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CONTEMPORARY RESEARCH IN SCIENCES AND HUMANITIES

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Presently, she is Fellow/Life Member of more than 08 national and international research societies such as Society of Life Sciences, Satna, (M.P.), Indian Hydrobiology, Chennai, Indian Association for Angiosperm Taxonomy, etc. She received some prestigious awards like Fellow of the Society of Ethenobotanists in 2013, FICCE award in 2004, Fellow of Society of Life Sciences award in 2004. She successfully completed one research project funded by University Grants Commission, India. The area of research of Dr. Shakun Mishra is Ethnobotany and Limnology. Presently she focused in the research area of Floristic diversity assessment of Angiosperms. For her academic contribution she received gold medal from former Lok Sabha Speaker Mr. Balram Jhakhad. Presently, Dr. Mishra works as a chairman of Board of Studies (BOS) in the subject of Botany, Soil Science, Sed Technology and Horticulture in D. A. V. V. University, M.P., India. She is also BOS chairman for Horticulture, Central University, M. P.

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The main area of his research is thin film solar cell. He is actively engaged in research. Dr. Sharadrao Vhanalakar has published more than 100 research papers in various international journals having more than 400 citations and 'h' index is near to 16. He is awarded by prestigious 'Raman Post-Doc Research Fellowship in USA' by University Grants Commission, New Delhi in year 2016. He is recipient of 'Young Scientist Award' by Department of Science and Technology, Government of India in 2014. He is working as a principal investigator of one research project funded by Department of Science and Technology, Government of India.

PREFACE

We are delighted to publish about our book entitled ***"Contemporary Research in Sciences and Humanities"****. This book is the compilation of esteemed articles of acknowledged experts in the various fields of basic and applied science providing a sufficient depth of the subject to satisfy the need of a level which will be comprehensive and interesting. It is an assemblage of up to date information of rapid advances and developments taking place in the field of science and humanities. With its application oriented and interdisciplinary approach, we hope that the students, teachers, researchers, scientists and policy makers in India and abroad will find this book much more useful.*

The articles in the book have been contributed by eminent scientists, academicians. Our special thanks and appreciation goes to experts and research workers whose contributions have enriched this book. We thank our publisher Bhumi Publishing, Nigave Khalasa for taking pains in bringing out the book.

Finally, we will always remain a debtor to all our well-wishers for their blessings, without which this book would not have come into existence.

- Editorial Team

Contemporary Research in Sciences and Humanities

CONTENT

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DRUGS CONTAINING METALS AND THEIR BIOLOGICAL APPLICATIONS

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ABSTRACT:

Metals constitute a huge bit of the components found in Earth's covering, waters, and environment. Pharmaceuticals may likewise be stored in the earth through uncalled for transfer, overflow from slop manure and recovered wastewater water system, and defective sewage. In 2009 an investigative report by Associated Press presumed that U.S. makers had lawfully discharged 271 million pounds of medications into nature, 92% of which was the disinfectants phenol and hydrogen peroxide. Press is a vital theme in pre-birth mind since ladies can some of the time end up noticeably press lacking from the expanded iron requests of pregnancy. Vanadium mixes have been incorporated up until this point, with an end goal to offer better resistance, more intense activity, a superior selectivity and less danger in malignancy treatment. In 1980s nitric oxide (NO.), blended endogenously by the chemical NO synthase (NOS), demonstrated as follows, was found to be a standout amongst the most vital physiological controllers, including cardiovascular control (circulatory strain direction), neuronal flagging, and platelet initiation, invulnerable. This book part incorporates the essential natural uses of a few metals and their insufficiencies

KEYWORDS: Metals, pharmaceutical, Drugs, antiseptic, Vanadium, toxicity, Nitrous oxide, neuronal signaling, Cardiovascular

INTRODUCTION:

A metallopharmaceutical is a medication that contains a metal as a dynamic fixing. Most ordinarily metallopharmaceutical are utilized as anticancer or antimicrobial operators. Cases of metallopharmaceuticals include: bismuth subsalicylate –a mellow against diarrheal, cisplatin and carboplatin –platinum containing anticancer operators, and gold salts, for example, auranofin – calming for treatment of joint inflammation. According to the current reports [1 - 5] an assortment of work is being completed in this field. Pharmaceutical Chemistry consolidates

learning of the natural, medicinal, and physical sciences in the investigation of the logical part of medication treatment. The accentuation is on the synthetic idea of the responses and communications required in sedate treatment. The understudies will get a strong foundation in the parts of science the most important to drugs: physical, natural, and diagnostic science. They will likewise take in the essential parts of the blend, produce, utilize, and method of activity of medications. Pharmaceutical medication, likewise alluded to as a drug or prescription, can be inexactly characterized as any concoction substance - or item involving such - proposed for use in the medicinal finding, cure, treatment, or aversion of malady.

Historical and Chemical Background of Metals:

A metal (from - Greek "mine, quarry, metal") is a component, compound, or composite that is a decent transmitter of both power and warmth. Metals are normally glossy, flexible and bendable. The importance of the expression "metal" contrasts for different groups (for instance, space experts call for accommodation metals everything except for hydrogen and helium, [6]). Numerous components and intensifies that are not ordinarily named metals wind up plainly metallic under high weights**.**

Physical and Chemical Properties of Metals:

Metals are usually inclined to form cations through electron loss reacting with oxygen in the air to form oxides over various timescales (iron rusts over years, while potassium burns in seconds).

Examples:

$4\ Na + O_2 \rightarrow 2\ Na_2O$ (sodium oxide)

$2\ Ca + O_2 \rightarrow 2\ CaO$ (calcium oxide)

$4\ Al + 3\ O_2 \rightarrow 2\ Al_2O_3$ (aluminium oxide)

The move metals, (for example, press, copper, zinc, and nickel) are slower to oxidize on the grounds that they frame passivating layer of oxide that secures the inside. Others, similar to palladium, platinum and gold, don't respond with the air by any stretch of the imagination. A few metals frame an obstruction layer of oxide on their surface which can't be entered by advance oxygen atoms and subsequently hold their glossy appearance and great conductivity for a long time (like aluminum, magnesium, a few steels, and titanium). The oxides of metals are for the most part essential, rather than those of nonmetals, which are acidic. Obtrusive exemptions are to great extent oxides with high oxidation states, for example, CrO_3, Mn_2O_7, and OsO_4, which have entirely acidic responses.

Figure 1: Gallium crystals

Painting, anodizing or plating metals are great approaches to keep their consumption. In any case, a more responsive metal in the electrochemical arrangement must be decided for covering, particularly when chipping of the covering is normal. Water and the two metals frame an electrochemical cell, and if the covering is less receptive than the coati, the covering really advances erosion.

Metals all in all have high electrical conductivity, high warm conductivity, and high thickness. Commonly they are moldable and malleable, distorting under worry without dividing. As far as optical properties, metals are sparkling and radiant. Sheets of metal past a couple of micrometers in thickness seem obscure, yet gold leaf transmits green light.

Albeit most metals have higher densities than most nonmetals, there is wide variety in their densities, Lithium being the slightest thick strong component and osmium the densest. The soluble base and basic earth metals in bunches I An and II An are alluded to as the light metals since they have low thickness, low hardness, and low liquefying points [7]. The high thickness of most metals is because of the firmly pressed precious stone cross section of the metallic structure. The quality of metallic bonds for various metals achieves a greatest around the focal point of the move metal arrangement, as those components have a lot of delocalized electrons in tight restricting sort metallic bonds. Be that as it may, different variables, (for example, nuclear range, atomic charge, number of bonds orbitals, cover of orbital energies and gem frame) are included also

Metals as Prodrugs:

Pharmaceutical science is an teach at the convergence of science, pharmacology, and science required with outlining, combining and creating pharmaceutical medications. Inorganic mixes and organometallic mixes have many intriguing applications. Numerous metallodrugs are "prodrugs" they experience ligand substitution or potentially redox responses before they achieve the objective site. Metallopharmaceuticals utilized as anticancer specialists, metal-

intervened anti-infection agents, antibacterials, antivirals, antiparasitics, antiarthritics, and radiosensitizing operators have been accounted for [8 -11],

Medicinal inorganic chemistry can be divided into two main categories

1. Drugs that target metal ions (free or protein-bound).
2. Metal-based drugs where the central metal ionisusually the key feature of the mechanism of action[12-14]..Metal-based and metal-binding agents are used for design of inorganic drugs.

In area of metallotherapeutics, three widely used inorganic pharmaceuticals include:

1. Platinum anticancer drugs (cisplatin and carboplatin)
2. Gold antiarthritic drugs (Auranofin)
3. Radiodiagnostic
4. Radiopharmaceutical drugs (Cardiolyte) [15].

Biological Role of Metal Ions:

Metals are fundamental forever and shortage of some metal particles can prompt malady. Understood illustrations incorporate noxious pallor coming about because of iron lack, development hindrance emerging from inadequate dietary zinc, and coronary illness in newborn children attributable to copper insufficiency. Over-burdening of both basic and superfluous metal particles incite harmfulness in people, great illustrations being mercury, lead, cadmium, iron and copper. Raised iron levels are related with many sorts of neurodegenerative sickness, for example, Alzheimer's, Parkinson's and Huntington's illnesses. Metals, for example, cadmium, manganese and lead in our condition speak to a genuine wellbeing peril.

Creation of oxygen by the water-part focal point of green plants (Photosystem II) depends on the complex organic utilization of manganese science. Metal particles are electron inadequate while most organic atoms, for example, proteins and DNA are electron rich and basic alterations could significantly regulate the DNA restricting mode and DNA harm handle, and therefore to a great extent enhance the antitumor adequacy of platinum complexes [16]. The utilization of many metal-based mixes in the treatment of different illnesses highlights the significance of metal mixes in prescription. As far as hostile to tumor movement, a wide range in pharmaceutical. As far as against tumor movement, an extensive variety of components have been researched for viability. The presence of a connection amongst tumor and metals is generally recognized by analysts alongside the current improvements in the field of metal-based anticancer agents [17]. Metals have the alternative of totally decimating the objective while most medications hinder through official to a protein/DNA atom and simply obstruct its capacity.

Glimpses of Metal Salts Reliable to Human Body:

Metal complexes work in one of two ways. Many use a process called redox chemistry to steal electrons from the bonds holding the target molecule together [18]. Metal binding agents in human body include chloride, phosphate and carbonate. Other metals use hydrolysis, meaning that they break down the target's chemical waterproofing, so that the water that is naturally present in a cell dissolves the target. The clinical utility of complexes such as *cis*-$[PtCl_2(NH_3)_2]$ (cisplatin, cis-DDP) and $[Pt(CBDCA)(NH_3)_2]$ (carboplatin, CBDCA = 1,1-cyclobutanedicarboxylate) are the basis for successful chemotherapy drugs.

Treatment of Diseases Using Metals:

Move metal buildings are utilized as medications to treat a few human ailments like carcinomas, lymphomas, contamination control, calming, diabetes, and neurological disorders [19]. Gold(III), Platinum(II), Ruthenium(II, III, IV), Iron(II) and Vanadium(IV) buildings for hostile to disease, against HIV medications , and as compound inhibitors for potential restorative applications have been reported [20, 21].

Gold is utilized as a part of dentistry and also a medication to treat few restorative conditions. Infusions of frail arrangements of sodium aurothiomalate or aurothioglucose are some of the time used to treat rheumatoid joint inflammation. Little measures of gold are utilized to cure a condition known as Lagophthalmos, which is a failure of a man to close their eyes totally. This condition is dealt with by embedding little measures of gold in the upper eyelid. The embedded gold "weights" the eyelid and the constrain of gravity enables the eyelid to close completely. Radioactive gold is utilized as a part of determination. It is infused in a colloidal arrangement that can be followed as a beta producer as it goes through the body. Numerous surgical instruments, electronic hardware and life-bolster gadgets are made utilizing little measures of gold. Gold is nonreactive in the instruments and is very solid in the electronic gear and life-bolster devices [22].

Metals in pharmaceuticals have assumed an inexorably vital part in prescription, especially in tumor treatment and indicative imaging techniques. Restorative utilizations of coordination science concentrate on the part that move metals play in clinical applications [23]. Certain reports of dynamic trans edifices and powerful di-and tri-Pt anticancer complexeshave been found [24].

