FACULTY OF INDUSTRIAL SCIENCES & TECHNOLOGY

EXAMINER ANSWER SCRIPT (FINAL EXAM)

Course: MATHEMATICS FOR MANAGEMENTS

Course Code: BUM1123

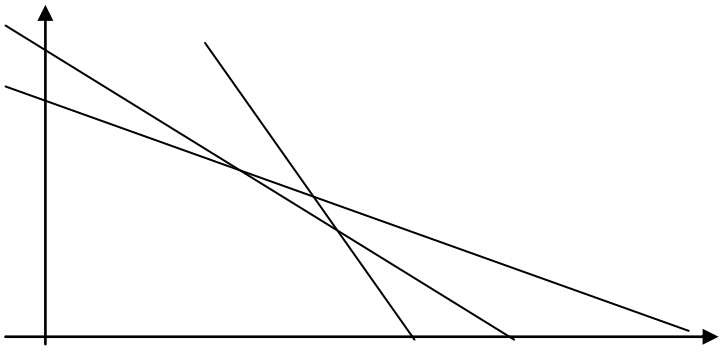
Question No. 1

Answer	Marks
QUESTION 1	
(a) $(g \cdot f)(x) = g(x) \cdot f(x)$	**M1**
$= (x^2 + 5x + 4)(x + 1)$	
$= x^3 + 5x^2 + 4x + x^2 + 5x + 4$	**A1**
$= x^3 + 6x^2 + 9x + 4$	**M1/**
$(g \cdot f)(2) = (2)^3 + 6(2)^2 + 9(2) + 4$	
$= 8 + 24 + 18 + 4$	**A1**
$= 54$	
(b) $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$	**M1**
$= \frac{x^2 + 5x + 4}{x + 1}$	**A1**
$= \frac{(x+4)(x+1)}{(x+1)}$	
$= x + 4$	
$\left(\frac{f}{g}\right)(6) = 6 + 4$	**M1/**
$= 10$	**A1**

Question No. 1 & 2

Answer	Marks
(c) $(f \circ g)(x) = f(g(x))$ $= f(x+1)$ $= (x+1)^2 + 5(x+1) + 4$ $= x^2 + 2x + 1 + 5x + 5 + 4$ $= x^2 + 7x + 10$ $(f \circ g)(-3) = f(g(-3))$ $= (-3)^2 + 7(-3) + 10$ $= 9 - 21 + 10 = -2$	**M1** **A1** **M1/** **A1**
	12 Marks
QUESTION 2 (i) $\left[\begin{array}{ccc\|c} 1 & 1 & 1 & 3 \\ 2 & 3 & 7 & 0 \\ 1 & 3 & -2 & 17 \end{array}\right] \xrightarrow[(-1)R_1 + R_3 \to R_3]{(-2)R_1 + R_2 \to R_2} \left[\begin{array}{ccc\|c} 1 & 1 & 1 & 3 \\ 0 & 1 & 5 & -6 \\ 0 & 2 & -3 & 14 \end{array}\right]$ $\xrightarrow[(-2)R_2 + R_3 \to R_3]{(-1)R_2 + R_1 \to R_1} \left[\begin{array}{ccc\|c} 1 & 0 & -4 & 9 \\ 0 & 1 & 5 & -6 \\ 0 & 0 & -13 & 26 \end{array}\right]$ $\xrightarrow{\left(-\frac{1}{13}\right)R_3 \to R_3} \left[\begin{array}{ccc\|c} 1 & 0 & -4 & 9 \\ 0 & 1 & 5 & -6 \\ 0 & 0 & 1 & -2 \end{array}\right]$ $\xrightarrow[(-5)R_3 + R_2 \to R_2]{(4)R_3 + R_1 \to R_1} \left[\begin{array}{ccc\|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 4 \\ 0 & 0 & 1 & -2 \end{array}\right]$ So $x = 1,\ y = 4,\ z = -2$	**B1** **M1** **M1** **M1/** **M1/** **M1/** **M1/** **M1/** **A1A1A1**
	11 Marks

Question No. 3

Answer	Marks
QUESTION 3	
$\dfrac{x^2-3x-4}{x^2-8x+16}<0$	**M1**
$\dfrac{(x+1)(x-4)}{(x-4)(x-4)}<0$	
$\dfrac{(x+1)}{(x-4)}<0$	**A1**
$(x+1)$: - | + | + $(x-4)$: - | - | + +ve -1 -ve 4 +ve	**D1A1** **A1A1**
$(-1,4]$	**6 Marks**
(b)	
$x+2y\le 48$ $x+y\le 30$ $2x+y\le 50$ $x\ge 0 \quad y\ge 0$	**D1** **D1** **D1** **A1** **A1** **A1**
	**6 Marks**

Question No. 4

Answer	Marks
QUESTION 4	
(a) $2\left(3^{2t-5}\right)-4=11$	
$3^{2t-5}=\frac{11+4}{2}$	**M1**
$3^{2t-5}=\frac{15}{2}$	
$\log_3 3^{2t-5}=\log_3\frac{15}{2}$	**M1**
$(2t-5)\log_3 3=\log_3\frac{15}{2}$	**M1**
	M1
$2t-5=\log_3\frac{15}{2}$	
$2t-5=\log_3 7.5$	
$t=\frac{5}{2}+\frac{1}{2}\frac{\log 7.5}{\log 3}$	**M1**
$t=3.417$	**A1**
	6 Marks
(b) $\log 5x+\log(x-1)=2$	
$\log(5x)(x-1)=2$	
$(5x)(x-1)=10^2$	**M1**
$5x^2-5x=100$	**M1**
$5x^2-5x-100=0$	
$x^2-x-20=0$	
$(x-5)(x+4)=0$	**M1/**
$x=5$ is the solution.	**A1**
	4 Marks

