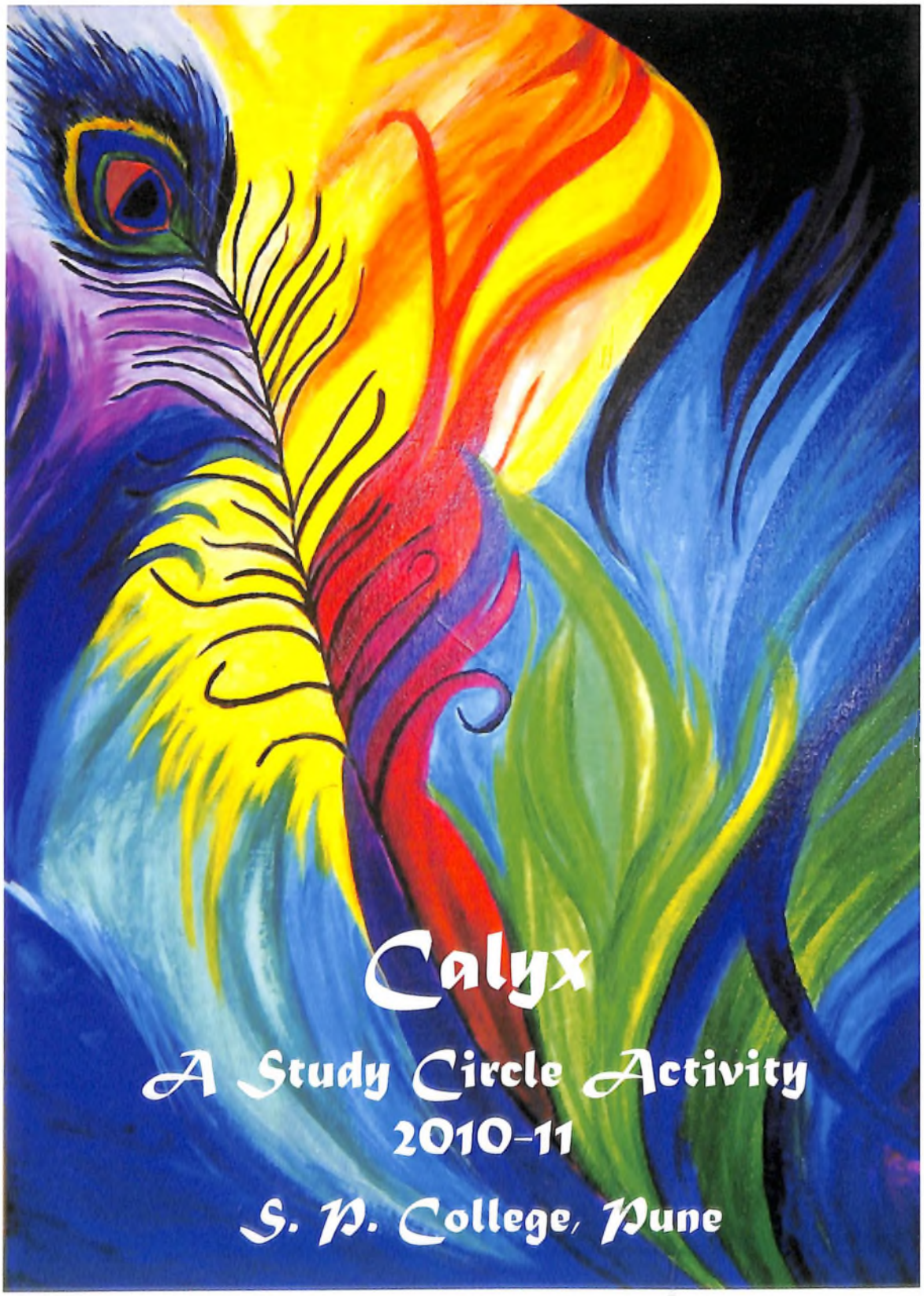


Calyx

A Study Circle Activity

2010-11

S. P. College, Pune

AN OVERVIEW OF CALYX 2010-11 ARTICLES

- NUCLEAR HAZARDS
  This article focuses on the world's nuclear disasters with special reference to the recent nuclear disaster in Japan in March 2011.

- LET'S TOUR THE ENVIRONMENT
  This article highlights the significance of ecotourism for the conservation of our environment. The status of ecotourism in India is also discussed in this essay.

- CRISIS THAT OPENS OPPORTUNITIES: 1991 BALANCE OF PAYMENT CRISIS
  This paper describes the story of how the balance of payment crisis in India in 1993 changed the economic fortune of the country and the perspective towards problem solving.

- ROLE OF CULTURE AND RELIGION IN THE PROCESS OF GLOBALIZATION
  This paper signifies how the role of culture and religion can be effective to improve the process of globalization and to achieve global peace.

- RENÉ DESCARTES: A RATIONALIST
  This paper gives the information about the great mathematician, philosopher and rationalist Descartes' life and work. Descartes was the founder of new epoch in philosophy.

- MATHS: A KALEIDOSCOPE
  This article reflects the importance of Mathematics in many disciplines with special emphasis on applications of Mathematics in the field of Chemistry.

- DISCOVERY OF BENZENE: KEKULE'S CREATIVITY
  As 2011 is "The International Chemistry Year", the achievements of the great scientist Kekulé whose creativity and famous discovery of the Benzene ring gave a new identity to Chemistry are addressed in this article.

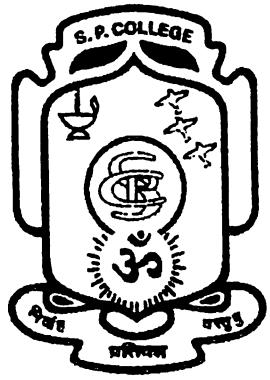
- THE MAGIC BETWEEN BOOTING OF OPERATING SYSTEM
  This article explains the process of booting of operating system.

- SUICIDAL IDEATION IN RELATION TO SELF ESTEEM AND FAMILY ENVIRONMENT AND ITS PREVENTION
  This research paper reveals the relationship between suicidal ideation and self esteem and family environment and also how it can be prevented.

SIR PARASHURAMBHAU COLLEGE, PUNE.

Calyx

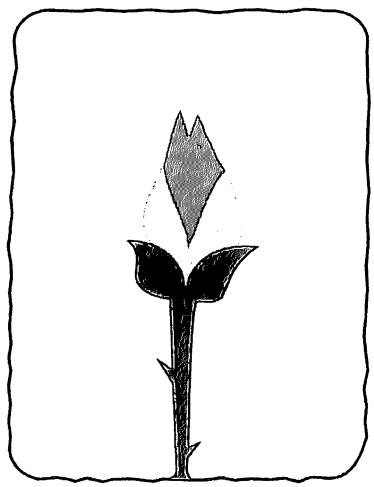
A STUDY CIRCLE ACTIVITY
(2010–11)



Editors:
Mithilesh Chavan
Barnali Das

calyx *n. tech. (pl.* ***calyxes*** *or* ***calyces****) a ring of leaves (sepals) which protects a flower before it opens and later supports the opened flower.*

Calyx will always remain a base upon which beautiful thoughts and ideas blossom.



Acknowledgement

We would like to extend our sincere gratitude and heartfelt thanks to the In-charge of the ***"Calyx"*** magazine Dr. V. M. Sholapurkar for his whole-hearted interest and invaluable guidance. Without his constant encouragement and efforts, completion of the magazine would not have been possible.

We also express our indebt to the Principal Dr. D. N. Sheth for his support and facilities provided for the activities of the ***"Calyx"*** magazine.

We take this opportunity to thank all the professors who directly or indirectly motivated, guided and helped in the making of this magazine.

We would like to thank all the students of ***'The Study Circle'*** for their whole-hearted co-operation, dedication and active participation.

Last but not the least we thank Mr. Madhav Nagpurkar of Shree Mudran Mandir, Pune for the neat typesetting and printing of the present volume.

Mithilesh Chavan
Barnali Das

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Editorial

Dear Readers,

We are highly elated to present to you the seventh issue of the students' magazine ***'Calyx'*** with a feeling of deep pleasure, enthusiasm and satisfaction. It is highly commendable that a lot of sincere efforts have gone into its making. We hope that its careful reading and understanding creates a delightful experience for the readers and offers them an opportunity to experience the joy of intellectual inquiry.

The magazine this year covers a diverse and broad spectrum of interesting articles. The present issue comprises articles from eight different streams of knowledge viz. Geography, Economics, Political Science, Philosophy, Mathematics, Chemistry, Computer Science and Psychology. This issue is specially written by Post Graduate students of the above diverse disciplines, who have chosen the topics of their own interest and from their own academic spheres of study and research.

Interestingly, these articles reflect the student's perception, approaches and their interpretation. The articles in this volume explore a variety of topics not commonly dealt with. They help in widening newer vistas of understanding. The articles reflect the core concerns in the respective branches of Science and Arts. In the present volume, recent issues like nuclear disaster in Japan are addressed. As 2011 is "The International Chemistry Year", articles related to chemistry are written in this issue.

'Calyx' is a magazine of the students of ***'The Study Circle'***. It is truly a students' magazine in a broad sense. All academic, artistic and intellectual efforts needed for its creation have come from the students. It offers them a platform to express themselves freely and creatively on any academic subject of their liking. The outcome, however, is not purely meant for students alone, but for all interested readers.

We have experienced that ***'Calyx'*** has grown and enhanced gloriously since last seven years and is constantly enriched with innovative ideas and thoughts. We also hope that the coming years will see ***'The Study Circle'*** becoming more active and encompass more fields of learning.

- Mithilesh Chavan
- Barnali Das

Foreword

I am delighted to present the seventh issue of the Students' magazine 'Calyx'. The first six issues received special attention, applause and appreciation from all those who are interested in student-centered activities. This issue, like first six, is an outcome of the sustained, committed and creative efforts of students of the study circle group of our college. I have a deep sense of contentment in expressing my heartfelt appreciation for this amazing work. Well Done!

The publication of 'Calyx' is an experiment, an experiment designed to promote original thinking, to provide opportunity to intelligent students for self-learning, to instill research mentality in bright young minds and ultimately to make students realize their infinite potential. Calyx is a modest attempt in initiating a learning process outside the walls of a classroom. I am sure that students enjoy this 'academic space' and meaningfully use it to widen their horizons.

The students of the study circle enjoy the freedom of selection and presentation of the topics. They also carry out all the editorial responsibilities. The chief editors and the leaders of the group Mithilesh Chavan and Barnali Das worked very hard. Their meticulous and dedicated editorial work deserves a special mention. I wish all the success to the members of the study circle group. The interaction with the group has been a fruitful and learning experience for me, at a personal level.

The articles are written exclusively by the students of postgraduate classes. As usual, the articles are written on a variety of interesting topics ranging from 'Climate Change' to 'Globalization' and from 'Nuclear Hazards' to 'Operating Systems'. I am sure that the readers would find the articles informative and interesting. Students of the study circle group to the best of their capacity have surveyed the literature and expressed their views. All suggestions for the improvement are most welcome!

I take this opportunity to thank Principal Dr. D. N. Sheth for his constant encouragement and support in bringing out the magazine. I gratefully acknowledge the help from all the teaching and non-teaching members of our college. It is a pleasure to place on record my sincere thanks to Mr. Nagpurkar for his interest, innovative suggestions and fine printing.

Dr. V. M. Sholapurkar
In-charge, Calyx

Contents

Nuclear Hazards

Barnali Das (M. Sc. II Geography)
Geetanjali Kamble (M. Sc. II Geography)
Amog Kadage (M. Sc. I Geography)
Vahida Shaikh (M. Sc. I Geography)

INTRODUCTION:

Risk or danger to human health or the environment posed by radiation emanating from the atomic nuclei of a given substance, or the possibility of an uncontrolled explosion originating from a fusion or fission reaction of atomic nuclei is known as **"Nuclear Hazard"**. Nuclear hazard is a chemical hazard.

'Nuclear Fusion' is a process in which two lighter nuclei fuse together to form a heavy nucleus and energy will be released. Fusion reactions are also known as ***'thermo-nuclear reactions'***. A fusion reaction is a powerful source of energy and is to be carried at a very high temperature.

'Nuclear Fission' is the splitting of the nucleus of the atom. The resulting energy can be used for a variety of purposes. **'Radioactivity'** is the spontaneous disintegration of the nucleus of an atom with the emission of radiation. Isotopes are capable of emitting radiant energy. Radioactive isotopes are also known as ***'radionuclides'***. Uranium, Radium and Thorium are the most commonly known isotopes that are capable of emitting radioactive emissions. On emission of radiation from isotopic elements, there will be loss of weight of the element. The loss of weight and its conversion into energy is illustrated by Einstein's famous equation $\mathbf{E = mc^2}$ (E = Energy, m = mass of the object and c = speed of light emission). Thus mass can be converted into energy.

ADVANTAGES AND DISADVANTAGES OF NUCLEAR ENERGY:

Nuclear energy can be both beneficial and harmful, depending on the way in which it is used. The nuclear energy obtained from nuclear fission and fusion has given rise to many good hopes but on the other hand has presented many threats to mankind.

X-rays are used to examine bones for fractures, cancer is treated with radiation, and diseases are diagnosed with the help of radioactive isotopes. Approximately 17% of the electrical energy generated in the World comes from nuclear power plants.

However, on the other hand, it is impossible to forget the devastation that nuclear bombs caused in the cities of Hiroshima and Nagasaki in Japan during the Second World War. United States was the first country to develop an atomic bomb, which was subsequently dropped on the Japanese cities of Hiroshima and Nagasaki in August 1945. Many nuclear

explosions have been conducted experimentally in the atmosphere, underground and undersea, particularly during the 1950s & 1960s. Since the disaster caused by Nagasaki and Hiroshima atom bombs, people all over the world became aware of the harmful effect of radioactive substances.