Present Status of Metallopharmaceuticals:

As of late, Metals in Medicine has been perceived universally as an essential region for investigate. There is prove by expanded financing through a unique National Institute of Health (NIH), USA program, the new Metals in Medicine Gordon Conferences and two European Union

COST communitarian programs. The present writing likewise demonstrates that metallopharmaceuticals is a region of developing enthusiasm as is obvious through the clinical trials that are being directed worldwide for the utilization of metals in therapeutics. For e.g.; clinical trials for Silver biotics have been completed for evaluating its adequacy in a wide assorted qualities of human issues, including jungle fever, upper respiratory tract contaminations, urinary tract diseases, sinusitis contaminations, vaginal yeast diseases, eye, nose and ear contaminations, cuts and contagious skin diseases and notwithstanding for sexually transmitted sicknesses like gonorrhea and so forth turned out to be an anti-microbial option at an advantageous dosage [25].

Classification of Metallopharmaceuticals:

Medications can be classified in various ways [26], such as by chemical properties, mode or route of administration, biological system affected, or therapeutic effects. An elaborate and widely used classification system is the Anatomical Therapeutic Chemical Classification System (ATC system). The World Health Organization keeps a list of essential medicines.

A sampling of classes of medicine includes:

- Antipyretics: reducing fever (pyrexia/pyresis)
- Analgesics: reducing pain (painkillers)
- Antimalarial drugs: treating malaria
- Antibiotics: inhibiting germ growth
- Antiseptics: prevention of germ growth near burns, cuts and wounds
- Mood stabilizers: lithium and valpromide
- Hormone replacements: Premarin
- Oral contraceptives: Enovid, "biphasic" pill, and "triphasic" pill
- Stimulants: methylphenidate (Ritalin)
- Tranquilizers: meprobamate, chlorpromazine, reserpine, chlordiazepoxide, diazepam, and alprazolam
- Statins: lovastatin, pravastatin, and simvastatin

TYPES OF MEDICATIONS:

For the gastrointestinal tract (digestive system):

- Upper digestive tract: antacids, reflux suppressants, antiflatulents, antidopaminergics, proton pump inhibitors (PPIs), H_2-receptor antagonists, cytoprotectants, prostaglandin analogues
- Lower digestive tract: laxatives, antispasmodics, antidiarrhoeals, bile acid sequestrants, opioid

For the cardiovascular system:

- General: β-receptor blockers ("beta blockers"), calcium channel blockers, diuretics, cardiac glycosides, antiarrhythmics, nitrate, antianginals, vasoconstrictors, vasodilators, peripheral activators
- Affecting blood pressure (antihypertensive drugs): ACE inhibitors, angiotensin receptor blockers, α blockers, calcium channel blockers
- Coagulation: anticoagulants, heparin, antiplatelet drugs, fibrinolytics, anti-hemophilic factors, haemostatic drugs
- Atherosclerosis/cholesterol inhibitors: hypolipidaemic agents, statins.

For the central nervous system:

Drugs affecting the central nervous system include: Psychedelics, hypnotics, anaesthetics, antipsychotics, antidepressants (including tricyclic antidepressants, monoamine oxidase inhibitors, lithium salts, and selective serotonin reuptake inhibitors (SSRIs)), antiemetics, anticonvulsants/antiepileptics, anxiolytics, barbiturates, movement disorder (e.g., Parkinson's disease) drugs, stimulants (including amphetamines), benzodiazepines, cyclopyrrolones, dopamine antagonists, antihistamines, cholinergics, anticholinergics, emetics, cannabinoids, and 5-HT (serotonin) antagonists.

For pain and consciousness (analgesic drugs):

The main classes of painkillers are NSAIDs, opioids and various orphans such as paracetamol. Other drugs such as anesthetic medication can also be used to reduce pain or numb a person's feeling to it.

For musculo-skeletal disorders:

The main categories of drugs for musculoskeletal disorders are: NSAIDs (including COX-2 selective inhibitors), muscle relaxants, neuromuscular drugs, and anticholinesterases.

For the eye:

- General: adrenergic neurone blocker, astringent, ocular lubricant
- Diagnostic: topical anesthetics, sympathomimetics, parasympatholytics, mydriatics, cycloplegics
- Antibacterial: antibiotics, topical antibiotics, sulfa drugs, aminoglycosides, fluoroquinolones
- Antiviral drug
- Anti-fungal: imidazoles, polyenes

- Anti-inflammatory: NSAIDs, corticosteroids
- Anti-allergy: mast cell inhibitors
- Anti-glaucoma: adrenergic agonists, beta-blockers, carbonic anhydrase inhibitors/hyperosmotics, cholinergics, miotics, parasympathomimetics, prostaglandin agonists/prostaglandin inhibitors. nitroglycerin

For the ear, nose and oropharynx:

sympathomimetics, antihistamines, anticholinergics, NSAIDs, steroids, antiseptics, local anesthetics, antifungals, cerumenolyti.

For the respiratory system:

Bronchodilators, NSAIDs, anti-allergics, antitussives, mucolytics, decongestants corticosteroids, Beta2-adrenergic agonists, anticholinergics, steroids.

For endocrine problems:

Androgens, antiandrogens, gonadotropin, corticosteroids, human growth hormone, insulin, antidiabetics (sulfonylureas, biguanides/metformin, thiazolidinediones, insulin), thyroid hormones, antithyroid drugs, calcitonin, diphosponate, vasopressin analogues

For the reproductive system or urinary system:

Antifungal, alkalinizing agents, quinolones, antibiotics, cholinergics, anticholinergics, anticholinesterases, antispasmodics, 5-alpha reductase inhibitor, selective alpha-1 blockers, sildenafils, fertility medications.

For contraception:

- Hormonal contraception
- Ormeloxifene
- Spermicide

For obstetrics and gynecology:

NSAIDs, anticholinergics, haemostatic drugs, antifibrinolytics, Hormone Replacement Therapy (HRT), bone regulators, beta-receptor agonists, follicle stimulating hormone, luteinising hormone, LHRHgamolenic acid, gonadotropin release inhibitor, progestogen, dopamine agonists, oestrogen, prostaglandins, gonadorelin, clomiphene, tamoxifen, Diethylstilbestrol

For the skin:

Emollients, anti-pruritics, antifungals, disinfectants, scabicides, pediculicides, tar products, vitamin A derivatives, vitamin D analogues, keratolytics, abrasives, systemic antibiotics, topicalantibiotics, hormones, desloughing agents, exudate absorbents, fibrinolytics, proteolytics, sunscreens, antiperspirants, corticosteroids

For infections and infestations:

Antibiotics, antifungals, antileprotics, antituberculous drugs, antimalarials, anthelmintics, amoebicides, antivirals, antiprotozoals

For the immune system:

Vaccines, immunoglobulins, immunosuppressants, interferons, monoclonal antibodies

For allergic disorders:

Anti-Allergics, antihistamines, NSAIDs

For nutrition:

Tonics, electrolytes and mineral preparations (including iron preparations and magnesium preparations), Parental nutritional supplements, vitamins, anti-obesity drugs, anabolic drugs, haematopoietic drugs, food product drugs

For neoplastic disorders:

Cytotoxic Drugs, therapeutic antibodies, sex hormones, aromatase inhibitors, somatostatin inhibitors, recombinant interleukins, G-CSF, erythropoietin

For diagnostics:

Contrast Media

For euthanasia:

Aneuthanaticum is used for euthanasia and physician-assisted suicide.Euthanasia is not permitted by law in many countries, and consequently medicines will not be licensed for this use in those countries.

Administration:

Administration is the delivery of a pharmaceutical drug to a patient. There are three major categories of drug administration; Enteral (taking medication orally), Parenteral

(introducing the medication directly to the circulatory system), and Other (which includes introducing medication through intranasal, topical, inhalation, and rectal means) [27].It can be performed in various dosage forms such as pills, tablets, or capsules.

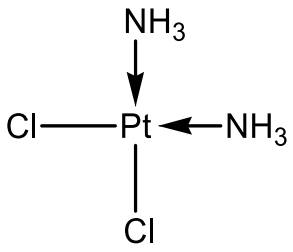
There are many variations in the routes of administration, including intravenous (into the blood through a vein) and oral administration (through the mouth).

They can be administered all at once as a bolus, at frequent intervals or continuously. Frequencies are often abbreviated from Latin, such as every 8 hours reading.

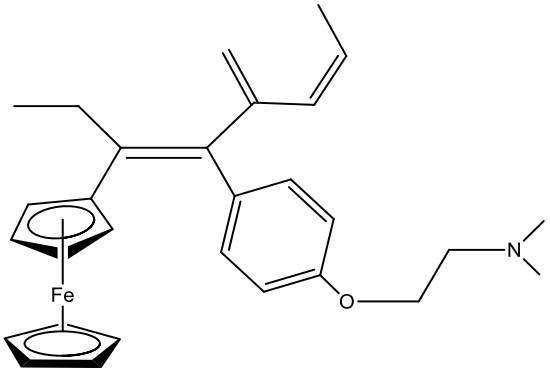
Environmental impact:

Since the 1990s water contamination by pharmaceuticals has been an environmental issue of concern [28]. Most pharmaceuticals are deposited in the environment through human consumption and excretion, and are often filtered ineffectively by wastewater treatment plants which are not designed to manage them. Once in the water they can have diverse, subtle effects on organisms, although research is limited. Pharmaceuticals may also be deposited in the environment through improper disposal, runoff from sludge fertilizer and reclaimed wastewater irrigation, and leaky sewage. In 2009 an investigative report by Associated Press concluded that U.S. manufacturers had legally released 271 million pounds of drugs into the environment, 92% of which was the antiseptics phenol and hydrogen peroxide. It could not distinguish between drugs released by manufacturers as opposed to the pharmaceutical industry. It also found that an estimated 250 million pounds of pharmaceuticals and contaminated packaging were discarded by hospitals and long-term care facilities [29].

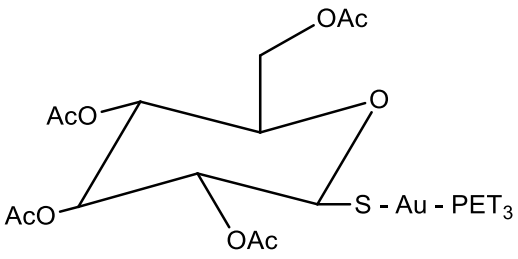
Some Representative Metal Complexes in Medicinal Use:



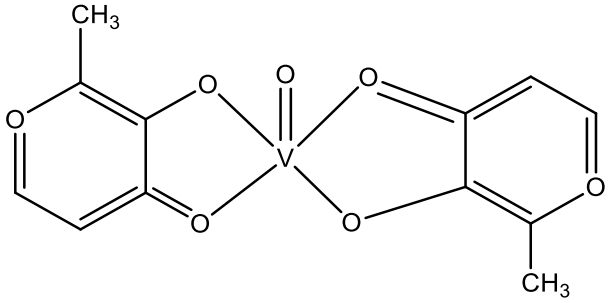
(a) Cisplatin (anticancer)



(b) Ferrocifen experimental anticancer



(c) Auronofin (antiarthritic)



(d) Bis (Maltolato) oxovandium (III) Antidiabetic

Platinum Complexes as Anticancer Agents:

The application of inorganic chemistry to medicine is a rapidly developing field, and novel therapeutic and diagnostic metal complexes are now having an impact on medical practice.Advances in biocoordination chemistry arecrucial for improving the design of compounds to reduce toxic side effects and understand their mechanisms of action.

*Cis*platin as one of the leading metal-based drugs, is widely used in thetreatment of cancer. Significant side effects and drug resistance, however, have limited its clinical applications. Biological carriers conjugated to cisplatin analogs have improved specificity for tumor tissue, thereby reducing side effects and drug resistance. Platinum complexes with distinctively different DNA binding modes from that of cisplatin also exhibit promising pharmacological properties. This review focuses on recent advances in developing platinum anticancer agents with an emphasis on platinum coordination complexes.

