



100 Marks

INTRODUCTORY FINANCIAL MATHEMATICS
DEPARTMENT OF DECISION SCIENCES

Duration : 2 Hours

EXAMINERS :

FIRST :
SECOND :

MRS S ROTHMANN
MRS MC STRYDOM

DR EHA VENTER

Programmable pocket calculator permissible.

This paper consists of 16 pages including a list of formulae, a table with the number of each day of the year and four sheets of paper for rough work, plus instructions for completing a mark-reading sheet.

Please complete the attendance register on the back page, tear it off and hand it to the invigilator.

Answer *all* questions on the mark-reading sheet supplied. Carefully follow the instructions for completing the mark-reading sheet. Also pay attention to the following:

- Only one option (indicated as [1] [2] [3] [4] [5]) per question is correct. Do not mark more than one option per question on the mark-reading sheet.
- Marks will *not* be deducted for incorrect answers.
- There are 30 questions for a total of 100 marks.

You are strongly advised to write your name on the mark-reading sheet. Then, if you have entered your student number incorrectly, we will still be able to link you to the mark-reading sheet.

Question 1

Two years from now Sipho has to pay Alet R15 000. He decides to pay her back earlier. If a simple interest rate of 12,5% per year is applicable, then the amount that Sipho will have to pay Alet nine months from now equals

- (1) R12 656,25 ✓
- [2] R12 972,97
- [3] R13 125,00
- [4] R13 664,28
- [5] R13 714,29

Question 2

If a simple interest rate of 24% is equivalent to a simple discount rate of 20,5% then the time under consideration approximately equals

- [1] 260 days
- [2] 304 days
- [3] 312 days
- [4] 711 days
- [5] 854 days

Question 3

Vince needs R150 000 on 17 November 2007 to upgrade his deli. On 8 January 2007 he deposited an amount into an account earning 13,45% interest compounded monthly and being credited on the 1st of every month. If fractional compounding is used for the full term then the amount that Vince deposited on 8 January 2007 equalled

- [1] R133 662,53
- (2) R133 708,72 ✓
- [3] R133 745,47
- [4] R168 230,00
- [5] R168 276,24

Question 4

The continuous compounding rate is 13,974%. The equivalent nominal rate, compounded every three months, equals

- [1] 13,658%
 - (2) 13,735% ✓
 - [3] 14,221%
 - [4] 14,305%
 - [5] 14,997%
- 13,974 %

[TURN OVER]

Question 5

If $S = Pe^{ct}$ then t equals

- [1] $\frac{c}{S - P}$
- [2] $\frac{P}{S - P}$
- [3] $\frac{P}{S + P}$
- [4] $\frac{c}{\ln(S - P)}$
- [5] $\frac{c}{\ln\left(\frac{P}{S}\right)}$

$$S = Pe^{ct}$$

$$\ln S = \ln P + ct$$

$$\ln \frac{S}{P} = ct$$

$$t = \frac{\ln\left(\frac{S}{P}\right)}{c}$$

Question 6

A 14,75% nominal rate compounded every four months is equivalent to a weekly compounded rate of

- [1] 14,51%
- [2] 14,75%
- [3] 15,00%
- [4] 15,10%
- [5] none of the above.

14,07

Question 7

Zola bought a stamp collection for R240 000. For the first 10 years the value of the stamp collection increased annually by 16%. For the next five years the value decreased yearly by 8%. Thereafter the value increased again by 4% per year. The amount of money that Zola can expect to receive if he sells his stamp collection after owning it for 21 years equals

- [1] R464 256,00.
- [2] R882 938,20.
- [3] R1 563 203,83. ✓
- [4] R1 651 200,00.
- [5] none of the above.

Question 8

The Shining Coin Company has a finance charge of 0,569% per week on outstanding balances. The effective interest rate is

- [1] 29,586%.
- [2] 34,318%.
- [3] 56,591%.
- [4] 57,059%.
- [5] none of the above.

29,588

57,059

Questions 9 and 10 relate to the following situation:

Charles invested an amount of money at $j\%$ interest per year compounded quarterly. After five years the accumulated amount of R24 000 was re-invested at $2,5\%$ more than previously, while the compounding period became half yearly.

