Volume-1, Issue-2

SREEPATHY JOURNAL OF APPLIED SCIENCE AND HUMANITIES



Published by Department of Applied Science and Humanities Sreepathy Institute of Management and Technology, Vavanoor Palakkad - 679 533

January 2015

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2014-15 has been a happening and fulfilling year for **AS&H** Department as we recreated the vision and mission to become a living document. One quality objective of our mission was to create research minded youngsters/faculty members who could find solution to the world's problem through research developments. Our intention and hope is that our work and effort will enable students and faculty members to develop skill knowledge and values that will allow them to participate and contribute positively in an ever changing world.

HOD'S Note

We are very fortunate to be received all possible support from the Sreepathy Management and Principal to accomplish this endeavor successfully. I would like to take the opportunity to thank all staff of **AS & H** department supportive community for working so hard to materialize this venture. By working together we will ensure positive and productive learning environment for all stake holders.

With best regards **Dr. George C.T, MA, PhD, MBA** HOD AS & H DEPARTMENT

Operation Research - Emerging Areas of Application

Neelima K M (Asst.Prof in Mathematics)

Abstract-Operations research, a scientific approach emerged after the second world war as a scientific method to determine how best to operate a system under conditions of allocating scarce resources. Historically operations research considered as a branch of Mathematics, now it is extensively used in almost all fields of human walk. Since operations research is an interdisciplinary mathematical science using mathematical modeling, statistical analysis, mathematical optimization it is easy to arrive optimal or near optimal solutions to complex decision making problems covering from management to technological issues.

Introduction

With the growth of human mankind from its primitive level to modern competitive market the world has seen remarkable changes, not only in its activities but also the nature of their wants. The allocation of resources to satisfy various activities and wants has gained significant importance due to the paucity of resources. This has created a new problem of meeting the future requirements, which needs the efficient use of nonrenewable resources. Since the resources are limited the important challenge faced by the managers is to find out the most effective utilization techniques that requires the application of quantitative methods. Operations research is the outcome and answer to such difficult situations and later on it has been used as a mathematical device for solving various critical problems related to managerial decision making process. Operations research an interdisciplinary mathematical science, employing techniques from mathematics and statistics in order to arrive optimal or near optimal solutions to complex decision making issues. It is also considered as a field, primarily concerned with a set of algorithms, used as a tool for problem solving. Presently no fields can be identified without the application of operations research.

Historical perspective

Operations research is as old as the development of human mankind and society. The known history of operations research as a field of decision making goes up to Mahabharata war, where Pandava's great victory against Kourava's was the result of proper decision taken by Lord Krishna. Historically there are many examples where operations research methods are implemented to solve complicated problems in different fields and gained success.

In third century B.C Archimedes found solutions for the defence of the city of Syracause from the Romans invasion. It was observed as the best example of using the magic of operations research as a method to solve issues related to defence strategy. In 1503 Leonardo Da Vinci used the new

techniques of bombardments, canons and other machines in the war against Prisa. This war was a great success story of the use of operations research as a tool for decision making. But the real start of operations research as a scientific method took place on 1840 when Charles Babbage an English Mathematician had presented a method of operations research for minimizing the cost of transportation of mail. Subsequently operations research as a method for scientific decision making process has been developed and implemented in many areas of decision making process. In 1885, Fredrick .N. Taylor strengthened the application of scientific analysis in the process of production. In the later period, F.W.Harris published a model of operations research in the area of inventory control. This was in the year 1915.

Another one study came in to the literature of operations research was in the year 1917 by a Danish Mathematician A.K.Erlang. His study was confined on the problem of congestion of telephone traffic. The year 1930 has witnessed H.C.Levinson's applied scientific analysis to the problem of merchandising. Scientific study of customers' buying habits, their response to advertisement etc. were the areas of his study. However, operations research as a mathematical device emerged from the need to determine optimal resource allocation and assist decision makers during the Second World War only. As a result, there is a strong belief that the development of operations research started during the Second World War as a discipline. American and British groups worked on various research projects and they had the experience of taking strategic and tactical decisions with the use of mathematical, economic and statistical devices along with engineering and that has resulted a great success in the war. In fact, Second World War was the first time when people realized that resources were scarce and had to be used effectively and allocated efficiently. The success and the usefulness of the projects initiated in the Second World War lead to the development of various techniques for decision making. Later on operations research has come to the order of the day for solving problems in business, industry, management, government, defence organizations, research and development in engineering etc. In the subsequent years, operations research has been extensively spread in the field of hospitals, libraries, city planning, crime investigation and many other related fields.