Platinum Coordination Compounds:

Structure-movement connections for a class of platinum coordination mixes affirmed that lone those mixes having cis geometry piece cell development. The most dynamic complex, cisplatin, was found to display antitumor movement, though its trans isomer demonstrated no such activity. Numerous subsidiaries of cisplatin additionally restrain development, and these mixes have no less than one N-H gathering, which is in charge of critical hydrogen-bond contributor properties, either in the approach of the natural target or the last structure. The greater part of the outstanding platinum anticancer buildings have the general recipe cis-[PtX2(NHR2)2], in which R = natural piece and X = leaving gathering, for example, cell platinophiles (S-benefactor ligands, for example, glutathione,methionine) as contending ligands in the cytosol. At long last, the supposed dynamic trans impact ought to be specified, which is in charge of ligand-trade responses on metalsions. The impact is most articulated for Pt(II) mixes, where it has been examined in incredible detail [35, 36]. The administer can be essentially figured as: ligands found trans to another ligand with a solid trans impact, (for example,

numerous delicate ligands) are more quickly substituted than ligands in cis positions. In spite of the achievement of cisplatin, be that as it may, it needs selectivity for tumor tissue, which prompts extreme symptoms. These incorporate renal disability, neurotoxicity and ototoxicity (loss of adjust/hearing), which are just mostly reversible when the treatment is ceased. With long haul or high-measurement treatment, extreme paleness may create. To address these issues, changed renditions of cisplatin, prompting second and third era platinum-based medications have been orchestrated in the course of recent years. A few platinum complexes are right now in clinical trials [30 – 36], yet some of these new edifices have not yet exhibited such noteworthy focal points over cisplatin.The second-era platinum medicate carboplatin,[Pt(C6H6O4)(NH3)2], has less harmful reactions than cisplatin and is all the more effectively utilized as a part of mix treatment. Its low reactivity enables higher measurements to be managed. Carboplatin is utilized more for ovarian disease treatment, though oxaliplatin is known to be best in colon malignancy treatment [34].

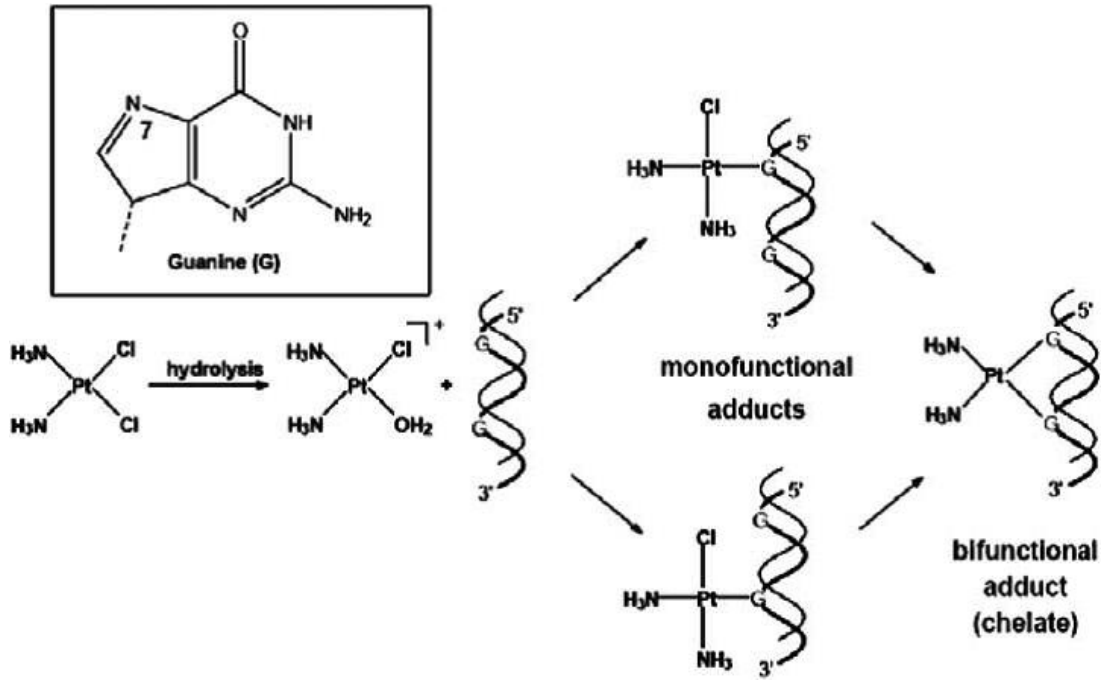


Figure 2: Pathways for GG intrastrand crosslinking of DNA by cisplatin. The insert shows the structure of guanine and the position of N7, the major Pt binding site

Use of Gold in Medicine:

Pharmaceuticals:

Credited with curing or avoiding everything from smallpox to measles, for a considerable length of time, the Gold was a typical treatment for rheumatoid joint inflammation from the late 1920s until the 1990s. As indicated by the Johns Hopkins Arthritis Center, gold chips were infused into muscles, into the veins and even given orally. In spite of the fact that

gold could some of the time be a successful treatment, it is misty precisely how it enhances the patient's condition. New medicines with less reaction are currently favored.

A standout amongst the most energizing employments of gold in drug is accuracy conveyance of prescription to battle malignancy. Minuscule gold secured "drug projectiles" are let go at focused cells at that point enacted to discharge their heap

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MEDICINAL APPLICATIONS OF NANOTECHNOLOGY

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ABSTRACT:

Nanoparticles of different composition can be used as well for bone repair, helping to restore normal bone structure following fracture. Nanobots injected in to a vein can be used as valuable diagnostic device, a kind of nano endoscopy, providing a medical team with important data about patients' condition. With further development it may be possible to use nanobots on cellular level to provide patients with advanced gene therapy, where abnormal genes can be swapped with normal ones. Nanotechnology can be utilized in drug delivery systems to ensure particular drugs are released at appropriate times to eliminate human errors, nano science and nanotechnologies have a huge potential to bring benefits in areas as diverse as drug development, water decontamination, information and communication technologies, and the production of stronger, lighter materials. Human health-care nanotechnology research can definitely result in immense health benefits. The genesis of nanotechnology can be traced to the promise of revolutionary advances across medicine, communications, genomics, and robotics. A complete list of the potential applications of nanotechnology is too vast and diverse to discuss in detail, in this book chapter we discuss some important uses of nanotechnology in the development of new and effective medical treatments.

KEYWORDS: Nanotechnology, Nanobots, Biological, Treatment, Human health, Development

INTRODUCTION:

Nanotechnology as defined by size is naturally very broad, including fields of science as diverse as surface science, organic chemistry, molecular biology, semiconductor physics, microfabrication, etc. The associated research and applications are equally diverse, ranging from extensions of conventional device physics to completely new approaches based upon

molecular self-assembly, from developing new materials with dimensions on the nanoscale to direct control of matter on the atomic scale.

Scientists currently debate the future implications of nanotechnology. Nanotechnology may be able to create many new materials and devices with a vast range of applications, such as in medicine, electronics, biomaterials and energy production. On the other hand, nanotechnology raises many of the same issues as any new technology, including concerns about the toxicity and environmental impact of nanomaterials, and their potential effects on global economics, as well as speculation about various doomsday scenarios. These concerns have led to a debate among advocacy groups and governments on whether special regulation of nanotechnology is warranted.

A work in the context of nanotechnology, nanomedicine, and the development of new effective therapies by [1] suggests thatcancer is the leading cause of death in the United States among people younger than 85 years, and for the first time has surpassed heart disease as the number one killer. This worrisome statistic has resulted not from an increase in the incidence of cancer, but because deaths from heart disease have dropped nearly in half while the number of cancer-related deaths has remained about the same. This fact accentuates the need for a new generation of more effective therapies for cancer. The development of new therapies in the context of advances in nanotechnologies related to cancer detection, analysis, diagnosis, and therapeutic intervention have been made. First several nanoanalytical methods, such as the use of quantum dots in detection and imaging of cancer, willbe described. These techniques will be essential to the process of precisely describing cancer at the level of the cell and whole organism. Second, examples of how nanotechnologies can be used in the development of new therapies will be given, including methods that might allow for more efficient and accurate drug delivery and rationally designed, targeted drugs.

Nanotechnology is a multidisciplinary field that covers a vast and diverse array of devices derived from engineering, physics, chemistry, and biology, [2]. The burgeoning new field of nanotechnology, opened up by rapid advances in science and technology, creates myriad new opportunities for advancing medical science and disease treatment in human health care. Applications of nanotechnology to medicine and physiology imply materials and devices designed to interact with the body at subcellular (i.e., molecular) scales with a high degree of specificity. This can be potentially translated into targeted cellular and tissue-specific clinical applications designed to achieve maximal therapeutic efficacy with minimal side effects. The chief scientific and technical aspects of nanotechnology are introduced, and some of its potential clinical applications are mentionable. [3] Worked out the treatment of diabetes of nanotechnology**.** After a solid background of the basics of nanotechnology and a good understanding of the mechanisms of diabetes, better understanding of current and future

treatment is possible. With an expected doubling of diabetes sufferers in some countries, new treatment methods must be put into effect if the World Health Organisation is to be expected to deal with this coming crisis.

Although the science is still in its infancy, it has major potential applications in diabetes. These include solving needs such as non-invasive glucose monitoring using implanted nanosensors, with key techniques being fluorescence resonance energy transfer (FRET) and fluorescence lifetime sensing, as well as new nano-encapsulation technologies for sensors such as layer-by-layer (LBL) films. The latter might also achieve better insulin delivery in diabetes by both improved islet encapsulation and oral insulin formulations. An 'artificial nanopancreas' could be an alternative closed-loop insulin delivery system. Other applications of nanomedicine include targeted molecular imaging (e.g. tissue complications) using quantum dots (QDs) or gold nanoparticles, and single-molecule detection for the study of molecular diversity in diabetes pathology. [4] Considered the most common complication of diabetes and cancer has major limitations such as poor sensitivity or specificity and drug toxicities respectively. Newer and improved methods of cancer detection based on nanoparticles are being developed. They are used as contrast agents, fluorescent materials, molecular research tools and drugs with targeting antibodies. Paramagnetic nanoparticles, quantum dots, nanoshells and nanosomes are few of the nanoparticles used for diagnostic purposes.Drugs with high toxic potential like cancer chemotherapeutic drugs can be given with a better safety profile with the utility of nanotechnology. These can be made to act specifically at the target tissue by active as well as passive means. Other modalities of therapy such as heat induced ablation of cancer cells by nanoshells and gene therapy are also being developed. The safety of nanomedicine is not yet fully defined. However, it is possible that nanomedicine in future would play a crucial role in the treatment of human diseases and also in enhancement of normal human physiology.

Nanotechnology is currently one of the most important chapters of medical research applications of nanotechnology in medicine and especially in cancer diagnosis and treatment has beendescribed, [5]. [6] Reported that the particular characteristics of the tumor microenvironment and tumor angiogenesis, it ispossible to design drug delivery systems that specifically target anti-cancer drugs to tumors. Most ofconventional chemotherapeutic agents have poor pharmacokinetics profiles and are distributed nonspecifically in the body leading to systemic toxicity associated with serious side effects. Therefore, the development of drug delivery systems able to target the tumor site is becoming a real challenge that is currently addressed. Nanomedicine can reach tumor passively through the leaky vasculature surrounding the tumors by the Enhanced Permeability and Retention effect whereas ligands grafted at the surface of nanocarriers allow active targeting by binding to the receptors overexpressed by cancer cells or angiogenic endothelial cells.

Considering threats of the most common complications of diabetes, namely diabetic neuropathy, heart disease and stroke, current treatments of these medical problems are only partially successful, [7]. Possible alternative treatments using nanotechnology are explored, as well as the ethical implications of a relatively new and untested field of medicine. The side effects of nanomedicine are unknown, so it is difficult to come to a firm conclusion about its uses in treating the complications of diabetes and in the wider medical field. However,those nanomedicines could provide more effective treatments for diabetic neuropathy, heart disease and stroke in the future. [8] Investigated the mechanisms of Diabetes which was obtained in order to better understand current and future treatment.Exploration of some of the ways nanotechnology treatment has been made of diabetes in years to come. With an expected doubling of Diabetes sufferers in some countries, new treatment methods must be put into effect if the World Health Organisation is to be expected to deal with this coming crisis.

Nanomedicine approaches have revolutionized the treatment of cancer and vascular diseases, as has been reported by [9]. Nanomedicine approaches have revolutionized the treatment of cancer and vascular diseases, where the limitation of rapid nonspecific clearance, poor biodistribution and harmful side effects associated with direct systemic drug administration can be overcome by packaging the agents within sterically stabilized, long - circulating nanovehicles that can be further surface-modified with ligands to actively target cellurlar /molecular compounds of the disease with significant advancements in genetics, proteomics, celluneering slar and molecular biology and biomaterials engineering ,the nanomedicine strategies have become progressively regarding the modulation of surface and bulk chemistry of the nanovehicles ,control of drug release kinetics, manipulation of nanoconstuctur geometry and integration of multiple functionalities on single nanoplatforms. analysis of the promises and these approaches will help identify and optimize vascular nanomedicine system to enhance their efficacy and clinical translation in the future are not fully recognized yet and further investigations will be required.

