

7. If the voltage gain is 10, the decibel voltage gain is  
a. 6 dB  
b. 20 dB  
c. 40 dB  
d. 60 dB
8. If the voltage gain is 100, the decibel voltage gain is  
a. 6 dB  
b. 20 dB  
c. 40 dB  
d. 60 dB
9. If the voltage gain is 2000, the decibel voltage gain is  
a. 40 dB  
b. 46 dB  
c. 66 dB  
d. 86 dB
10. Two stages have decibel voltage gains of 20 and 40 dB. The total ordinary voltage gain is  
a. 1  
b. 10  
c. 100  
d. 1000
11. Two stages have voltage gains of 100 and 200. The total decibel voltage gain is  
a. 46 dB  
b. 66 dB  
c. 86 dB  
d. 106 dB
12. One frequency is 8 times another frequency. How many octaves apart are the two frequencies?  
a. 1  
b. 2  
c. 3  
d. 4
13. If  $f = 1$  MHz, and  $f_2 = 10$  Hz, the ratio  $f/f_2$  represents how many decades?  
a. 2  
b. 3  
c. 4  
d. 5
14. Semilogarithmic paper means that  
a. One axis is linear, and the other is logarithmic  
b. One axis is linear, and the other is semilogarithmic  
c. Both axes are semilogarithmic  
d. Neither axis is linear
15. If you want to improve the high-frequency response of an amplifier, which of these approaches would you try?  
a. Decrease the coupling capacitances  
b. Increase the emitter bypass capacitance  
c. Shorten leads as much as possible  
d. Increase the generator resistance
16. The voltage gain of an amplifier decreases 20 dB per decade above 20 kHz. If the midband voltage gain is 86 dB, what is the ordinary voltage gain at 20 MHz?  
a. 20  
b. 200  
c. 2000  
d. 20,000
17. In a BJT amplifier circuit,  $C'_e$  is the same as  
a.  $C_{be}$   
b.  $C_{ib}$   
c.  $C_{ibo}$   
d. Any of the above
18. In a BJT amplifier circuit, increasing the value of  $C_{in}$  and  $C_{out}$  will  
a. Decrease  $A_v$  at low frequencies  
b. Increase  $A_v$  at low frequencies  
c. Decrease  $A_v$  at high frequencies  
d. Increase  $A_v$  at high frequencies
19. Input coupling capacitors in FET circuits  
a. Are normally larger than in BJT circuits  
b. Determine the high-frequency cutoff value  
c. Are normally smaller than in BJT circuits  
d. Are treated as ac opens
20. On FET data sheets,  $C_{oss}$  is  
a. Equal to  $C_{ds} + C_{gd}$   
b. Equal to  $C_{gs} - C_{rss}$   
c. Equal to  $C_{gd}$   
d. Equal to  $C_{iss} - C_{rss}$

## Problems

### SEC. 16-1 FREQUENCY RESPONSE OF AN AMPLIFIER

- 16-1 An amplifier has a midband voltage gain of 1000. If cutoff frequencies are  $f_1 = 100$  Hz and  $f_2 = 100$  kHz, what does the frequency response look like? What is the voltage gain if the input frequency is 20 Hz? If it is 300 kHz?
- 16-2 Suppose an op amp has a midband voltage gain of 500,000. If the upper cutoff frequency is 15 Hz, what does the frequency response look like?
- 16-3 A dc amplifier has a midband voltage gain of 200. If the upper cutoff frequency is 10 kHz, what is the voltage gain for each of these input frequencies: 100 kHz, 200 kHz, 500 kHz, and 1 MHz?