Environmental hazards from nuclear power plants are results of the release of radioactive substances which could happen at the slightest error or negligence. The emitted radiations are capable of damaging the protoplasmic system of living system. The emitted radiations may be alpha, beta and gamma rays. These rays enter the environment from nuclear fallouts, nuclear power plants, nuclear wastes and certain other sources.

The consequences of using nuclear fuels to generate energy are very serious. The radioactive wastes from nuclear energy have caused, and will continue to cause serious environmental damage. The waste products of nuclear reactors are highly radioactive and toxic. The problem of their disposal is a challenging problem that is not solved as yet. Several serious accidents have caused worldwide concern about safety and disposal of radioactive wastes.

SOURCES OF RADIOACTIVITY:

The sources of radioactivity are natural and man-made. The natural sources include:

1) Cosmic rays from the outer space. The quantity depends on altitude and latitude; it is more at higher latitudes and high altitudes.
2) Emissions from radioactive materials from the Earth's crust.

'Radioactive Fallout' is the shower of radioactive debris, usually from the Earth's atmosphere. Three categories of fallout material are recognized viz. Local Fallout, Tropospheric Fallout and Stratospheric Fallout.

But it is the man-made sources which are posing a threat to mankind. The man-made sources of radioactivity are Nuclear wastes (i.e. waste material that contains radioactive nuclei) produced during:

1) Mining and processing of radioactive ores;
2) Use of radioactive material in nuclear power plants;
3) Use of radioactive isotopes in medical, industrial and research applications;
4) Use of radioactive materials in nuclear weapons;

Radioactive contamination of the atmosphere and the oceans may be caused by the spread of radionuclides. The release of artificial radionuclides into air and water is causing grave concern in the world today. Three major sources of ocean contamination by artificial radioactive material include:

1. Nuclear Explosions.
2. Nuclear power plants.
3. Nuclear-driven ships/ submarines.

The greatest exposure to human beings comes from the diagnostic use of X-rays, radioactive isotopes used as tracers and treatment of cancer and other ailments.

RADIOACTIVE WASTE

Metal fuel rods produced from Uranium ore containing U-235 are loaded into the reactor. As fission occurs, the concentration of U-235 atoms decreases. After about three years, a fuel rod does not have enough radioactive material to sustain a chain reaction and the spent fuel rods must be replaced by new ones. However, these spent rods are still very radioactive, containing about 1% U-235 and 1% Plutonium. These rods are a major source of radioactive waste material produced by a nuclear reactor. Initially, it was thought that spent fuel rods could be reprocessed, not only to provide new fuel but also to reduce the amount of nuclear waste. However, the cost of producing fuel rods by reprocessing was found to be greater than the cost of producing fuel rods from ore. Presently, India does operate reprocessing plants to reprocess spent fuel as an alternative to storing them as nuclear waste. At each step in the cycle, there is a danger of exposure to harmful radiation and poses several attendant health and environmental concerns.

The nuclear wastes are usually classified into three categories:

1) **High Level Wastes (HLW):** High level wastes have a very high-radioactivity per unit volume e.g. spent nuclear fuel. HLW's have to be cooled and are, therefore, stored for several decades by its producer before disposal. Since these wastes are too dangerous to be released anywhere in the biosphere, therefore, they must be contained either by converting them into inert solids (ceramics) and then buried deep into earth or are stored in deep salt mines.

2) **Medium level wastes (MLW):** Medium level wastes (e.g., filters, reactor components, etc.,) are solidified and are mixed with concrete in steel drums before being buried in deep mines or below the sea bed in concrete chambers.

3) **Low liquid wastes (LLW):** Low liquid wastes (e.g., solids or liquids contaminated with traces of radioactivity) are disposed of in steel drums in concrete-lined trenches in designated sites.

There are several types of radioactive waste generated by the nuclear industry, but the two most important and potentially dangerous are high-level waste and radon which need to be concentrated largely on.

High-Level Waste:

The spent reactor fuel is sent to a reprocessing plant to remove valuable components. The residue, containing nearly the entire radioactivity produced in the reactor, is called high-level waste. Following reprocessing, the waste can be converted into a rock-like form and buried deep underground in a carefully selected geological formation.

One important aspect of high-level waste disposal is the small quantities involved. The waste generated by one large nuclear power plant in one year and prepared for burial is about six cubic yards, roughly one truckload. This is two million times smaller by weight, and billion of times smaller by volume, than wastes from a coal plant. The principal concern about buried waste is that it might dissolve in groundwater and contaminate food and drinking water supplies.

Radon:

Another aspect of nuclear waste may involve important health impacts: the release of radon, a radioactive gas that naturally evolves from uranium. There has been some concern over increased releases of radon due to uranium mining and milling operations. These problems have now been substantially reduced by cleaning up those operations and covering the residues with several feet of soil. The health effects of this radon are several times larger than those from other nuclear wastes, such as the high-level waste, but they are still much smaller than the effects of coal-burning.

WORLD'S NUCLEAR DISASTERS

CHERNOBYL DISASTER

Although nuclear power has significant benefits, an incident which changed people's attitudes towards nuclear power plants was the Chernobyl Disaster that occurred in 1986. Chernobyl is a small city in Ukraine, near the border with Belarus, north of Kiev. The Chernobyl nuclear disaster was the world's worst nuclear accident. Due to this accident more than 50 ton of radio-active material mixed in the atmosphere and spread over a large region. This radio-active radiation was 200 times the radiation spread during atomic blast in Hiroshima and Nagasaki. In 1996, ten years after the accident, it was clear that one of the long-term effects was the increased frequency of thyroid cancer in children. There was also a spurt in genetic anomalies as doctors began observing clusters of children born displaying *monodactyly* (fingers fused together to form a paddle) and *polydactyly* (more than 5 digits on the hands and feet). A similar phenomenon has also been observed in the villages and towns around the Kalpakkam Nuclear Station, south of Chennai.

FUKUSHIMA I NUCLEAR ACCIDENT:

The 40-year-old Fukushima I Nuclear Power Plant, built in the 1970s, endured Japan's worst earthquake on record in March 2011 but had its power and back-up generators knocked out by a 7-meter tsunami that followed. The designers of the reactors at Fukushima did not anticipate that a tsunami generated by an earthquake would disable the backup systems that were supposed to stabilize the reactor after the earthquake. Back-up diesel generators that might have averted the disaster were positioned in a basement, where they were overwhelmed by waves. Nuclear reactors are such *"inherently complex, tightly coupled systems that, in rare, emergency situations, cascading interactions will unfold very rapidly in such a way that human operators will be unable to predict and master them"*. The cascade of events at Fukushima had been foretold in a report published in the U.S. several decades ago.

Lacking electricity to pump water needed to cool the atomic core, engineers vented radioactive steam into the atmosphere to release pressure, leading to a series of explosions that blew out concrete walls around the reactors. Radiation readings spiked around Fukushima as the disaster widened, forcing the evacuation of 2,00,000 people and causing radiation levels to rise on the outskirts of Tokyo, 135 miles (210 kilometers) to the south, with a population of 30 million.

The people in Japan are living in a contaminated area for ever and knowing that whatever food they eat, it might be contaminated and always living with this sort of shadow of fear over them that they will die early because of cancer and induced by Caesium or Strontium or some other radionuclide. It affects millions of people, it affects our land and it affects our atmosphere. The radio nuclides from Fukushima are going into the sea. It doesn't just kill now, it kills later, and it could kill centuries later. Because the stuff that is being deposited doesn't just end, it has a long, long life. It's affecting future generations, it's not just affecting this generation.

NUCLEAR SAFETY:

Nuclear safety covers the actions taken to prevent nuclear and radiation accidents or to limit their consequences. This covers nuclear power plants as well as all other nuclear facilities, the transportation of nuclear materials and the use and storage of nuclear materials for medical, power, industry and military uses.

The nuclear power industry has improved the safety and performance of reactors, and has proposed new (but generally untested) "inherently" safe reactor designs but there is no guarantee that the reactors will be designed, built and operated correctly. Mistakes do occur and the designers of reactors at Fukushima in Japan did not anticipate that a tsunami generated by an earthquake would disable the backup systems that were supposed to stabilize the reactor after the earthquake. Catastrophic scenarios involving terrorist attacks are also conceivable.

The three primary objectives of **nuclear safety systems** as defined by the Nuclear Regulatory Commission are to shut down the reactor, maintain it in a shutdown condition, and prevent the release of radioactive material during events and accidents. These objectives are accomplished using a variety of equipment, which is part of different systems, of which each performs specific functions.

Nuclear weapon safety, as well as the safety of military research involving nuclear materials, is generally handled by agencies different from those that oversee civilian safety, for various reasons, including secrecy.

Internationally the International Atomic Energy Agency (IAEA) works with its Member States and multiple partners worldwide "to promote safe, secure and peaceful nuclear technologies". Some scientists say that the 2011 Japanese nuclear accidents have revealed that the nuclear industry lacks sufficient oversight, leading to renewed calls to redefine the mandate of the IAEA so that it can better police nuclear power plants worldwide. It recommends safety standards, but Member States are not required to comply; it promotes nuclear energy, but it also monitors nuclear use; it is the sole global organization overseeing the nuclear energy industry, yet it is also weighed down by checking compliance with the Nuclear Non-Proliferation Treaty (NPT).

Despite victories like the creation of the Atomic Energy Commission, and later the Nuclear Regular Commission, the secrecy that began with the Manhattan Project has tended to permeate the civilian nuclear program, as well as the military and defence programs.

Nuclear power plants are some of the most sophisticated and complex energy systems ever designed. Any complex system, no matter how well it is designed and engineered, cannot be deemed failure-proof. The reactors themselves were enormously complex machines with an incalculable number of things that could go wrong. When that happened at Three Mile Island in 1979, another fault line in the nuclear world was exposed. One malfunction led to another, and then to a series of others, until the core of the reactor itself began to melt, and even the world's most highly trained nuclear engineers did not know how to respond. The accident revealed serious deficiencies in a system that was meant to protect public health and safety.

A fundamental issue related to complexity is that nuclear power systems have exceedingly long lifetimes. The timeframe involved from the start of construction of a commercial nuclear power station, through to the safe disposal of its last radioactive waste, may be 100 to 150 years.

FAILURE MODES OF NUCLEAR POWER PLANTS:

There are concerns that a combination of human and mechanical error at a nuclear facility could result in significant harm to people and the environment. Nuclear reactors can fail in a variety of ways. Normally,

the cooling system in a reactor is designed to be able to handle the excess heat this causes; however, should the reactor also experience a loss-of-coolant accident, then the fuel may melt or cause the vessel it is contained in to overheat and melt. This event is called a **'Nuclear Meltdown'.**

After shutting down, for some time the reactor still needs external energy to power its cooling systems. Failure to provide power for the cooling systems, as happened in Fukushima I, can cause serious incidents. Because the heat generated can be tremendous, immense pressure can build up in the reactor vessel, resulting in a steam explosion, which happened at Chernobyl. More importantly, the Chernobyl plant lacked a containment structure. Western reactors have this structure, which acts to contain radiation in the event of a failure. Containment structures are, by design, some of the strongest structures built by mankind. However during the serious incidents engineers may need to vent the containment intentionally as otherwise it would crack due excess of the pressure.

Intentional cause of such failures may be the result of **'Nuclear Terrorism'.**

VULNERABILITY OF NUCLEAR PLANTS TO ATTACK:

Nuclear power plants are generally (although not always) considered "hard" targets. In the U.S., plants are surrounded by a double row of tall fences which are electronically monitored. The plant grounds are patrolled by a sizeable force of armed guards.

Plant location

In many countries, plants are often located on the coast, in order to provide a ready source of cooling water for the essential service water system. As a consequence the design needs to take the risk of flooding and tsunamis into account. Failure to calculate the risk of flooding correctly lead to a Level 2 event on the International Nuclear Event Scale during the 1999 Blayais Nuclear Power Plant flood, while flooding caused by the 2011 Tōhoku earthquake and tsunami lead to the Fukushima nuclear accidents.

The design of plants located in seismically active zones also requires the risk of earthquakes and tsunamis to be taken into account. Japan, India, China and the USA are among the countries to have plants in earthquake-prone regions.

NEW NUCLEAR TECHNOLOGIES:

The next nuclear plants to be built will likely be Generation III or III+ designs, and a few such are already in operation in Japan. Generation IV reactors would have even greater improvements in safety. These new designs are expected to be passively safe or nearly so, and perhaps even inherently safe.

However, safety risks may be the greatest when nuclear systems are the newest, and operators have less experience with them. Almost all serious nuclear accidents occurred with what was at the time the most recent technology. The problem with new reactors and accidents is twofold: scenarios arise that are impossible to plan for in simulations; and humans make mistakes". *"Fabrication, construction, operation, and maintenance of new reactors will face a steep learning curve: advanced technologies will have a heightened risk of accidents and mistakes".* The technology may be proven, but people are not". The multiple reactor crises at Japan's Fukushima nuclear power plant reinforce the need for strengthening global instruments to ensure nuclear safety worldwide.

HARMFUL EFFECTS OF NUCLEAR ENERGY:

Nuclear energy has following dark sides:

1. **Nuclear weapons :** The nuclear weapons have devastating implications. The atom bombs dropped over Hiroshima and Nagasaki can never be forgotten. These bombs killed numerous people and destroyed everything. A nuclear explosion produces tremendous heat and gaseous matter rising up like a cloud, dispersing radioactive materials and causing pollution of air, water and soil.