Conceptual cob web

Defining the concept operations research is not an easy task since it is riddled with numerable number of definitions which have been emerged from time to time. Though there is no official definition of operations research it can be considered as a scientific approach to solve complicated issues. The concept operations research varies from time to time, persons to persons and country to country. Americans called O.R as operations research while it is operational research in Britain. From the aforementioned it is known that there is no well accepted definition of operations research available in the literature of operations research analysis. However to examine and analyse various definitions of operations research given by eminent scholars is useful for further study.

Churchman et al defined operations research as the application of scientific methods, techniques and tools of problems involving the operations of systems so as to provide those in control of the operations with optimum solutions to the problem. From their opinion operations research is a scientific tool for finding optimal solutions to the complicated problems. Another definition of operations research given by Morse and Kimball expressed the same opinion as given by Churchman. They defined operations research as a scientific method of providing quantitative basis for decision making process. E.L Arnoff together with M.J Netzorg defined operations research as a systematic method -oriented study of the basic structure, characteristics, functions and relationships of an organization to provide the executive with a sound, scientific and quantitative basis for decision making. They were of the opinion that operations research is a decision making tool for solving organizational problems. A different definition given by A Clark shown that operations research is the art of winning wars without actually fighting them.

Operations Research Society of America defined operations research as an experimental and applied science devoted to observing, understanding and predicting the behaviour of purposeful man-machine systems. As per their opinion operations research workers should actively engaged in applying this knowledge to practical problems in business, government and society.

As per the above definitions, operations research is an applied science for prediction and observation particularly in the areas of business, Government and society. It is the branch of applied science that is accepted as a reliable tool to arrive optimal or near optimal solution to different issues related to managerial, organizational, technical problems of human mankind. As an interdisciplinary mathematical science it holds a peek position among decision making devices.

Emerging areas of operations research

Operations research has gained an important role in day to day life. It has been emerging as an interdisciplinary area of knowledge that helps to find out solutions to different problems of human mankind. Nowadays, it is widely accepted as a decision making tool and it has a significant impact on economics, management, engineering and other social and behavioral services.

In 1950, operations research was introduced as a subject for academic study in American Universities. Since then, it has been gaining ever increasing importance for the students of mathematics, statistics, commerce, economics, management and engineering. Realizing the importance of operations research in accounts and administration, the governments at different countries have introduced this subject for many of their competitive examinations. Some of the Indian organizations, say, Airlines, Railways, Defense organizations, BHEL, SAIL, ONGC etc. are effectively using operations research techniques as a tool for problem solving. As operations research widens its scope, a wide variety of industries and business concerns are coming and using this technique in their managerial functions. Air carriers, financial institutions, insurance companies, engineering and management, telecommunications and even government sector are using the methods of operations research for finding optimal solutions to their problems. Following are the emerging areas where the scope for operations research is immense and the proper use of such methods would bring better results.

Marketing and sales

Marketing and sales is one of the managerial functions performed by successful business people. The successful marketing operations particularly in the areas of product selection, nature of advertisement and salesman ship, product mix and demand forecasting etc. depend upon the best use of operations research techniques.

Inventory control

The success of a business organization depends on the proper utilization of inventories. Operations research method is useful to find out optimum level of inventories that contribute maximum possible benefit to the industrial concern. The success rate of inventory management directly related to how operations research methods are used to reach best and proper decisions.

Defence

Operations research has also a wide scope of application in defence operations. Many activities are there to be effectively performed by different defence groups like Army, Navy and Air force. Defence operations, intelligence administration, training to troupes, communication facilities etc. require the best use of scientific methods of operations research. In order to coordinate such activities and to arrive at optimum strategy and thereby to get desired results one can use operations research method effectively.

Personnel management

To get an optimum number of skilled persons for the successful working of an organization is not an easy task. Through operations research there is every possibility to overcome this situation.

Traffic management

By the help of operations research one can manage and control traffic demand and available capacity of transportation facilities. By continuously monitoring system performance and related real time data, strategies would be employed based on prevailing and anticipated conditions to optimize effectiveness and safety of the transportation network.

Travel and tourism

Operations research may be used for improving any business process. It can be extensively used in the travel and tourism sector so as to gain maximum benefit. Demand, market research and forecasting, market segmentation, pricing and revenue management, event scheduling etc. are the important areas of this sector where operations research is heavily used.

