POSSESSION OF MOBILES IN EXAM IS UFM PRACTICE

Name of Student:———————— Enrollment Number: ————————

BENNETT UNIVERSITY, GREATER NOIDA
B.TECH., MINOR-2 EXAMINATION
SPRING SEMESTER 2017-18

COURSE CODE :	EMAT102L	MAX. TIME: 1 Hour
COURSE NAME :	Linear Algebra and Ordinary Differential Equations	
COURSE CREDIT:	3-1-0-4	MAX. MARKS: 15

Instructions
There are five questions in this question paper, and all questions are mandatory.
Rough work must be carried out at the back of the answer script.

1. Let $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 4 & 1 \\ 0 & 0 & 4 \end{bmatrix}$. Find
   (a) The characteristic polynomial of A.
   (b) The eigenvalues of A.
   (c) The corresponding eigenvectors. [3]

2. Find all real values of k for which the matrix
$$A = \begin{bmatrix} 1 & 0 & k \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$
is diagonalizable. [2]

3. (a) Let
$$V = \{[x \ y \ z \ w]^t \in \mathbb{R}^4 \ : \ x = z + w, \, y = z - w\}.$$
   Find a basis for $V^{\perp}$. [2]
   (b) In $\mathbb{P}_2(\mathbb{R})$, let $U = \{p(x) \in \mathbb{P}_2(\mathbb{R}) : p'(0) = 0\}$. Apply Gram-Schmidt process to find an orthonormal basis for U. [3]

4. Under what initial conditions, the following differential equation
$$(x^2 - 2x)\frac{dy}{dx} = 2(x-1)y$$
has (i) no solution (ii) unique solution (iii) infinitely many solutions. [3]

5. Find the expression for $N(x, y)$ such that the differential equation
$$(2xy + \cos y)dx + N(x, y)dy = 0$$
is exact. [2]