IJIRMET ISSN (Online): 2456-0448
International Journal Of Innovative Research In Management, Engineering And Technology
Vol. 1, Issue 5, June 2016

MATHEMATICS AND ITS APPLICATIONS

[1] Geetanjali Gilhotra, [2] Balwant Singh
[1]Assistant Professor, Department of Applied Sciences, Chandigarh University, Gharuan, Punjab (India)
[2]Assistant Professor, Department of Mechanical Engineering, Chandigarh University, Gharuan, Punjab (India)

Abstract: ***The purposes of this research were to develop and evaluate the efficiency of the application of learning mathematics as it is perception of many that it is a boring subject with no much use in day to day life, moreover it is not applicable anywhere as it is restricted to pen and paper without using modern technologies. This theory also reveals that in how many ways we are using mathematics in our daily life and it has proved a positive effect on motivating the students towards Mathematics. In a view, by mentioning the uses of mathematical terms first, we can increase students' motivation and participation in Mathematics learning and provide the opportunity of diversity of training methods of Mathematics.***

Keywords: ***Mathematics, application of mathematics.***

I. INTRODUCTION

Since nobody is born mathematician. It is the interest and resources that make a layman to be a mathematician. Here are some common views on Mathematics

1. Mathematics is tough
2. Mathematics is boring
3. Maths has nothing to do with real life
4. All mathematicians are mad

But these all are illusions and not the facts about maths. In this paper we will see mathematics in a new perspective.

Cryptography in algebraic alphabets can studied with the help of matrices and determinants, we can illustrate it with the help of live examples where the matrices are being actually used.[1] The relations and functions are not the words of difficulty in mathematics also they have a sound meaning in the applying in daily life.[2] The differential equations are that branch of mathematics on which the modern technology runs. We can't deny the truth of uses of differential equations in various extremes [4].

II. OBJECTIVE:

Main object of this theory is to see the world as only application of mathematics everywhere and no one can deny this fact that maths is the mother of all sciences and technologies in this modern era.

Understanding what is Mathematics:

Maths is not called the collection of some boredom and hectic calculations. It is the beauty of science found in numbers, equations functions and geometry etc.

Daily life application of mathematics:

Even a layman , who doesn't know the formulae of mathematics at all can't refuse to use maths in its daily life as we are not in the era of barter system and get to pay the bills, some taxi fares, buying food and goods ,we need maths to calculate the charge . These are casual applications of mathematics which a layman does in its daily life. But as far as peculiar knowledge of mathematics is concerned, we call it advanced mathematics.

What is advanced mathematics?

It consists of some following perspectives

1. Relations and functions
2. Matrices and determinants
3. Trigonometry and inverse trigonometry functions
4. Limits and continuity
5. Applications of derivatives and integration

6. Differential equations
7. Vector algebra
8. Geometry
9. Linear programming
10. Probability

We, mathematicians are known to the definitions and theorems to advanced mathematics very well but only we can make maths interesting to a layman as it seems to us just by explaining its use in daily life.

Relations and functions- application in daily life

1. In Business: **Alfred Marshall** (26 July 1842 – 13 July 1924) in his book *Principles of Economics* (1890),explains that sale and demand are dependent on price thus we can call sale as function of price and similarly the demand as function of price
2. Similarly in Economics: we call inflation as function of price of oil.
3. In Physics: the Einstein's famous equation $E=mc^2$ where
4. E = energy, m=mass , c= velocity of light
5. In biology: growth rate of plants can be called as a function of sunlight and water

Application of matrices:

Nowadays we use coding language to keep our conversation private for say a shopkeeper to remember its price of a good Rs.35 ,write the code CE on the good (here the code is generated thus it's called encoding) where C refers as 3rd letter and E as 5th letter in alphabets. Thus by doing this, the customer is unknown of the price and only shopkeeper can know this by decoding it. But this is the case of brittle coding. For this modern era we use matrices to encode our message and it is called cryptography. (Lester S. Hill in 1929)

Steps to create cryptogram:
Let us call a number in terms of alphabet
1=A 2=B 3=C 4= D 5=E 6=F 7=G 8=H 9=I 10=J 11=K 12=L 13=M 14=N 15=O 16=P 17=Q 18=R 19=S 20=T 21=U 22=V 23=W 24=X 25=Y 26=Z and Space = 0
To encode "CARRY ON" break the message into groups of two letters using space

CA RR Y_ ON

Now convert these letters into a 2x1 matrix each

$$\begin{pmatrix}3\\1\end{pmatrix}\begin{pmatrix}18\\18\end{pmatrix}\begin{pmatrix}25\\0\end{pmatrix}\begin{pmatrix}15\\14\end{pmatrix}$$

Steps to encode a message
Choose a 2x2 matrix A that has an inverse and premultiply A to each of matrix
If $A = \begin{pmatrix}1 & 0\\2 & 1\end{pmatrix}$ then the product of A and matrices give

$$\begin{pmatrix}3\\7\end{pmatrix}\begin{pmatrix}18\\54\end{pmatrix}\begin{pmatrix}25\\50\end{pmatrix}\begin{pmatrix}15\\44\end{pmatrix}$$