Agriculture and food

Agriculture and food industry is one of the users of operations research techniques for planting, procurement and distribution of agricultural goods.

Airline industry

Revenue management, pricing, airline network planning, scheduling of airline crews, maintenance planning, inventory management and fuel are some of the areas where operations research method is extensively used.

Energy

Operations research technique is an inevitable factor for managing refinery operations so it is widely used by all the major companies. Electrical and hydro electrical projects use operations research to determine how to effectively produce power and how it is effectively distributed. The efficiency of such projects is the result of proper utilizations of operations research methods.

Health care

Health care area offers a variety of uses for operations research including quality assurance, the design of medical informatics, emergency room scheduling, resource modeling and diagnosis etc. Revenue management in hospitals seeks to reduce cost and makes better use of resources using the techniques of operations research.

Waste management

Waste management is one of the main concerns of every society. Every day a huge amount of waste is generated and accumulated different parts of the world. Disposal of waste without affecting the environment is a big task and to be done very carefully using scientific methods. Since waste consists of different types like biodegradable, solid, non degradable, E waste etc. the disposal of such waste has become a costly affair. Many of the waste may be used for recycling process but the majority of waste cannot be recycled. Cost minimization including the social cost of waste disposal is a challenge faced by governments at different levels. Operations research can be exercised as a scientific method for finding solutions to the aforesaid problems. So operations research methods ensure the best mathematical model that brings cost of waste management to the lowest level and also offers the best practical way of disposing both the biodegradable and non degradable solid waste.

The list of the aforementioned emerging areas of the application of operations research is not a completed one. Still there are many prospective areas that require the application of operations research is lying outside the purview of the study of operations research.

Conclusion

Operations research is an analytical method of problem solving and decision making that is useful in the management of all organizations. The use of operations research was confined to limited areas in the previous periods, but now its application is extended to almost all fields of human life. Not even a single area of human life can be highlighted without the use of operations research method. Even though the uses of operations research methods are widely used in different areas, its use is especially applicable in certain areas. Defence, management, government, production, inventory control, transportation are the areas where the methods of operations research is used very successfully. There are many fields partially applying advanced analytical methods of operations research to make better decisions. Market research, product mix, quality control, portfolio analysis, project planning, recruitment policies, job evaluation, drinking water problems, environmental issues, city planning, research and development, etc. are the newly emerging areas that seeks the help of operations research methods for reaching prudent decisions. Operations research as an art of optimization technique has an edge to other methods commonly used to find out better decisions and build more productive styles. In fact the scope of operations research as an analytical method for problem solving and its importance will be beyond our imagination in the forthcoming years.

An Introduction To Quantum Mechanics

Remitha V P (Asst. Prof in Physics)

The theories of classical mechanics explain the relationship between matter and energy on a macroscopic scale. At the end of nineteenth century it was observed that classical physics could not explain physical phenomena in both macroscopic and microscopic scale. This discovery led to two important revolutions in the world of physics – "The theory of Relativity and the development of Quantum mechanics". The word Quantum represents the minimum of any physical entity involved in an interaction.

Light behaves like particles as well as waves. Matter exhibits wave like characteristics too. It means that light and matter have dual nature. Quantum mechanics shows that all electromagnetic radiations including visible light propogate in the form of packets of energy called photons. Also its energies and spectral intensities are calculated.

Thermal radiation is electromagnetic radiation emitted from the surface of an object due to temperature. This phenomenon is called Blackbody radiation. But classical physics was unable to explain the relationship between temperatures and predominant frequencies of radiations. The accurate explanation was given by Plank's law against classical interpretation of Rayleigh jean's law. He came up with a model In which the radiations are in equilibrium with harmonic oscillators. According to planck the quantum energy of each oscillator is proporational to tha frequency. The constant of proportionality is now known as Planck's constant. Planck's law was the first quantum theory in physics and he won Nobel prize in 1980.

In 1905 Albert eienstein suggested that the energy in a beam of light occurs in individual packets which are now called photons. The 19th century considered light as waves according to wave theory since it was able to explain effects such as refraction, diffraction and polarization. James clark Maxwell had shown that light is a manifestation of electromagnetic field. Maxwell's equation which are complete set of laws of classical electromagnetism describe light as waves. Because of this explanation Eienstein's ideas were not sounded initially. But later the photon model became favoured as it was able to explain several aspects of Photoelectric effect.

