TOPIC 4

TIME-VALUE OF MONEY

QUESTION 1

April 2026 Question One D

(i) Explain TWO reasons why an individual would prefer to receive a specific sum of money today rather than the same amount at a future date. (2 marks)

(ii) An investor plans to save for a child's education by depositing equal annual amounts into a savings account at the end of each year for the next eight years. The target sum is Sh.4,000,000 and the account earns compound interest at 12% per annum.

Required:

Calculate the annual deposit required to achieve the target amount. (4 marks)

MASOMO MSINGI ANSWER

(i) Reasons why an individual would prefer to receive a specific sum of money today

- **Investment opportunity:** Money received today can be invested to earn interest or returns resulting in a larger amount in the future.
- **Uncertainty / risk:** Future receipts may not be received due to default, inflation or other unforeseen circumstances. Therefore, people prefer the certainty of current cash. Inflation may also be accepted as a reason because it reduces the purchasing power in the future.

(ii) Annual deposit required

$FV = A\frac{(1+r)^n-1}{r}$

$= 4{,}000{,}000 = A\frac{(1.2)^8-1}{0.12}$

$A = \frac{4{,}000{,}000}{12.299693} = Sh.\ 325{,}211.3655$

A = Sh. 325,211.3655

QUESTION 2

April 2026 Question Four C

Pandora Ltd. issued a 14% coupon bond with a face value of Sh. 1,000 and twelve years to maturity. The current market required rate of return for similar bonds is 10%.

Required:
Determine the value of the bond assuming that interest is paid semi-annually. (4 marks)

MASOMO MSINGI ANSWER

Bond value

$P = c\left(\frac{1-(1+r)^{-n}}{r}\right) + \frac{Fv}{1+r^{n}}$

$C = \frac{14\% \times 1000}{2} = 70$

$P = 70\left(\frac{1-(1.05)^{-12\times 2}}{0.05}\right) + \frac{1000}{1.05^{24}}$

$P = (70 \times 13.7986) + 310.07$

$P = 965.902 + 310.07$

= Sh. 1275.972 ≅ 1,275. 97

QUESTION 3

December 2025 Question Two A

Thomas Atego borrowed Sh.5,000,000 from Axim Bank at an interest rate of 14% per annum. The loan is to be repaid semi-annually over a period of 3 years. The interest on the loan is to be repaid on a reducing balance basis.

Required:

(i) The amount of each semi-annual instalment payable for the loan. (2 marks)

(ii) A loan amortisation schedule. (4 marks)

MASOMO MSINGI ANSWER

Semi-annual instalment payable for the loan

$\frac{Loan\ Amount}{PVIFA\left(\frac{r\%}{2}\right) n\times 2}$ $\frac{r}{2} = \frac{14}{2} = 7\% = 0.07,\ n = 3 \times 2 = 6$

$$\frac{5{,}000{,}000}{\frac{1-(0.07)^{-6}}{0.07}}$$

$$= \frac{5{,}000{,}000}{4.76653966} = \text{Sh. } 1{,}048{,}978.999$$

Loan amortisation schedule

Period	Loan Amount at Start (a)	Interest @ 7% (b)	Annual Repayment (c)	Principal Repaid (d = c - b)	Balance at End (e = a - d)
1	5,000,000	350,000	(1,048,978.999)	698,978.999	4,301,021.001
2	4,301,021.001	301,071.4701	(1,048,978.999)	747,907.5289	3,553,113.472
3	3,553,113.472	248,717.943	(1,048,978.999)	800,261.056	2,752,852.416
4	2,752,852.416	192,699.6691	(1,048,978.999)	856,279.3299	1,896,573.086
5	1,896,573.086	132,760.116	(1,048,978.999)	916,218.883	980,354.203
6	980,354.203	68,624.7942	(1,048,978.999)	980,354.2048	0

QUESTION 4

December 2025 Question Four B

Hamza Ltd. issued a bond worth Sh.2,500,000. The company established a sinking fund to retire this debt in three years and made deposits into it at the end of every six months.

Required:

Assuming the fund earns interest at 7% per annum compounded semi-annually, determine the periodic amounts deposited. (4 marks)

MASOMO MSINGI ANSWER

Periodic payments to be deposited in the sinking fund.