Question 9

If, after a further three years, the accumulated amount was R34 773,52 then the original interest rate equals

- [1] 7,56%
- [2] 10,25%
- [3] 12,55%
- [4] 12,75%
- [5] 15,25%

Question 10

The original amount invested equals

- [1] R12 813,55
- [2] R14 469,03
- [3] R14 559,66
- [4] R16 511,75
- [5] R16 564,33

Question 11

Six years ago Trevor lent Maria R150 000 on the condition that she would pay him back in nine years time. The applicable interest rate is $15,5\%$ per year, compounded monthly. Maria also owes Trevor another amount of R250 000 that she has to pay back six years from now for a loan that earned interest at $16,4\%$ per year, compounded half-yearly. Maria asks Trevor if she can settle both her debts three years from now. The total amount that Maria will have to pay Trevor three years from now equals

- [1] R400 000,00
- [2] R475 017,72
- [3] R488 092,15
- [4] R755 667,10
- [5] R777 202,69

much

Question 12

calc pv

The present value of payments of R1 200 made every three months for nine years at an interest rate of 10,61% per year compounded weekly approximately equals

- [1] R22 550,00.
- [2] R27 470,00.
- [3] R27 610,00.
- [4] R43 200,00.
- [5] R70 860,00.

Questions 13, 14 and 15 relate to the following situation:

Cyril bought a house and made a down payment of 35% on the price of the house. For the remaining amount he managed to secure a loan at an interest rate of 13,25% per year, compounded monthly for a period of 20 years. His monthly payment is R10 437,26.

Question 13

The size of the loan (to the nearest rand) equals

- [1] R869 941.
- [2] R877 500.
- [3] R1 020 091.
- [4] R1 508 454.
- [5] R2 504 942.

Question 14

The down payment (to the nearest rand) equals

- [1] R307 125.
- [2] R472 500.
- [3] R527 959.
- [4] R570 375.
- [5] R876 730.

Question 15

If an average inflation rate of 5,57% per year is expected, then the total real cost (to the nearest rand) of the loan equals

- [1] R631 108.
- [2] R877 500.
- [3] R1 350 000.
- [4] R1 508 608.
- [5] none of the above.

Questions 16 and 17 relate to the following situation:
The equation for the present value of Stock E733 on 8/11/2007 is given by

$$P(8/11/2007) = \frac{16,5}{2} a_{\overline{320}, 0,142} + 100 \left(1 + \frac{2}{0,142} \right)^{-32}$$

The fraction of the half year to be discounted back is

$$f = \frac{182}{7}$$

$$All in - Acc int$$

$$- 0,04$$

Question 16

The clean price of Stock E733 equals

- [1] R113,77560%.
- [2] R114,09204%.
- [3] R114,39343%.
- [4] R114,40848%.
- [5] R114,70987%.

Question 17

Moeti sold his Stock E733 on 8/11/2007 and received R1 500 000. The number of Stocks E733 that Moeti sold approximately equals

- [1] 13 076.
- [2] 13 111.
- [3] 13 147.
- [4] 13 184.
- [5] 15 000.

Question 18

Eddie took out an endowment policy that matures in 15 years' time. His first yearly payment is R8 400. This payment will increase yearly by R2 100. The applicable interest rate is estimated at 12,6% per year. The amount of money that Eddie will pay into this policy to the nearest rand equals

- [1] R155 400.
- [2] R157 500.
- [3] R328 686.
- [4] R346 500.
- [5] R730 841.

Questions 19 and 20 relate to the following situation:
Tracy deposited R25 000 into an account earning 9,75% interest per year, compounded quarterly. After five years the interest rate changed to 10% per year, compounded weekly. She then decided to deposit R500 every week into this account.

Question 19

The balance in this account after five years equals

- [1] R34 750,00.
- [2] R37 187,50.
- [3] R41 198,25.
- [4] R48 780,49.
- [5] none of the above.

Question 20

After owning this account for nine years Tracy decides to close it. The amount of money that Tracy can expect to withdraw then equals

- [1] R127 725,46.
- [2] R129 000,00.
- [3] R167 519,80.
- [4] R168 194,18.
- [5] R188 074,51.

Question 21

Jonathan bought a 107 cm plasma screen television set. He agrees to *immediately* start to pay R1 403 per month. The term of the agreement is 24 months and the applicable interest rate is 20,124% per year, compounded monthly. The original price of the television set equals

- [1] R27 079,22.
- [2] R27 533,34.
- [3] R27 995,08.
- [4] R30 385,36.
- [5] R33 672,00.