[10] Reported that diabetes is attaining epidemic proportions across the world. The most prevalent treatment strategy for diabetes focuses on the control of postprandial blood glucose which is found to be associated with cardiovascular diseases. In recent years, insulin delivery routes have undergone a radical change. The subcutaneous route may not necessarily succeed providing satisfactory postprandial hyperglycemic management. The ultimate goal of exogenous insulin regimen in diabetics is to closely and correctly imitate the physiological profile observed in non-diabetics. Over the last decade, many routes including pulmonary, nasal, rectal, transdermal, buccal and ocular have been studied for insulin delivery to achieve the therapeutic insulin levels using non-invasive drug delivery systems. Recently the buccal route has been evaluated for safe, simple, fast and flexible insulin delivery. The objective of this

review is to provide an update on various promising approaches that have been explored for buccal delivery of insulin. The buccal insulin spray has provided an alternative form of insulin to the patient as well as to the physician.

Nanotechnologies for Alzheimer's disease diagnosis, therapy, and safety issues by [11] is nice workrepresenting the most common form of dementia worldwide, affecting more than 35 million people. Advances in nanotechnology are beginningto exert a significant impact in neurology. These approaches which are often based on the design and engineering of a plethora of nanoparticulate entities with high specificity for brain capillary endothelial cells are currently being applied to early AD diagnosis and treatment. In addition, nanoparticles (NPs) with high affinity for the circulating amyloid-β (Aβ) forms may induce "sink effect" and improve the AD condition. There are also developments in relation to in vitro diagnostics for AD, including ultrasensitive NP-based bio-barcodes, immunosensors, as well as scanning tunneling microscopy procedures capable of detecting Aβ1−40 and Aβ1−42. However, there are concerns regarding the initiation of possible NP-mediated adverse events in AD, thus demanding the use of precisely assembled nanoconstructs from biocompatible materials. Key advances and safety issues are reviewed and discussed.

Diabetes mellitus is a group of metabolic disorder in which a person has high blood sugar either because the body does not produce enough insulin or because cells do not respond to the insulin. There are three main types of diabetes, [12]. Symptoms include increased thirst, frequent urination, constant hunger, weight loss, blurred vision etc. Complications include hypo/hyperglycemia, diabetic ketoacidosis, hypertension, neuropathy, nephropathy etc. Insulin therapy is used for the treatment of diabetes byadministration of exogenous insulin. Islet cell transplantation is a procedure which effectively controls blood glucose level for diabetic patients. A number of plants have been described as a traditional medicine for the treatment of diabetes. Vitamin Dsupplementation has been found to lower the incidence of type I diabetes. Several classes of oral hypoglycemic agents like sulfonylurea, biguanides and alpha-glycosidase inhibitors are available for the treatment of type II diabetes. Targeted drug delivery for the treatment of Diabetes using nanotechnology is one of the recent advances in nanomedicine.

[13] discussed polymeric nanoparticles, oral insulin administration using polysaccharides and polymericnanoparticles, inhalable insulin nanoparticle formulations, and insulin delivery usingBioMEMS. In addition to ceramic and polymeric nanoparticles, studies on nanoparticles for insulin delivery atreatment of diabetes-associated symptoms areutilized. There are a few limitations in the use of conventionally available drug deliverysystems for diabetes treatment. Nanomedicine is defined as integration of nanotechnology in medicine for the better human health care, [14]. The burgeoning new field of nanomedicine opened up by rapid advances in health care, creates myriad new opportunities for advancing medical science

and disease treatment in human health care. Worldwide around 230 million people havebeen affected by Diabetes, is a chronic metabolic disorder due to the relative deficiency of insulin secretion and varyingdegrees of insulin resistance and is characterized by high circulating glucose. The major problems with conventional problems in glucose self monitoring are overcome by advances in nanomedicine, like Glucose nanosensors, layer-bylayer (LBL) technique, Carbon Nanotubes and Quantum Dots(QD's) etc. The major problem concerning about diabetes control with improper insulin administration routes also achieved by nanomedicine with better insulin delivery technology like oral insulin formulations, artificial pancreas, microsphere and nanopumps etc. Oxidative stress is a imperative for its morbidity towards diabetic complications like delayed wound healing is a well known problem in diabetes and it can be treated by use of some nanoparticle.

The efficacy, cellular uptake and specific transport of drugs and/or imaging agents to target organs, tissues and cells are common issues in the diagnosis and treatment of different disorders, [15]. Engineered nanomaterials, objects with dimensions of 1–100 nm, are providing interesting biomedical tools potentially able to solve these problems, thanks to their physico-chemical features and to the possibility of multi-functionalization, allowing to confer them different features at the same time, including the ability to cross the blood–brain barrier. Finally, their potential neurotoxicity is discussed, and future nanotechnological approaches are approached.

Nanotechnology and its applications in drug delivery by [16] is also mentionable in the present context.There has been a rapid increase innanotechnology in the fields of medicine and morespecifically in targeted drug delivery. At present many substances are under investigation for drug delivery and more specifically for cancer therapy. Interestingly pharmaceutical sciences are also using nanoparticles to reduce toxicity and side effects of drugs. The potential to cross the Blood Brain Barrier (BBB) has open new ways for drug delivery into the brain. In addition, the nanosize also allows for access into the cell and various cellular compartments including the nucleus. Nanoparticles are also considered to have the potential as novel intravascular or cellular probes for both diagnostic and therapeutic purposes (drug/gene delivery), which is expected to generate innovations and play a critical role in medicine. Target-specific drug/gene delivery and early diagnosis in cancer treatment is one of the priority research areas in which nanomedicine will play a vital role.

Nanotechnology, nanomedicine, and the development of new, effective therapies for cancer:

The war on cancer is now in its fourth decade since the National Cancer Act was passed in 1971. Although much progress has been made in cataloging the environmentalcauses and

cellular and molecular biological basis for this dreaded disease, we still do not have a precise understanding of the differences between a cancer cell and its normalcounterpart. If we do not understand cancer, we cannot control, conquer, and eliminate it. The completion of the human genome sequence in 2001[17, 18] and subsequentimprovements in the sequence data [19] are important steps toward our goal to fully comprehend cancer cell biology. We are now closer to being able to fully characterize thedifferences between the normal and the tumor cell. Coupledwith the use of microdissection techniques [20], it is alsopossible to interrogate the genetic make-up of individual celltypes. The hope is that use of such technologies will accelerate the progress in identifying the differences betweennormal and tumor cells, which in turn will lead todevelopment of new therapies that will specifically target the cancer. The ultimate goal of these strategies is to eliminate the tumor with limited effect on normal tissue. At about the same time that the human genome was being sequenced, a new, novel focus of research evolved from the convergence and coalescence of many diverse scientific disciplines. This new area of research for the sake of simplicity, iscalled nanotechnologyas a general term for the creation, manipulation, and application of structures in the nanometer size range. The term by nanoscienceis used to infer the study of thephenomena associated with objects somewhat arbitrarily defined as having dimensions between 1 to 100 nm. Indeed the prefix by nanois now being used in so many fields of research that it has become a source of confusion [21]. In thisarticle, nanomedicine can be thought of as a subdisciplinecontained within nanotechnology or the nanosciences. The nanomedicine aspects of nanotechnology will be stressed and will cover areas such as bioimaging, drug delivery systems, and new drug therapies as they relate tocancer. This will not be an exhaustive review, as only a fewexamples will begiven, so the authors wish to apologize forthe many excellent articles in the field of nanomedicine that will not be cited.

Nanoscale devices that can deliver cancer prevention and treatment agents will be created. These might include the nanoparticles/liposomes described above for drug delivery. Multicomponent anticancer vaccines will be tested using nanoscale delivery vehicles as described above in the cancer immunotherapy section.

The present and future of nanotechnology in human health care:

Nanotechnology can be defined as the science and engineering involved in the design, synthesis, characterization and application of materials and devices whose smallest functional organization in at least one dimension is on the nanometer scale (one-billionth of a meter) [22, 23]. In the past few years nanotechnology has grown by leaps and bounds, and this multidisciplinary scientific field is undergoing explosive development [24]. It can prove to be a boon for human health care, because nanoscience and nanotechnologieshave a huge potential to

bring benefits in areas as diverse as drug development, water decontamination, information and communication technologies, and the production of stronger, lighter materials. Human health-care nanotechnology research can definitely result in immense health benefits. The genesis of nanotechnology can be traced to the promise of revolutionary advances across medicine, communications, genomics, and robotics. A complete list of the potential applications of nanotechnology is too vast and diverse to discuss in detail, but without doubt, one of the greatest values of nanotechnology will be in the development of new and effective medical treatments [25, 26]. These technologies will extend the limits of current molecular diagnostics and permit accurate diagnosis as well as the development of personalized medicine.

Nanomedicine and its potential in diabetes research and practice:

Nanotechnology is the measurement and manipulation of material at the level of 1–100 nanometres (nm), 1 nm being 10^{-9} or one billionth of a meter (*nanos*, Greek, 'dwarf'). When this science is applied specifically to the problems of medicine, it is called nano medicine. The nanomedicine scale conventionally excludes at the lower end atoms, which have a size of about 0.1 nm, and at the upper end biological entities such as bacteria (1000–10 000 nm) and body cells (e.g. 10 000 nm for a white blood cell). Clearly, the body has configured many of its biocomponents as nanostructures, including proteins, mitochondria, ion channels, membranes, secretory granules, lysosomes and so on, but many new nanomaterials and structures are now being manufactured that might be of use in medicine, including nanoparticles, capsules, films and tubes, and complex molecules such as fullerenes (a new allotrope of carbon containing, in its original form,60 carbon atoms arranged symmetrically as a molecular ball of diameter about 1 nm [27].

Nanomedicine can be classified into *measurement (*or *'nanometrology'*) [28], which concerns either measuring very small amounts of analyzes (e.g. single molecules) or using very small-sized devices for measuring (e.g. sensors within a cell), or [29] *therapy*, as all of the manipulations and constructions of materials at the nano-level ultimately concern therapies (e.g. membranes and coatings for more biocompatible implants or vehicles for drug delivery), if they do not concern measurement (e.g. constructing nanoscale devices for monitoring analytes in or out of the body).

Some of the potential advantages of nanoscale research and its clinical applications are fairly obvious, such as small size allowing unprecedented access to target areas within the body (e.g. nanostructures and devices for imaging, analysis, treatment or repair inside diseased tissues and cells), and the assay of very small amounts of bioanalyte might allow earlier, more sensitive diagnosis. But much of the interest in nanotechnology is for theless obvious reason that the nature of some materials is altered in unexpected ways as size is reduced, called

'quantum effects', producing changes in properties such as electrical conductivity, strength, cooler and reactivity. For example, carbon which is soft and malleable as graphite becomes, in the form of carbon nanotubes (1.5 nm in diameter), flexible, resilient and stronger than steel, as well as fluorescent and conducting electricity with virtually no resistance [30, 31].

Novel applications of nanotechnology in medicine:

Nanomedicine involves utilization of nanotechnology for the benefit of human health andwell being. The use of nanotechnology in various sectors of therapeutics has revolutionized the field of medicine where nanoparticles of dimensions rangingbetween 1 - 100 nm are designed and used for diagnostics, therapeutics and as biomedical too isfor research [32]. It is now possible to provide therapy at a molecular level with the help of these tools, thus treating the disease and assisting in study of the pathogenesis of disease. Conventional drugs suffer from major limitations of adverseeffects occurring as a result of non specificity of drug action and lack of efficacy due to improper or ineffective dosage formulation (*e.g*., cancer chemotherapy and antidiabetic agents). Designing of drugs with greater degree of cell specificity improves efficacy and minimizes adverse effects. Diagnostic methods with greater degree of sensitivity aid in early detection of the disease and provide better prognosis. Nanotechnology is being applied extensively to provide targeted drug therapy, diagnostics, tissue regeneration, cell culture, biosensors and other tools in the field of molecular biology. Various nanotechnology platforms likefullerenes, nanotubes, quantum dots, nanopores, dendrimers, liposomes, magnetic nanoprobes andradio controlled nanoparticles are being developed.

