POSSESION OF MOBILES IN EXAM IS UFM PRACTICE.

Name _____ _____ **Enrollment No.**____ _____

Jaypee Institute of Information Technology, Noida
T1 Examination, 2019
B.Tech Vth Semester

Course Title: Matrix Computations **Maximum Time: 1 Hr.**
Course Code: 16B1NMA533 **Maximum Marks: 20**

COURSE OUTCOMES
After pursuing the above mentioned course, students will be able to:

C301-3.1	explain the basics of matrix algebra and inverse of a matrix by partitioning.
C301-3.2	solve the system of linear equations using direct and iterative methods.
C301-3.3	explain the vector spaces and their dimensions, inner product space, norm of a vector and matrix.
C301-3.4	apply the Gram-Schmidt process to construct orthogonal basis and Q-R decomposition of a matrix.
C301-3.5	construct Gershgorin's circles and solve eigenvalue problem using Jacobi, Givens, Householder, power and inverse power methods.
C301-3.6	analyze systems of differential and difference equations arising in dynamical systems using matrix calculus.

Note: All questions are compulsory.

1. **[C301-3.1]** Find the inverse of the matrix A using elementary matrices, where $A=\begin{bmatrix}2 & 3 & -4\\ 3 & -2 & 0\\ 8 & -1 & -4\end{bmatrix}$ and hence find the solution of the system of equations $AX=b$ where $X=[x\ y\ z]^T$ and $b=[12\quad -1\quad 10]^T$. **(4)**

2. **[C301-3.2]** Solve the following system of equations using partial pivoting: **(4)**
$$2y+3z=0;\ x+0.4y+0.8z=90;\ 4x+10y+z=40.$$

3. **[C301-3.2]** (i) What conditions on the constants p and q must be set so that matrix $B=\begin{bmatrix}p & q & q\\ q & p & q\\ q & q & p\end{bmatrix}$ becomes positive definite. **(2)**

(ii) Find the Cholesky factorization of the matrix $A=\begin{bmatrix}4 & -4 & 8\\ -4 & 13 & 1\\ 8 & 1 & 26\end{bmatrix}$. **(3)**

4. **[C301-3.3]** Let V be a vector space of all 2×2 matrices over the field of real numbers. Let W_1 be the set of matrices of the form $\begin{bmatrix}x & -x\\ y & z\end{bmatrix}$ and let W_2 be the set of matrices of the form $\begin{bmatrix}a & b\\ -a & c\end{bmatrix}$.

a) Find the dimensions of subspaces W_1 and $W_1\cap W_2$. **(2)**

b) Prove the necessary and sufficient condition for a subset W of a vector space V to be a subspace. **(3)**

c) Consider the subspace W consisting of the plane $x+2y-3z-t=0$ in R^4. Find dimension and basis of W. **(2)**

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