarrow$  diode is ON  $\Rightarrow V_0 = 5 \text{ V}$

Hence output waveform can be as shown below

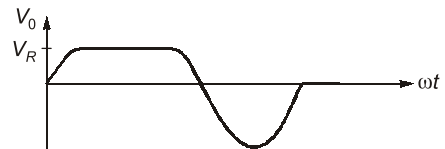
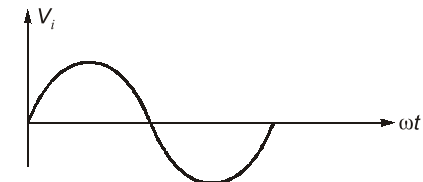


6. (c)

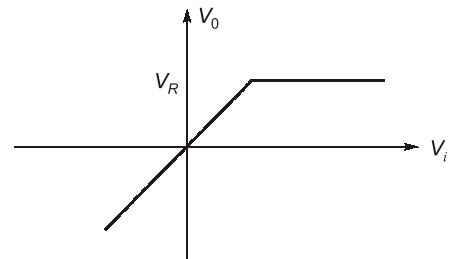
For  $V_i < V_R$  = Diode is OFF  $\Rightarrow V_0 = V_i$

For  $V_i > V_R$  = Diode is ON  $\Rightarrow V_0 \approx V_R$

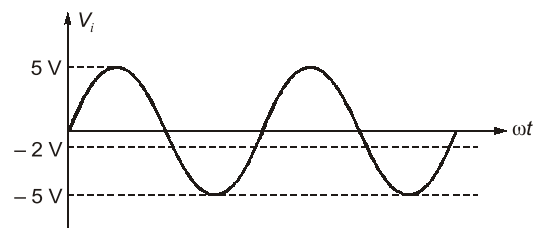
Hence for a sinusoidal input, output can be shown as below



Hence characteristic can be as shown below



7. (b)



Hence given circuit acts as a clamper, sine wave clamped at  $-2 \text{ V}$ .