Diagnostic and therapeutic applications of nanotechnology in cancer:

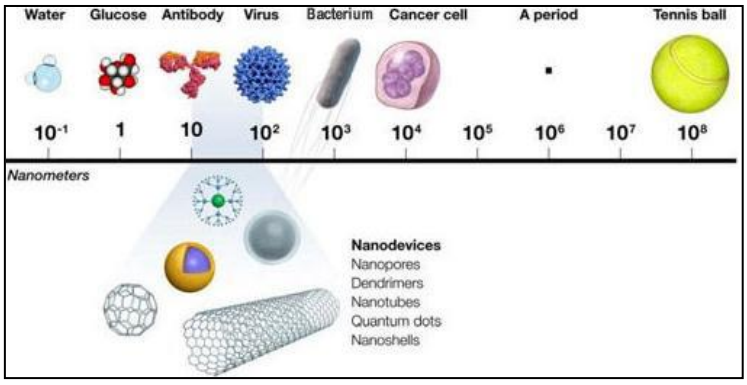

Figure 1. Size of varios objects in the terms of nano

Nanotechnology (Greek nano – "dwarf") was envisioned for the first time by physicist, laureate of Nobel Prize, Richard Feynman at his lecture"there is plenty of room in the bottom" in 1959 .It is defined as the study and use of structures between 1 and 100 nanometers in size; the

scale of molecules like proteins and receptors antibodies. The following illustration can help us comprehend how small 1 nanometer actually is. In reality it is 100,000 times smaller than the diameter ofhuman hair.

Scientists used to work with nanoparticles for centuries, but they were not able to see their structure until recent years, when microscopes capable of displaying structures as small as atom were developed. With better scientific understanding of processes on molecular level it was possible to create the smallest devices and use them to help in various designations [33]. The spectrum of applications of nanotechnology is huge, including electronics, optics, chemistry, information technology and biosciences.fi is summarizing all major fields nanoparticles are playing important role.

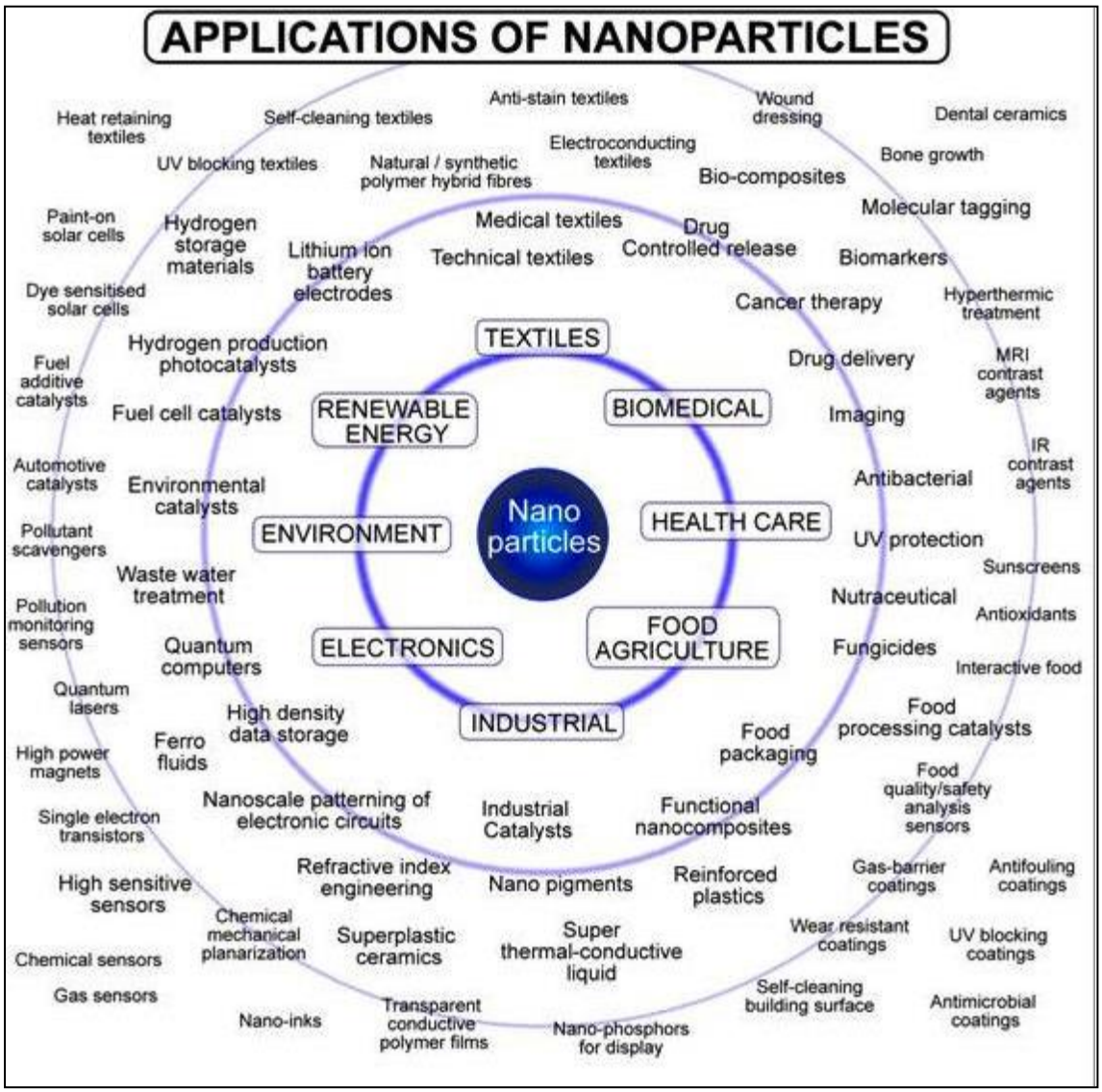

Figure 2. Applications of nanoparticles

Because of the fact that basic elements of living organisms, components of cells, are of nano size, application of nanotechnology at this field, nano biotechnology, seems to be natural consequence. Medicine is the field, which can benefit from utilization of nanotechnology most, as it deals with specimens on the smallest levels. On top of this development of tiny nano devices can make it possible to enter the body and explore it from inside, what used to be only science fiction even a decade ago.There are plenty of areas in medicine, which can be revolutionized by the use of nanotechnology.

Nanobots – nano devices, which can be used for some interventions inside the body; they can be even programmed in the way to build new nanobots. Nano computers must be built to supervise the work of nanobots. They can be small enough to repair cells working on atomic/ molecular level. [34] They canbe used in heart diseases to repair damaged heart cells as wellas to remove cholesterol deposits from the inside of coronary arteries. Nanotechnology can help in cancer treatment and diagnosis. Nanobots canbe sent directly to the side of tumor to destroy cancer cells, notaffecting surrounding normal tissues. With the use of nano particlesdrugs can be sent and released directly into cancer cells making treatment more effective and reducing side effects.Instead of using implants, such as current practice, it may be possible to send nanobots to build required structures in situ. Nanoparticles of different composition can be used as well for bone repair, helping to restore normal bone structure following fracture. Nanobots injected in to a vein can be used as valuable diagnostic device, a kind of nano endoscopy, providing a medical team with important data about patients' condition. With further development it may be possible to use nanobots on cellular level to provide patients with advanced gene therapy, where abnormal genes can be swapped with normal ones. Nanotechnology can be utilized in drug delivery systems to ensure particular drugs are released at appropriate times to eliminate human errors, for example in elderly patients. It can make life much easier for diabetics – nanocomposite contact lenseswith the property of changing color depending on blood sugar level can be used instead of invasive blood tests.

Nanotechnology in cancer:

The use of nanotechnology in the management of cancer is currently the most important fragment of nanomedicine. The diagram below is summarizing the applications of nanotechnology in cancer: detection, treatment and monitoring, which will be discussed in the next part of the paper [35].

Role of nanotechnology in cancer diagnosis:

It is complementary to already existing technologies, seems to be very useful in biomarkers research, brings better sensitivity to tests and can be used for tumor imaging.

Nanoparticles of superparamagnetic iron oxide (SPIONs) – iron oxide core with a hydrophilic coat can be applied as a contrast agent for MRI; they can alter magnetic field gradients in target tissue. They are lymph tropic and when administered intravenously they are trapped in lymph nodes. They are very valuable for detection of metastatic lymph nodes, not detected in standard MRI.

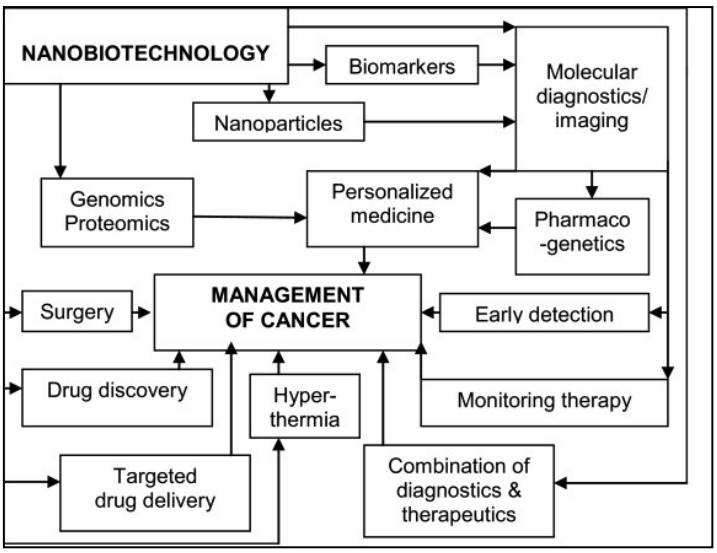

Figure 3. Management of cancer by nanobiotechnology

To exploit the tumor microenvironment: Passive and active tumor targeting of Nanocarriers for anti-cancer drug delivery:

Cancer is a leading cause of death around the world. The World Health Organization estimates that 84 million people will die of cancer between 2005 and 2015. For effective cancer therapy, it is necessary to improve our knowledge of cancer physiopathology, discover new anti-cancer drugs and develop novel biomedical technologies. Currently, the cancer therapy has become a multidisciplinary challenge requiring close collaboration among clinicians, biological and materials scientists, and biomedical engineers. Conventionalchemotherapeutic agents are distributed non-specifically in the body affecting both normal and tumor cells. Given the potency of modern pharmacological agents, tissue selectivity is a major issue. Hence, the dose achievable within the solid tumor is limited resulting in suboptimal treatment due to excessive toxicities. The ultimate goal of cancer therapeutics is to increase the survival time and the quality oflife of the patient by reducing the systemic toxicity of chemotherapy [36] the idea of exploiting vascular abnormalities of tumors, avoiding penetration into normal tissue interstitial while allowing access to tumors becomes particularly attractive. In this context, the tumor targeting of nanomedicine-based therapeutics has emerged as oneapproach to overcome the lack of specificity of conventional chemotherapeutic agents [37]. This concept dates back to 1906 when Ehrlich first imagined the “magic bullet” [38]. The challenge of the targeting is triple:

(i) to find the proper target for a particular disease; (ii) to find the drug theeffectively treats this disease and (iii) to find how to carry the drug.The specific tumor targeting of nanocarriers leads to better profiles of pharmacokinetics and Parma codynamics, controlled and sustained release of drugs, an improved specificity, an increased internalization and intracellular delivery and, more importantly, a lower systemic toxicity. The tumor targeting consists in "passive targeting" and "active targeting"; however, the active targeting process cannot be separated from the passive because it occurs only after passive accumulation in tumors. Alternatively, existing anti-cancer agents can be more effective by using nanomedicines (the medical application of nanotechnology). The European Science Foundation's Forward Look on Nanomedicine defined nanomedicines as «nanometer size scale complex systems, consisting of at least two components, one of which being the active ingredient». Protecting drug from the degradation, nanocarriers have to be able to target a drug to the tumor site, reducing damage to normal tissue.

