EXERCISES FOR CHAPTER 7

More Problems

1. Bob buys a 1000 par–value 5 year bond with 8% semiannual coupons to yield 6% converted semiannually. Find the amount of interest and principal of the 3rd coupon.
2. Same as problem 1 but assuming that Bob buys the bond to yield 10% converted semiannually.
3. Find the accrued interest, market price and flat price of 1000 5–year bond with 8% coupons paid semiannually, bought to yield 6% converted semiannually, two months after the second coupon has been issued. Use all three methods.
4. A 1000 par–value 5–year bond with 8% coupons paid semiannually is selling for 900. Find the yield rate converted semiannually.
5. Consider a 100 par–value 8% bond with semiannual coupons callable at 109 on any coupon date starting 5 years after issue for the next 5 years, at 104.5 starting 10 years after issue for the next 5 years and maturing at 100 at the end of 15 years. What is the highest price which an investor can pay and still be certain of a yield of (a) 10% converted semiannually, (b) 6% converted semiannually?
6. Find the price of a 1000 5 % bonds with annual coupons which will be redeemed in 10 annual installments at the end of the 11th through the 20th years from the issue date at 105. The bonds are bought to yield 7% effective.

Problems from actuarial exams

1. A 13–week Treasury bill maturing for 100,000 is bought at a discount to yield 6.4%. For the same purchase price, a zero coupon bond paying 325,000 at the end of 10 years is available. The nominal yield rate convertible monthly on this bond is i%. Calculate i.
   (A) 11.6 (B) 12.0 (C) 12.3 (D) 12.7 (E) 13.0

2. A common stock is purchased on January 1, 1992. It is expected to pay a dividend of 15 per share at the end of each year through December 31, 2001. Starting in 2002, dividends are expected to increase K% per year indefinitely, K < 8%. The theoretical price to yield an annual effective rate of 8% is 200.90. Calculate K.
   (A) .86 (B) 1.00 (C) 1.14 (D) 1.28 (E) 1.42

3. Dick purchases an n–year 1000 par value bond with 12% annual coupons at an annual effective yield of i, i > 0. The book value of the bond at the end of year 2 is 1479.65, and the book value at the end of year 4 is 1439.57. Calculate the purchase price of the bond.
   (A) 1510 (B) 1515 (C) 1519 (D) 1523 (E) 1527

4. An investor purchases a 1000 bond redeemable at par that pays 8% semiannual coupons and matures in 10 years. The bond will yield 7% convertible semiannually to maturity. If the bond is called in 5 years, the minimum redemption value the investor needs to realize the same yield is X. Find X.
   (A) 1036 (B) 1042 (C) 1048 (D) 1054 (E) 1060

5. An n–year zero coupon bond with par value of 1000 was purchased for 600. An n–year 1000 par value bond with semiannual coupons of X was purchased for 850. A 3n–year 1000 par value bond with semiannual coupons of X was purchased for P.
All three bonds have the same yield rate. Find P.
(A) 686 (B) 696 (C) 706 (D) 716 (E) 726

6. A bond with a par value of 1000 and 6% semiannual coupons is redeemable for 1100. You are given:
(i) The bond is purchased at P to yield 8% convertible semiannually; and
(ii) the amount of principal adjustment for the 16th semiannual period is 5.
Find P.
(A) 760 (B) 770 (C) 790 (D) 800 (E) 820

7. A 10–year bond with coupons at 8% convertible quarterly will be redeemed at 1600. The bond is bought to yield 12% convertible quarterly. The purchase price is 860.40. Calculate the par value.
(A) 800 (B) 1000 (C) 1200 (D) 1400 (E) 1600

8. A 12% serial bond with semiannual coupons and par value of 1000 will be redeemed by the following schedule:
(i) 100 at the end of years 10 through 14; and
(ii) 500 at the end of year 15.
Calculate the price of the bond on the issue date to yield 10% per annum convertible semiannually.
(A) 1125 (B) 1130 (C) 1135 (D) 1140 (E) 1145

9. Five years ago, the XYZ Company bought a 20–year 100,000 non–callable bond with coupons at 8% convertible semiannually. The next coupon is due six months from today. You are given:
(i) The bond was bought to yield 7%, compounded semiannually.
(ii) The market value is based on a 6% interest rate, compounded semiannually.
(iii) The book value is equal to the adjusted cost (amortized value) of the bond.
Calculate the unrealized capital gain.
(A) 9200 (B) 10400 (C) 18400 (D) 19600 (E) 20800

10. On January 1 of each year, Company ABC declares a dividend to be paid quarterly on its common shares. Currently, 2 per share is paid at the end of each calendar quarter. Future dividends are expected to increase at the rate of 5% per year. On January 1 of this year, an investor purchased some shares a X per share, to yield 12% convertible quarterly. Calculate X.
(A) 103 (B) 105 (C) 107 (D) 109 (E) 111

11. On May 1, 1985, a bond with par value 1000 and annual coupons at 5.375% was purchased to yield an effective annual interest rate of 5%. On May 1, 2000, the bond is redeemable at 1100. The book value of the bond is adjusted each year so that it equals the redemption value on May 1, 2000.
Calculate the amount of write–up or write–down in the book value in the year ending May 1, 1991.
(A) 1.25 write–down (B) .81 write–down (C) .77 write–down (D) .81 write–up (E) .77 write–up

12. Becky buys an n–year 1000 par value bond with 6.5% annual coupons at a price of 825.44. The price assumes an annual effective yield rate of i. The total write–up in book value of the bond during the first two years after purchase is 23.76.
Calculate i.
(A) 8.50% (B) 8.75% (C) 9.00% (D) 9.25% (E) 9.50%

13. Matt Purchases a 2—year par value bond with 8% semiannual coupons at a price of 1722.25. The bond can be called at par value X on any coupon date, starting at the end of year 15. The price guarantees that Matt will receive a minimal semiannual yield of at least 6%.
Bert purchases a 20-year par value bond identical to the one purchased by Matt, except it is not callable. Assuming a nominal semiannual yield of 6%, the cost of the bond purchased by Bert is P.
Calculate P.
(A) 1,700 (B) 1,725 (C) 1,750 (D) 1,775 (E) 1,800

14. A 1000 par value 5-year bond with semiannual coupons of 60 is purchased to yield 8% convertible semiannually.
Two years and two months after purchase, the bond is sold at the flat price which maintains the yield over the two years and two months.
Calculate the flat price using the theoretical method.
(A) 1089 (B) 1099 (C) 1105 (D) 1113 (E) 1119

15. A 30-year bond has 10% annual coupons and a par value of 1000. Coupons can be reinvested at a nominal annual rate of 6% convertible semiannually.
X is the highest price that an investor can pay for the bond and obtain an effective yield of at least 10%.
Calculate X.
(A) 518 (B) 618 (C) 718 (D) 818 (E) 918

16. A consumer loan of 1000 is being repaid with 24 monthly instalments of 50 at the end of each month. Rather than making payments as originally scheduled, the borrower repaid the outstanding principal immediately after the 10th regular payment.
Determine the unearned finance charge recovered by the borrower using the actuarial method.
(a) 200 (B) 116.65 (C) 83.35 (D) 73.40 (E) 67.85