2. **Disasters:** Use of nuclear energy can result in major disasters. One of these is Chernobyl Disaster of 1986 in erstwhile USSR. The nuclear reactor caught fire and resulted in world's worst nuclear accident that took 10 days to control the runaway reaction. Thousands of people died immediately, 24,000 people received high doses of radiations. After ten years of the incident (1996) it was found that increased rate of thyroid cancer in children was one of the long term effects. Fused fingers (monodactyly) to form a paddle and more than 5 digits (polydactyly) in hands and feet were the other genetic defects observed in Chernobyl.

3. **Other effects:** There are many more kinds of damages from nuclear accidents and use of nuclear energy. The most common and long term effect of radiations is the mutation, leading to abnormalities in the off springs. Leukemia and breast cancer are the two common types of cancers linked to exposure to radiations. The disposal of the nuclear waste is another major problem.

Nuclear radiation produced in blasts has fatal effects. The kind of damage from nuclear accidents varies with the kind of radiation, the amount of radiation, the duration of exposure and the types of cells irradiated. The effects of radioactive pollutants depend upon half-life, energy releasing capacity, rate of diffusion and rate of deposition of the contaminant. The radiation damage to human beings is due to (i) intake of radioactive materials and (ii) exposure to radiation.

Such radiation, when mixed with atmosphere and water, has two types of dangers: (1) genetic danger, (2) pathological danger. Exposure to nuclear radiations, affects genes also due to which children of next coming generation are found to be physically disabled. Due to pathological danger, person becomes victim of some disease like cancer and dies in short period of time.

There are two types of major effects of radiation on human body i.e. somatic effects and genetic effects. The most dangerous effect of nuclear radiation is generic effect.

In **somatic effects**, the general body cells of the person exposed to nuclear radiations are affected. This may lead to deadly diseases like cancer and shorten the lives of the people. Two common cancers that are related to increased radiation exposure are leukemia and breast cancer. Workers handling radioactive wastes get slow but continuous irradiation and in course of time develop cancer of different types.

In **genetic effects**, the genes of the person exposed to nuclear radiation get damaged. Radiations may break chemical bonds, such as DNA in cells. Radiation is able to cause mutations, which are changes in the genetic makeup of the cells. The effects can be instantaneous, prolonged or delayed types. Even it could be carried to future generations. Mutations can occur in the ovaries or the testes leading to the formation of mutated eggs or sperms, which in turn can lead to abnormal offspring. The genetic disorders are passed onto the next generations. This may produce mental disorder, birth of disabled, handicapped babies, etc.

Human exposure at high enough levels can cause both short-term illness and death and longer-term death by cancer and other diseases. Exposure at low doses of radiations (100-250 rads), men do not die but begin to suffer from fatigue, nausea, vomiting and loss of hair. But recovery is possible. Exposure at higher doses (400-500 rads), the bone marrow is affected, blood cells are reduced, natural resistance and fighting capacity against germs is reduced, blood fails to clot, and the irradiated person soon dies of infection and bleeding. Higher irradiation doses (10,000 rads) kill the organisms by damaging the tissues of heart, brain, etc. But the most significant effect of radioactivity is that it causes long range effects, affecting the future of man and hence the future of our civilization.

Through food chain also, radioactivity effects are experienced by man. Radioactive dust accumulate on living system through food chain and thereby cause serious damage to the life processes.

The dangers associated with nuclear energy are not only limited to the mankind, but also to the life in general on the earth. Use of nuclear energy is harmful to the living world. Nuclear blast causes death of lakhs of people in a few seconds. Such a blast also destroys buildings. Heat produced in such a blast spreads up to large distance in the form of heat waves, which destroys living beings also.

Nuclear reactors, meant for peaceful use of nuclear energy, are not as dangerous as the nuclear explosions but if, due to some accident, nuclear radiations leak out it has an adverse effect on the environment. Operating nuclear reactors contain large amounts of radioactive fission products which, if dispersed, can pose a direct radiation hazard, contaminate soil and vegetation, and be ingested by humans and animals. Rods of the nuclear fuel used in the nuclear reactor have very high radio-activity and they also contain poisonous elements like plutonium.

CONTROL OF NUCLEAR HAZARDS

Global banning of nuclear weapons, safe disposal of nuclear plant wastes and proper dumping of radioactive materials used in therapeutic purpose etc. are the major activities undertaken currently as a measure of radiation hazard protection. In addition, the workers handling radioactive materials are required to undertake appropriate protection measures during working phase at the nuclear plants premises. International Atomic energy Commission set up a standard guideline for the said purpose.

Some controlling steps of nuclear hazards are as follows:

1) Leakages from nuclear reactors, careless handling, transport and use of radioactive fuels, fission products and radioactive isotopes have to be totally stopped;
2) Safety measures should be enforced strictly;
3) Waste disposal must be careful, efficient and effective;
4) There should be regular monitoring and quantitative analysis through frequent sampling in the risk areas;
5) Preventive measures should be followed so that background radiation levels do not exceed the permissible limits;
6) Appropriate steps should be taken against occupational exposure; and
7) Safety measures should be strengthened against nuclear accidents.

Protective shielding

Uses of lead blocks, concrete walls of thickness 10 m can prevent the spreading of radio-active effect around the nuclear reactor. This is called radiation shielding.

Precautions after the disposal of nuclear waste:

The careful, efficient and effective treatment/disposal of radioactive waste, just do not complete the task. A regular supervision of the disposal sites is must. The essential precautions, at the disposal sites, that have to be taken include:

1) Monitoring radioactivity around the disposal sites.
2) Prevention of erosion of radioactive waste disposal sites.

3) Prevention of any drilling activity in and around the waste disposal site.

4) Periodic and long-term monitoring of such disposal sites and areas of naturally occurring uranium rich rocks.

So after their use they should be disposed in such a way that we do not become victim of its radiations. For this purpose, such rods are kept under water in the nuclear plant and then useful elements are taken out of them in the processing plant. Now remaining rods have to be buried deep in the earth where water doesn't come in contact with them. They are buried in the old mines, which are not in use.

Let's Tour The Environment !

Shrikrishna Jagdale (M.A. II Geography)
Mithilesh Chavan (M.Sc. II Geography)
Rahul Nimse (M.A. II Geography)
Sagar Pataskar (M.Sc. II Geography)

Environment generally refers to the surroundings of an individual or community. This environment may be physical (natural) or built up (man-made). All the living and non-living things on the Earth encompasses the environment. Right from the beginning, Man has intervened with the environment to get the things needed for his survival and comfort. Research says that modern Man originated in Africa about 2, 00, 000 years ago and since then his surroundings are being utilized just for the sake of fulfillment of his needs. Presently the world is at stake where the quality of environment has depleted to such an extent that all the needful things which were numerous previously have now become rare. Hence the human beings need to think and act environmentally. When it comes to thinking and acting environmentally, it means environmental conservation through human initiative in every aspect like rational use of things like electricity, fuel, etc., tree plantation, "no carry bag policy" and so on.

Unlike today, the World was unexplored centuries ago. It was because of volunteered travelers and sailors this unexplored world came to light. This helped the cultures and traditions in the parts of world to mingle within or simply people shared their culture and tradition with others. This habit of sharing has led to the emergence of tourism activity. After the industrial revolution, tourism has spread all over the world. Presently, tourism has become a popular global leisure activity. In 2008, there were over 922 million international tourist arrivals, with a growth of 1.9% as compared to 2007. Hence, it is required to know about the new dimensions of tourism which have let us think and act environmentally.

TOURISM

Tourism is an important source of national income for developing countries like Malaysia, South-East Asian countries, etc. Tourism is the largest service industry in India, with a contribution of 6.23% to the national GDP (Gross Domestic Product) and 8.78% of the total employment in India. India has more than 5 million annual foreign tourist arrivals and 562 million domestic tourists.

Tourism may be defined in terms of particular activities selected by choice and undertaken outside the home environment. Tourism may or may not involve an overnight stay away from home. Tourism comprises the activities of person traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and such other purposes. It has become symbol of status in modern society and also thought to be necessary for one's health. Today 40% of the free time is devoted to travel in developed countries. Film, pleasure and entertainment are concepts popularly associated with tourism.

Being world's largest export industry, it involves cultural exchanges which results in the cultural enrichment of those who travel as well as of those at receiving end. The importance of tourism has increasingly been realized because of its social, economical, political, cultural and aesthetic implications. Recent phenomenal increase in tourist traffic from all over the world testifies to the fact that it is a commodity of mass consumption! The activity has considerable contributions in the nation's economy.

It is the opportunity to increase the income level of the people that has motivated many countries particularly developing and under developing countries, to attract people. Their expenditure forms an important source of income. The industry has vast contributions in employment generations as it is visualized as a factor in activating the idle resources i.e. human resource of the nation. Tourism does not merely have an economic aspect it has a social aspect too while planning for future development.

PHYSICAL ENVIRONMENTAL IMPACTS OF TOURISM:

There are some good as well as bad effects of tourism. The good effects are that, the parks and nature reserves may be created and ecological preservation may be supported as a necessity for nature based tourism. Through good tourism planning improved waste management can be achieved. Increased awareness and concern for the environment can be a result of nature-based touristic activity and development.

But as it is said the good is followed by the bad, extensive tourism leads to negative changes in the physical integrity of the area. Rapid development, over development and over crowding can forever change the physical environment and ecosystem of an area. Notwithstanding, degradation of parks, reserves and other attraction such as beaches may occur through overuse and poor management. The bad is not stopping with this. Extensive use of vehicles is leading to more carbon emission. Tourists generating wastes mainly plastics are leaving the visited area environmentally affected.

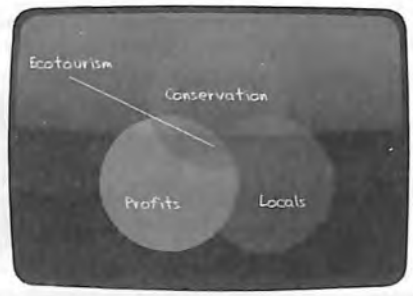
A NEW MODE: ECOTOURISM

The developing World's share in the context of number of tourist arrivals has become more than double in the last 15 years. With such rapid growth, it is no wonder that the impact of largely unplanned touristic development has had a deep impact on the environment, the ecology and the people. Tourism pleasure has been destroyed by human's unjust indulgence which has led to the decline and damage to the forest cover, our precious ecosystem and biodiversity. The adverse effect of the unplanned growth of tourism has also been felt on agriculture, forest, land resources, wealth, the local people and their lifestyle.

The perspective towards tourism is needed to be changed or rather it has changed. A concept called "Ecotourism" has come into light which is the remedy for environmental conservation. The prefix "eco" itself clears us the intention. "Sustainable development" is the slogan of the 21st century and "Sustainable Tourism" is one section of sustainable development. In

general sense, ecotourism means the management of tourism with the objective of conservation of nature in such a way that the fine balance between the requirements of tourism and ecology on one hand and the needs of the local communities for jobs and new skills on the other hand are maintained to generate income and employment. It is tourism whose roots lie in nature's unusual places out of a usual place in the environment.

Presently World Tourism Organization (WTO) has defined ecotourism as "The tourism that involves traveling to relatively undisturbed natural areas with the specified object of studying, admiring and enjoying nature and its wild plants and animals as well as exciting aspects found in these areas".



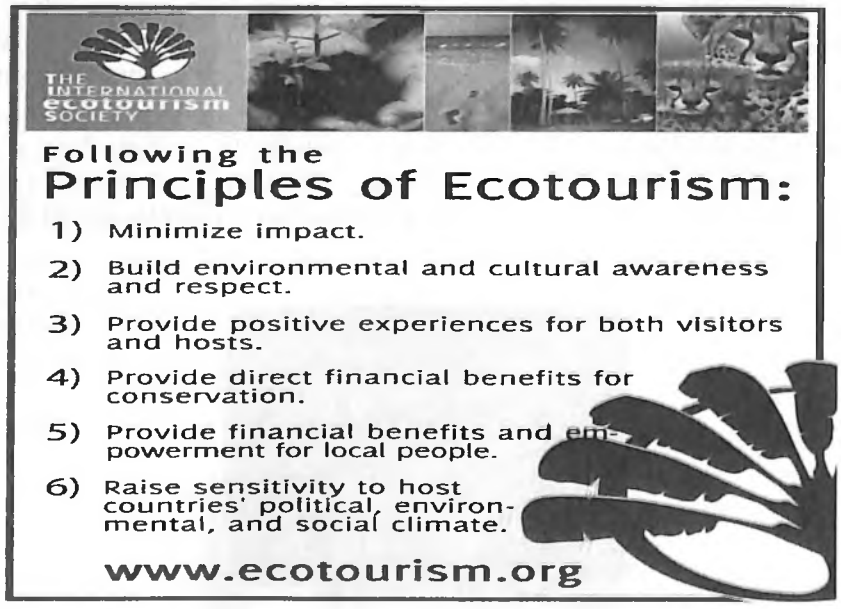
Ecotourism can advance three basic goals of the convention on biological diversity such as:

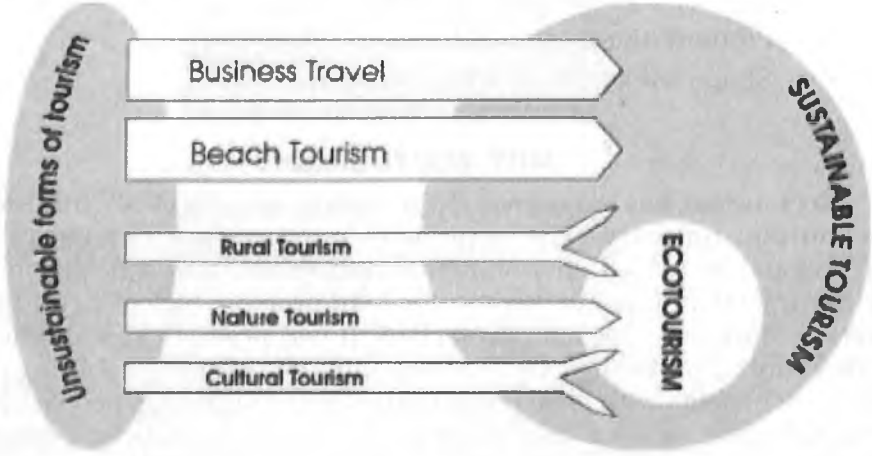
- ✓ Conserve biological features.
- ✓ Promote the Sustainable use of biodiversity.
- ✓ Shape the benefits of Ecotourism.

