Name:	**Dr JBO - Model Answer**
Student ID Number:	
Section:	01A / 01B
Lecturer:	Dr. Jamaludin Bin Omar

EEEB273 - Quiz 5 [Question Set 1]
SEMESTER 1, ACADEMIC YEAR 2010/2011
Date: 22 September 2010

Question:

Figure 1 shows an idealized class-B output stage. (The effective turn-on voltages of devices A and B are zero, and the effective "saturation" voltages of v_A and v_B are zero.) Given that V^+ and V^- are **+10 V** and **-10 V**, respectively. Assume a symmetrical sine wave is produced at the output.

(a) What is the peak output voltage at maximum power conversion efficiency?
[3 marks]

(b) What is the peak output voltage when each device dissipates the maximum power?
[3 marks]

(c) If the maximum allowed power dissipation in each device is **2 W** and the output voltage is at its maximum value, what is the permitted value of R_L?
[4 marks]

Answer:

(a)
At maximum power conversion efficiency

V_p (max)	$= V^+$	[2]
	$= 10$ V	[1]

(b)
Maximum power dissipation occurs when

V_p	$= (2\ V^+) / \pi$	[1]
	$= (2*10) / \pi$	[1]
	$= 6.366$ V	[1]

(c)
Maximum power dissipation occurs when

P(max)	$= (V^+)^2 / (\pi^2 R_L)$	[1]
R_L	$= (V^+)^2 / (\pi^2 P(\max))$	[1]
	$= (10)^2 / (\pi^2 * 2)$	[1]
	$= 5.07\ \Omega$	[1]

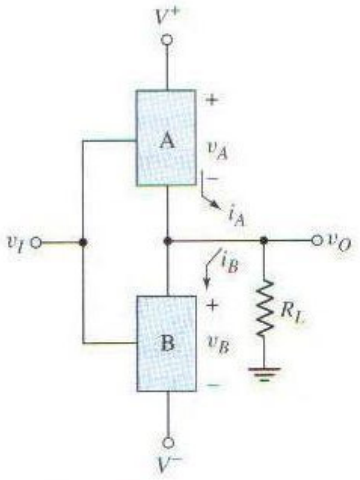

Figure 1

Name:	**Dr JBO - Model Answer**
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Lecturer:	Dr. Jamaludin Bin Omar

EEEB273 - Quiz 5 [Question Set 2]
SEMESTER 1, ACADEMIC YEAR 2010/2011
Date: 22 September 2010

Question:

Figure 1 shows an idealized class-B output stage. (The effective turn-on voltages of devices A and B are zero, and the effective "saturation" voltages of v_A and v_B are zero.) Given that V^+ and V^- are **+8 V** and **-8 V**, respectively. Assume a symmetrical sine wave is produced at the output.

(a) What is the peak output voltage at maximum power conversion efficiency?
[3 marks]

(b) What is the peak output voltage when each device dissipates the maximum power?
[3 marks]

(c) If the maximum allowed power dissipation in each device is **3 W** and the output voltage is at its maximum value, what is the permitted value of R_L?
[4 marks]

Answer:

(a)
At maximum power conversion efficiency

V_p (max)	$= V^+$	[2]
	$= 8$ V	[1]

(b)
Maximum power dissipation occurs when

V_p	$= (2\ V^+) / \pi$	[1]
	$= (2*8) / \pi$	[1]
	$= 5.093$ V	[1]

(c)
Maximum power dissipation occurs when

P(max)	$= (V^+)^2 / (\pi^2 R_L)$	[1]
R_L	$= (V^+)^2 / (\pi^2 P(\text{max}))$	[1]
	$= (8)^2 / (\pi^2 * 3)$	[1]
	$= 2.16\ \Omega$	[1]

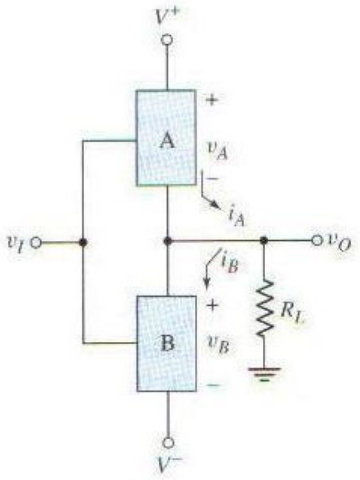

Figure 1

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Date: 22 September 2010

Question:

Figure 1 shows an idealized class-B output stage. (The effective turn-on voltages of devices A and B are zero, and the effective "saturation" voltages of v_A and v_B are zero.) Given that V^+ and V^- are **+10 V** and **-10 V**, respectively. Assume a symmetrical sine wave is produced at the output.