The development of nanocarriers for poorly soluble drugs is very interesting because a large proportion of new drug candidate emerging from high throughput screening are poorly-water soluble drugs which are also poorly absorbed and which present a low bioavailability. The representations of the most currently used in preclinical and clinical tumor-targeted nanomedicines are illustrated in Fig 4. Nanoparticles are solid and spherical structures, ranging around 100 nm in size, in which drugs are encapsulated within the polymeric matrix. We distinguish "nanospheres" in which the drug is dispersed throughout the particles and "nanocapsules" in which the drug is entrapped in a cavity surrounded by a polymer membrane [39]. They can be PEGplated and grafted with targeting ligands (Polymeric micelles (Fig. 4) are arranged in a spherical structure with hydrophobic core which increases the solubility of poorly-water soluble drugs, and the hydrophilic corona which allows a longcirculation time of the drug by preventing the interactions between the core and the blood components. These systems are dynamic and have a size usually below 50 nm [40]. Liposomes (Fig. 4) are closed spherical vesicles formed by one or several phospholipid bilayers surrounding an aqueous core in which drugs can be entrapped. They can be also PEGylated and grafted with targeting ligands [41]. Dendrimers (Fig. 4) are highly branched macromolecules with controlled three-dimensional architecture. Polymers grow from a central core by a series of polymerization reactions. Drugs are attached to surface groups by chemical modifications [42]. They can be grafted with targeting ligands [43]. To contribute to the "stealth" characteristics of PEGylated nanoparticles, there are three important factors, (i) the molecular weight of the PEG chain, (ii) the surface chain density and (iii) the conformation. The coating of PEG chains to the surface of nanoparticles results in anincrease in the blood circulation half-life by several orders of magnitude. By creating a hydrophilic protective layer around the nanoparticles, steric repulsion

forces repel the absorption of opsonin proteins, thereby blocking and delaying the opsonization process [44].

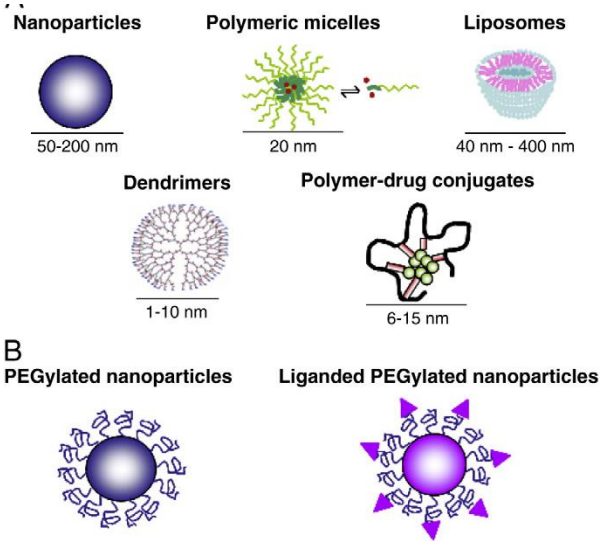

Figure 5. Nanomedicine in drug delivery. A. Types of nanocarriers currently described in preclinical and clinical studies. B. Schematic representation of PEGylation and ligand grafting

Tumor microenvironment:

In cancer therapy, the tumor microenvironment is one of many areas which are studied to design new therapies. More precisely, the knowledge and the understanding of the tumor microenvironment allow researchers to elaborate different therapeutic strategies, basedon numerous differences compared with normal tissue including vascular abnormalities, oxygenation, perfusion, pH and metabolic states. Here, the differences in terms of morphology of tumor vasculature and the pH will be particularly described as they are themore relevant characteristics for the design of nanocarriers as tumortargeted drug delivery systems.

Enhanced Permeability and Retention (EPR) effect:

Structural changes in vascular pathophysiology could provide opportunities for the use of long-circulating particulate carrier systems. The ability of vascular endothelium to present open fenestrations was described for the sinus endothelium of the liver [45] when the endothelium is perturbed by inflammatory process,hypoxic areas of infracted myocardium [46] or in tumors [48]. Moreparticularly, tumor blood vessels are generally characterized by abnormalities such as high proportion of proliferating endothelial cells, pericyte deficiency and aberrant basement membrane formation leading to an enhanced vascular permeability. Particles, such as nanocarriers (in the size range of 20–200 nm), can extravasate and accumulate inside the interstitial space. Endothelial pores have sizesvarying from 10 to 1000 nm [49]. Moreover, lymphatic vessels are absent or non-functional in tumor which contributes to inefficient drainage from the tumor tissue. Nanocarriers entered into the tumor are not

removed efficiently and are thus retained in the tumor. The "Enhanced Permeability andRetention (EPR) effect," discovered by Matsumura and Maeda [50, 51]. The abnormal vascular architecture plays a major role for the EPR effect in tumor for selective macromolecular drug targeting at tissue level that can be summarized as follows and illustrated in fig. 5

1. Extensive angiogenesis and hypervasculature
2. Lack of smooth-muscle layer, pericytes
3. Defective vascular architecture: fenestrations
4. No constant blood flow and direction
5. Inefficient lymphatic drainage that leads to enhanced retention in the interstitium of tumors
6. Slow venous return that leads to accumulation from the interstitium of tumor

Physiological changes in blood flow within the tumors and intransport properties of tumor vessels are consequences of these vascular abnormalities. In1987, Jain hypothesized that the osmotic pressure in tumors must be high. This high tumor interstitial fluid pressure (IFP) could be a barrier for efficient anti-cancer drug delivery[52]. It is now well known that the IFP of most solid tumors is increased. Many anti-cancer drugs — high molecular weight compounds in particular — are transported from the circulatory system through the interstitial space by convection rather than by diffusion. Increased IFP contributes to a decreased transcapillary transport in tumors, leading to a decreased uptake of drugs into tumor. In addition, IFP tends to be higher at the center of solid tumors, diminishing toward the periphery, creating a mass flow movement of fluid awayfrom the central region of tumor. To ensure that all the tumor get an adequate drug supply, drug molecules or drug-loaded nanocarriers should migrate through the tumor interstitial space from a site of entry to remote cells. This process is hindered by high IFP. Due to their greater size, the transport of drug-loading nanocarriers is less affected by this enhanced IFP in tumors. Moreover, the microvasculature pressure in tumors is also one to two orders of magnitude higher than in normal tissues. This facilitates extravasation of nanocarriers that could otherwise have been precluded by high IFP. Many types of nanocarriers successfully overcome these barriers and selectively accumulate in the tumors [53, 54].

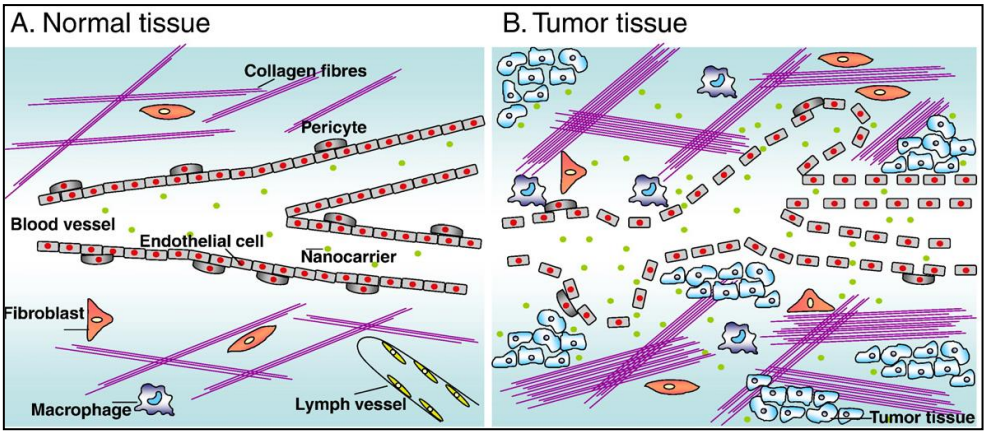

Figure 6. Differences between normal and tumor tissues

Potential uses of nanotechnologyinthe treatment of complications of Diabetes:

Nanotechnology can be defined as a field of technology that researches into and manipulates matter on a molecular scale, between 1 and 100nm. One nanometer is one billionth (10–9) of a metre. Nanoparticles often have different physical properties than the same elements when they are in bulk, also they can reach much smaller spaces and structures that other, larger substances cannot. This makes them very useful as they can perform tasks that larger materials cannot [55]. There are many uses of nanotechnology in medicine. Nanotechnology can potentially be used in drug delivery, where nanoparticles are used to transport drugs to specific cells, and to prevent the drugs from being damaged by extremes of pH (for example the low pH in the stomach). Also, the nanoparticles prevent the drug from damaging any tissue or organs en route to the target cells [56].

Nanotechnology could also be used in diagnostic and imaging techniques, for example in order to detect cancer cells. Scientists in Shanghai Jiaotong University have attached gold nanoparticles to antibodies that are specific for biomarkers of different cancer cells. These gold nanoparticles can be easily detected, which makes this method of detection highly sensitive [57]. Potential therapy techniques using nanotechnology include using titanium dioxide nanoparticles, covalently bonded with antibodies that are specific to brain tumour cells, to destroy brain tumour. These covalently bonded particles obtain their energy from light in order to produce reactive oxygen species, which have a cytotoxic effect, damaging the cell membrane of the tumour cells. A problem with this technique is that brain tumour cannot be exposed to light directly, so surgery is still needed. However, this method is less invasive than current surgical treatment, and brain tumour are often inaccessible for surgeons, so this method could reach tumour deep within the brain, and, as the antibody is specific to certain tumour cells, will not damage any healthy tissue on the way to the tumour. Nanotechnology could potentially be

used in cell replacement, where titanium oxide nanotubes could be used as a scaffold to support artificial cartilage, grown from chondrocytes in vitro [58].

The aim is to use the scaffold to link the cartilage to the bone, restoring the tissue to its normal functioning environment [59]. Nanotechnology could also be used in antimicrobial techniques. Nanocrystalline silver particles could be used in wound dressing, acting as a physical barrier to microbes such as MRSA. As MRSA is a strain of bacterium that is resistant to methicillin, using nanotechnology would avoid this problem [60]. Nanotechnology is likely to influence the way all diseases are diagnosed and treated, however in this paper I have chosen to focus on the uses of nanotechnology in treating diabetic complications caused by blood vessel damage. These are diabetic neuropathy, heart disease and stroke. They are serious and present increasing problem for the NHS, and for the patients affected. The proposed treatment will demonstrate some of the different uses of nanotechnology [61]. It is estimated that the number will increase further, with over 4 million people having diabetes in 2025. The number of new diagnoses is equivalent to 400 people every day.

***Diabetes Mellitus* and recent advances:**

Glucose homeostasis, a balance between glucose production and glucose utilization is primarily regulated by the pancreatic islet β-cells, which secrete insulin and α-cells, which secrete glucagon. Glucose production occurs predominantly in liver whereas glucose utilization occur inmuscles and adipose, brain, kidney; red blood cells. Diabetes mellitus is a group of metabolic disorder in whicha person has high blood sugar either because the body doesnot produce enough insulin or because cells do not respondto the insulin that is produced. Diabetes mellitus affect tmost of the people of both developed and developing countries. This cans usually becontrolled with dietary management, exercise, oral hypoglycemic drugs and insulin therapy. The diet most often recommended is high indietary fiber, especially soluble fiber, but low in fat are in the extracellular matrix. Lymph vessels are present. B. Tumor tissues containdefective blood vessels with many sac-like formations and fenestrations. The extracellular matrix contains more collagen fibres, fibroblasts and macrophages than in normal.

CONCLUSION:

Nanomedicine approaches hold great promise in revolutionizing therapeutic and diagnostic modalities in the clinical treatment of vascular diseases. The current review has attempted to capture comprehensively the various nanoconstruct fabrication and formulation strategies in this area. Many of these reports are still based on in vitro or preclinical small animal model in vivo investigations. Successful clinical translation of these approaches can be realized only through efficient optimization of the structure-function parameters of the vehicle

itself, the payload encapsulation characteristics and appropriate delivery mechanisms, suitable cellular/molecular targeting mechanisms, and statistically established demonstration of safety and treatment benefit in appropriate pre-clinical models.

There are still many questions to be answered before use of nanobiotechnology will be used on a daily basis in oncology and otherfields of medicine. Whatever medicine is going to be used in nanoparticles must go through all the tests, as its properties can become very different. Issue of safety is still not resolved. Some nanoparticles, especially containing metals are considered to be toxic, while others, like biodegradable polymer nanoparticles are suitable for drug delivery as there is no significant toxicity.Most research is still performed on animal models, where nano particles potentially behave differently than in humans. We must still wait forclinical trials results before new techniques are widely introduced.There are however strong rationales for using nanobiotechnology. Structural, optical and magnetic properties of nanoparticles are not available from larger molecules. Connected with targeting ligands they can become very specific. Direct delivery of cancer medication into their place of action should reduce doses needed making treatment safer and more effective. Diagnosis of cancer can be made earlier in the course of disease giving patients better chances for recovery. Knowledge about molecular profileof particular patients will enable doctors to set more personalized cancer therapies. Nano technology has a promising future, and further advances are anticipated in the next 5 – 10 years. We can expect introduction of nanobots to clinical practice and may be personal computers as well which will monitor our health and will use preventive measures rather than treatment. We must remember about all risks and limitations but there are good reasons to be optimistic about the future of nanotechnology in medicines.