When light with sufficient frequency hits a metallic surface, it emits electrons. The maximum possible energy of an ejected electron is related to the frequency of the light, not to its intensity. If the frequency is too low, no electrons are ejected regardless of intensity. The lowest frequency of light that can cause electrons to be emitted is called threshold frequency which is different for different metals. This observation is at odds with classical electromagnetism, which predicts that the electron's energy should be proportional to the intensity of radiation. So when physicists first discovered devices exhibiting Photoelectric effect they initially expected that a higher intensity of light would produce a higher voltage from the Photoelectric device. Einstein explained the effect by postulating that a beam of lighyt is a stream of particles called photons and that, if the beam is of frequency v, then each photon has an energy equal to hu. An electron is likely to be struck only by a single photon, which imparts at most an energy to the electron . Therefore, the intensity of the beam has no effect and only its frequency determines the maximum energy that can be imparted to the electron.

To explain the threshold effect, Einstein argued that it takes a certain amount of energy, called work function, denoted by φ , to remove an electron from the metal. This amount of energy is different for each metal. If the energy of the photon is less than the work function, then it does not carry sufficient energy to remove the electron from the metal. The threshold frequency is the frequency of a photon whose energy is equal to the work function:

Einstein's description of light as being composed of particles extended Planck's notion of quantised energy: a single photon of a given frequency, v, delivers an invariant amount of energy, hv. In other words, individual photons can deliver more or less energy, but only depending on their frequencies. In nature, single photons are rarely encountered. The Sun and emission sources available in the 19th century emit vast numbers of photons every second, and so the importance of the energy carried by each individual photon was not obvious. Einstein's idea that the energy contained in individual units of light depends on their frequency made it possible to explain experimental results. However, although the photon is a particle, it was still being described as having the wave-like property of frequency. Once again, the particle account of light was being compromised.

Development of potentiometric sensor for the determination of Cadmium ion

Jyothi K K (Asst. Prof in Chemistry)

Analytical instrumentation plays an important role in the production and evaluation of new products and in the protection of consumers and the environment. The principal objective of analytical chemistry is to obtain as much chemical information and of as high quality as possible from objects and systems by using a little material, time and human resources as possible and with minimal costs and risks. Analytical chemistry deals with the methods for determining chemical composition of samples of matter and information about the identity of atomic or molecular species or the functional groups of sample. The determination of metal levels especially the toxic ones both in the environment and biological materials are increasingly demanded by the society. The information gathered from analytical chemical process come under the three classes-chemical, biological and biochemical. There is a growing trend to expand boundaries of analytical chemistry to the micro biological and allergiological fields. Analytical chemistry has wide applications in the field of pharmaceutical, food and environmental analysis¹⁻¹³. A number of techniques are available for the determination of metals, such potentiometric, voltammetric, the as amperometric, titrimetric analysis etc. Electroanalytical methods involve the measurement of parameters such as electric potential, current resistance and quantity of electric charge.

Chemical sensors:The desire and need to monitor everything around us, there occurs a tremendous input of energy and resources into developing sensors for a multitude of applications. As a result of all these research lead to the invention of sensors which provide us with portable, miniature and intelligent sensing devices to monitor almost anything we wish. Sensors can be categorized into two general groups. There are physical sensors which are sensitive to such physical responses such as temperature, magnetic field and force, pressure etc. that do not have chemical interface. The chemical sensor rely particular chemical reaction or their response. A chemical sensor is a device which responds to a particular analyte in a selective way through a chemical reaction and can be used for the qualitative and quantitative determination of the analytes. There are two parts to a chemical sensor. Firstly there is the region where the selective chemistry takes place and then there is the transducer. The chemical reaction produces a signal such as colour change, the emission of fluorescent light, a change in oscillator frequency of a crystal. The transducer responds to the signal and translates the magnitude of signal into a measure of the amount of analyte.