WHY ECOTOURISM?

Ecotourism has experienced the fastest growth of all sub-sectors in the tourism industry. The popularity represents a change in tourist perceptions, increased environmental awareness, and a desire to explore the natural environments. Ecotourism can promote biological and cultural diversity through ecosystem protection. It can promote sustainable use of biodiversity by providing jobs to local populations through sharing of socio-economic benefits with local communities and indigenous people by having their informed consent and participation in the ecotourism enterprises. Ecotourism also minimizes wastage and environmental impact through sensitized tourists. It can be one of the medium to preserve local culture, flora and fauna and other natural resources.

PRINCIPLES OF ECOTOURISM:





BASIC FORMS OF ECOTOURISM:

ECOTOURISM IN INDIA:

In India, ecotourism is the second largest net earning means of foreign exchange. The main strength of Indian tourism at present lies in its cultural attractions, particularly monuments and archaeological remains, fairs and festivals, wildlife and beaches.

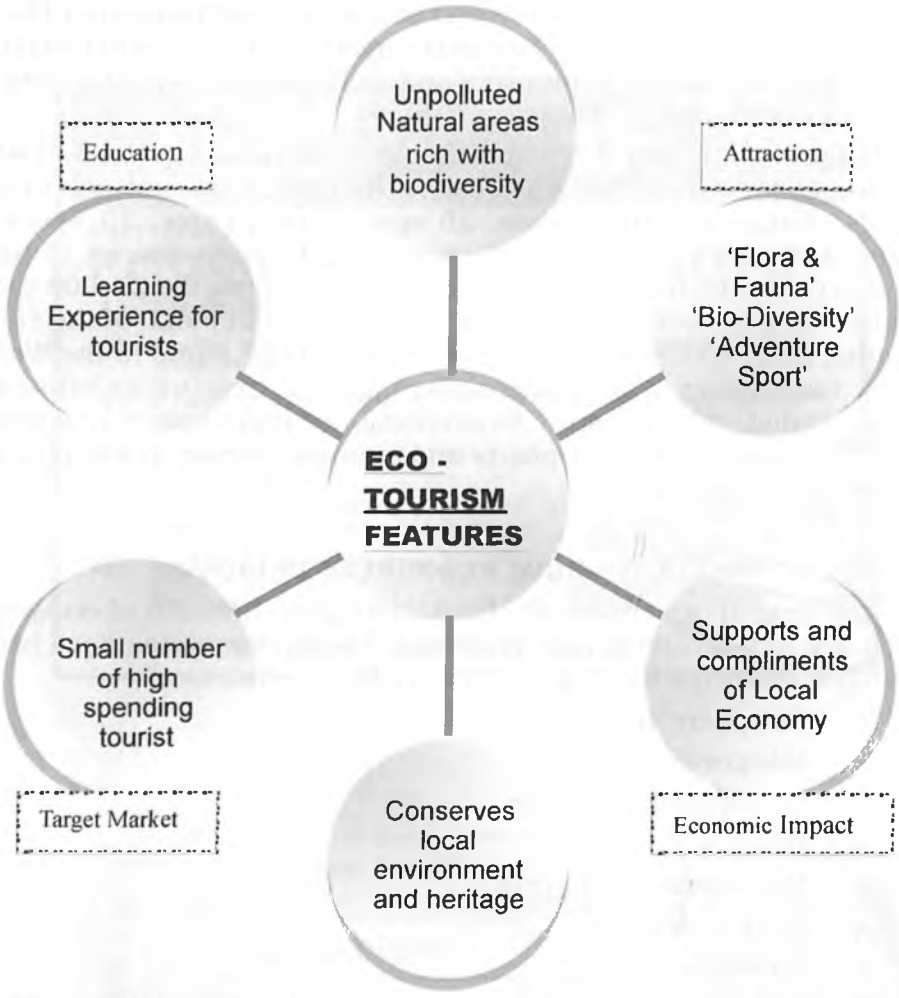
India occupies only 2.4 % of the Earth's landmass but has over 8 % of the World's known wildlife. The eastern Himalayas are endemic to 3500 species of higher plant groups, 20 species of reptiles, 25 species of amphibians and a rich fauna of insects. Of the eight species of turtles found in the world, India is home to five species. Among the 20, 000 species of fishes known, more than 2000 species are found in India. Of the 15, 000 flowering plant species in India, over 4500 are to be found in the Western Ghats. Biodiversity is our national heritage and treasure as valuable as the Taj Mahal. "If we destroy biodiversity, we may destroy our planet", because different species of plants and animals interact in complex ways to sustain life on the Earth.

ECOTOURISM RESOURCES IN INDIA:

The geographical diversity of India has given a wealth of ecosystems, which are well protected and preserved. These ecosystems have become the major resources for ecotourism in India. It consists of:

- Biosphere reserves
- Mangroves
- Corals and coral reefs
- Deserts
- Mountains and forests
- Flora and fauna
- Wetlands

The Indian topography boasts an abundant source of flora and fauna. India has numerous rare and endangered species in its surroundings. The declaration of several wildlife areas and national parks has encouraged the growth of the wildlife resource, which was reduced due to the wildlife hunt by several kings in the past.



Today, India has many wildlife sanctuaries and protection laws. Currently, there are about 80 national parks and 551 sanctuaries in India, which work for the protection and conservation of wildlife resources in India. There are number of Botanical and Zoological Gardens in India, which are working towards the enhancement of the Ecosystem. Poaching has stopped to a large extent. There are severe punishments for poachers, hunters and illegal traders of animals and trees. Tree plantation activities are taking place in several places. There are several animal and plant rights organization, which fight for the rights of the animals and plants. Many organizations and NGOs (Non-Government Organizations) are coming forward to provide environmental education to the common people at the grass root level.

Ecotourism in India has recently emerged, for the concept itself is a relatively new idea. It pertains to conscious and responsible efforts to preserve the diversity of a naturally endowed region and sustaining its beauty and local culture. Indians have been known since ages to worship and conserve the nature. So the growth of ecotourism in India is but natural. Also, "Government of India" has set up The Ministry of Tourism and Culture to promote ecotourism in India alongside other types of tourism. The diversity in India has provided various destinations not only to distress the tourists but also to rejuvenate them. This face has given ecotourism in India a major boost.

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Crisis That Opens Opportunities: 1991 Balance Of Payment Crisis

Aniket Tharkude M. A. II (Economics)

INTRODUCTION:

Indian economy is the 11th largest economy in the World by nominal GDP (Gross Domestic Product) and 4th largest economy by PPP (Purchasing Power Parity). India is an emerging market-oriented economy characterized by domestic demand driven growth. The country has 2nd largest population in the world with 300 million middle class people, rising domestic market for FMCG (Fast Market Consumer Goods) products. One of the youngest populations in the world, it has strong financial market and also rising savings and investment. In India, service sector or tertiary sector accounts for more than 50% of GDP, employing 23% of population, industries or secondary sector accounts for 28% of GDP, employing 14% of population and agriculture or primary sector accounts for 20% of GDP, employing 63% of population.

India has ranked 2nd worldwide in farm output. Agriculture and Allied activities like forestry, logging and fishing play significant role in India's economy. Also, India is 16th in the World in terms of nominal factory output. Many MNCs (Multi National Companies) have invested in India as it has growing FMCG market. Also Indian companies have started their operation at global level mainly through mergers and acquisitions. After the 1991 reforms, Indian companies have faced challenge of rising international competition including the Chinese cheaper imports. They manage to face these challenges by cost cutting, managerial changes and relying on cheap labor and new technology. Textile is the 2nd largest source of employment after agriculture and accounts for 20% of manufacturing output. Automobile industry is also booming in the country with global brands entered into Indian automobile market. India is 15th in services output. Service sector in India is growing fast at rate of nearly 7.5% annually. It is the sector that has worked as a catalyst for economic growth of the country. Business Processing outsourcing and Information Technology are the fastest growing sectors contributing to 25% of India's total exports. India has largest low cost, highly skilled, educated and fluent English speaking work force which has high demand in world market.

Country to a large extent has remained insulated from Asian Currency Crisis and Recent Financial Crisis due to less dependence on exports and higher domestic market, strong financial institutions and regulatory bodies. Due to this investors' confidence in Indian economy has increased.

INDIAN GROWTH STORY:

In the last 20 years, India has achieved significant economic growth and political position in the World. It is considered as one of the fastest growing economy. Country has seen tremendous growth in last 20 years compared to 40 years after independence.

India's post-independence development strategy was best described by Valeria Cerra and Sweta Chaman Saxena in their paper *"What caused the 1991 currency crisis in India?"* According to them, Post-independence development strategy in India was both inward-looking and highly interventionist, consisting of import protection, complex industrial licensing requirements, financial repression, and substantial public ownership of heavy industry. However, macroeconomic policy sought stability through low monetary growth and moderate public sector deficits. Consequently, inflation remained generally low except in response to unfavorable supply shocks (e.g., from oil price increase or poor weather conditions). The current account was in surplus for most years until 1980, and there was a reasonable cushion of official reserves. The official aid dominated capital inflows. Capital flows to India predominantly consisted of aid flows, commercial borrowings, and non-resident Indian deposits. Direct investment was restricted, foreign portfolio investment was channeled almost exclusively into small number of public sector bond issues, and foreign equity holdings in Indian companies were not permitted. While deposits to Indian banks by non-resident Indians were allowed, restrictions were placed on interest paid. India's growth rate in those years was known as ***"Hindu Rate of Growth"*** i.e. whatever Indian planner do they were unable to cross 3-4% growth rate.

This situation changed in 1980s. India had came out of Hindu Rate of Growth in 1980 itself but faced serious Balance of Payment problems in 1991 due to fiscal extravagances, mismanagement at macro-level, Gulf War and rising oil prices. In 1980s country had started to shift from policy of import substitution towards export oriented growth. It had started process of gradual liberalization of trade, investment and financial markets. To promote export it had liberalize imports for exporters. Initially though the exports were greater than import soon there was a reverse trend where imports are more than exports. Current account deficits were widened in 2nd half of 1980s which exhausted availability of aid financing and other financial resources thereby it made country vulnerable to shocks and more dependent on external commercial financing. External shocks like Gulf War and rising prices of oil had surged import bill and reduced remittances and export earnings. As investors' confidence in economy was shaken, financing became hard to obtain and outflow began to take place on short-term external debt, as creditor became reluctant to roll over maturing loans. Moreover, the previously strong inflows on non-resident Indian deposits shifted to net outflows. Finally country opted for emergency loan from IMF (International Monetary Fund) by moving collateral of 67 tons of gold to Bank of England and Switzerland. This resulted in panic throughout the country and change in Government and Economic policies.

CRISIS THAT OPENS OPPORTUNITIES:

After the 1991 BOP (Balance of Payment) crisis, India started economic reforms which were known as **'Liberalization, Privatization and Globalization (LPG) model'.** Country had moved from socialist economy to capitalist market based economy. Country opened its doors to foreign investment and reduced barriers on export and import of capital and goods. But in doing this, country had made step-by-step progress for opening up. It had made many reforms in its industrial policies and financial market. Country gave up managed exchange rate policy and accepted floating exchange rate policy. The average growth rate in the 10 years period was around 6 percent which puts India among the fastest growing developing countries in 1990s. Though it is slightly better than growth rate in 1980s but 1980s growth rate was considered to be unsustainable as it resulted in large pile of external debt and BOP crisis in 1991. On the other hand, growth after 1991 reforms was accompanied by remarkable external stability despite the East Asian Currency Crisis. India's resilience from East Asian Currency Crisis had strengthened investors' confidence on the country. Country grew at an impressive growth rate of 6.7 percent in 1st five years (1992-97) after reforms but slowed down to 5.7 percent in next five years (1997-2002). Still it was fastest growing economy in the region as other developing countries also slowed down due to East Asian Currency Crisis. As country was less dependent on exports it remained insulated from the crisis.

Indian IT (Information Technology) industry got opportunity to explore its talent due to Y2K problem. Y2K bug which not only existed in computer software but it also existed in the firmware being used in the computer hardware, threatened all the major industries including utilities, banking, manufacturing, telecom, airlines. Expertise shown by Indian IT professionals while dealing with Y2K problem got world-wide recognition. Also India had benefited from bursting of Dot Com Bubble and Internet-Telecom Bubble which was caused by heavy investment in this sector creating unused overcapacity all over the world. Heavy investment in building infrastructure i.e. undersea cables, satellites, wire-less networks to support future (speculated) growth of data and communication traffic over network led to falling cost of communication and meager cost of using internet which helped Indian IT industry to expand its business.

As off shoring became cost effective, western MNCs shifted some of their functions to developing countries from which India benefited the most. India has had largest young population with good English communication skills and analytical skills plus it has developed good communication infrastructure through network of satellites. This helped country to take lead in off shoring business which is growing faster.

In 2001, another crisis hit the Western economies i.e. *'Terrorism'*. After 9/11 attack on USA (United States of America), Western countries started war on terror which was focused mainly in South-Asia. Due to the war on terror, developed countries especially USA came closer to India for

strategic partnership. The changing Geo-Political situation i.e. rise of Chinese dominance in Asia, Africa and Indian Ocean region which was the most important sea route to Asia (especially for China as it is route to import cheaper resources from Africa and export goods to western countries in cheapest way) raised cautions in developed World so they became aware of India's strategic position in Indian Ocean Region. Again it benefited India in terms of growing economic relations though for strategic reasons.

