POSSESSION OF MOBILES IN EXAM IS UFM PRACTICE

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

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

COURSE CODE :	EMAT102L	MAX. TIME: 2 Hours.
COURSE NAME :	Linear Algebra and Ordinary Differential Equations	
COURSE CREDIT:	3-1-0-4	MAX. MARKS: 40

Instructions

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

1. Examine whether the following sets are subspaces of $\mathbb{R}^3$: [3]

   (a) $S_1 = \{[x,\ y,\ z]^t \in \mathbb{R}^3 : x^2 + y^2 + z^2 = 0\}$,

   (b) $S_2 = \{[x,\ y,\ z]^t \in \mathbb{R}^3 : x = y^2\}$.

OR

For what values of $\lambda \in \mathbb{R}$ and $k \in \mathbb{R}$, the following system of equations has (i) no solution, (ii) a unique solution, and (iii) infinitely many solutions?
$x + y + 2z = 3,\ x + 2y + \lambda z = 5,\ x + 2y + 4z = k.$

2. Let V be a vector space over $\mathbb{C}$ and let T be a linear map on V such that $T^2\mathbf{v} = T\mathbf{v}$, for $\mathbf{v} \in V$. Find the eigenvalues of T. [3]

3. Apply Gram-Schmidt process to the set $\{[1,\ 1,\ 0]^t, [0,\ 0,\ 1]^t, [2,\ 5,\ 8]^t\}$ to obtain an orthonormal set in $\mathbb{R}^3$. [4]

4. (a) Find the value of c for which the following differential equation is exact. [2]

$$(ye^{2xy} + x)dx + (cxe^{2xy} + y)dy = 0.$$

   (b) Check whether the following functions are linearly dependent or linearly independent. [2]

$$f(x) = 9\cos 2x,\ g(x) = 2\cos^2 x - 2\sin^2 x.$$

   (c) Check whether the function $f(x, y) = e^{-x^2} + y^2$ satisfies Lipschitz condition or not in the region $R : |x| \leq 1, |y| \leq 1$. [2]