Formular

$$P = \frac{F.\frac{r}{n}}{\left(1+\frac{r}{n}\right)^{nt}-1}$$

P = Is the periodic payment

F = Face value

r = Interest rate per period = $\frac{7}{2}$ = 3.5%

n = Number of compounding periods per year (2 for semi annually)

t = Number of years

$$P = \frac{2{,}500{,}000 \times \frac{0.07}{2}}{\left(1+\frac{0.07}{2}\right)^{2\times3}-1} = \frac{2{,}500{,}000 \times 0.035}{(1+0.035)^{6}-1}$$

$$P = \frac{87{,}500}{1.229255326-1} = 381{,}670.5217$$

QUESTION 5

August 2025 Question Two C

Assume that you have just won a competition prize with the following options:

Option A: Lumpsum payment of Sh.25.8 million in 5 years' time.

Option B: A sum of Sh.16 million paid as follows:

- Sh.5 million payable today.
- Sh.5.5 million to be paid after one year
- Sh.5.5 million to be paid after 2 years.

Option C: Annual payment of Sh.1.4 million for 30 years, the first payment being made at the end of the year.

Option D: A perpetual payment of Sh.1.38 million.

Required:

Assuming a required rate of return of 8%, advise on the payment option that you would select. (7 marks)

MASOMO MSINGI ANSWER

Advice on the payment option to select.

Option A

Present value (P_v) = A$(1 + r)^{-n}$

$$= 25{,}800{,}000 \times PVIF_{8\%5}$$

$$= \text{Sh. } 25{,}800{,}000 \times 0.6806$$

$$\text{Sh. } 17, 559, 480$$

Option B

Present value 5.5 after year 1 = 5, 500, 000 × 0.9259 = Sh.5, 092, 450

P_v = of 5.5M after 2 years = 5, 500, 000 × 0.8573 = Sh. 4,715,150

Total PV = 5,000,000 + 5,092,450 + 4,715,150

= Sh. 14, 807, 600

Option C

PV of annuity = Sh. 1,400,000 × PVIFA8%, 30

= 1,400,000 × 11.2578 = Sh. 15, 760, 920

Option D

PV of perpetuity = $\frac{Payment}{rate} = \frac{Sh.\ 1{,}380{,}000}{0.08}$ = Sh. 17, 250, 000

Advice:
Choose option A, since it yields the highest PV of Sh. 17, 559, 480

QUESTION 6

August 2024 Question Two B

(i) Samuel Mwongeka intends to invest Sh.200,000 at the beginning of each year in treasury bonds which earns a return of 9% per annum.

Required:
Determine the accumulated value of investment after ten years. (2 marks)

(ii) Determine the present value of Sh.1.2 million annuity payable for 20 years at an interest rate of 8% per annum. (2 marks)

MASOMO MSINGI ANSWER

(i) Samuel Mwongeka

The accumulated value of investment after ten years.

Amount = Sh. 200,000

r = 9% p.a

n = 10 years

$FV = A\left(\frac{(1+r)^n-1}{r}\right) \times (1+r)$

$= 200{,}000\left(\frac{(1.09)^{10}-1}{0.09}\right) \times 1.09$

$= 3{,}038{,}585.944 \times 1.09 =$ Sh. 3,312,058.678

(ii) The present value of Sh.1.2 million annuity payable for 20 years at an interest rate of 8% per annum.

A = Sh. 1,200,000

n = 20 years

r = 8% p.a

$PV = A + A\left(\frac{1-(1+r)^{n-1}}{r}\right)$

$= 1{,}200{,}000 + 1{,}200{,}000\left(\frac{1-(1.08)^{19}}{0.08}\right)$

= Sh. 12,724,319

OR

$PV = A\left(\frac{1-(1+r)^{-n}}{r}\right)$

$= 1{,}200{,}000\left(\frac{1-(1.08)^{-20}}{\frac{0.08}{1{,}08}}\right)$

= Sh. 12,724,319

QUESTION 7

April 2024 Question Four C

A company negotiates a Sh.30 million loan for eight years from a financial institution. The interest rate is 14% per annum on the outstanding balance of the loan. The principal and interest will be repaid in eight equal year-end instalments.

Required:

(i) Prepare a loan repayment schedule. (5 marks)

(ii) Determine the amount of interest payable at the end of the 8th year. (1 mark)

MASOMO MSINGI ANSWER

(i) Loan repayment schedule.