In 2008, when the World was hit by earthquake of sub-prime crisis in USA, it resulted in tsunami of credit crunch and recession all over the World but the Indian economy was amongst the least affected by it. As India's much of the growth is domestic demand driven and it has firm regulatory institutions, and it is not in full integration with the World economy, so the country stayed resilient to financial crisis. India achieved highest ever growth rate before the financial crisis i.e. 9.7 and though growth rate were affected World over India still achieved growth rate of 6.7 and 7.2 in 2008-09 and 2009-10, respectively. And now the World looks at India for accelerating global economic recovery from financial crisis.

CONCLUDING REMARKS:

The country has many shortcomings. The Indian agriculture is still considered as 'gamble of monsoon' as irrigation facilities are inadequate and only 39% of total cultivated land is irrigated. 60-70% of production came from irrigated land which shows importance of irrigation. Though country is self-sufficient in food production, there have been fluctuations in food production due to changing climatic conditions. The average size of land holding in the country is very small; nearly 70% of holdings being less than 1 hectare.

The country looses nearly 30% production of fruits and 6% production of food in transportation and storage due to infrastructure bottlenecks. There is looming food crisis over the country which if becomes true will affect the whole World as the country has the 2nd largest population to feed.

Unemployment is higher and as small, medium and large scale industries are using capital intensive techniques, employment generation in this sector has been low.

Also the country is facing serious energy problems and due to rising fuel prices, inflation has touched double digits.

But after 1991 reforms, there is change in India's vision and it is positive towards resolving problems such as previously population was considered to be a burden but now there is a **Human Resource Development (HRD) Ministry** to find out ways for using human resources more efficiently. There are various problems faced by the country but now it has the confidence to overcome those problems and finding solution to them on its own.

Role of Culture and Religion in the Process of Globalization

Vahid Pourtajrishi (M. A. II Political Science)

Introduction

Today, we are living in **"The Age of Globalization".** The world has become smaller than the past by the process of integration between the nation-states. So we can not speak escapism. The world is going to become like a big village. As we know in a village, people are connected to each other and the life of one depends on the others. This is the perspective of global life. But in the process of Globalization, many factors perform their influence. One of the most important factors is culture. We cannot connive of culture, while we want to study on globalization.

Culture and its Notion

Wherever human beings form communities, a culture comes into existence such as a village, society, family, ethnic, national and religious groups, etc. But what is culture? Culture is an identity for individuals in a Society. The elements which compose any culture are language, ethnicity, history and religion. A culture embodies ideas and practices that support patterns of domination or hegemony within and between societies.

According to Kymlicka, Culture provides meaningful ways of life across the full range of human activities.

But religions are the most important part of cultures that have most of the impact on shaping of man's view to the world and his decision making which are reflected from his mind. So it is one of the cardinal methods which helps us to recognize man and his beliefs in the theme of society.

Religions as the most Significant Part of Culture:

Consideration to religion has to be categorized in two dimensions:

1) Medieval era:

In this era, the nature of religion was rigid and abstract. It means that the right to authority on individual's religious beliefs is just with the Church. People had not such a dignity to recognize true and false or have the interpretation on religion and scripture. This right was the exclusive mean in the hands of the Church. So obviously God and his delegation institute on the Earth are pivot for human thought. The Church is not only a church, but it includes all religious institutions. In fact these institutes are delegations of a religion.

2) Renaissance era:

Renaissance started from the 14th to 15th century which implied reformation of religion, God, Science and human relations with them. Therefore for the first time in the history, man could challenge God by his questions and doubts during the process of enlightenment. By these challenges, the various methods of thoughts created among virtuous nations led to diversity in beliefs and religions or their branches. So this diversity was the background for creating the multi-culturalism and religious pluralism phenomenon.

In fact, by renaissance, the nature of religion and celestial beliefs changed to personal beliefs from compulsory and innate concept. We can categorize modes of religions in four dimensions (Eric Sharp, 1983):

1) The existential mode, in which the focus is on faith
2) The intellectual mode, which gives priority to beliefs in the sense of those statements to which a person has conscious assent.
3) The institutional mode at the centre of which are authority of organizations that maintain and transmit doctrines.
4) The ethical mode, which stresses the behavioral relationships between members of a religious community and those outside it.

These factors are relative together and we cannot study only one of them, without the consideration of another. It seems the biggest problem between some rigid and closed religious societies for connection with other societies is the Fourth dimension. According to religious pluralism and tolerance, the goal of all religions is same but they are different from each other, in methodology to achieve this common goal.

So what is the main cause of these differences? To define the concept of religion, the points to understand the behavioral problem in society should be marked:

1) Scripture:

Religion in this sense is defined as the scripture and its contents without any interpretation.

2) Interpretation:

It refers to interpenetration and various views to scripture. So in this sense, we have many kinds of views to a specific religion, such as Catholic, Protestantism, etc.

3) Behavior of followers:

In this aspect, the social behavior of followers of a specific religion, in the name of that religion is interpreted. For instance, the fundamentalist Islam is a cause of terrorism in the name of Islam.

By attention to the above subjects, we can get this fact that the points 2 and 3 are wrong, and it is the cause to get opposite deploy against a Religion and phobia of global environment.

The compatibility of liberalism and multi-culturalism depends on the conceptualization of pluralism. So justification for such toleration of

differences is nothing except social peace. The religious pluralism is one of the most important methods to achieve global peace. The emphasis must be given on the structures of any religion to achieve unity in theory. The interpretations swerve the beliefs and essences of religion. While stress on foundations of religions which almost are the same, can seen as a guideline for us to gain a common opinion.

RELIGION AND GLOBALIZATION:

The broadest construction of cultural identity is civilization. The process of modern civilization according to rule was shaped in the eighteenth and nineteenth century while eastern nations were not civilized. So they used empirical mean to enforce their cultural hegemony on the east.

During the era of western cultural hegemony, eastern countries used religion as a cultural symbol and weapon against the west.

Roots of religion is in traditions of a nation. In fact, nations used their traditional custom as a powerful mean against western modernity which according to eastern beliefs was against them.

But all of eastern religions and customs were not in similar manner, challenging the west. These religions can be categorized in two dimensions:

1) Rigid religions such as Islamic, its essence implies to holy war against the west and its culture hegemony is their enemy. This holy fight in Islamic vocabulary means Jihad.

2) Flexible religions such as Hinduism or some branches of Chinese confuciusism which encourage their followers to improve their knowledge, material welfare and keeping the world peaceful.

By regarding these dimensions, the Muslim's reason to fight against the west can be understood, which is today's one of the most complicated debates in world politics.

After the end of cold war and by growth of capitalism in economic sphere and going towards achieving more liberal-democrat states, the western hegemony appeared much more than bipolar world era. In fact US tried to establish more allies, especially from the eastern bloc. This kind of new world order was completely different with the former one. It means the liberal democracy was placed instead of Leninism and Marxism.

Samuel Hantington in his famous theory (clash of civilizations) in 1996 and Francis Fukuyama's (End of history, 1992) defends this new world order.

By taking a brief look at the content of the nature of this new world order, the following key points can give us a generic view:

1) Appearance of Islamic, as a new global phenomenon, especially by growth of Islamic fundamentalism in Middle East region and its impact on world politics.
2) Spread of liberal–democrat states and the process of globalization as its influence.

3) Impact of global commercial coordination, international law, international institutions (INGO's and IGO's) on relations between states.

4) Visibility of Multiculturalism as direct reflected influence of globalization.

By consideration to these points, it can be understood that except Islam, the other characteristics are mutually related to each other. The purpose of Islam is not scripture but interpretative one. So Islam is anti-thesis against the others.

Therefore, cultural groups often blurt themselves by representing different cultures as alien. Basically a certain ideology or thesis will be meaningful, when an anti-thesis is oppose to it. The anti-thesis in this condition is a separate thesis itself. So this relationship between diverse thesis and anti-thesis is similar to a chain. Only about religious conflicts in macro level is discussed so far, but in micro level, also we observe local and internal conflicts between the followers of various branches of a specific religion in it, such as the conflicts between Shi'aa and Sunni people, while both of them are Muslim.

The new wave of globalization has met local resistance in some places from those who are seeking to preserve their cultures from unbridled change. Religious revivalism has been a global phenomenon since 1970. This process reached its peak by Islamic revolution of Iran in 1979.

Conclusion

The impact of culture on the process of globalization is significant. Religious pluralism and tolerance are the main keys to break the lock of cultural challenges. If the emphasis is laid on common goals and structures of religions instead of individual or group interpretations, a way for having dialogue between the civilizations and nations with any kind of beliefs and religious views can be found out. This way can help us to resolve the religious debates, which exist in many regions all over the world, such as the Middle East, Europe and even in a specific country like India which are suffering of this common pain.

Therefore, belief in multiculturalism, cultural–religious pluralism and mutual respect to each other in the field of culture and religion, can be effective to improve the process of globalization and to achieve global peace - Amen.

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René Descartes: A Rationalist

Sarita Kulkarni (M. A. I Philosophy)

INTRODUCTION:

Descartes, the greatest French mathematician and the founding father of Modern Philosophy, was himself one of the creators of the 17th century science. He retains much of the scholasticism *(the philosophy taught in the church schools and theological training-grounds in the medieval period).* Like the thinkers of the transition period, he had completely broken with the previous philosophy and considered everything from the very beginning. He had resolutely set the face against the old authorities. He emphasized the practical character of philosophy. He introduced a new positive content wise rich philosophical principle and then endeavored to construct a complete philosophic edifice ***'de novo'.*** This had not happened since Aristotle's time and was a sign of the new self-confidence that resulted from the progress of science. There is freshness about his work that is not found in any eminent previous philosopher after Plato. He writes, not as a teacher, but as a discoverer and explorer, addressing to the intelligent men of the world rather than to pupils.

LIFE:

René Descartes was born in 1596 at La Haye in Touraine. He completed his education at the new Jesuit College at La Fleche. He became dissatisfied with his education and unconvinced of any truth, weary of text books based on confused ideas and unconfirmed sciences and weary of the authorities of church. Therefore after completing his studies he resolved to bid adieu to all school learning and hence forward to gain knowledge from himself and the great book of the World, from nature and by observing human being. For this reason he traveled widely from 1619 to 1628. He remained always aloof from the moral and political conflicts of his days.

He decided that he would make no social commitments and no marriage bonds, so as not to interfere with his vow to advance knowledge in accordance with his vision. He refused to get married saying, ***"No beauty is comparable to the beauty of the truth".*** He was not industrious, he worked short hour and read little. When he went to Holland he took few books with him, but among them were the Bible and books by St. Thomas Aquinas. As Holland was at peace at that time, he seemed to have enjoyed two years of undisturbed meditations.

WORKS:

1) Descartes' most famous book in Philosophy is ***'Meditations on First Philosophy'.*** His plan in the meditations is to put the edifice of human knowledge upon secure foundation, set the agenda for speculation in the philosophy of mind and epistemology (philosophy of knowledge) for at least the next 300 years. This work together with objections by distinguished contemporaries and their replies by Descartes appeared in 1641.
2) His first substantial work was never completed treatise ***'Rules for the direction of mind'*** [1628-29] which was not printed until 1701. He first wrote and then cautiously suppressed. It reveals that Descartes was already preoccupied with the method of clue to scientific advance – basically a mathematical method, though it is intended to be the method of rational enquiry.
3) ***Le Monde*** in 1634 was a scientific work, beginning with astronomy and showing how the world might have come into being, according to physical laws. It was proposed to give a mechanical explanation of the human body. The body is looked upon as ***'a machine made by the hands of God, which is incomparably better arranged and adequate to movement, more admirable than is any machine of human invention'.*** It was by the influence of Galileo's work and Harvey's treatise on ***'The circulation of the blood'.***
4) In 1637, he published the ***'Discourse on method'.*** Its full title was ***'A Discourse on the method of rightly conducting the reason and seeking the truth in the sciences- the Diopteric, Meteors and Geometry essays in this method'.*** The diopteric had been made possible by recent invention of the telescope and of optical delusion. The treatise upon Meteors was really a general exposition of Descartes theory of Matter which he identified with extension and an attempt to apply it to the explanation of many natural phenomena. The Geometry, the most famous and epoch making part of his scientific work, was an exposition of his new analytic geometry. The French style that Descartes developed in this work has been regarded as a model for the expression of abstract thought in that language.
5) In 1644, Descartes' penultimate work ***'Principles of philosophy'*** was designed partly for use as a theological textbook. He hoped that it could

be used in ***'Christian teaching without contradicting the text of Aristotle'.***

6) His last work was ***'The Passions of the Soul'*** published in 1649. His last words are supposed to have been ***'So, my soul, it is time to part'.***

Descartes as a Mathematician

Descartes was a philosopher and a mathematician of very great ability. His great contribution to geometry was the invention of co-ordinate geometry. He discovered how to describe geometrical figures by means of algebraic equations and so how to solve the problems in geometry by reasoning in algebra. He used the co-ordinate system in the determination of the position of a point in the plane by its distance from two fixed lines. He did not himself discover all the power of this method, but did enough to make further progress easy. Though not his sole contribution, it was the most important one. He did great work in science when philosophy and science had not yet been demarcated.

Rationalism- Means of knowledge

Descartes was a rationalist. Rationalism claims in support of reason which is universal in all human beings and the only means of certainty in knowledge.

Descartes had a question, how can I establish solid and permanent truth which past philosophers have failed to do? In his ***'Discourse on Method'*** he says, *"of all who sought for the truth in the sciences, it has been the mathematicians alone who have been succeeded in producing reasons which are evident and certain".* He thought mathematicians could clear up the confusions and uncertainties of Philosophy. Philosophy could then reach final and certain truth which would decisively end the disputes among the philosophers and the bitter controversy raging between the Church and the scientists.

