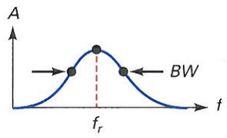
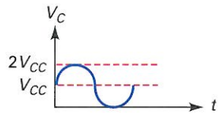
(12-31) Bandwidth:



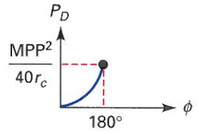
$$BW = \frac{f_r}{Q}$$

(12-38) Maximum output:



$$MPP = 2V_{CC}$$

(12-39) Power dissipation:



$$P_D = \frac{MPP^2}{40r_c}$$

Student Assignments

1. **For class B operation, the collector current flows for**
   a. The whole cycle
   b. Half the cycle
   c. Less than half a cycle
   d. Less than a quarter of a cycle

2. **Transformer coupling is an example of**
   a. Direct coupling
   b. AC coupling
   c. DC coupling
   d. Impedance coupling

3. **An audio amplifier operates in the frequency range of**
   a. 0 to 20 Hz
   b. 20 Hz to 2 kHz
   c. 20 to 20 kHz
   d. Above 20 kHz

4. **A tuned RF amplifier is**
   a. Narrowband
   b. Wideband
   c. Direct-coupled
   d. A dc amplifier

5. **The first stage of a preamp is**
   a. A tuned RF stage
   b. Large signal
   c. Small signal
   d. A dc amplifier

6. **For maximum peak-to-peak output voltage, the Q point should be**
   a. Near saturation
   b. Near cutoff
   c. At the center of the dc load line
   d. At the center of the ac load line

7. **An amplifier has two load lines because**
   a. It has ac and dc collector resistances
   b. It has two equivalent circuits
   c. DC acts one way and ac acts another
   d. All of the above

8. **When the Q point is at the center of the ac load line, the maximum peak-to-peak output voltage equals**
   a. V_{CEQ}
   b. $2V_{CEQ}$
   c. I_{CQ}
   d. $2I_{CQ}$

9. **Push-pull is almost always used with**
   a. Class A
   b. Class B
   c. Class C
   d. All of the above

10. **One advantage of a class B push-pull amplifier is**
    a. No quiescent current drain
    b. Maximum efficiency of 78.5 percent
    c. Greater efficiency than class A
    d. All of the above

11. **Class C amplifiers are almost always**
    a. Transformer-coupled between stages
    b. Operated at audio frequencies
    c. Tuned RF amplifiers
    d. Wideband

12. **The input signal of a class C amplifier**
    a. Is negatively clamped at the base
    b. Is amplified and inverted
    c. Produces brief pulses of collector current
    d. All of the above

13. **The collector current of a class C amplifier**
    a. Is an amplified version of the input voltage
    b. Has harmonics
    c. Is negatively clamped
    d. Flows for half a cycle

14. **The bandwidth of a class C amplifier decreases when the**
    a. Resonant frequency increases
    b. Q increases
    c. X_L decreases
    d. Load resistance decreases

15. **The transistor dissipation in a class C amplifier decreases when the**
    a. Resonant frequency increases
    b. coil Q increases
    c. Load resistance decreases
    d. Capacitance increases

16. **The power rating of a transistor can be increased by**
    a. Raising the temperature
    b. Using a heat sink
    c. Using a derating curve
    d. Operating with no input signal

17. **The ac load line is the same as the dc load line when the ac collector resistance equals the**
    a. DC emitter resistance
    b. AC emitter resistance
    c. DC collector resistance
    d. Supply voltage divided by collector current

18. **If $R_C = 100\ \Omega$ and $R_L = 180\ \Omega$, the ac load resistance equals**
    a. 64 Ω
    b. 100 Ω
    c. 90 Ω
    d. 180 Ω

19. **The quiescent collector current is the same as the**
    a. DC collector current
    b. AC collector current
    c. Total collector current
    d. Voltage-divider current

20. **The ac load line usually**
    a. Equals the dc load line
    b. Has less slope than the dc load line
    c. Is steeper than the dc load line
    d. Is horizontal

21. **For a Q point closer to cutoff than saturation on a CE dc load line, clipping is more likely to occur on the**
    a. Positive peak of input voltage
    b. Negative peak of input voltage
    c. Negative peak of output voltage
    d. Negative peak of emitter voltage

22. **In a class A amplifier, the collector current flows for**
    a. Less than half the cycle
    b. Half the cycle
    c. Less than the whole cycle
    d. The entire cycle

23. **With class A, the output signal should be**
    a. Unclipped
    b. Clipped on positive voltage peak
    c. Clipped on negative voltage peak
    d. Clipped on negative current peak

24. **The instantaneous operating point swings along the**
    a. AC load line
    b. DC load line
    c. Both load lines
    d. Neither load line

25. **The current drain of an amplifier is the**
    a. Total ac current from the generator
    b. Total dc current from the supply
    c. Current gain from base to collector
    d. Current gain from collector to base

26. **The power gain of an amplifier**
    a. Is the same as the voltage gain
    b. Is smaller than the voltage gain
    c. Equals output power divided by input power
    d. Equals load power

27. **Heat sinks reduce the**
    a. Transistor power
    b. Ambient temperature
    c. Junction temperature
    d. Collector current

28. **When the ambient temperature increases, the maximum transistor power rating**
    a. Decreases
    b. Increases
    c. Remains the same
    d. None of the above

29. **If the load power is 300 mW and the dc power is 1.5 W, the efficiency is**
    a. 0
    b. 2 percent
    c. 3 percent
    d. 20 percent

30. **The ac load line of an emitter follower is usually**
    a. The same as the dc load line
    b. Vertical
    c. More horizontal than the dc load line
    d. Steeper than the dc load line

31. **If an emitter follower has $V_{CEO} = 6$ V, $I_{CQ} = 200$ mA, and $r_e = 10\ \Omega$, the maximum peak-to-peak unclipped output is**
    a. 2 V
    b. 4 V
    c. 6 V
    d. 8 V

32. **The ac resistance of compensating diodes**
    a. Must be included
    b. Is very high
    c. Is usually small enough to ignore
    d. Compensates for temperature changes

33. **If the Q point is at the middle of the dc load line, clipping will first occur on the**
    a. Left voltage swing
    b. Upward current swing
    c. Positive half-cycle of input
    d. Negative half-cycle of input

34. **The maximum efficiency of a class B push-pull amplifier is**
    a. 25 percent
    b. 50 percent
    c. 78.5 percent
    d. 100 percent

35. **A small quiescent current is necessary with a class AB push-pull amplifier to avoid**
    a. Crossover distortion
    b. Destroying the compensating diodes
    c. Excessive current drain
    d. Loading the driver stage

Problems

SEC. 12-2 TWO LOAD LINES

12-1 What is the dc collector resistance in Fig. 12-38? What is the dc saturation current?

12-2 In Fig. 12-38, what is the ac collector resistance? What is the ac saturation current?

12-3 What is the maximum peak-to-peak output in Fig. 12-38?

12-4 All resistances are doubled in Fig. 12-38. What is the ac collector resistance?

12-5 All resistances are tripled in Fig. 12-38. What is the maximum peak-to-peak output?