MAT402 ASSESSMENT (TEST)
ANSWER SCHEME

QUESTION 1
Ammara borrowed RM X and agreed to pay back RM5,000 in 5 years on loan at 10% interest compounded semi-annually. Find X.

$$\mathrm{P} = \text{ RM X}; \quad \mathrm{t} = 5 \text{ years}; \quad \mathrm{k} = 10\% = 0.1, \quad \mathrm{m} = 2, \quad \mathrm{S} = \text{RM } 5{,}000$$

$$\mathrm{S} = \mathrm{P}\left(1 + \frac{k}{m}\right)^{mt}$$

$$\text{RM } 5{,}000 = \mathrm{P}\left(1 + \frac{0.1}{2}\right)^{2(5)}$$

$$\mathrm{P} = \frac{\text{RM } 5{,}000}{1.6289}$$

$$\mathrm{P} = \text{ RM } 3069.56$$

QUESTION 2
Farah deposited RM3,000 in a saving account which pays 10% compounded monthly. Eight months after her first deposit, she saved another RM2,000 into the same account. Calculate the amount in her saving account at the end of fourth year.

$$\mathrm{P}_1 = \text{RM } 3{,}000, P_2 = \text{RM } 2{,}000, t_1 = \frac{8}{12} \text{ years}, t_2 = \frac{10}{3}\ years\ , \mathrm{k} = 10\% = 0.1, \mathrm{m} = 12$$

$$\mathrm{S} = \mathrm{P}\left(1 + \frac{k}{m}\right)^{mt}$$

$$\mathrm{S}_1 = \text{RM}3{,}000\left(1 + \frac{0.1}{12}\right)^{12\left(\frac{8}{12}\right)} = \text{RM } 3205.93$$

$$\mathrm{P} = \mathrm{S}_1 + \mathrm{P}_2 = \text{RM } 3205.93 + \text{RM } 2{,}000 = \text{RM } 5205.93$$

$$\mathrm{S}_2 = \text{RM } 5205.93\left(1 + \frac{0.1}{12}\right)^{12\left(\frac{10}{3}\right)} = \text{RM } 7255.43$$

QUESTION 3
Nizam took a loan of RM15,000 from a bank at an interest rate of *k*% compounded every two months. The amount to be paid after 4 years 6 months is RM21, 448.86. Find the value of *k*.

$$\mathrm{P} = \text{ RM } 15{,}000; \quad \mathrm{t} = 4.5 \text{ years}; \quad \mathrm{k} = \mathrm{k}\%, \quad \mathrm{m} = 6, \quad \mathrm{S} = \text{RM } 21{,}448.86$$

$$\mathrm{S} = \mathrm{P}\left(1 + \frac{k}{m}\right)^{mt}$$

$$\text{RM } 21{,}448.86 = \text{RM}15{,}000\left(1 + \frac{k}{6}\right)^{6(4.5)}$$

$$\left(1 + \frac{k}{6}\right)^{27} = 1.4299$$

$$k = 0.08 = 8\%$$

QUESTION 4
Damia wants to invest RM12,000 in an account for 5 years. She has two options to consider:

Bank A offers an interest rate of 4.9% compounded quarterly.
Bank B offers an interest rate of 4.5% compounded every two months.

Calculate the maturity amount of each bank. Hence, determine which bank she should invest in.

Bank A

$$\mathrm{P} = \mathrm{RM}\ 12{,}000, \quad \mathrm{t} = 5\ \mathrm{years} \quad \mathrm{k} = 4.9\% = 0.049, \qquad \mathrm{m} = 4$$

$$\mathrm{S} = \mathrm{P}\left(1 + \frac{k}{m}\right)^{mt}$$

$$\mathrm{S} = \mathrm{RM}12{,}000\left(1 + \frac{0.049}{4}\right)^{4(5)} = \mathrm{RM}\ 15{,}308.65$$

Bank B

$$\mathrm{P} = \mathrm{RM}\ 12{,}000, \quad \mathrm{t} = 5\ \mathrm{years} \quad \mathrm{k} = 4.5\% = 0.045, \qquad \mathrm{m} = 6$$

$$\mathrm{S} = \mathrm{RM}12{,}000\left(1 + \frac{0.045}{6}\right)^{6(5)} = \mathrm{RM}\ 15{,}015.26$$

Damia should choose Bank A to invest because the maturity amount given by Bank A is higher than Bank B.