The Method of Mathematics

Descartes describes in his ***'Rules for the directions of the mind'*** that Mathematics consists of only two mental operations by which true knowledge can be achieved 1) Intuition and, 2) Deduction.

By Intuition, he means understanding of self evident principles i.e. the axioms of geometry or an arithmetic equation, self evident statements having power to prove themselves. They are absolutely true; no rational mind can doubt them.

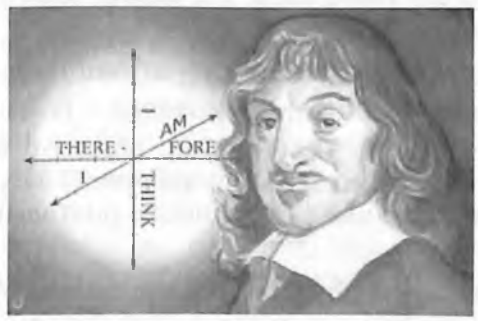
Descartes says about deduction, *"The chief distinguishing feature of the method is to arrange all facts into a deductive, logical system".* The entire series of six meditations is a single sustained effort to reconstruct philosophy, to find the certainty of a mathematical proof, from which an absolutely certain philosophy can be deduced.

Skepticism: The theory of knowledge

Skepticism is the name for the philosophical position of doubt concerning the reliability of knowledge. Descartes' skepticism is called "methodological skepticism" which is defined as the use of doubt methodology in order to arrive at true knowledge.

In the *meditations*, Descartes came up with an ingenious method, the method of doubt, for selecting the propositions that are to serve as the basis for his reasoning. This method of selecting his fundamental assumption was thorough going one. He notes that many of his beliefs derived from his senses or from percept can often mislead. A stick may look bent when viewed half submerged in water, the true size of the sun and the moon is many times greater than that would appear from a sight. Therefore he rejects any information from the senses as being uncertain and fallible.

He suggests that the only thing one can be absolutely certain of is the fact of one's own existence as a thinker. An insight summed up in his famous edict ***'Cogito ergo sum'*** translated as 'I think therefore I exist'.



'Cogito ergo sum'

"Immediately I noticed that while I was trying to think everything false, it was necessary that I, who was thinking this was something and observing that this is truth, 'I am thinking therefore I exist' was so solid and sure that the most extravagant suppositions of skeptics were incapable of shaking it. I judged that I need scruple to accept it as the first principle of the philosophy that I was seeking."

This passage is the core of Descartes' theory of knowledge. Descartes says, "Nothing in the world is certain but one thing is certain that I doubt or I think of that there can be no doubt. He does not appeal to an empirical psychical fact, the mind's awareness of itself, but reasons logically that doubt implies a doubter, thinking a thinker, a thinking thing 'Res Cogitans'. Thus he reaches what seems to him a rational, self evident proposition. To doubt means to think, to think means to be 'Cogito ergo sum' i.e. I think, therefore I am. It is the first and the most certain knowledge that occurs to one who philosophizes in an orderly manner. He next asks himself 'Why is the Cogito ergo sum so evident?' He concludes that it is only because

it is clear and distinct. This one proposition is absolutely certain, true, clear and distinctly perceived. So he adapts a general rule ***'all things that are conceived very clearly and distinctly are true'.***

Descartes' fundamental certainty, 'I think therefore I am' made the basis of knowledge different for each person, since for each, the starting point was his own existence, not that of other individuals or of the community. In this way epistemological individualism had penetrated into philosophy. Most of the part in philosophy since Descartes has had this intellectually individualistic aspect in greater or less degree.

Innate ideas

The aim of Descartes is to reach clear and certain knowledge. Certainty is property of truths which are clearly and distinctly perceived. However, the only principle of certainty does not supply me yet with knowledge of the body of the truth. In order to discover something that shall be objectively true, I apply thoughts or ideas. Genuine knowledge is the result of reasoning from certain basal concepts and principles; they must be inherent in the mind itself, i.e. innate. But my ideas are

1) partly innate,
2) partly contributed from nature- adventitious,
3) partly formed by ourselves- invented.

Among them all I find that of God, eminent and first. It can be implemented in me only by an actually existent of God. All the attributes of God, demonstrate that the ideas could not be produced by me alone.

The theory of physical and mental substances

Descartes' theory of physical universe is called **'mechanism'**, which can be explained by the mechanical motion of material substances. According to Descartes the world is infinite in extension, with bodies of all shapes and sizes continuously moving and changing. All motions of bodies are like the mechanical workings in a clock. We see here the influence of Galileo's celestial clock work of motion of the planets. But Descartes' philosophy contains something more than a mechanical clock work. According to his philosophy, in physical universe, substances are moving according to the laws of physics and the principle of geometry. There is also a perfect being, the God and there are also finite imperfect selves like us, finite thinking beings. Reality includes self, matter and the God. Descartes considers that the God is the cause of the world and the world can be understood in the terms of substances of which it has constituted. But what is a substance?

He defines it as *"nothing other than a thing existing in such a manner that it has no need of other things in order to exist."* But in reality his doctrine of substances was a doctrine of categories. By a substance he did not mean 'a thing' but 'a kind of thing', because he believed that 'things' had defining properties just as 'kind of things' have. In this strict sense only God can be

a substance. All other substances require God to exist. Both physical and thinking substances are created by the God. They represent completely different kind of substances which are diametrically opposite.

Thinking substances:

Thinking is used by Descartes in a very wide sense. He says a thing that thinks is one that doubts, understands, conceives, affirms, denies, wills, imagines and feels. Since thought is the essence of mind, it must always think even during deep sleep.

Mind, a thinking substance, occupies no space, is not in motion, is not a part of any clock work, has the capacity for reasoning, remembering, denying, has free will and is morally responsible for its action.

Physical substances:

Matter, in contrast with mind, is spatially extended, is in mechanical motion, and is infinitely visible, without the capacity for reasoning, without free will or any moral qualities. Each kind of substance is independent of the other. For each kind of substance there is a distinct and appropriate disciple. Matter is studied by physics, the new science of Copernicus and Galileo. Mind is studied by church theology and by philosophy. A distinction made between mind and matter (body) is similar to the distinction between the theology and philosophy in the days of scholasticism.

According to Descartes there is a close relation between mind and body which is in fact a primitive and not analyzable notion. He says that thought and extension are combined in a human being, in unity of composition, but not in unity of nature, the union should not be compared with a mixture of two bodies. He teaches that 'thought can be troubled by organs without being the product of them.' e.g. Sensations, feelings and appetites are disturbances in the soul resulting from its union with the body. In spite of the union, body and soul remain distinct. But in *Passions of soul*, which is his last work, he gives thorough going elementary account of the relation involved in mind and body. He says 'there is one part in which it exercises its functions, more particularly than elsewhere.' This part is the pineal gland, a structure, having principle seat near top of the brain. He particularly selected this organ because it appeared unique in the brain in being single (not in pair, as eyes or ears.)

But Descartes does not succeed in showing how this interaction is compatible with his metaphysical dualism of thinking and extended substances.

The existence of God

Descartes presents the idea of God, "By the name of God I understand the substance which is infinite, independent, all knowing, all powerful and by which I myself and everything else that does not exist, have been created."

Descartes' argument for the existence of God proceeds as his system demands. He says, "The idea of God, I have received from the God." It is innate. God is not only the cause, but the archetype of our existence; he has created man in his own image. God must be self caused. If God did not exist, we could not possibly be what we are, nor could we have an idea of God.

The God and the foundation of knowledge

There is a property of the God that is central to the further construction of Descartes' epistemology:

"God .....is liable to no errors and defects" [Third meditation]

God is perfect and cannot deceive us. The power of distinguishing the true from the false, which God has given us, is not infinite. Error depends on the occurrence of two causes,

1) Faculty of cognition,

2) Faculty of selection or the power of free choice- understanding and will.

Errors are due to our failure, to restrain the will from judging a thing when we do not conceive it with sufficient clearness and distinctness.

Descartes is the founder of new epoch in philosophy because:

1) He enunciated the postulate of an entire removal of any presupposition. This absolute protest maintained by Descartes against the acceptance of anything as true, because it is so given to us, or so found by us and not something determined and established by thought, became hence forward the fundamental principle of moderns.
2) Descartes was the first to propose the principle of self consciousness, of the pure, self subsistent ego, or the conception of mind, thinking substance, as individual self, as singular ego- a new principle, a conception unknown to antiquity.
3) He gave complete distinctness to the antithesis of being and thought, existence and consciousness and announces the conciliation of this antithesis as a philosophical problem – a problem, for the future, of all modern philosophy.

But these great ideas, distinctive of an epoch in the history of philosophy are suggestive.

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Maths: A Kaleidoscope

Makarand Sarnobat (M. Sc. I Mathematics)
Maitreyee Kulkarni (M. Sc. II Mathematics)

"The laws of nature are but the mathematical thoughts of God".

- Euclid

The word **'Mathematics'** comes from the Greek word *'mathema'*, which technically means 'mathematical study'. Its adjective is *'math-ematikos'*, which means 'mathematical'. In particular, *'mathematike tekhne'*, in Latin 'ars mathematica', meant the mathematical art.

"Mathematics is the Queen of all Sciences" was quoted by the great mathematician ***Carl Friedrich Gauss.*** The sentence is not at all false and no science can develop and flourish without the aid of Mathematics. Mathematical thinking is important for all members of a modern society as a habit of mind for its use in the workplace, business and finance; and for personal decision-making also. Mathematics is fundamental to national prosperity in providing tools for understanding science, engineering, technology and economics. Mathematics is a creative discipline. The language of Mathematics is international. The subject transcends cultural boundaries and its importance is universally recognized. Mathematics has developed over time as a means of solving problems and also for its own sake. Today everyone is aware about the importance of Mathematics.

There are a few instances which occur in our day to day life where difficulties arise often without Mathematics! In a business deal or any kind of trade without Mathematics, many problems will occur! The most basic concepts namely, addition, subtraction, multiplication and division are used to take care of almost all the financial problems of the world. This is the power of Mathematics!!!

A painter usually paints a wall at the rate of Rs. X per square foot. The cost which will arise to paint a full house needs to be calculated. The length, breadth and height of a wall are measured and then the area is calculated. Mathematically these are called dimensions of the wall. Now by multiplying the area with the rate, the amount for painting that particular wall is estimated. The same calculations are carried out for each wall and the respective amounts are summed up to get the total amount. Here a lot of Mathematics is really used (rather only Mathematics is used!)! Actually a mathematical entity called dimensions is used, something more than just addition and multiplication.

These were some of the basic applications of Mathematics. There are also some advanced applications which are used by other sciences. Suppose a physicist (supposition is again inevitable in Mathematics!) has to calculate the velocity or acceleration of a moving object, then that physicist wouldn't be able to do so without the aid of the concept of derivative which has evolved from Mathematics!!! Also calculating the volume and the surface area of any object needs integration! The fields of Quantum Physics and Mechanics also use very advanced Mathematics for the calculations and approximations! Though the applications mentioned above are very few, there are more advanced applications in Physics which will require rigorous study of Physics as well as Mathematics just to understand them. This application was for Physics.

Let us now see if Biology (which may seem totally independent of Mathematics to some) can do without Mathematics. The applications of Mathematics in Biology have a very long history but only recently many people have gained interest in this field. There is an upcoming interdisciplinary field known as Mathematical and Theoretical Biology whose applications are found in Medicine, Biology and Biotechnology! Many times this field is referred to as ***'Mathematical Biology'*** or ***'Biomathematics'*** to stress the mathematical side. There are other fields such as Modeling cell and Molecular Biology, Molecular set theory, Population dynamics, Mathematical Biophysics, etc which are coming to the surface as time is progressing and one cannot help noticing the importance of Mathematics which is evident from the names themselves.

Now consider a concrete example: to calculate the speed of blood in an artery of the body (This necessary to calculate because if some artery or vein gets blocked then the blood starts using other sources to flow. This causes an increase in the speed of flow of blood. So if this speed exceeds a particular limit then it can be said that some blood vessel is blocked!). Consider the blood vessel to be a long pipe or mathematically a cylinder with constant width. So a cylinder with length l (in meters) has a radius of the cross section R (in meters). Now the walls of the vessel (cylinder) cause friction. So at the walls, the speed of the blood is zero. The speed is maximum at the central axis. The blood, like any liquid, has internal friction known as viscosity (η). Now as long as the speed of the blood does not exceed a critical value, the flow is smooth and the speed increases regularly from zero at the wall towards the centre. The speed of the blood in the vessel can be given by:

$$v = \frac{p}{4\eta l}(R^2 - r^2)$$

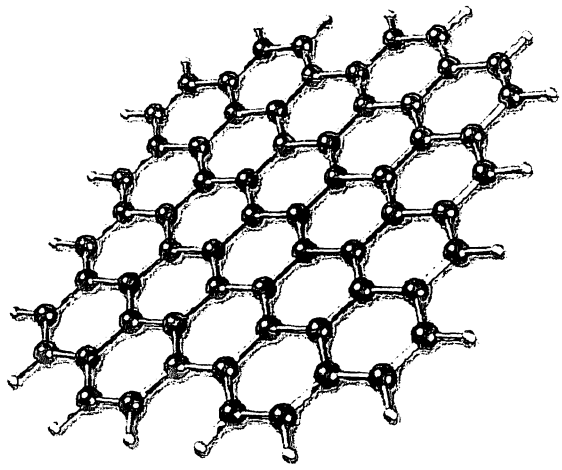
This was experimentally discovered by J. L. Poiseuille which was later verified theoretically. So using Mathematics now it is a simple calculation formality to calculate the speed of blood in the artery! Wow!! It can be known that how fast blood flows, though it can't even be seen!