The message will appear as 3 7 18 54 25 50 15 44
Now to an unauthorised person this message will be just a collection of numbers until and unless he knows the matrix used. This is the case of 2x2 matrix. For more secured information, large matrices are used and thus decoding becomes more complex without matrix.
How to decode the data
To decode the message, we just need to premultiply the matrices with
A^{-1} to obtain the number of a sequence and then ordering it alphabetically we can know the hidden message.
Here $A^{-1}=\frac{1}{1-0}\begin{pmatrix}1 & 0\\-2 & 1\end{pmatrix}' = \begin{pmatrix}1 & 0\\-2 & 1\end{pmatrix}$

$$\begin{pmatrix}3\\1\end{pmatrix}\begin{pmatrix}18\\18\end{pmatrix}\begin{pmatrix}25\\0\end{pmatrix}\begin{pmatrix}15\\14\end{pmatrix}$$

Arranging alphabetically, we get the answer.

Derivatives and integration:

1. It is used in economic a lot. To determine the maximum and minimum values of particular functions (e.g. cost, strength, amount of material used in a building, profit, loss, etc.)

2. It is used in history, for predicting the life of a stone
3.it is used in geography, which is used to study the gases present in the atmosphere
4. It is mainly used in daily by pilots to measure the pressure in the air.

5. Applications of the Indefinite Integral shows how to find displacement (from velocity) and velocity (from acceleration) using the indefinite integral. There are also some electronics applications.

In primary school, we learnt how to find areas of shapes with straight sides (e.g. area of a triangle or rectangle). But how do you find areas when the sides are curved?

6. Area under a Curve

7. Area in between the two curves. Answer is by Integration.

III. REAL LIFE USE OF DIFFERENTIAL EQUATIONS

Differential equations have a remarkable ability to predict the world around us. They are used in a wide variety of disciplines, from biology, economics, physics, chemistry and engineering. They can describe exponential growth and decay, the population growth of species or the change in investment return over time. A differential equation is one which is written in the form dy/dx = ………. Some of these can be solved (to get y = …..) simply by integrating, others require much more complex mathematics

One of the most basic examples of differential equations is the Malthusian Law of population growth dp/dt = rp shows how the population (p) changes with respect to time. The constant r will change depending on the species. Malthus used this law to predict how a species would grow over time.

Vectors:

Vector calculus was developed from quaternion analysis by J. Willard Gibbs and Oliver Heaviside near the end of the 19th century, Vectors are nothing but a scalar with direction. And as we know directions play an important role in our life. So the vectors are used in directing a boat i.e. sailing, in sports like football, baseball etc. and also in amusement parks, in slides and rides like roller coaster (LaMarcus Adna Thompson, January 20, 1885), Most of the motion in a roller-coaster ride is a response to the Earth's gravitational pull (Galileo Galilei 16th and 17th centuries). No engines are mounted on the cars. After the train reaches the top of the first slope the highest point on the ride the train rolls downhill and gains speed under the Earth's gravitational pull. The speed is sufficient for it to climb over the next hill. This process occurs over and over again until all the train's energy has been lost to friction and the train of cars slows to a stop. If no energy were lost to friction, the train would be able to keep running as long as no point on the track was higher than the first peak. Here vectors of forces, acceleration, and velocity are important to make a safety system, if designer consider them accurately then system will be safety.

Hence we see that the mathematics is not restricted to various calculations only but we can feel that mathematics is in the air. Having mentioned the uses above, we are not yet finished with this, because the uses of maths cannot be listed enough as we use it in medicines, operation theatres, investigation departments, forensic labs, and so on.

Conclusion and future scope

The problems of the teaching and learning of Mathematics by pointing out that such problems existed long time ago in nearly every educational institutions. It can be concluded that currently the students' attitudes towards Mathematic are negative, and this subject is quite difficult to understand. Moreover there are various factors relating to the problems of teaching and learning Mathematics, namely the characteristic of the subject, teachers, students, and parents. Teachers are, therefore, required to take major roles in solving these problems by being aware of the goals of education, objectives of Mathematics curriculum, objectives of contents, teaching methodologies as well as assessment and evaluation so that the students will be able to succeed in learning Mathematics and gain positive attitudes towards the subject.

REFERENCES:

1. Lester S. Hill, Cryptography in an Algebraic Alphabet, *The American Mathematical Monthly* Vol.36, June–July 1929, pp. 306–312.

2. Rainville, S. et al. World Year of Physics: A direct test of $E = mc^2$. *Nature* 438, 1096–1097 (22 December 2005) | doi:10.1038/4381096a; Published online 21 December 2005.

3. Sime, Ruth (1996), *Lise Meitner: A Life in Physics*, California Studies in the History of Science **13**, Berkeley: University of California Press, pp. 236–237, ISBN 0-520-20860-9

4. Andrei N. Soklakov (2013). "Deriving Derivatives

5. Sasser, John E. (1992). "History of Ordinary Differential Equations: the First Hundred Years", Proceedings of the Midwest Mathematics History Society.

6. Robert Coker (2002). Roller Coasters: A Thrill Seeker's Guide to the Ultimate Scream Machines. New York: Metrobooks. 14. ISBN 1-58663-172-1.