The moral implications of nanotechnology within the human body are very important to understand for instance if scientists can create an artificial organ successfully where does it stop, people could argue that creating an organ is a small step away from creating an organism and that man cannot meddle in the creation of life. On the other hand the leap from organ to living creature is immense and no technology available today or in the foreseeable future would be able to make that jump. Also before any treatment is developed scientists must give serious thought to the toxicity of Nanoparticles, as of yet there has been no indication of Nanoparticles causing illness or harm through toxicity however the small size of these particles cause them to spread over a larger surface area that their larger chemical counterparts and their ability to pass into cells would cause disastrous results if a harmful Nano particle were to be used. In conclusion the future of nanotechnology in diabetes is open with many possibilities and will no doubt be of huge importance in times to come.

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A GIST OF METHODS INVOLVED IN THE DETERMINATION OF THE WATER QUALITY PARAMETERS

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ABSTRACT:

Water is the most imperative in forming the land and managing the atmosphere. It is a standout amongst the most imperative aggravates that significantly impact life. The nature of water is normally depicted by its physical, synthetic and organic qualities. Fast industrialization and aimless utilization of substance manures and pesticides in farming are causing overwhelming and shifted contamination in amphibian condition prompting disintegration of water quality and exhaustion of oceanic biota. Because of utilization of defiled water, human populace experiences water borne ailments. It is hence important to check the water quality at normal interim of time. Parameters that might be tried incorporate temperature, pH, turbidity, saltiness, nitrites, phosphates and so on.

KEYWORDS: Alkalinity, Industrialization, Water, Turbidity

INTRODUCTION:

All life is rely upon water and exists in nature in many structures like sea, stream, lake, mists, rain, snow and haze and so on. Be that as it may, entirely synthetically unadulterated water does not exist for any considerable period of time in nature. A lake is a substantial waterway encompassed via arrive, possessed by different oceanic living things, for all down to earth reason, unadulterated water is considered to what has low disintegrated or suspended solids and repulsive gasses too low in organic life. Such high caliber of water might be required just to drink purposes while for different utilizations like farming and industry, the nature of water can be very adaptable and water dirtied up to certain degree when all is said in done detect can be viewed as immaculate. The wellbeing of the water bodies are specifically identified with strength of practically every part of the biological system. Lakes are additionally subjected to different common procedures occurring in the earth like the hydrologic cycle, with remarkable improvement exercises; individuals are in charge of stifling a few lakes to death. Tempest water overflow and release of sewage into the lakes are few of the regular causes where different supplements enter the oceanic biological systems bringing about their demise.

Of all the water quality issues confronting lakes all over, eutrophication is of incredible concern. Eutrophication is a term used to depict the maturing of a lake, coming about because of the gathering of supplements, residue, sediment and natural issue in the lake from the encompassing watershed. The part of vegetation and silt as sources and sink of supplements has been illustrated. It portrays the organic response of oceanic frameworks to supplement enhancement, the possible outcome of which is the improvement of essential creation to irritation extents.

Great nature of water is fundamental for living beings. The nature of water can be surveyed by concentrate its physical and substance attributes. As a result of huge populace and carelessness of person the nature of water is being weakened step by step [1].An gigantic modern development has occurred all through the world in the previous couple of decades, to satisfy the expanded request of human progress, which has made an overexploitation of accessible assets and caused contamination of water, land, and air. Fast industrialization, urbanization and anthropogenic exercises subsequently cause water contamination which has brought a variable water emergency. Ecological contaminations emerging from anthropogenic source can possibly influence the sea-going biological system in a synergistic way. The assurance of such ecological toxins can be evaluated by physicochemical right around 70% of the water in non mainstream has turned out to be dirtied because of the release of residential sewage and mechanical effluents in to characteristic water assets, for example, waterway, streams, lakes [2]. The necessity of water in all lives, from microorganisms to people, is expanded step by step yet it is a difficult issue to give a protected drinking water since all water assets have come to a state of emergency because of impromptu urbanization and industrialization [3]. As per WHO gauge around 80% of water contamination in India is because of residential waste. The inappropriate administration of water frameworks may cause difficult issues in accessibility of drinking water [4]. Water asset is frequently dirtied by mechanical effluents. At the point when squander from various industry are released without legitimate treatment in to the water. The physical, substance and organic attributes of water are modified such that they are not helpful for the reason for which they are proposed [5]. Consideration of water quality is important in wetland habitat evaluation because a host of interacting physical and chemical factors can influence the levels of the primary productivity and thus influence trophic structure and total biomass throughout the aquatic food web [6]. In this paper, some parameters assessing the quality of water has been presented with past work carried out by scientist and academicians related with quality. It is very essential and important to test the water before it is used for drinking, domestic, agricultural or industrial purpose [7]. Water must be tested with different physico-chemical parameters. Selection of parameters for testing of water is solely depends upon for what purpose we going to use that water and what extent we need its quality and purity. Water does content different types of floating, dissolved, suspended and microbiological as well as bacteriological impurities. Some physical test should be

performed for testing of its physical appearance such as temperature, color, odour, pH, turbidity, TDS etc, while chemical tests should be perform for its BOD, COD, dissolved oxygen alkalinity, hardness and other characters [8]. For obtaining more and more quality and purity water, it should be tested for its trace metal, heavy metal contents and organic i.e. pesticide residue. It is obvious that drinking water should pass these entire tests and it should content required amount of mineral level [9]. Only in the developed countries all these criteria's are strictly monitored due to very low concentration of heavy metal and organic pesticide impurities present in water it need highly sophisticated analytical instruments and well trained manpower.

ANALYTICAL PROCEDURE FOR THE PHYSICO-CHEMICAL PARAMETERS:

Physico-chemical parameters of water, their units and method of analysis are summarized in Table 1.

Table 1. Water quality parameters associated with their abbreviations, units and analytical methods used:

Parameters	Abbreviations	Units	Analytical methods
pH	pH	pH unit	pH meter
Air temperature	A –Temp	^{0}C	Thermometric
Water temperature	W –Temp	^{0}C	Thermometric
Colour	Colour	Hazen units	Visually
Electrical conductivity	EC	μScm^{-1}	Electrometric
Salinity	Salinity	ppm	Electrometric
Total Dissolved Solids	TDS	ppm	Evap. Method
Total Hardness	T-Hard	ppm	Titrimetric
Turbidity	Turbidity	NTU	Turb metric
Dissolved Oxygen	DO	ppm	Prob. Method
Chemical Oxygen Demand	COD	ppm	Spectroquant photometric
Biochemical Oxygen Demand	BOD	ppm	Prob. method (5 days later)
Total Alkalinity	T-Alk	ppm	Titrimetric
Phosphate	PO_4	ppm	Photometric
Sulphate	SO_4	ppm	Gravimetric
Nitrite	NO_2	ppm	Spectroquant NOVA 60
Free carbon dioxide	Free CO_2	ppm	Titrimetric
Acidity	Acidity	ppm	Titrimetric
Total Chloride	T-Cl	ppm	Titrimetric
Calcium	Ca	ppm	AAS
Magnesium	Mg	ppm	AAS
Sodium	Na	ppm	AAS

The air temperature, water temperature, pH, EC, salinity, DO, turbidity of each sample is measured at the sampling points following the standard procedures. In laboratory the water samples are analyzed for other physico-chemical parameters and detection of metal ions (i.e. Ca, Mg and Na). These parameters must be analyzed within 48 hours from the time of sampling.

Temperature:

Air temperature can be obtained directly by using mercury thermometer but for water temperature the instrument was immersed in a thoroughly shaken water sample and the reading (in °C) is noted down.

Colour:

Colour to the water samples can be assigned by comparing them with the known colour standards, platinum-cobalt method is normally used for preparation of colour standards, in which one colour unit is equivalent to the colour produced by 1mg/L of platinum. The colour determination can be arried out quickly after the sampling in the laboratory because colour gets changed biologically or physically during storage.

Apparatus and Reagents:

1. Nessler tubes, 50 mL
2. Colour standards: 1.246 g of potassium chloro palatinate (K_2PtCl_6) and 1 g of cobaltous chloride ($CoCl_2.6H_2O$) dissolved in distilled water having 100mL of concentrated sulphuric acid (conc. H_2SO_4) to prepare 1 litre of solution. The solution has 500mg/L of platinum and about 250 mg of metallic cobalt and thus equivalent to 500 colour units.

50 mL each of 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60 and 70 colour units is prepared by diluting the stock standard solution of 500 units with distilled water. The standards be put in 50 mL Nessler tubes and evaporation and contamination should prevented.

Procedure:

1. 50 mL of turbidity free sample is taken in a 50 mL Nesslers tube. Turbidity is removed by centrifugation or filtering the sample using some filter paper.
2. The colour of the sample is matched with standard colour tubes by looking vertically through the tubes towards a white surface placed at such an angle that light is reflected upward through the column of liquid.

Calculations:

Colour units = Estimated colour × dilution factor

Turbidity:

Turbidity of water samples can be measured by two ways:

1. By making use of digital portable turbidity meters of WTW (Turb 430- IR) which gives the turbidity values directly after the scattering of light has taken place.
2. Nephelometric method:

Principle:

The turbidity of water samples is measured from the amount of light scattered by the sample taking a reference with standard turbidity suspension.

Apparatus and Reagents:

1. Nephelometer (Turbidimeter)
2. Sample tubes
3. Stock turbidity suspension: 1.0 g of hydrazine sulphate, $(NH_2)_2.H2SO4$ is dissolved in distilled water to prepare 100mL of solution. 10.0 g of hexamethylenetetramine $(CH_2)_6 N_4$ is dissolved in distilled water to prepare 100 mL of solution. 5 mL each of the solutions prepared are to be mixed together in a 100 mL volumetric flask and then allowed to stand for 24 hours at 25°C. Then the resultant solution is diluted upto 100 mL mark. This was 400 NTU (Nephelometric Turbidity Unit) suspension.
4. Standard turbidity suspension: 40 NTU solution was prepared by diluting 10 mL of stock solution to 100 mL.

Procedure:

1. The instrument is set at 100 with 40 NTU standard suspension. Each division on the scale equals to 0.4 NTU turbidity.
2. The sample is thoroughly shaken and kept for some time to eliminate the air bubbles.
3. The sample is then put in the Nephelometer sample tube and the value was found on the scale.

Calculations:

Turbidity, NTU = Nephelometer reading × 0.4× dilution factor

pH:

The pH meter is used for the determination of pH.

Reagents:

For the calibration of pH meter, buffer solutions are used.

1. Potassium hydrogen phthalate buffer: 10.2 g of Potassium hydrogen phthalate is dissolved in water to prepare 1000 mL of buffer. The pH of the buffer at 20°C is 4.
2. Phosphate buffer: 3.4 g of potassium dihydrogen phosphate is dissolved in distilled water to prepare 1000 mL of buffer. The pH of the buffer at 20°C is 6.9.

Total Dissolved Solids (TDS):

TDS is determined as the residue left after evaporation of the filtered sample.

Procedure:

1. An evaporating dish (made of silica or porcelain) of 100 mL capacity is taken and heated properly in a muffle furnace for an hour. It is then cooled in a dessicator and weighed.

2. The sample is filtered through glass fibre filter paper by applying the suction. The 100 mL filtered sample is evaporated in the pre-weighed dish on a water bath having temperature not more than 98°C.
3. The residue is heated at 103 to 105°C in an oven for one hour and the final weight is taken after cooling in the dessicator.

Calculations:

$$\text{TDS, ppm} = \frac{\text{A} - \text{B} \times 1000 \times 1000}{\text{V}}$$

Where, A = Final weight of the dish in g, B = Initial weight of the dish in g
V = Volume of the sample taken in mL

Electrical Conductivity (EC) and Salinity:

EC is the ability of the substance to conduct the electric current. In water, it is the property caused by the presence of various ionic species.

Procedure:

The EC (in μScm^{-1}) of the water sample is obtained by immersing the electrodes in a well mixed sample.