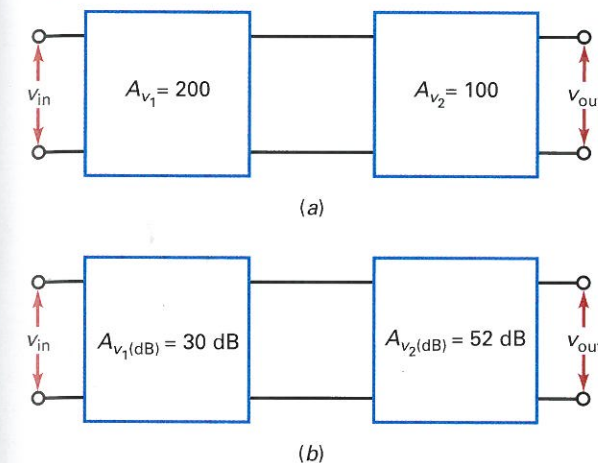
### SEC. 16-2 DECIBEL POWER GAIN

- 16-4 Calculate the decibel power gain for  $A_p = 5, 10, 20$ , and 40.
- 16-5 Calculate the decibel power gain for  $A_p = 0.4, 0.2, 0.1$ , and 0.05.
- 16-6 Calculate the decibel power gain for  $A_p = 2, 20, 200$ , and 2000.
- 16-7 Calculate the decibel power gain for  $A_p = 0.4, 0.04$ , and 0.004.

### SEC. 16-3 DECIBEL VOLTAGE GAIN

- 16-8 What is the total voltage gain in Fig. 16-34a? Convert the answer to decibels.

Figure 16-34



- 16-9 Convert each stage gain in Fig. 16-34a to decibels.
- 16-10 What is the total decibel voltage gain in Fig. 16-34b? Convert this to ordinary voltage gain.
- 16-11 What is the ordinary voltage gain of each stage in Fig. 16-34b?
- 16-12 What is the decibel voltage gain of an amplifier if it has an ordinary voltage gain of 100,000?
- 16-13 The data sheet of an LM380, an audio power amplifier, gives a decibel voltage gain of 34 dB. Convert this to ordinary voltage gain.
- 16-14 A two-stage amplifier has these stage gains:  $A_{v1} = 25.8$  and  $A_{v2} = 117$ . What is the decibel voltage gain of each stage? The total decibel voltage gain?

### SEC. 16-4 IMPEDANCE MATCHING

- 16-15 If Fig. 16-35 is an impedance-matched system, what is the total decibel voltage gain? The decibel voltage gain of each stage?
- 16-16 If the stages of Fig. 16-35 are impedance-matched, what is the load voltage? The load power?

### SEC. 16-5 DECIBELS ABOVE A REFERENCE

- 16-17 If the output power of a preamplifier is 20 dBm, how much power is this in milliwatts?
- 16-18 How much output voltage does a microphone have when its output is  $-45$  dBV?
- 16-19 Convert the following powers to dBm: 25 mW, 93.5 mW, and 4.87 W.
- 16-20 Convert the following voltages to dBV:  $1 \mu\text{V}$ , 34.8 mV, 12.9 V, and 345 V.

### SEC. 16-6 BODE PLOTS

- 16-21 The data sheet of an op amp gives a midband voltage gain of 200,000, a cutoff frequency of 10 Hz, and a roll-off rate of 20 dB per decade. Draw the ideal Bode plot. What is the ordinary voltage gain at 1 MHz?
- 16-22 The LF351 is an op amp with a voltage gain of 316,000, a cutoff frequency of 40 Hz, and a roll-off rate of 20 dB per decade. Draw the ideal Bode plot.

### SEC. 16-7 MORE BODE PLOTS

- 16-23 Draw the ideal Bode plot for the lag circuit of Fig. 16-36a.
- 16-24 Draw the ideal Bode plot for the lag circuit of Fig. 16-36b.
- 16-25 What is the ideal Bode plot for the stage of Fig. 16-37?

Figure 16-35

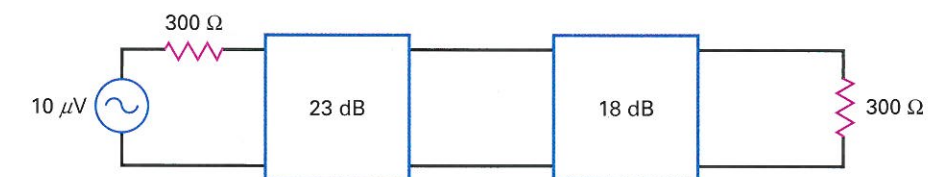


Figure 16-36

