Dr. Rakesh Bajaj

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

Test 1 EXAMINATION- February 2019

PhD 2nd Semester (Department of Mathematics)

COURSE CODE: 17P1WMA231   MAX. MARKS: 15

COURSE NAME: Advanced Linear Algebra

COURSE CREDITS: 3   MAX. TIME: 1 Hr

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Use of scientific calculator is allowed.

1. Let V be a vector space and H be a nonempty subset of V. Prove the necessary and sufficient condition for H to be a subspace of V. Show that union of two subspaces need not be a subspace. (4)

2. Let $v_1 = \begin{bmatrix} 1 \\ -3 \end{bmatrix}$, $v_2 = \begin{bmatrix} -2 \\ 4 \end{bmatrix}$, $w_1 = \begin{bmatrix} -7 \\ 9 \end{bmatrix}$, $w_2 = \begin{bmatrix} -5 \\ 7 \end{bmatrix}$. Consider the bases for R^2 given by $B = \{v_1, v_2\}$ & $C = \{w_1, w_2\}$. Find change of co-ordinates matrix from C to B as well as from B to C. (3)

3. Let $A = \begin{bmatrix} 4 & -1 & 6 \\ 2 & 1 & 6 \\ 2 & -1 & 8 \end{bmatrix}$. Find a basis for the corresponding eigenspace for eigenvalue 2. (4)

4. Let $A = \begin{bmatrix} 0.95 & 0.03 \\ 0.05 & 0.97 \end{bmatrix}$. Analyze the long term behavior of the dynamical system defined by (4)

$$x_{k+1} = Ax_k; \quad k = 0, 1, 2, \ldots\ldots \quad with \quad x_0 = \begin{bmatrix} 0.6 \\ 0.4 \end{bmatrix}.$$

*****