Annual loan payment = $\frac{loan\ amount}{PVIFA_{14\%8}}$

Annual repayment = $\frac{30{,}000{,}000}{4.638863894} = Sh.\,6{,}467{,}100.714$

Year	Amount @start	Interest@14%	Repayment	Principal paid	Amount @end
1	30,000,000	4,200,000	6,467,100.714	2,267,100.714	27,732,899.29
2	27,732,899.29	3,882,605.9	6,467,100.714	2,584,494.814	25,148,404.48
3	25,148,404.48	3,520,776.627	6,467,100.714	2,946,324.087	22,202,080.39
4	22,202,080.39	3,108,291.255	6,467,100.714	3,358,809.459	18,843,270.93
5	18,843,270.93	2,638,057.93	6,467,100.714	3,829,042.784	15,014,228.15
6	15,014,228.15	2,101,991.94	6,467,100.714	4,365,108.774	10,649,119.38
7	10,649,119.38	1,490,876.713	6,467,100.714	4,976,224.001	5,672,895.379
8	5,672,895.379	794,205.353	6,467,100.714	5,672,895.361	-

(ii) Amount of interest payable at the end of the 8th year.

= Sh. 794,205.353

QUESTION 8

December 2023 Question Three C and D

(c) An investor plans to borrow a loan of Sh.3 million to purchase a piece of land for his family. The interest rate agreed upon is discounted at a rate of 10% per annum. The loan is repayable in 4 years of equal instalments.

Required:

(i) Amount payable per instalment. (1 mark)

(ii) A loan amortisation schedule. (4 marks)

(d) Jane Kiyo has the following investment options to choose from:

- Post Office MIS Scheme, monthly interest 8% per annum.
- ICD Bank Deposit, quarterly interest 8.25% per annum.
- HDFC Ltd., half-yearly interest 8.50% per annum.

Required:

Using effective interest rate (EIR) method, advise Jane Kiyo on the preferred investment option. (4 marks)

MASOMO MSINGI ANSWER

(c)

(i) **Amount payable per instalment.**

$P = \frac{r\,(PV)}{1-(1+r)^{-n}}$

P = payment

PV = Present value

r = Rate of period

n = number of periods

$$\frac{0.10\ (300{,}000)}{1-\ (1+0.1)^{-4}}$$

$$\frac{30{,}000}{0.316987}$$

$$= 94{,}641.24$$

(ii) **A loan amortisation schedule.**

Year	Balance B/D	Loan Installment	Interest@10%	Principal Repaid	Balance C/D
1	300,000.00	94,641.24	30,000.00	64,641.24	235,358.76
2	235,358.76	94,641.24	23,535.88	71,105.36	164,253.40
3	164,253.40	94,641.24	16,425.34	78,215.9	86,037.50
4	86,037.50	94,641.24	8,603.75	86,037.50	0

(d) Jane Kiyo

$EAR = \left\{\left(1+\frac{i}{n}\right)^{n}-1\right\} \times 100$

EAR Post Office MIS Scheme $\left\{\left(1+\frac{0.08}{12}\right)^{12}-1\right\}\times 100 = 8.30\%$

EAR ICD Bank Deposit = $\left\{\left(1+\frac{0.0825}{4}\right)^{4}-1\right\}\times 100 = 8.51\%$

HDFC LTD = $\left\{\left(1+\frac{0.085}{2}\right)^{2}-1\right\}\times 100 = 8.68\%$

The preferred investment option is the investment in HDFC Ltd because it has the greatest equivalent annual interest.

QUESTION 9

August 2023 Question Five B

Joel Ouma needs Sh.9,000,000 in five years' time to purchase a house. He is determined to deposit a given amount of money each quarter in a sinking fund that earns interest at the rate of 12% compounded quarterly for five years.

Required:

Compute the amount of money that Joel Ouma should deposit in each quarter in a sinking fund so as to enable him realise Sh.9,000,000 in five years time. (5 marks)

MASOMO MSINGI ANSWER

Amount of money that Joel Ouma should deposit in each quarter

FV = A $\left(\frac{(1+r)^{n}-1}{r}\right)$

$$9{,}000{,}000 = A\left(\frac{(0.03+1)^{20}-1}{0.03}\right)$$

$$9{,}000{,}000 = A\left(\frac{1.03^{20}-1}{0.03}\right)$$

$$\frac{9{,}000{,}000}{26{,}8704} = \frac{26.8704A}{26.8704}$$

A = Sh. 334,941.05

QUESTION 10

April 2023 Question Five D

John Osoro has deposited Sh.700,000 into a savings account at an annual interest rate of 5% compounded monthly with additional deposits of Sh.10,000 per month (made at the end of each month).

Required:

Determine the value of the investment after 10 years. (4 marks)

MASOMO MSINGI ANSWER

Monthly interest rate = 5% ÷ 12

= 0.42%