Cadmium is a chemical element with symbol **Cd** and atomic number 48. This soft, bluish-white metal is chemically similar to the two other stable metals in group 12, zinc and mercury. Like zinc, it prefers oxidation state+2 in most of its compounds and like mercury it shows a low melting point compared to transition metals. The average concentration of cadmium in Earth's crust is between 0.1 and 0.5 parts per million (ppm). It was discovered in 1817 simultaneously by Stromeyer and Hermann, both in Germany, as an impurity in zinc carbonate. Human uptake of cadmium takes place mainly through food. Foodstuffs that are rich in cadmium can greatly increase the cadmium concentration in human bodies. Examples are liver, mushrooms, shellfish, mussels, cocoa powder and dried seaweed. An exposure to significantly higher cadmium levels occurs when people smoke. Tobacco smoke transports cadmium into the lungs. Blood will transport it through the rest of the body where it can increase effects by potentiating cadmium that is already present from cadmium-rich food. Other high exposures can occur with people who live near hazardous waste sites or factories that release cadmium into the air and people that work in the metal refinery industry. When people breathe in cadmium it can severely damage the lungs. This may even cause death. Cadmium is first transported to the liver through the blood. There, it is bond to proteins to form complexes that are transported to the kidneys. Cadmium accumulates in kidneys, where it damages filtering mechanisms. This causes the excretion of essential proteins and sugars from the body and further kidney damage. It takes a very long time before cadmium that has accumulated in kidneys is excreted from humanbody.

Other health effects that can be caused by cadmium

- are:
- Diarrhoea, stomach pains and severe vomiting
- Bone fracture
- Reproductive failure and possibly even infertility
- Damage to the central nervous system
- Damage to the immune system
- Psychological disorders
- Possibly DNA damage or cancer development

So the need for farication of cadmium based potentiometric sensor is increasing day by day as cadmium seems to be a poisonous element.

Cadmium selective sensors have been fabricated from poly vinyl chloride matrix membrane (PVC) containing 2, 8, 14, 20 *tetrakis* (styryl) calix [4] resorcinarene (TSCR) as ionophore and di-n-butyl sebacate as plasticizers. The best performance was exhibited by the membrane having the composition TSCR: PVC: DBS: NaTPB in the ratio 2: 31: 62: 5 (w/w %). This membrane gives a linear potential response in the concentration range 1.0×10^{-3} M to 1.0×10^{-5} M with a Nernstian slope of $28.47(\pm 1.08)$ mV/decade between pH 4.0 and 7.0. It is inert towards most of salt solutions and non-aqueous media (up to 20%). The membrane can be used over a period of 3 months with good reproducibility. The practical utility of the sensor has been demonstrated by using successively as an indicator electrode in the potentiometric titration of Cadmium (II) with EDTA.



The role of sensor research has gained very much importance in the analytical field. Its need is ever increasing in the newer world. As a part of investigations, a potentiometric sensor is developed for the determination of Cd^{2+} ion. A systematic study is carried out at optimum conditions for the determination of Cd²⁺ ions using the presently developed sensor. The developed sensor acted as a better sensor for the metal in the sample and also as a good indicator electrode in the potentiometric titration.

A survey of socioeconomic status of women in rural areas

Priya Subramanian M (Asst. Prof in Humanities and Communication)

Introduction

Women are one of the greatest assets in our society. Women constitute nearly half of the total population and half of its potential, who are the co-builders of civilization alongside man. But they are deprived all over the world especially in rural areas. Such a social system shows disparity between man and woman in areas like education, employment, health and income opportunity. Here arises the question of empowerment! Empowerment refers to enabling people to take charge of their own lives. Women empowerment emphasizes the importance of increasing their power and taking control over decision and issues that shape their lives. This project as its name suggests, focuses on the socio-economic issues confronted by women.

Significance of the study

- To raise awareness among women about the gender discrimination and the resulting oppression it creates for women as a social group.
- To achieve control and ability to direct or to influence events to protect one's own interests.
- To provide knowledge about support groups and positive attitudes towards life.

Scope of the study

Women empowerment will definitely make them control their own lives. This control makes it possible to ensure that resources and benefits of this world are distributed so that men and women get equal shares.

Objectives of the study

- To analyze various aspects of gender inequality.
- To create a self worth among women.
- To make them realize their ability to influence the direction of social change to create a just social and economic order in nationality.

- To coordinate programs exploiting the potentials of women and develop their personality.
- To enable women to control their own lives.

Literature Review

Women constitute about half of the total population of the country but they suffer from many disadvantages as compared to their counter parts in terms of literary rates, lab our participation rates earnings etc. Even though a number of studies on this topic in general, no comprehensive study had carried out in this particular area. So the available literature regarding this subject is scanty. That's why SIMAT is focusing mainly on this issue and try to conduct a study.