QUESTION 5
Diana purchased a washing machine at RM3,800 cash by instalment. She was charged an interest of 17% based on reducing balance. She must pay a down payment of RM600 and equal weekly payments for 1.5 years. Find the amount of interest charged by using the constant ratio formula.

Cash Price, CP = RM 3800, Down Payment, DP= RM600
r = 17%=0.17 , n=52 ×1.5 = 78, M=52

B = RM 3800 - RM600= RM3200

$$\mathrm{I} = \frac{\mathrm{B}(\mathrm{n}+1)\mathrm{r}}{2\mathrm{M}}$$

$$\mathrm{I} = \frac{\mathrm{RM}\ 3200\ (78+1)(0.17)}{2(52)}$$

$$\mathrm{I} = \mathrm{RM}\ 413.23$$

QUESTION 6

Mikhail purchased 3 bedroom sets for RM35,000 through an installment plan. He paid 10% down payment and the balance is to be paid monthly for 9 years. If the interest charged is 4% flat rate, calculate the total interest charged.

$$\text{Cash Price, CP} = \text{RM}35{,}000 \text{ , Down payment, DP} = 0.1 \times \text{RM}35{,}000 = \text{RM}3{,}500$$
$$\text{r} = 4\% = 0.04, \text{t} = 9 \text{ years}$$

$$I = Brt$$
$$I = (\text{RM } 35{,}000 - \text{RM}3{,}500)(0.04)(9)$$
$$I = \text{RM } 11{,}340$$

QUESTION 7

Syafiq bought a piano through an installment plan. He paid RM500 as a down payment and 24 monthly payments of RM320 each. The interest charged was 8% based on the original balance. Calculate the interest charged for the piano.

$$\text{R} = \text{RM}320 \text{ , Down payment, DP} = \text{RM } 500$$
$$\text{t} = 2 \text{ years, n} = 24$$

$$\text{I} = Brt$$
$$\text{I} = nR - B$$

$$I = B(0.08)(2) \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$
$$I = (24 \times 320) - B \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Substitute (2) into (1)

$$\text{RM } 720 - B = 0.16B$$
$$B = \text{RM } 620.69$$

Substitute $B = RM\ 620.69$ into (1)

$$\therefore I = \text{RM } 620.69 \times 0.16 = \text{RM}99.31$$

QUESTION 8

Sandy bought a television through an installment plan. The cash price of the television is RM4,000. She paid RM550 as a down payment. The balance was settle by making 20 monthly payments of RM190. If the interest rate charged was 10% per annum on the original balance, find

a) the installment price

$$\text{Cash Price, CP} = \text{RM } 4{,}000 \text{ , Down payment, DP} = \text{RM } 550, \text{ r} = 10\% = 0.1, \text{n} = 20, \text{R} = \text{RM}190$$

$$\text{I} = Brt$$
$$\text{I} = (\text{RM}4{,}000 - \text{RM}550)(0.1)\left(\frac{20}{12}\right) = \text{RM}575$$

$$\text{Instalment Price, IP} = \text{CP} + \text{I}$$
$$\text{IP} = \text{RM } 4{,}000 + \text{RM } 575 = \text{RM } 4575$$

b) the outstanding balance after the 10th payment using the Rule of 78.

$$\text{OB} = \text{RN- I}\left[\frac{N(N+1)}{n(n+1)}\right]$$

$$\text{OB} = (\text{RM } 190 \times 10)\text{- RM } 575\left[\frac{10(10+1)}{20(20+1)}\right]$$

$$\text{OB} = \text{RM } 1749.40$$