Mathematics: MCM 109 Final Exam: 1 – 8 – 2011 Duration Time: **1 Hour**	Modern University For Technology & Information Faculty of Pharmacy	Academic Year: 2010 – 2011 Semester: Summer Examiner: Dr. Mohamed Eid
Answer 3 Questions Only		Marks

[1](a) Find y` where: (i) $y = 2x^3 + 4^x$ (ii) $y = \cos x + \log x$ (iii) $y = x^3 \sin x$ — 3

(b) Find the integrals: (i) $\int (x^2 + 3^x + 8)dx$ (ii) $\int [x^2 + 3]^2 dx$ — 4

(c) Find the eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 0 & 1 \\ 4 & 0 \end{bmatrix}$ — 5

[2](a)Determine maximum and minimum values of the function: $f(x) = x^3 - 9$ — 3

(b)Find the integrals:(i) $\int (\frac{1}{x} + \frac{1}{x^2})dx$ (ii) $\int (\sin x + \frac{2x}{x^2 + 3})dx$ (ii) $\int_0^2 (3x^2 + 1)dx$ — 6

(c) Write the matrix of chemical compound : $CH_2 \equiv CH - CH_2$ — 3

[3](a) Find maximum and minimum values of the function: $f(x) = 2x^2 - 8x + 1$ — 4

(b)If $A = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 3 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 3 & 2 \\ 1 & 0 & -2 \end{bmatrix}$. Find, if possible, A + B, A.B, B^t.A — 4

(c)Discuss the consistence of the following linear system (it has one solution, no solution or infinite solutions): — 4

2x + 3y – z = 1, x – y = 2, 3x + 2y – z = 4

[4](a)Find the integrals: (i) $\int x.\cos x \, dx$ (ii) $\int \frac{x+3}{x^2 - 3x + 2} dx$ — 6

(b)If a medicine is available in 3 dosage forms: — 6

First type of concentration: 1 mg /tablet
Second type of concentration: 2 mg /tablet
Third type of concentration: 3 mg /tablet
If the pharmacist wanted to prepare 8 tablets of concentration 2.5 mg / tablet by mixing whole tablets of each type. Find all possible solutions.

Good luck *Dr. Mohamed Eid*

Academic Year: 2010 – 2011 Semester: Summer Date: 10 – 7 – 2011 Time: 50 Minutes	Modern University For Technology & Information Faculty of Pharmacy	Mathematics: MCM 109 Mid-Term Exam Examiner: Dr. Mohamed Eid **Answer all questions**

[1] Find y` where:

(a) $y = 2x^3 + 4^x$ (b) $y = \sin x \,.\, \log x$ (c) $y = 8 + \ln(x^3 + x)$ (d) $y = x^{-3} + x^3$

[2] Find the integrals:

(a) $\int (x^4 + 3^x)dx$ (b) $\int (\frac{1}{x} + \cos x)dx$ (c) $\int_1^2 (x^2 + \frac{1}{x^3})dx$ (d) $\int x\sin x\, dx$

[3] Find the maximum and minimum values of the function: $f(x) = 3 + 6x - x^2$

[4]A medicine in the blood decreases according to equation $y_0 - y = 6t$.

If the initial quantity $y_0 = 120$ units. Find, time by hours:

(i)The time at which 40 % of medicine exists in the blood.

(ii)The time at which 60 % of medicine exists in the blood.

(iii)The time at which there is no medicine in the blood.

Good luck *Dr. Mohamed Eid*

Quiz I 3 – 7 – 2011

(1) Find f `(x) where: (a) $f(x) = x^3 + \log x$ (b) $f(x) = 3^x + 2\cos x$ (c) $f(x) = x^4 \tan x$

(2)Find y` where: (a) $y = \frac{\sin x}{x^2}$ (b) $y = 4^x + \frac{1}{x^4}$ (c) $y = (3+\sin x)^2$

(3) Find the maximum and minimum values of the functions:

(a) $f(x) = x^2 - 4x + 2$ (b) $f(x) = x^3 - 3x^2$ (c) $f(x) = x^3 + 2$

Quiz II 24 – 7 – 2011

[1] If $A = \begin{bmatrix} 1 & 2 \\ 3 & 1 \\ 1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 1 & 3 \\ 1 & 0 & 2 \end{bmatrix}$. Find, if possible, $A + B$, $A^t + B$, $A.B$, $|B.A|$

[2] Write the following linear system and discuss its consistence (it has one solution or no solution or infinite solutions): $x + y + z = 6$, $x – y + 2z = 2$, $2x + 2y + 2z = 6$

[3] Find the eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 3 & 1 \\ 0 & 1 \end{bmatrix}$