Methodology of the study

The study is based on the primary data collected by pre-constructed scheduled questionnaire. The secondary data also can be collected from the panchayaths as well as villages office since the study targets on women. For the analytical purpose, simple mathematical tools like ratios, percentages, etc may be used.

Limitations of the study

- Possible cooperation problems
- Reliability of data

• Reluctance to reveal information from the part of sample groups.

Conclusion

The best gift parents can give to their daughters is education. If women choose to be ignorant then all the efforts taken by the government and NGO's will go in vain. They should get goals for future and strive to achieve them with courage. Hope that this study will inspire women in this with the courage to break free from the chains of limiting beliefs and societal conditions

Coordination compounds in biological systems

Amrutha K (Asst. Prof in Chemistry)

Coordination compound, any of a class of substances with chemical structures in which a central metal atom is surrounded by nonmetal atoms or groups of atoms, called ligands, joined to it by chemical bonds. Coordination compounds include such substances as vitamin B_{12} , hemoglobin, and chlorophyll, dyes and pigments, and catalysts used in preparing organic substances.

.Naturally occurring coordination compounds are vital to living organisms. Metal complexes play a variety of important roles in biological systems. Many enzymes, the naturally occurring catalysts that regulate biological processes, are (metalloenzymes); metal complexes for example. carboxypeptidase, a hydrolytic enzyme important in digestion, contains a zinc ion coordinated to several amino acid residues of the protein. Another enzyme, catalase, which is an efficient catalyst for the decomposition of hydrogen peroxide, contains iron-porphyrin complexes. In both cases, the coordinated metal ions are probably the sites of catalytic activity. Hemoglobin also contains iron-porphyrin complexes, its role as an oxygen carrier being related to the ability of the iron atoms to coordinate oxygen molecules reversibly. Other biologically important coordination compounds include chlorophyll (a magnesium-porphyrin complex) and vitamin B₁₂, a complex of cobalt with a macrocyclic ligand known as corrin.

Metal ions are very widespread in biological systems: some are present in enzymes, some in structural features like the calcium in bones, some in transport systems like the iron in haemoglobin, some in control systems like sodium and potassium in nerve cells. Generally speaking, metals of groups 1 and 2 (Na, K, Ca, Mg) tend to be present in fairly large quantities, whereas transition metals tend to be present in relatively small quantities, and are sometimes called trace metals. These metal ions are not usually present as free metal ions, but instead as complexes. Metals in biological systems are often bound to ligands called *macrocycles* - these are cyclic compounds that contain several donor atoms. Two of the most common examples are the porphyrin ring and the corrin ring:



Both of these compounds have four nitrogen donors. They are subtly different though: for one thing the porphyrin coordinates as a dianion, whereas the corrin coordinates as a mono-anion (the N's get deprotonated), and also the porphyrin is planar whereas the corrin tends not to be. Various substituents can be attached at those numbered positions (1-8, and the ones between the rings labelled with Greek letters) around the periphery of the macrocycle.

The most well known example of a porphyrin complex is the haem in haemoglobin, the oxygen-transporting protein in red blood cells. The way that haemoglobin works is shown schematically below:



Haemoglobin basically consists of two parts, the haem group (the iron with its porphyrin ligand), and a protein, globin. In its resting state with no oxygen bound, the iron is high spin Fe(II). When oxygen binds to make oxyhaemoglobin, it changes to low spin Fe(II). This, needless to say is a reversible process, so that when the red blood cell gets to an oxygendeficient area, that equilibrium gets reversed and O_2 is released. Notice that this this is an example of *oxygenation* (adding oxygen) rather than oxidation, because the iron doesn't change oxidation state. Or at least not usually: if we do oxidise it to Fe(III) (and a very small proportion does actually do this for every oxygenation/deoxygenation cycle) we get a substance called methaemoglobin, which is inactive for oxygen transport. One of the functions of the globin protein is to stop this oxidation happening: if we disrupt the protein so that we separate the haem from the globin, we can isolate haem under strictly anaerobic conditions, but as soon as we expose it to air, it changes to Fe(III) in the form of haematin.

That change from high spin to low spin on oxygenation has far reaching consequences. In its high spin state, the radius of the iron atom is just too large to allow it to fit into the plane of thre porphyrin ring. But when we change to low spin, the radius decreases a bit (becasue all six electrons are now in the t_{2g} level) and it's thought this allows the iron to move into the plane - dragging with it its sixth ligand, a histidine group, and thus triggering off a cascade of conformational changes which affect other subunits of the haemoglobin. This results in cooperative binding of O₂: once an oxygen is bound to one subunit, the others pick one up more easily.

