Mathematics: MCM 109 Final Exam: 12 – 6 – 2011 Duration Time: **1 Hour**	Modern University For Technology & Information Faculty of Pharmacy	Academic Year: 2010 – 2011 Semester: Spring Examiner: Dr. Mohamed Eid
Answer 3 Questions Only		Marks

[1](a) Find y` where: (i) $y = 2x^3 + 8^x$ (ii) $y = \sin x + \log x$ (iii) $y = x^2 \tan x$ — 3

(b) Find the integrals: (i) $\int (2x^3 - 3^x)dx$ (ii) $\int [x + \frac{1}{x}]^2 dx$ — 4

(c) Find the eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} -2 & 4 \\ 0 & 3 \end{bmatrix}$ — 5

[2](a)Determine maximum and minimum values of : $f(x) = x^3 - 3x^2 - 9x$ — 4

(b) Find the integrals: (i) $\int x.2^x dx$ (ii) $\int (x - \tan x)dx$ — 4

(c)If $A = \begin{bmatrix} 1 & 2 \\ -1 & 1 \\ 3 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ 3 & 6 \end{bmatrix}$. Find, if possible, A + B, |A|, |B|, A.B, B.A — 4

[3](a) Find the inflection points of the function: $f(x) = x^3 - 9x + 2$ — 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, $A.B^t$ — 4

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

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

[4](a)Find the integrals: (i) $\int_1^2 (x^2 + \frac{1}{x^2})dx$ (ii) $\int \frac{x+1}{x^2 - 5x + 6} dx$ — 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 10 tablets containing 1.5 mg / tablet by mixing whole tablets of each type. Find all possible solutions.

Good luck *Dr. Mohamed Eid*

Academic Year: 2010 – 2011 Semester: Spring Date: 4 – 5 – 2011 Time: 60 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) $y = 2x^3 + 2^x$ (b) $y = \sin x \,.\, \log x$

(c) $y = 8 + \log(x^3 + x)$ (d) $y = x^{-3} + 3x$

[2] Find the integrals: (a) $\int (3^x + \cos x)dx$ (b) $\int (3 + \frac{2x+1}{x^2 + x + 2})\, dx$

(c) $\int (\frac{1}{x^2} + \frac{1}{x} + x^2)\, dx$ (d) $\int x \sin x \, dx$

[3] Find the maximum and minimum values of the function: $f(x) = x^3 - 12x + 3$

[4]A drug in the blood decreases according to equation $\sqrt{y_0} - \sqrt{y} = 8t$.

If the initial quantity $y_0 = 200$ units. Find

(i)The time at which 30 % of drug exists in the blood.

(ii)The time at which 50 % of drug exists in the blood.

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

Good luck *Dr. Mohamed Eid*

Quiz 18 – 5 - 2011 Time 35 Minutes

[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, $A^t + B$, $A + B$, $A.B$, $|B.A|$, $|A.B|$

[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 $A = \begin{bmatrix} 3 & 1 \\ 4 & 0 \end{bmatrix}$

Good luck *Dr. Mohamed Eid*