Academic Year: 2015 – 2016 Semester: Autumn Date: December 27, 2015	Modern University for Technology & Information مستقبل الصفوة **Faculty of Pharmacy**	Mathematics: OCM 103 Final Exam Duration Time: **2** Hours
Answer All Questions		No. of questions: 4 Total Mark: 60

Question 1

(a)If $A = \begin{bmatrix} 1 & 3 & -2 \\ 0 & 2 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 & 4 \\ 1 & 3 & 1 \end{bmatrix}$ — 10

Find, if possible, A + B, A.A , A.B, |A|, $A.A^t$, $|A^t.B|$.

(b)Find the eigenvalues and eigenvectors of : $A = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}$. Also, find A^{-1}. — 5

Question 2

(a)Solve the linear system : $x - 2y = 2$, $2x - y = 7$, $3x - 3y = 9$. — 5

(b)If a drug exists in three dosage forms : The first of concentration 1 mg / tablet , The second of concentration 2 mg / tablet , The third of concentration 4 mg /tablet. If the pharmacist wanted to produce 8 tablets of concentration 2.5 mg / tablet by mixing whole tablets. Find two possible solutions. — 5

Question 3 — 24

(a)Find **y`** where:

(i) $y = x^{-2} + 3^x + 2x$ (ii) $y = x^3 . 4^x + 4$ (iii) $y = \cos x . \log x$

(iv) $y = [\ln x + \sin x]^8$ (v) $y = 3^{2x} + \sin^5 x$ (vi) $y = x + \frac{\ln(1+x)}{3}$

(b)Find the integrals:

(i) $\int (x^4 + 2^{3x})dx$ (ii) $\int (\frac{2}{3} + \frac{x}{\sqrt{3+x^2}})\, dx$ (iii) $\int (\cos x - 2\sin x)\, dx$

(iv) $\int (\frac{1}{2x} + \frac{2}{x+3})\, dx$ (v) $\int x \cos x\, dx$ (vi) $\int_1^2 (x + \frac{1}{x})^2\, dx$

Question 4

(a)If y is the quantity of drug decreases according to the equation $\frac{dy}{dt} = -y^2$. — 5

Find y as function of the time t where the initial quantity is 10 units.

Also, find (i)The value of y after 2 hours.

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

(b)If the quantity of a drug in the blood decreases according to the data: — 6

Time: t	0	2	4	6	8	10	Hours
Quantity: y	20	18	15	10	4	1	Units

From these data, find the relation y = a + bt. Also, find the value of y at t = 3.

Good Luck *Dr. Mohamed Eid*