The best known example of a corrin ring is in Vitamin B12 cofactor, which contains a cobalt corrin complex:



The unusual thing about this species is that in the natural state the R group attached to cobalt is a methyl: this means that it's a rare example of a naturally-occurring organometallic compound (that's one with a direct metal-carbon bond).

As well as occurring in biogical systems, metal complexes can actually be used as drugs. The best example here is cis-platin, the name given to cis-[PtCl₂(NH₃)₂], which is used in cancer chemotherapy. This is a very simple complex, though there is one drawback: it has a certain degree of toxicity itself. The corresponding *trans* isomer has no beneficial effect, but is also toxic. Therefore it is important to be able to make the *cis* isomer in a pure form, uncontaminated by the *trans*.



The trans effect is the ability of a ligand to labilise the ligand trans to itself, in other words it encourages the substitution reactions of that ligand. In this case the trans effect of chloride is greater than that of ammonia. So in the top diagram, once we have put one ammonia on, the second one goes on *trans* to one of the remaining chlorides to give us exclusively the *cis* isomer. In the bottom diagram, if we start from $[Pt(NH_3)_4]^{2+}$, when we put one chloride on, the second will go on *trans* to the first, resulting in the *trans* isomer. So we can make both isomers in a controlled way.

A major application of coordination compounds is their use as catalysts, which serve to alter the rate of chemical reactions. Certain complex metal catalysts, play a key role in the production of polyethylene and polypropylene. In addition, a very stable class of organometallic coordination compounds has provided impetus to the development of organometallic chemistry.

9

RAVENS

I am a dead man now Walking in the woods, alone Walking through the lawns Whatever I touch Whatever I see Is death, only death? Everything under my wings Are for the Ravens Nothing feeds my hunger Not even the autumn woods Not even the fallen leaves When they feel my breath They run for their lives Away from my bloodshot eyes So better wonder off now Holding your dear ones, close Or your lives will be mine Left for the high flying Ravens....

> ABHIRAJ (S1S2 Batch B)





ALONE!

I'm always being alone here Mob rush to see me, I'm always being alone The pair of eyes wondering around me She is trying to say something to me How long i cry or murmur, don't know I'm not hearing anything Slugging to say Am I alive? But I'm alone. Blazes round me Floating like a feather. I'm alone here.....

> VIMAL V (Asst Prof in Mathematics)

Mathematics as a part of human culture

Deepthi P V (Asst. Prof in Mathematics)

Mathematics may be described as the fundamental science. It may be broadly described as the science of space, time and number. The universe exists in space and time, and is constituted of units of matter. To calculate the extension or composition of matter in space and time and to compute the units that make up the total mass of the material universe is the object of Mathematics. For the space-time quantum is everywhere full of matter and we have to know matter mathematically in the first instance.

Mathematics is a universal part of human culture. It is the tool and language of commerce, engineering and other sciences – physics, computing, biology etc. It helps us recognise patterns and to understand the world around us. Mathematics plays a vital, often unseen, role in many aspects of modern life, for example:

- Space travel
- Safeguarding credit card details on the internet
- Modelling the spread of epidemics
- Predicting stock market prices
- Business decision making

Science

Science and math are intimately connected, particularly in fields such as chemistry, astronomy and physics. Students who can't master basic arithmetic skills will struggle to read scientific charts and graphs. More complex math, such as geometry, algebra and calculus, can help students solve chemistry problems, understand the movements of the planets and analyze scientific studies. Math is also important in practical sciences, such as engineering and computer science. Students may have to solve equations when writing programs.

Literature and Writing

Literature might seem like a far cry from math, but mastering basic arithmetic can enable students to better understand poetry. The meter of poetry, the number of words to include in a line and the effect that certain rhythms have on the reader are all products of mathematical calculations.. The linear, logical thinking used in mathematical problems can also help students write more clearly and logically.

Social Studies

Social studies classes, such as history, often require students to review charts and graphs that provide historical data or information on ethnic groups. In geography classes, students might need to understand how the elevation of an area affects its population or chart the extent to which different populations have different average life spans. Knowledge of basic mathematical terms and formulas makes statistical information accessible.

The Arts

Students interested in pursuing careers in theater, music, dance or art can benefit from basic mathematical knowledge. Musical rhythm often follows complex mathematical series, and math can help students learn the basic rhythms of dances used in ballet and theater performances. Art thrives on geometry, and students who understand basic geometric formulas can craft impressive art pieces.