(a) What is the peak output voltage at maximum power conversion efficiency?
[3 marks]

(b) What is the peak output voltage when each device dissipates the maximum power?
[3 marks]

(c) If the maximum allowed power dissipation in each device is **3.5 W** and the output voltage is at its maximum value, what is the permitted value of R_L?
[4 marks]

Answer:

(a)
At maximum power conversion efficiency

V_p (max)	$= V^+$	[2]
	$= 10$ V	[1]

(b)
Maximum power dissipation occurs when

V_p	$= (2\ V^+) / \pi$	[1]
	$= (2*10) / \pi$	[1]
	$= 6.366$ V	[1]

(c)
Maximum power dissipation occurs when

P(max)	$= (V^+)^2 / (\pi^2 R_L)$	[1]
R_L	$= (V^+)^2 / (\pi^2 P(\text{max}))$	[1]
	$= (10)^2 / (\pi^2 * 3.5)$	[1]
	$= 2.89\ \Omega$	[1]

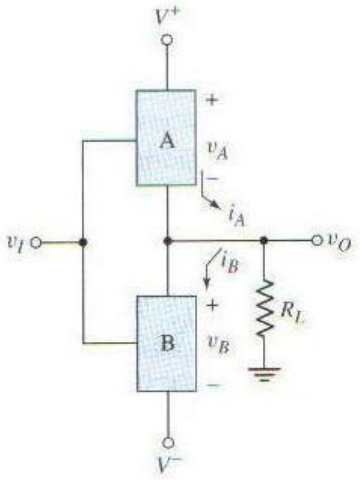

Figure 1

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SEMESTER 1, ACADEMIC YEAR 2010/2011
Date: 22 September 2010

Question:

Figure 1 shows an idealized class-B output stage. (The effective turn-on voltages of devices A and B are zero, and the effective "saturation" voltages of v_A and v_B are zero.) Given that V^+ and V^- are **+7.5 V** and **-7.5 V**, respectively. Assume a symmetrical sine wave is produced at the output.

(a) What is the peak output voltage at maximum power conversion efficiency?
[3 marks]

(b) What is the peak output voltage when each device dissipates the maximum power?
[3 marks]

(c) If the maximum allowed power dissipation in each device is **2.5 W** and the output voltage is at its maximum value, what is the permitted value of R_L?
[4 marks]

Answer:

(a)
At maximum power conversion efficiency

V_p (max)	$= V^+$	[2]
	$= 7.5$ V	[1]

(b)
Maximum power dissipation occurs when

V_p	$= (2\ V^+) / \pi$	[1]
	$= (2*7.5) / \pi$	[1]
	$= 4.775$ V	[1]

(c)
Maximum power dissipation occurs when

P(max)	$= (V^+)^2 / (\pi^2 R_L)$	[1]
R_L	$= (V^+)^2 / (\pi^2 P(\text{max}))$	[1]
	$= (7.5)^2 / (\pi^2 * 2.5)$	[1]
	$= 2.28\ \Omega$	[1]

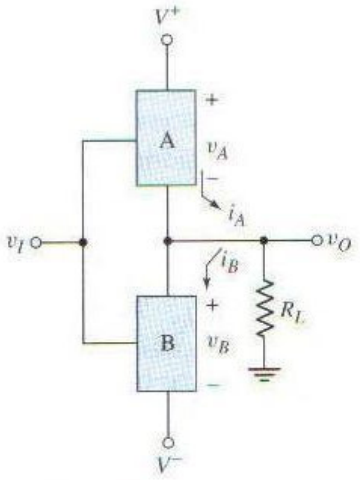

Figure 1