The main branches of Mathematics that are used nowadays in biology are calculus, probability theory, statistics, linear algebra, abstract algebra, graph theory, combinatorics, algebraic geometry, topology, dynamical systems, differential equations and coding theory. So a great deal of Mathematics in Biology is highly needed!

The year 2011 is the ***'International Year of Chemistry'***. So the applications of Mathematics in Chemistry need to be focused upon. Chemistry is the science of matter and the changes it undergoes. The science of matter is also addressed by physics, but while physics takes a more general and fundamental approach, Chemistry is more specialized, being concerned with the composition, behavior (or reaction), structure, and properties of matter, as well as the changes it undergoes during chemical reactions. It is a physical science which studies various substances, atoms, molecules, crystals and other aggregates of matter whether in isolation or combination, and which incorporates the concepts of energy and entropy in relation to the spontaneity of chemical processes. Chemistry is sometimes called ***'The Central Science'*** because it connects the other natural sciences such as Astronomy, Physics, Biology and Geology. The importance of Mathematics in the development of Chemistry needs to be dealt with. So now it is important to realize how Chemistry forms an important part in our day to day life and observe how Chemistry can explain many changes that occur around us.

Many day to day phenomena have reasons in Chemistry like rust develops on many objects which is due to oxidation i.e. reaction with oxygen. With knowledge of Chemistry at disposal, rusting of materials can be prevented by coating them with materials which do not react easily with oxygen. Many times steel is preferred to iron as the bonding of atoms in steel is much stronger than in iron which makes it harder. So if the behavior of substances while bonding with each other is known, then this information can guide in preparing new and useful substances. For example, Graphene, which is recently discovered, is an allotrope of carbon, whose structure is one-atom-thick planar sheets of sp2-bonded carbon atoms that are densely packed in a honeycomb crystal lattice. The carbon-carbon bond length in graphene is about 0.142 nanometers. Graphene sheets stack to form graphite with an interplanar spacing of 0.335 nm, which means that a stack of 3 million sheets would be only one millimeter thick. The Nobel Prize in Physics for 2010 was awarded to Andre Geim and Konstantin Novoselov for groundbreaking experiments regarding the two-dimensional material 'graphene'. This material may be a suitable material for the construction of quantum computers using anyonic circuits.

GRAPHENE



In Chemistry the basic unit is an atom followed by a molecule which is the smallest indestructible part of a chemical substance. Since a molecule contains a number of atoms, they form a structure which is an important property. While the structure of diatomic, triatomic or tetra atomic molecules may be trivial (linear, angular, pyramidal, etc.), the structure of polyatomic molecules, that are constituted of more than six atoms can be crucial for its chemical nature. This structure plays a very important role in determining chemical properties of an element. Once the structure is known, hand in hand comes a very familiar branch of Mathematics known as geometry along with which also comes symmetry. Symmetry plays a very important role in Chemistry. It is also useful in bonding, spectroscopy and reactions. Symmetry can be described as similarity in the form of arrangement. For example, one side of the vase may be looked up as the reflection of the other, through a mirror passing through the center of the vase. But for a mathematician symmetry is a distance preserving function from one set onto itself! Now imagine how this symmetry plays an important role and how Mathematics is used to simplify matters in Chemistry.

First have a glance at where symmetry plays a part in Chemistry. Around an atom are orbitals. These orbitals are described by their symmetry properties. In chemical reactions only those orbitals with similar symmetry properties can combine. So if the symmetry properties of orbitals with respect to the molecule are known, then which compounds are possible and which are not can be determined! Now if the symmetry properties of the molecule can be found out then the job will become much easier. Here comes in picture the important role of Mathematics. The symmetries of a molecule form a group. A group may be described as an algebraic structure on a collection of elements related to one another by certain rules. The rules of the group may be stated as follows:

1. Two elements of a group combine together to give the third element of the group.
2. An element combines with itself to form another element of the group.
3. Every group consists of one element which commutes with all elements and leaves them unchanged. This element is known as the identity element.
4. Every group element of the group obeys the associative law of combination. i.e. If a, b, c are three elements of the group then (ab)c = a(bc). (Here, by 'ab' we mean multiplication or addition or composition, whichever operation is defined on the group.)
5. Every element has an inverse or reciprocal which is also an element of the group. The element and the inverse combine to give the identity element.

So if some of the elements are known, then the full group can be found out.

Group theory is a well advanced branch of Mathematics with the help of which many problems are solved in Chemistry. For example, chemical isomers are usually obtained by trial and error method. This method is useful if the isomers are less in number. When the number becomes very large, symmetry and group theory provide the means for determining the number of isomers and even for generating the isomers.

Also around an atom electron clouds are present which are described by the symmetry properties. The same properties can be applied to the wave function which gives the probability of finding an electron around the nucleus. The symmetry conditions applied to the wave function simplify the equation as well as the solution.

Suppose there is a crystal of some element. Since these crystals are found in nature they may be broken or damaged. Then how the structure of the crystal is determined? One cannot go looking till he finds the complete or undamaged crystal. One may never find it! So what one does is the following: take the crystal and obtain an X-ray diffraction pattern of the crystal. It is already known that the crystal possesses symmetry which is obviously reflected in the diffraction pattern. Though the pattern is incomplete it can be easily completed using the symmetry properties. And there is the structure of the crystal. Isn't this much easier than searching for the complete crystal? Thus symmetry properties are also used in determining the structure of a crystal or a molecule!

The development of Combinatorial Chemistry has generated a wide variety of new concepts and much associated terminology. In addition, the nature of research in this area has brought together scientists from diverse backgrounds: statisticians may discuss their work with biologists and heterocyclic chemists; medicinal chemists are talking to engineers, analytical chemists and polymer scientists. Combinatorial Chemistry is a technique by which large numbers of structurally distinct molecules may

be synthesized in a time and submitted for pharmacological assay. The key of Combinatorial Chemistry is that a large range of analogues is synthesized using the same reaction conditions and the same reaction vessels. In this way, the chemist can synthesize many hundreds or thousands of compounds in one time instead of preparing only a few by simple methodology. The range of combinatorial techniques is highly diverse, and these products could be made individually in a parallel way or in mixtures, using either solution or solid phase techniques. Whatever the technique being used, the common denominator is that productivity has been amplified beyond the levels that have been routine for the last hundred years. Over the last few years, the Combinatorial Chemistry has emerged as an exciting new paradigm for the drug discovery.

Combinatorial Chemistry (or CombiChem) is an innovative method of synthesizing many different substances quickly and at the same time. Combinatorial Chemistry contrasts with the time-consuming and labor intensive methods of traditional Chemistry where compounds are synthesized individually, one at a time. While Combinatorial Chemistry is primarily used by organic chemists who are seeking new drugs, chemists are also now applying Combinatorial Chemistry to other fields such as semiconductors, superconductors, catalysts and polymers. CombiChem is used to synthesize a large number of chemical compounds by combining sets of building blocks. Each newly synthesized compound's composition is slightly different from the previous one. A traditional chemist can synthesize 100-200 compounds per year. A combinatorial robotic system can produce in a year thousands or millions of compounds which can be tested for potential drug candidates in a high-throughput screening process. Combinatorial Chemistry is one of the important and new methodologies developed by academics and researchers in the pharmaceutical, agrochemical and biotechnology industries to reduce the time and costs associated with producing effective, marketable and competitive new drugs.

This is how Mathematics is useful in our life. There are many mathematicians who not only view Mathematics as a useful science but also as a form of art. Mathematics is many times described as beautiful! Mathematics is also compared with music and poetry. The famous mathematician and philosopher Bertrand Russel describes his view of Mathematics as:

"Mathematics, rightly viewed, possesses not only truth, but supreme beauty - a beauty cold and austere, like that of sculpture, without appeal to any part of our weaker nature, without the gorgeous trappings of painting or music, yet sublimely pure, and capable of a stern perfection such as only the greatest art can show. The true spirit of delight, the exaltation, the sense of being more than Man, which is the touchstone of the highest excellence, is to be found in Mathematics as surely as poetry".

The unreasonable effectiveness of Mathematics in the natural sciences, in particular Physics as noted by Wigner, emphasizes the striking synergy of Mathematics and Physics. Examples abound spanning several

centuries which indicate that how old Mathematics has been found to be tailor-made to promote progress in Physics, how new Mathematics got evolved to quantify new-found laws and how demands of the physical world have led to creation of new Mathematics. Starting from the theory of curves, the development of calculus in quantifying laws of motions, and the use of non-Euclidean geometry to understand gravitation to the more recent examples of modular and elliptic curves and complex manifolds, and Calabi-Yau spaces are some striking examples of this symbiosis. Another versatile tool which has been finding more and more use in Physics is the compression of information using the idea of algorithmic complexity.

It seems eminently possible that mathematical tools like pattern recognition, artificial intelligence, collective computing, algebraic topology and fuzzy logic will make major forays into Chemistry and create an integrated platform where these tools will enmesh fruitfully with quantum mechanics and statistical mechanics.

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Discovery of Benzene: Kekule's Creativity

Amol Garkhedkar (M. Sc. I Organic Chemistry)

Friedrich August Kekulé von Stradonitz (1829 - 1896)

Science is a system of knowledge where many facts are related together. As scientific knowledge is obtained from observations, it is empirical in nature. Another important thing is that science is self-corrective in nature. But what is the place of discoveries in science? Are these also a part of systematization or intuition that plays an important role in invention?

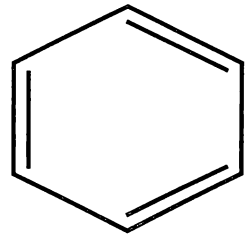
There are plenty of things which are being discovered in the field of Chemistry. All of these discoveries are due to the creativity and diligent work of great scientists. What is then creativity? Imagination is man's most powerful tool. But when such imagination comes into the reality, such conversion is nothing but the creativity.

As the year 2011 is ***"The International Chemistry Year"***, the achievements of one of the great scientists of the 19th century whose creativity and discovery gave a new identity to the field of Chemistry should be addressed. This scientist is none other than **Dr. Friedrich August Kekulé von Stradonitz** and his famous discovery of the Benzene Ring.

Kekule was born to a bourgeois family in Darmstadt, the capital of the Grand Duchy of Hesse (Germany), in 1829. Initially he wanted to become an architect. But at some point of time in his life, some events took place which changed his entire life and also gave a new way to his life. That event not only changed his life, but also gave a new view and attitude to the field of Chemistry. At the University of Giessen, he was inspired by the

lectures of Justus von Liebig and ultimately he decided to become a Chemist. Later, Kekule's decision made a humongous difference in Chemistry. Then he introduced many important things such as the concept of chemical bonds, the tetravalent nature of carbon atom and the use of chemical formulae to explain the formation of molecules. Kekule also defined for the first time that Organic Chemistry is the Chemistry of carbon compounds. Due to his creative nature he could discover the correct structure of benzene ring. This discovery was one of the brilliant ideas of the nineteenth century.

Behind this great discovery, there is an interesting story. Kekule was trying to visualize the structure of benzene as that structure could be the backbone of almost all organic compounds. For visualizing the structure of benzene, he took not less than seven years which was the real commanding task. Kekule was working hard to understand the exact structure of the benzene ring. One day while working in his laboratory, he had a nap during the afternoon. During his nap, he dreamt a snake seizing its own tail in its mouth (this is a common symbol in many ancient cultures known as the *'Ouroboros'* or Endless knot). He then discovered that the ring shape of the benzene molecule should be the same which he saw in his dream. This vision, he said, came to him after years of study of the nature of carbon-carbon bonds. Kekule thus solved the problem of how carbon atoms could bond to up to four other atoms at the same time and thus discovered that carbon atom has tetravalent nature.



Structure of Benzene: Discovered by Kekule

Hence Kekule's discovery of the structure of benzene ring was a pioneering work in the field of Chemistry!