Mathematics has played a very important role in building up modern Civilization by perfecting all Science. It is said that Mathematics is the gate and key of the Science. According to the famous Philosopher Kant, "A Science is exact only in so far as it employs Mathematics". So, all scientific education which does not commence with Mathematics is said to be defective at its foundation. Neglect of mathematics works injury to all knowledge. Mathematics is a creation of human mind concerned chiefly with ideas, processes and reasoning. It is much more than Arithmetic, more than Algebra more than Geometry. Also it is much more than Trigonometry, Statistics, and Calculus. In the pedagogical study of mathematics we mainly concern ourselves with two things; the manner in which the subject matter is arranged or the method the way in which it is presented to the pupils or the mode of presentation. Mathematics is intimately connected with everyday life and necessary to successful conduct of affairs. It is an instrument of education found to be in conformity with the needs of human mind

Tomorrow

Anagha Venugopal(S1S2 Batch A)

Days are passing swifter..... Never giving chances for a pause Off with it glides me and you Through the paths of undefinable agonies

All we see here are puddles Not of sweat......after a day out But blood.... And bloodshed everywhere!!

Garnished is this mighty land With sinless blood of innocence Ruling over them bold at heart Out for another part..!!

Taking away with them Are our breathes.! "Revolution"... Revolt

To you .. this means nothing... For you have got it old..! Family.. Goodwill and bonds!!

To me this refugee camp is my home Little place to rest this forehead Fixed with dilemmas and question marks

.. Red blood stains mark her face..The one that brought me to earth..!Blasting away from my home...Are my dreams...! My little world..!

My little hopes..! All in vain!!

Lying on the bare land... Is my plumpy pussy No longer in vigour Better outshining are those ribs... When sunlight strikes those reflecting strings!!

Unbearable are these sights "Mutiny ... rage and "tantrum"..! Shedding away with it are our lives..! Who cares ...!! Bothers forth..?

For them this means nothing.. For all I know is "they got it all"..! At least a tomorrow in their hands..!

What is this life mean to us? Are we to be mean..! Meant to be.. Crushed and thrown away

Answering with a full stop would be pleased.. But all I know is that.... You will give it exclamation, an awe... And forget this in ease!

For this, cries remain silent In those dumb ears of you..! Who is to give us a tomorrow..!? "A tomorrow" in peace.

To be.....

Always wanted to live freely But wasn't! Just living Was just surviving. Survived in the world of dreams Now they are threatening me Now I'm haunted Can't break the shackle of sorrow I'm just surviving Want to forget everything It is getting worst and worst Think, horns of death is near Watching myself Not breathing, no heart beats Hardly realizing All I thought was not mine from now onwards

Gopeekrishnan J (S1S2 Batch E)

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Sarang B Divakar (S1S2 Batch C) 13

OWAK AR

Trigonometry in Nature

Bagyasree P G (Asst. Prof in Mathematics)

One specific area of mathematical and geometrical reasoning is trigonometry which studies the properties of triangles. Now it's true that triangles are one of the simplest geometrical figures, yet they have varied applications. The primary application of trigonometry is found in scientific studies where precise distances need to be measured.

The techniques in trigonometry are used for finding relevance in navigation particularly satellite systems and astronomy, naval and aviation industries, oceanography, land surveying, and in cartography (creation of maps). Now those are the scientific applications of the concepts in trigonometry, but most of the math we study would seem (on the surface) to have little real-life application.





So is trigonometry really relevant in your day to day activities? Let's explore areas where this science finds use in our daily activities and how we can use this to resolve problems we might encounter. As you may be aware sound travels in waves and this pattern though not as regular as a sine or cosine function, is still useful in developing computer music. A computer cannot obviously listen to and comprehend music as we do, so computers represent it mathematically by its constituent sound waves. And this means that sound engineers and technologists who research advances in computer music and even hi-tech music composers have to relate to the basic laws of trigonometry.



Trigonometry finds a perfect partner in modern architecture. The beautifully curved surfaces in steel, stone and glass would be impossible if not for the immense potential of this science. So how does this work actually. In fact the flat panels and straight planes in the building are but at an angle to one another and the illusion is that of a curved surface.





Sreepathy Journal of Applied Science and Humanities



Sreepathy Journal of Applied Science and Humanities

Volume-1, Issue-2