Course No: TECH 1301 **Course Title:** Mathematics II **Date:** 21/05/2019 **No. of Questions:** (4) **Time:** 120 Minutes (2hr.) **Using Calculator:** (Yes)	**University of Palestine** **FinalExam 2st semester 2019/2020 Total Grade: 50**	**Instructor Name:** Dr. Nabil Hamad, Dr. Diab Al Awar **Student No.:** ________________ **Student Name:** ______________ **College Name:** IT **Dep. / Specialist:** ______________ **Using Dictionary:** (No)

Q1	Q2	Q3	Q4	Total
5	15	15	15	50

Question 1: True or False:

5 marks

1. $The\ set\ of\ all\ 2x2\ matrix\ of\ the\ form \begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix} with\ the\ standard\ matrix\ addition\ and\ scalar\ multiplication\ is\ a\ vector\ spaces$ in V ()

2. $The\ vector\ spsce\ \boldsymbol{w} = (3.1.5) is\ a\ linear\ combinations\ of\ two\ vectors\ \boldsymbol{u} = (0, -2, 2)\ and\ \boldsymbol{v} = (1, 3, -1)?$ ()

3. $The set of vectoes is Linear independent if and only if matrix \boldsymbol{A} madden coefficient of vectors has determinant equal to zero$ ()

4. If the two vectors u and v are orthogonal (perpendicular) if and only if $\mathbf{u}.\boldsymbol{u} = \mathbf{0}$ *.* ()

5. If V is any vector space and $S = \{v_1, v_2, \ldots v_n\}$ *is a set of vectors in V, then S is called a basis for V if S spans V and S is not linearly dependent.*()

Question 2: **15 marks**

1. $Show\ that\ \ D = \begin{bmatrix} 6 & -8 \\ -1 & -8 \end{bmatrix}\ is\ a\ linear\ combinations\ of\ A = \begin{bmatrix} 4 & 0 \\ -2 & -2 \end{bmatrix}$

$, B = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix} and \quad C = \begin{bmatrix} 0 & 2 \\ 1 & 4 \end{bmatrix}$? (8 marks)

2. Consider the vector $u = (2, -1, 1)$ and $v = (1,1,2)$. Find $\boldsymbol{u}.\boldsymbol{v}$anddetermine $||\mathbf{u}\frac{\mathbf{1}}{\boldsymbol{u}\times\boldsymbol{v}}||$. (4 marks)

3. Find the determinant of

$$\begin{bmatrix} 4 & 0 & 0 & 1 & 0 & 0 \\ 0 & 5 & 0 & 0 & 1 & 0 \\ 0 & 0 & 3 & 0 & 0 & 1 \\ 0 & 0 & 0 & 2 & 0 & 0 \\ 0 & 0 & 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

(3 marks)

Question 3: **15 marks**

1. $Show\ that\ the\ following\ sets\ of\ vectors\ in\ \ are\ linearly\ independent$?

$$u_1 = (-3,0,4),\ \ u_2 = (5,-1,2)\ \ \ and\ \ \ u_3 = (1,1,3)$$

<u>and verify your answer</u> **(8 marks)**

2. *Use the Wronskian to show that the following sets of vectors are linearly independent.* $\boldsymbol{v_1} = \sin x$, $\boldsymbol{v_2} = \cos x$ *and* $\boldsymbol{v_3} = x \sin x$ **(7 marks)**

Question 4: **(15marks)**

a) Determine the dimension and a basis for the solution space of the system.

$$3x_1 + x_2 + x_3 + x_4 = 0$$
$$5x_1 - x_2 + x_3 - x_4 = 0$$

b) let $V = \{(x, y),\ x, y \in R\}$.

define addition and multiplaction on V by

$$(\boldsymbol{x_1},\ \boldsymbol{x_2}) + (\boldsymbol{y_1},\ \boldsymbol{y_2}) = ((\boldsymbol{x_1} - \boldsymbol{y_1}),\ (\boldsymbol{x_2} + \boldsymbol{y_2}))\ \ \boldsymbol{and}\ \boldsymbol{a}(\boldsymbol{x_1}, \boldsymbol{x_2}) = (\boldsymbol{ax_1}, \boldsymbol{ax_2})$$

<u>then V is not a vector space. Why??.</u>

Good Luck