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**KEARSNEY COLLEGE TRIAL EXAMINATION**

**23 AUGUST 2019**

**ADVANCED PROGRAMME MATHEMATICS: PAPER 2**

**MODULE 2: FINANCE AND MODELLING**

Time: 2 hours 100 marks

**PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY.**

1. This question paper consists of 11 pages and an Information Sheet.

Please check that your question paper is complete.

2. Non-programmable and non-graphical calculators may be used, unless otherwise

indicated.

3. All necessary calculations must be clearly shown and writing should be legible.

4. Diagrams have not been drawn to scale.

5. Round off your answers to two decimal digits, unless otherwise indicated.

**MEMORANDUM**

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| **QUESTION 1** | |  |
| Paul Poverty has R180 000 as a deposit to buy his dream house. Although the sale price of the house is R760 000, an extra R52 000 must still be added to the purchase price (made up of estate agents commission, transfer fees etc.). The financial institution offers Paul a mortgage at a rate of 18% per annum, compounded monthly, for a period of 20 years. | | |
| 1.1 | Calculate Paul`s monthly payment. | (6) |
|  |  |  |
| 1.2 | Paul is only willing to commit himself up to a third of his gross monthly salary which amounts to R21 000. His company have agreed to pay him a housing subsidy of R1700 per month. Will Paul be able to buy this house if the term is still for a period of 20 years? Justify your solution by performing the necessary calculations. | (4) |
|  | He cannot afford the house. |  |
|  |  | **[10]** |

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| **QUESTION 2** | |  |
| 2.1 | Recently in Zimbabwe prices of goods doubled every month.  Determine what this equated to as the effective annual rate of inflation | (6) |
|  |  |  |
| 2.2 | Three grandchildren Kevin, Jack and Bryce, aged 9, 15 and 16 respectively will all receive a sum of money on their 21st birthday from their wealthy grandfather Darian. Darian makes a deposit, now, of R80 000 in a bank account at a guaranteed interest rate of 15% p.a. for the first two years and thereafter the rate is 14% p.a. compounded quarterly for the remaining term.  54If each grandchild is to receive the same amount on their 21st birthday how much do they each receive? | (11) |
|  |  |  |
|  |  | **[17]** |

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| **QUESTION 3** | |  |
| Humphrey Hunger purchases an apartment in a low cost development for an amount of R180000. He makes a down payment (deposit) of R60 000 and obtains a 20-year loan for the balance at a rate of 20% per annum, compounded monthly. | | |
| 3.1 | Show that the original monthly instalment is R2038,59 | (6) |
|  |  |  |
| 3.2 | After  years the interest rate changes from 20% p.a. compounded monthly to 18% p.a. compounded monthly. What is the new monthly amount that he must pay if the loan must still be amortised based on the original term? | (8) |
|  | Remaining Term: 240 – 54 = 186; |  |
|  |  | **[14]** |
| **QUESTION 4** | |  |
| How much interest is earned on a savings scheme at the end of a 6 year period, if equal quarterly payments of R500 are made at the start of each quarter? The quoted interest rate is 16% per annum effective. | | |
| Interest earned = | | |
|  |  | **[10]** |

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| **QUESTION 5** | |  |
| Mr Moneyless takes out a loan of R500 000 and agrees to repay the money in monthly instalments of R9 000 over *n* months. A final payment (*y*) is made, which is less than the monthly instalment. The bank charges interest at a rate of 16,5% p.a. compounded monthly and the payments start one month after the loan is granted.  Calculate: | | |
| 5.1 | The total number of monthly payments, *n*. | (6) |
|  | ∴ 106 payments are made |  |
| 5.2 | The amount of the final payment (*y*). | (8) |
|  | Final pmt:  or |  |

|  |  |  |
| --- | --- | --- |
| 5.3 | What amount of money would be required to amortize the loan after 2 years, if Mr  Moneyless paid a monthly instalment of R10 000? | (10) |
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|  |  | **[24]** |

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| **QUESTION 6** | |  |
| Penny Penniless borrows R35 000 from Richard Rich at a rate of 15% p.a. compounded monthly and agrees to pay back R800 per month for the first year, R900 per month for the second year, and R1 000 per month for the remaining time until the loan has been paid in full.  Note that her final payment will be less than R1 000. | | |
| 6.1 | How much will she still owe after the first two years? | (5) |
|  |  |  |
| 6.2 | How many payments of R1 000 does Penny Penniless make? | (7) |
|  | ∴ 29 payments are made |  |
|  |  | **[12]** |
| **QUESTION 7** | |  |
| Ethan deposits R420 at the end of every quarter in a savings account that also earns an interest rate of 6,84% p.a. compounded monthly. Calculate the value to which his investment will accrue over a five-year period. | | |
| First convert nominal to nominal rate…    Penalties with rounded *i* values:  Using *i* = 0,069: *F* = 9930,07  Using *i* = 0,06879: *F* = 9924,91  Using *i* = 0,07: *F* = 9954,68 | | |
|  |  | **[7]** |

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| **QUESTION 8** | |  |
| How much should a donor give Kearsney College to fund a Scholarship of R180 000 per year, indefinitely (in perpetuity), if the bank gives interest at a rate of 12,5% per annum. | | |
| In perpetuity: i.e. this is the interest gained from a lump sum deposit. | | |
|  |  | **[6]** |