Faculty of Pharmacy Academic Year: 2014 – 2015 Semester: Summer	Modern University for Technology & Information مستقبل الصفوة	Mathematics: OCM 103 Final Exam: August, 2015 Duration Time: **2** Hours
Answer All Questions		No. of questions: 4 Total Mark: 60

Question 1

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

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

(b)Find the eigenvalues and the eigenvectors of : $A = \begin{bmatrix} 2 & 1 \\ 4 & -1 \end{bmatrix}$ 6

Question 2

(a) Determine the type of solution of the linear system : 4

$x - y + z = 3$, $3x - 2y - z = -2$, $-2x + y + 2z = 5$.

(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 16 tablets of concentration 3 mg / tablet by mixing whole tablets. Find two possible solutions. 6

Question 3

(a)Find **y`** where: 6

(i) $y = 2x^4 + 2^x + 3x$ (ii) $y = x^3 . e^x + 2 \ln x$ (iii) $y = \sin x . \log x$

(iv) $y = [x + 3 \sin x]^7$ (v) $y = \cos x + (\cos x)^4$ (vi) $y = \frac{x}{3} + \frac{3}{x}$

(b)Find the extrema of the functions: (i) $f(x) = 2x - \ln x$ (ii) $f(x) = 1 + 2x^3$ 4

(c)Find the integrals: 12

(i) $\int (2x^3 + 2^x) dx$ (ii) $\int (x^2 - x)^2 dx$ (iii) $\int e^x . (3 + e^x)^8 dx$

(iv) $\int (\cos x + 2 \sin x) dx$ (v) $\int (\frac{1}{x} + \frac{3}{x+2}) dx$ (vi) $\int \frac{x}{x^{2-5x+6}} dx$

Question 4

(a)If y is the quantity of drug decreases according to the equation $\frac{dy}{dt} = -y^{\frac{1}{2}}$. 6

Find y as function of the time t where the initial quantity is 9 units.

Also, find (i)The value of y after 2.5 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	1	2	3	4	5	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 = 1.5

Good Luck *Dr. Mohamed Eid*