Questions 22 and 23 relate to the following situation:
Carolyn inherited R1 750 000 and decides to invest it into an account that will pay her a fixed monthly amount indefinitely. (unpaid)

Question 22

If money is worth 11,25% per year, compounded monthly, then the amount of money that Carolyn can expect to receive monthly equals

- [1] R4 530,62
- [2] R4 794,52
- [3] R12 962,96
- [4] R16 406,25
- [5] R16 969,22

Question 23

After seeing what she will receive, Carolyn decides to rather have two payments made to her: one payment two years from now and the other one, twice the size of the first one, six years from now. If money is worth 13,45% per year, compounded semi-annually, then the amount of money that Carolyn can expect to receive six years from now equals

- [1] R950 265,80
- [2] R1 037 551,45
- [3] R1 166 666,67
- [4] R2 075 102,89
- [5] R3 821 483,69

Question 24

Consider Stock XYZ

Coupon rate: 14,7% per year
Yield to maturity: 13,5% per year
Settlement date: 17 February 2008
Maturity date: 17 August 2222

The present value of the coupon payment on the settlement date equals

- [1] R91,40320%
- [2] R91,52914%
- [3] R92,50885%
- [4] R107,46149%
- [5] R107,55174%

Question 25

Semi-annual deposits of R rand each are made into a bank account earning 14% interest per year, compounded every six months. The time under consideration is n half-yearly periods and the accumulated amount is 5 rand. The semi-annual deposits can be denoted by

- [1] $S \left[\frac{(1.07)^n - 1}{0.07} \right]$
 [2] $S \left[\frac{1.07^n - 1}{0.07} \right]$
 [3] $S \left[\frac{0.14}{1.14^n - 1} \right]$
 [4] $S \left[\frac{0.14}{1.14^n - 1} \right]$
 [5] none of the above.

Questions 26 and 27 relate to the following situation:
 The following table represents the negative cash flows of the Young and Fit Complex:

Year	Cash flows
3	-100 000
5	-490 000
10	-160 000

14,35

Money can be borrowed at 14,35% per year while an investment can earn 9,6% per year.

Question 26

The present value of the negative cash flows, to the nearest rand, equals

- [1] R449 777.
 [2] R650 871.
 [3] R680 279.
 [4] R750 000.
 [5] none of the above.

Question 27

If the MIRR for the Young and Fit Complex is 18,16%, then the total future value for the positive cash flows for the same period equals

- [1] R217 827.
 [2] R394 533.
 [3] R592 837.
 [4] R1 073 758.
 [5] R1 906 464.

$$\text{MIRR} = \left(\frac{FV_{\text{pos}}}{PV_{\text{neg}}} \right)^{\frac{1}{n}} - 1$$

$$= \left(\frac{750000}{100000} \right)^{\frac{1}{10}} - 1 = 18,16\% \times 750000$$

Questions 28 and 29 relate to the following situation:
The following table shows the number of investors who each invested a certain amount of money at an average interest rate.

Number of investors	Amount invested R	Average interest rate per annum
125	12 000	6,0%
130	15 000	7,0%
80	18 000	7,25%
145	20 000	9,00%
110	30 000	9,25%
90	40 000	9,75%
50	100 000	11,00%

Question 28

The weighted average interest rate on the amounts invested equals

- [1] 8,46%
- [2] 9,60%
- [3] 10,42%
- [4] 33,57%
- [5] none of the above.

Question 29

The relationship between the number of investments made and the applicable average interest rate can be represented by the regression line

- [1] $y = -0,02897x + 11,48549.$
- [2] $y = -10,11472x + 189,89962.$
- [3] $y = -0,54132x + 11,48549.$
- [4] $y = -0,73866x + 110,60350.$
- [5] $y = -0,78984x + 110,60350.$

Question 30

The future value of an annuity is R32 620,38. The investment period is 10 years. The applicable interest rate is 12% per year compounded every three months. The present value of this annuity equals

- [1] R8 155,10.
- [2] R10 000,00.
- [3] R10 057,47.
- [4] R10 502,89.
- [5] R14 827,45.