Question No. 5

Answer	Marks
QUESTION 5 (a) $P = RM\ 7,000$ $r = 13\% = 0.13$ $t =$ as shown in the table	

	No of days (approximate time)	No of days (exact time)
14/7/2015- 12/9/2015	July 16 Aug 30 Sept 12	July 17 Aug 31 Sept 12
Total no of days	58	60

M1M1

A1A1

	$t =$	$I=Prt$	$S=P+I$
i. Approximate time, ordinary interest	$t = \frac{58}{360}$	$I = (7000)(0.13)(0.1611)$ $= 146.60$	$S = 7000 + 146.60$ $= 7146.60$
ii. Exact time, exact interest	$t = \frac{60}{360}$	$I = (7000)(0.13)(0.1644)$ $= 149.60$	$S = 7000 + 149.60$ $= 7149.60$

M1M1

M1A1A1

M1A1A1

12 Marks

Question No. 6

Answer	Marks
QUESTION 6	
a(i) Principal value $P = 10,000$ Compound interest, $i = 0.06$ $a = 4$ Time $n = 17$	**M1** **A1**
Maturity value, $S = P\left(1 + \frac{i}{a}\right)^{n \times a}$	**M1**
$S = 10,000\left(1 + \frac{0.06}{4}\right)^{17 \times 4}$ $= 10,000\,(1 + 0.015)^{68}$ $= \text{RM}\,27522.69$	**A1**
	4 Marks
a(ii) $I = S - P$ $= 27,522.69 - 10,000$ $= \text{RM}17,522.69$	**M1** **A1**
	2 Marks

Question No. 6

Answer	Marks
(b) (i) Maturity date = Date of note + 90 days = 22 Feb 2015 + (6 days + 31 days + 30 days + 23 days) = 23 May 2011	**M1** **A1**
(ii) Maturity value = S Proceeds = P = RM 9,108.60 Term of discount = t = 13 April to 23 May = 17 days + 23 days = 40 days Thus $P = S(1-dt)$ $9108.60 = S\left(1-0.07\times\frac{40}{360}\right)$ $S = \underline{\underline{\text{RM } 9{,}180}}$ The maturity value is RM 9,180.	**M1** **A1** **M1** **A1**
(iii) Face value of note = P Maturity value of note = RM 9,180 Simple interest rate of the note = 0.08 Term of note = 90 days Thus, $S = P(1+rt)$ $9180 = P\left(1+0.08\times\frac{90}{360}\right)$ $P = \underline{\underline{\text{RM}9{,}000}}$ The face value is RM 9,000.	**M1** **A1**
(iv) Rate of interest earned = r Discount rate = d= 7% Term of discount = t = 40 days Thus $r = \frac{d}{1-dt}$ $= \frac{7\%}{1-7\%\times\frac{40}{360}}$ $= \underline{\underline{7.05\%}}$	**M1** **A1**
10 Marks	

Question No. 7

Answer	Marks
QUESTION 7	
(a) (i) Texco : Net price = 100(1-20%) = RM 80 Jayen : Net price = 120(1-40%) = RM 72	**M1A1** **A1**
(ii) Texco sells at a higher net price. Let the additional discount be r % $72 = 100(1-r)$ $r = 28\%$ Hence Texco must offer an additional 8% to meet its competitor's price.	**M1** **A1** **A1**
	6 Marks
(b) (i) Single equivalent rate = $\left[1-(1-d_1)(1-d_2)(1-d_3)\right]\times 100\%$ $=\left[1-(1-20\%)(1-10\%)(1-5\%)\right]\times 100\%$ = 31.6%	**M1** **A1**
(ii) $LP = 14,560$ Trade discount rate = 20%, 10% and 5% Therefore, $NP = LP(1-d_1)(1-d_2)(1-d_3)$ $NP = LP(1-0.2)(1-0.1)(1-0.05)$	**M1**
Payment date is 20 days after date of invoice = 8 Sept + 20 days = 28 September 2015. Last day to receive 6% cash discount = 8 Sept + 20 days = 28 September 2015 Last day to receive 4% cash discount = 8 Sept + 30 days = 8 October 2015. Therefore, 6% cash discount obtained if payment made on 28 September 2012.	**M1A1** **A1** **A1** **A1**
Net payment $= LP(1-d_1)(1-d_2)(1-d_3)(1-c)$ $=14560(1-20\%)(1-10\%)(1-5\%)(1-6\%)$ $=9361.50$	**M1** **A1**
	10 Marks

Question No. 8

Answer	Marks
QUESTION 8	
(a)(i) $R = C + M$ $= 5000 + 0.2(5000)$ $= 6000$ Retail price is RM 6,000.	**M1** **A1**
(ii) $R = C + M$ $x = 5000 + 0.2(x)$ $0.8x = 5000$ $x = \frac{5000}{0.8}$ $= 6250$ Retail price is RM 6,250. 3 x RM 6,250 = RM 18,750	**M1** **M1** **A1** **M1A1**
	7 Marks
(b) $MD = \frac{20}{100} \times 12$ $= 2.4$ New selling price = $R - MD$ $= 12 - 2.4$ $= 9.6$	**M1** **A1** **M1** **A1**
	4 Marks