The Magic between Booting of Operating System

Vitthal Devkar (M. Sc. I Computer Science)
Sachin Bhadage (M. Sc. I Computer Science)

Booting Process:

The term ***'God Born'*** means "How to Boot Our Computer". Simply ***'Booting'*** is the process that means when the computer is power on, it does some operations and the **OS** (Operating System) is loaded in the **RAM** (Random Access Memory). On the motherboard, there is one program. This program is called ***"God program"*** that loads the **OS**. This program is hard coded. If this program is not there, any operating system will not be booted by the **HDD** (Hard Disk Drive). In computer language, this program is called ***"Bootstrap program"***. So the question arises where the bootstrap program is loaded. The answer is summarized as follows:

440Bytes	4Bytes	2Bytes	64Bytes	2Bytes	512Bytes

Total size = 1024Bytes

440B → Bootstrap

4B → HDD vendor disk signature (optional file)

2B → NULL but important because if it is not there, then it is guaranteed or doubtful that HDD is corrupted

64B → partition table information

2B → FDISK signature value i.e. OXAA55

512B → Boot loader

Here a question may arise that whether there are multiple operating systems on single machine or not. This is shown by the **OS** List given below. On motherboard there is single program called base maker program. On computer, current technology is that there are different boot loaders on different Operating Systems. These are as follows:

Name of the Operating System	Loader Name
1. Windows XP	NTLDR
2. Windows7	BCD => Boot Configuration Data
3. Linux	GRUB => Grand Uniform Boot loader
	LILO => Linux Loader
4. Solaris	SiLO => Sparc Inforved Boot Loader
	GRUB
5. Sun CPU	SPARC
6. PC-BSD	BTX – BooTeXTended
7. Mac. OS	Boot Camp

GRUB -> Only boot loader which incorporates 128 OS

Now actually what exactly is the sequence of booting the bootstrap program to the OS Kernel, is as follows:

On old Operating System

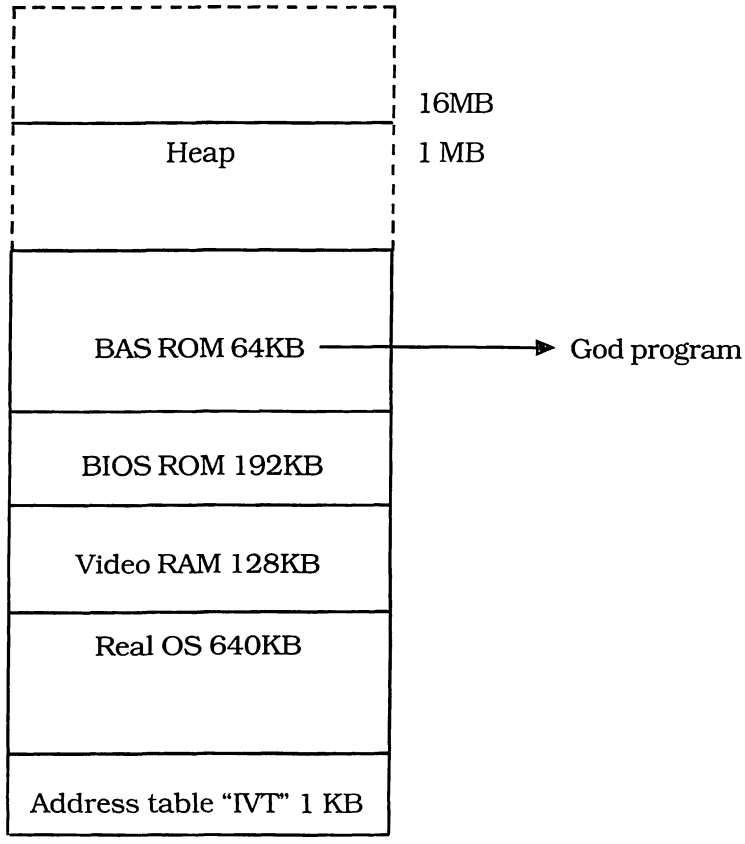
BIOS → MBR or NTLDR → bootini → bootstrap → kernel

On new current Operating System

BIOS → MBR → bootMgr → BCD → winlad.exe → Wind7 kernel

RAM Structure

RAM is Random Access Memory. It is an electronic memory that is why after computer is turned off the content is lost. Following figure shows the structure of RAM when operating system is loaded:



- BAS ROM → the size of this block is 64KB in which "God program" loads these BIOS program.
- BIOS ROM → program size is 192KB. All information is there.
- Video RAM → the size is 128KB.
- Real Operating system → the real OS is actually 640KB in size in real mode.
- IVT → Interrupt Vector Table in which address is present .i.e. address table is called as IVT. Size of IVT table is 1KB.

When operating system is loaded that time it loads in two modes i.e. real mode and protected mode. After opening "A20GATE" current operating system is changed from real mode to protected mode.

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Suicidal Ideation In Relation To Self-esteem and Family Environment and Its Prevention

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ABSTRACT

Given that college students may be at an increased risk of suicide, it is important to conduct a research that could guide suicide prevention efforts in college campuses. Although much work has been done on the role of hopelessness and depression in suicidal ideation, not much has been done on the role of level of self-esteem and family environment. In this study, subjects were 90 college students (60 girls and 30 boys) aged between 17 to 20 years. Self-esteem was measured using Raj and Thomas' Self-esteem inventory and family environment was checked using Bhatia's Family Environment Scale. The outcome measure was a checklist of 12 statements for suicidal ideation. Correlation was used to see the relation between the level of self-esteem, family environment and suicidal ideation. The outcome was that lower the self-esteem, higher is the suicidal ideation. The scores on Family Environment Scale said that higher the scores on the dimensions of the scale lower the ideation except for the dimension of conflict, where it is vice-versa. The objective of the study was to identify pupils on the campus with ideation which can help to prevent the act of suicide.

INTRODUCTION

Throughout the history, the word **"suicide"** has had different meanings to different people. Various meanings attributed to the term include "The murder of oneself", "nothing less than a exit", "an end to psychic conflicts", "a conscious effort of self inflicted cessation" and others. In whatever way the word is defined and understood, undeniably it is an act of self destruction and a major loss to the society. But before the act, is the ideation of suicide which occurs and the same factors apply here too. So in this study, the research has been focused on two main factors, family environment and self-esteem, which helps to shape the personality of an individual. It is important to know to what extent these factors affect the very ideation of suicide.

There is considerable debate all over the world as to why people commit suicide, since self destruction of human beings has always been a matter of curiosity. Since suicide is an act of killing oneself performed by the person with his/ her full knowledge, and knowing well the results or the final outcome, it is always considered something very close to the person committing the act. The various causes for a suicide are by and large

many and complex, ranging from social, economic, health, cultural, political, religious, and other areas of an individual's life. Recent research indicates that suicides are multifactoral, in nature, cumulative due to number of causes which are progressive and operate over a period of time. A small percentage of impulsive suicides have been extremely difficult to understand. Since causes are multifactoral, several options are also considered in prevention of suicides.

SUICIDAL IDEATION:

Suicidal ideation is a common medical term for thoughts about suicide, which may be as detailed as a formulated plan, without the suicidal act itself. Although most people who undergo suicidal ideation do not commit suicide, some go on to make suicide attempts. The range of suicidal ideation varies greatly from fleeting to detailed planning, role playing and unsuccessful attempts, which may be deliberately constructed to fail or be discovered, or may be fully intended to succeed.

The importance of suicidal ideation, particularly in adolescence, and its relationship to psychiatric morbidity and completed suicide continue to be a subject of debate. A number of recent studies, however, revealed that suicidal ideation was both associated with predictive of psychopathology, especially mood, anxiety, and substance use disorders, among adolescents as well as older age groups. Furthermore, adolescent suicidal ideation has been linked to deficits in behavioral and emotional functioning (e.g., low self-esteem, depressive symptoms) in adolescence, extending into young adulthood.

Due to stress coming from society, parents, competition, etc. students see suicide as an escape route from their miseries. Some of the more common reasons for ideation among youth are failure, rejection in love, projection of suicide by media as acceptable, substance abuse, all these leading to depression. Also family histories of suicide and family environment, low self-esteem, hopelessness have been seen causes of suicide and suicidal ideation.

FAMILY ENVIRONMENT:

The family is the nucleus of all activities in an individual's life. Given the crucial role of the family throughout childhood and adolescence, it is not surprising that risk for suicidal ideation and behavior among depressed youth has been associated with multiple aspects of the family environment.

Studies indicate that family conflict is associated with suicidal ideation and behavior in depressed youth. Paluszny and colleagues (1991) found that adolescent suicide attempters and ideators reported more family problems and greater family chaos than non-suicidal psychiatric controls. Similarly, Skinner, Williams, Gibbon et al. (1983) found that depressed attempters and ideators perceived their families as more dysfunctional, and particularly the mother-child relationship as more conflicted, than

non-suicidal psychiatric subjects and healthy controls. Epstein and colleagues (1983) also showed an association between overall family dysfunction and suicidal ideation and attempts in high school students.

SELF-ESTEEM:

Self-esteem refers to the evaluative and affective aspects of the self, to how "good" or "bad" we feel about ourselves. It is a consequence of the self's capacity for reflexivity, that is, the ability to look at oneself and to evaluate what one sees. Self-evaluations typically give rise to positive or negative self-feelings, such as pride or shame. These self-feelings make self-esteem important both experientially (i.e., they constitute some of our strongest emotions) and motivationally (i.e., people are motivated to seek positive self-feelings and to avoid negative self-feelings).

There may be optimum levels of self-esteem beyond which the consequences for individuals are negative. Overlying low levels of self-esteem are associated with depression and self-defeating behavior including suicidal ideation, but excessively high self-esteem may be associated with arrogance, egoism, and even aggression. The self-esteem literature generally indicates that low self-esteem individuals depend more on and are more influenced by external cues that provide self-relevant information about performance than high self-esteem individuals (Tice 1993).

A number of correlation studies have found that self-esteem is negatively related to suicidal thoughts and attempts, even after controls for other factors such as depression (Emler, 2001). There is also evidence from longitudinal studies that relatively low self-esteem is a risk factor for health problems, including social isolation (Stinson et al., 2008), depression (Orth, Robins & Robert, 2008), suicide ideation (Goldney, Smith, Winefield, Tiggerman, & Winefiled 1991; McGee & Williams, 2000), suicide attempts (Lewinson, Rohde, Seeley, 1994) and completed suicide.

METHODOLOGY

Objective:

To study the relation of suicidal ideation with self-esteem and family environment among young college students

Hypothesis:

Suicidal ideation is high in college students with low self-esteem and poor family environment.

Sample:

The sample consisted of 90 subjects (60 females and 30 males) studying at the graduate level. The subjects were drawn from one college in Mumbai

using non-probability sampling. The age of the selected subjects ranged from 17 to 20 years. In general the subjects were having good health and did not suffer from any serious or chronic ailment.

Tools:

1. Suicidal Ideation checklist:

The suicidal ideation checklist contains 12 statements; each stating what a person ideating suicide may have felt. Here the subjects had to tick the statement which they might have thought about some time. The checklist is used by the ***'National American Suicide Prevention Organization'.***

2. Self-esteem Inventory: (Immanuel Thomas and Sanand Raj)

The self-esteem inventory consists of 25 items/statements the subjects had to choose. Each item consists of five answers A, B, C, D, E ranging from strongly agree for A to strongly disagree for E (a five point scale). The inventory has a split half reliability which is 0.95 and test retest reliability is 0.90 and the inventory has content validity.

3. Family Environment Scale (FES): (Harpreet Bhatia and N.K. Chadha)

RESULTS:

Non-parametric Correlations

DIMENSIONS	SI	SEI	FES_C	FES_EX	FES_CO	FES_ACC & CAR	FES_IND	FES_CTR
SI	1.000							
SEI	-0.368**	1.000						
FES_C	-0.285**	0.527**	1.000					
FES_EX	-0.415**	0.603**	0.564**	1.000				
FES_CO	-0.468**	0.643**	0.670**	0.682**	1.000			
FES_ACC & CAR	-0.337**	0.541**	0.674**	0.554**	0.729**	1.000		
FES_IND	-0.442**	0.493**	0.450**	0.615**	0.569**	0.470**	1.000	
FES_CTR	-0.147	0.323**	0.427**	0.265*	0.354**	0.421**	0.262*	1.000

**significant at 0.01 Level

- **SI = SUICIDAL IDEATION**
- **SEI = SELF-ESTEEM INVENTORY**

FAMILY ENVIRONMENT SCALE DIMENSIONS (FES)

- **FES_C = COHESION**
- **FES_EX = EXPRESSIVENESS**
- **FES_CO = CONFLICT**
- **FES_ACC & CAR = ACCEPTANCE & CARING**
- **FES_IND = INDEPENDENCE**
- **FES_CTR = CONTROL**

The obtained results are in accordance with the previously done studies which state that suicidal ideation and self-esteem are negatively correlated (De Man, Leduc, Labreche-Gauthier, 1993; Marciano & Kazdin, 1994). Also family environment where cohesion, independence, expressiveness is low and conflict is high, suicidal ideation is high (Dubow, Kausch, Blum, Reed, & Bush, 1989; Friedrich, Reams, & Jacobs, 1982; Harris & Molock, 2000; McKeown, Garrison, Cuffe, Addy, & Waller, 1997; Morano, Cisler & Lemerond, 1993).

CONCLUSIONS:

- There is a negative correlation between suicidal ideation and self-esteem, which means lower the self-esteem, higher the suicidal ideation and more are chances of committing the act of suicide.
- Subjects who scored low on the five dimensions and high on the dimension of conflict have higher suicidal ideation than subjects who scored high on the five dimensions and low on the conflict dimension.

PREVENTION:

Suicidal thoughts can be prevented by an early intervention, which can be carried out by a regular scan of pupils for such thoughts on the college campus. Various tests can be used to identify suicidal thoughts. Also students should be educated about suicide and the ill effects of suicide, students should also be encouraged to talk about their problems and if they have thought committing suicide and going away with it. Once identified individual's problems and thoughts, the problem can be countered through counseling, crisis intervention etc. by a counselor available in the campus or by a person trained in crisis intervention.

CRISIS INTERVENTION:

Suicidal behavior is the most frequent mental health emergency. The goal of crisis intervention in this case is to keep the individual alive so that a stable state can be reached and alternatives to suicide can be explored. In other words, the goal is to help the individual reduce distress and survive the crisis.

COUNSELING:

Medical crisis counseling is a brief intervention used to address psychological (anxiety, fear and depression) and social (family conflicts) problems related to chronic illness in the health care setting. It uses coping techniques and building social support to help patients manage the stress of being newly diagnosed with a chronic illness or suffering a worsening medical condition.

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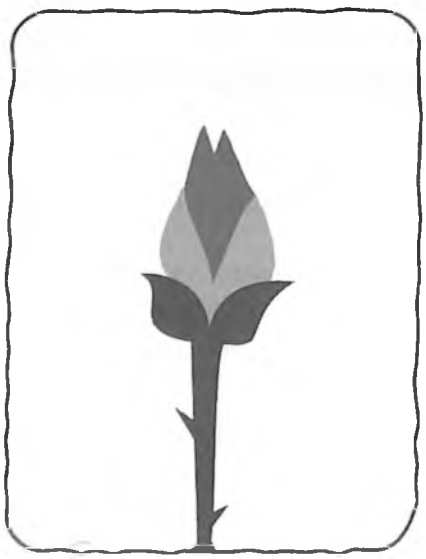

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Release of 'Calyx'
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