Chapter 5 Practice Questions

Question guide

- Questions 5.1 – 5.9 test material from Sections 5.1 – 5.4.
- Questions 5.10 – 5.16 test material from Sections 5.5 – 5.6.
- Questions 5.17 – 5.20 are from the SOA/CAS Course 2 exam or the IOA/FOA 102 exam.

Question 5.11

Payments on a \$10,000 loan are made quarterly in arrears for 10 years. The annual effective rate of interest is 7%. Find the principal outstanding after the 6th payment. Use the amortization method.

Question 5.12

Payments on a \$10,000 loan are made quarterly in arrears for 10 years. The annual effective rate of interest is 7%. Find the total amount of interest payable on the loan, using the amortization method.

Question 5.13

Payments on a \$10,000 loan are made quarterly in arrears for 10 years. The annual effective rate of interest is 7%. Find the interest and principal paid in the 10th payment. Use the amortization method.

Question 5.14

A company takes out a 10-year loan of \$50,000 at an annual effective interest rate of 10% to be repaid with level payments at the end of each year. Three years later, the company refinances the loan at an annual effective interest rate of 6%, but it maintains the same maturity date. What is the new level payment after the loan is refinanced?

Question 5.15

A loan of \$80,000 is repaid using the amortization method by annual payments at the end of each year for 10 years. Each payment is \$1,600 higher than the one before. The annual effective rate of interest is 5%. Find:

(i) the first payment

(ii) the interest paid in the first payment.

Question 5.16

A loan of \$50,000 over 15 years can be repaid using either of the following methods:

(i) amortization method with an annual effective rate of interest of 6%

(ii) sinking fund method where interest is charged on the loan at an annual effective rate of i% and is earned on the sinking fund at an annual effective rate of 5.5%.

The payments under both methods are constant and made at the end of each year. If the annual payments are the same under both methods, find i.

Question 5.18 *SOA/CAS*

A 20-year loan of \$20,000 may be repaid under the following two methods:

i) amortization method with equal annual payments at an annual effective rate of 6.5%

ii) sinking fund method in which the lender receives an annual effective rate of 8% and the sinking fund earns an annual effective rate of j.

Both methods require a payment of $\$X$ to be made at the end of each year for 20 years.

Calculate j.

Question 5.20 *FOA/IOA*

A loan was taken out on September 1, 1998 and was repaid with the following increasing annuity:

The first payment was made on July 1, 1999 and was \$1,000. Thereafter, payments were made on November 1, March 1, and July 1 until March 1, 2004 inclusive. Each payment was 5% greater than its predecessor. The effective rate of interest throughout the period was 6% per annum.

(i) Show the amount of the loan was \$17,692 to the nearest dollar.

(ii) Calculate the amount of principal repaid on July 1, 1999.

(iii) Calculate both the principal component and the interest component of the seventh payment.

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Q5.11: \$8,895.44

Q5.12: \$3,878.40

Q5.13: The interest paid in the 10th payment is \$141.58 and the principal paid in the 10th payment is \$205.38.

Q5.14: \$7,096.55

Q5.15: (i) \$3,801.83
(ii) \$4,000.00

Q5.16: 5.83%

Q5.17: \$559.88

Q5.18: 14.18%

Q5.19: 15%

Q5.20: (i) \$17,691.77
(ii) \$119.73
(iii) The interest component of the 7th payment is \$261.67 and the principal component of the 7th payment is \$1,078.43.