The salinity (ppm) was determined by dividing EC value with 1.56.

Total Alkalinity:

Alkalinity of water is its acid neutralizing capacity. Alkalinity of surface water is primarily a function of carbonate and hydroxide content.

Reagents:

1. 0.02N H_2SO_4,
2. Methyl orange, 0.05%
3. Phenolphthalein indicator

Procedure:

1. 50 mL of sample is taken in a conical flask and two drops of phenolphthalein indicator is added to it.
2. The solution if remains colourless upon titration against sulphuric acid i.e. the phenolphthalein alkalinity is zero, and hence total alkalinity is determined.
3. Few drops (2 to 3) of methyl orange are added to the sample and the titration is continued further until yellow colour changes to pink at the end point. This is total alkalinity.

Calculations:

$$\text{Total Alkalinity} = \frac{(\text{mL} \times \text{N}) \text{of } H_2SO_4 \times 50 \times 1000}{\text{mL of sample taken}}$$

Acidity:

Acidity is determined by titrating the sample with a strong base (NaOH) using phenolphthalein as an indicator.

Reagents:

1. Sodium hydroxide, N/50
2. Phenolphthalein indicator

Procedure:

100 mL of sample is taken in a conical flask and to it 2 to 3 drops of phenolphthalein are added. Titration is to carried until the contents turn pink.

Calculations:

$$\text{Total Acidity, ppm} = \frac{(\text{mL} \times \text{N})\text{of NaOH} \times 1000 \times 50}{\text{mL of sample taken}}$$

Free Carbon-dioxide:

Free carbon dioxide is determined by titrating the sample with a strong base (NaOH). Titration was carried out at pH 8.3 when all the free CO_2 gets converted into bicarbonates.

Reagents:

1. Sodium hydroxide, N/44
2. Phenolphthalein indicator

Procedure:

1. 100 mL of water sample is taken in a conical flask and to it few drops of phenolphthalein is added.
2. The sample is titrated against N/44 NaOH till pink colour appears.

Calculations:

$$\text{Free } CO_2\text{, ppm} = \frac{(\text{mL} \times) \text{ of NaOH} \times 1000 \times 44}{\text{mL of sample taken}}$$

Total Chloride:

Principle:

Silver nitrate reacts with chloride to form very slightly soluble white precipitate of silver chloride (AgCl). At the end point when all the chlorides get precipitated, free silver ions react with chromate to form silver chromate of reddish-brown colour.

Reagents:

1. Potassium chromate indicator
2. Silver nitrate, 0.02N

Procedure:

1. 50 mL of sample is taken in a conical flask and 2 mL of potassium chromate solution is added to it.
2. Then titration is carried against 0.02N of $AgNO_3$ until a persistant red colour appears.

Calculations:

$$\text{Chloride, ppm} = \frac{(\text{mL} \times \text{N})\text{of } AgNO_3 \times 1000 \times 35.5}{\text{mL of sample taken}}$$

Total Hardness:

The total hardness of water reflects the sum total of alkaline metal cations present in it. The metal cations react with the indicator Eriochrome Black T (EBT) to form a complex of wine red colour at pH of 10. Ethylenediaminetetraaceticacid (EDTA) has strong affinity for the metal ions and therefore it forms new complex by breaking the complexes of the indicator.

Metal + Indicator → Metal – Indicator (complex)

Metal – Indicator + EDTA → Metal – EDTA + Indicator

Reagents:

1. EDTA solution, 0.01M: 3.723 g of disodium salt of EDTA is dissolved in distilled water to prepare 1L of solution.
2. Buffer solution: i) Dissolved 16.9 g of ammonium chloride (NH_4Cl) in 143 mL of concentrated ammonium hydroxide (NH_4OH). ii) Dissolved 1.179 g of disodium EDTA and 0.780 g of $MgSO_4.7H_2O$ IN 50mL of distilled water. Both the solutions prepared are to be mixed and diluted to 250 mL with distilled water.
3. Eriochrome Black T indicator: 0.40 g of EBT is mixed with 100 g of NaCl and grinded.

Procedure:

1. 50 mL of sample is taken in a conical flask.
2. 1 mL of buffer is added to it.
3. 100-200 mg of EBT indicator is added till the solution turns wine red.
4. Titration of the resultant solution is carried against EDTA, till the colour changes from wine red to blue.

Calculations:

$$\text{Hardness as}\frac{\text{mg}}{\text{L}}, CaCO_3 = \frac{\text{mL of EDTA used} \times 1000}{\text{mL of the sample}}$$

Sulphate:

Sulphate ions usually occur in natural waters. They contribute to the permanent hardness. It is determined by gravimetric method by the addition of barium chloride solution to the water sample acidified with hydrochloric acid.

Reagents:

1. 6 M HCl
2. 0.05 M $BaCl_2$

Procedure:

Gravimetric analysis is done to determine the analyte concentration in the sample. Barium chloride reagent is used to precipitate sulphate. The mass of the sulphate in the sample is calculated by simple stoichiometry from the mass of the weighing from the sulphate precipitate.

Precautions:

1. Avoiding excessively high concentration of precipitating reagent.
2. Slow addition of reagent to the hot solution, with vigorous stirring.

3. Avoiding a great excess of reagent.

Nitrite:

Nitrite forms a diazonium salt with sulphanilic acid in acidic medium (pH = 2.0 - 2.5) which in turn reacts with N-(1-naphthyl) ethylenediaminedihydrochloride to form a red –violet-azo dye. This dye is determined photometrically. The instrument used for the measurement of nitrite spectroquant NOVA 60 manufactured by Merck.

Procedure:

1. Analysis is carried out immediately after sampling.
2. pH of the sample was kept within the range of 2 – 10.
3. 5 mL of pre- treated sample (at 5 - 25°C) is taken in a test tube. To it was added one micro spoon of reagent NO_2–1 of Merck and was shaken vigorously until the reagent was completely dissolved in it.
4. The pH of the resulting solution is adjusted between 2-2.5.
5. The solution is left to stand for 10 minutes (reaction time). After this, the solution is put into the cell of the photometer and the reading is recorded.

Phosphate:

Phosphate is determined by using paqualab photometer of ELE International. Water test tablets (photometer grade) of palin test® were used in its determination. The wavelength of the photometer was set at 490nm.

Procedure:

1. 10 mL of water sample is filled in a test tube.
2. To it one phosphate HR tablet is added after crushing properly.
3. The sample is vigorously shaken and allowed to stand for 10 minutes.
4. After that reading is taken from the photometer which gives percentage transmittance and corresponds to a particular concentration of phosphate in mg/L.

Dissolved Oxygen:

The DO of the water samples can be measured by two ways:

I) By making use of digital portable WTW DO metres of Merck.

II) Winkler's method:

Reagents:

1. Sodium thiosulphate, 0.025 N
2. Alkaline potassium Iodide
3. Manganoussulphate solution
4. Starch indicator solution
5. Conc. H_2SO_4.

Procedure:

1. The sample is filled in a glass stoppered bottle of known volume (100 – 300 mL) carefully, avoiding any kind of bubbling.
2. 1 mL of $MnSO_4$ and alkaline KI is poured in about 300 mL of the sample. A brown precipitate of basic manganic oxide was allowed to settle.
3. 1 mL of concentrated H_2SO_4 is added and mixed well until the precipitate is dissolved.
4. 25 mL of the solution is taken and titrated against sodiumthiosulphate until a straw yellow colour appeared.
5. Few drops of starch indicator is added and titrated again until the blue colour disappeared.

Calculations:

$$\text{DO, mg/L} = \frac{(\text{mL} \times \text{N}) \text{ of sodiumthiosulphate} \times 8 \times 1000}{V_2\,[(V_1 - V)/V_1]}$$

where,

V_1 = Volume of sample bottle

V_2 = Volume of contents titrated

V = Volume of $MnSO_4$ and KI added (2mL)

Biochemical Oxygen Demand:

BOD is the measure of the degradable organic material present in a water sample.

Calculations:

BOD, mg/L. = $(D_o - D_5) \times$ dilution factor

where,

D_o = Initial DO in the sample

D_5 = DO after five days

Chemical Oxygen Demand:

COD is the measure of oxygen consumed during the oxidation of the oxidizable organic matter by a strong oxidizing agent. The instruments used for COD measurement are spectroquant NOVA-60 and spectroquant TR-320 of Merck. COD voils of Merck containing mercury(II)sulphate and sulphuric acid (3 mL total) are used and to it 3 mL of the sample water to be tested is put in it.

Procedure:

1. 3 mL of the sample water is poured in the COD voils of Merck containing mercury (II)sulphate and sulphuric acid.
2. The contents in the cell are mixed vigorously.
3. The cell is heated at 148°C for 2 hours in spectroquant – TR 320.
4. After 2 hours the cell is removed and allowed to cool for 30 minutes.
5. Now the measurement of COD is carried in spectroquant- NOVA 60.

Calcium, Magnesium and Sodium:

Calcium, magnesium and sodium were determined by Atomic Absorption Spectrophotometer (AAS) of Perkin Elmer Precisely, AAnalyst 800.

Atomic absorption utilizes the principle that each atom absorbs light at a specific wavelength. Therefore, at a specific wavelength the quantity of the absorbing element can be measured and is proportional to its concentration. A sample is aspirated into an air-acetylene (C_2H_2) or nitrous oxide (N_2O)-C_2H_2 flame. The molecules are atomized in the flame having a specific wavelength of light diverted through it. The atoms absorb light. The amount of light absorbed quantifies the amount of element present by use of Beer's law.

A=abc.

Where, A=absorbance

A=absorption coefficient for the absorbing species

b =length of light path

c=concentration

CONCLUSION:

Water quality determination is an important step in evaluating the status of any water body. The gist of the techniques mentioned in the chapter in the simplified way help in determining the physico-chemical parameters and thus helping in establishing the pollution status of any water system. Some of the parameters are to be determined insituly while others exsituly. Adopting the proper procedures and following the standard methods in determination of water quality parameters will help in reducing the error tremendously.

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CIGS THIN FILMS FOR SOLAR CELL APPLICATIONS

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ABSTRACT:

This chapter reports the deep introduction of thin film CIGS solar cells and shows the advantages of CIGS solar cells over other thin film based solar cells. Optical parameters like absorption coefficient, extinction coefficient, optical band gap, refractive index are also discussed in this chapter. Various CIGS thin film deposition techniques, and many CIGS solar cell efficiencies achieved by different researchers are also discussed in this chapter.

INTRODUCTION:

For the last few decades, researchers have been focused on developing clean, renewable energy resources, and definitely will be useful in the near future; to switch carbon based energy resources such as oil, gas and coal. Renewable energy is increasingly viewed as critically important globally. The depletion of fossil fuel demands to exploration the substitute renewable energy resources for wrapper the energy crisis in the imminent decade [1-4]. A very standard renewable source called photovoltaic device is foreseen to solve energy problem, which transfigures directly the solar energy from sun to the electrical energy. Lot of research has been carried out in improving solar cells efficiency. In this regard, most of the compound semiconductors like CdTe, ZnSe ,CZTSSe, CIGS, CdSe etc. have been served for photovoltaic device applications. The major benefit of these compound semiconductors over elemental semiconductors like silicon and germanium is that they make available a wide variety of energy gaps and mobility's, so that materials are available with properties that meet specific requirements. For example, the optimum band gap for producing maximum efficiency in solar cells is 1.5 eV for terrestrial power generation (AM1.5 spectrum) which is very close to the energy band gaps of compound semiconductors [4]. However the single crystalline silicon based solar cells enhance the efficiency up to 26.5% for commercial products [5] but the cast of these

solar cells is relatively expensive. Amorphous silicon based solar cells ultimately degrade when exposed to light and their efficiency decreases by 10-20% [5]. Therefore, there is an urgent necessity to overcome the aforementioned vibrant snags. Modern-day technology calls for the development of eco-friendly compound semiconductor thin film having the tailor made properties. However chalcogenide based solar cells like CdTe, CIGS, CZTSSe etc. show good advantages over Silicon based solar cells. Among which CIGS solar cells attract significant attention for space applications because of their advantages like; it offers specific power up to 919 W/Kg, the highest for any solar cell [6], CIGS cells are also superior to GaAs cells in radiation hardness [7]. CIGS belongs to the I-III-VI2 semiconductor family that crystallizes in the tetragonal chalcopyrite structure. Each I (Cu) or III (In, Ga) atom has four bonds to the VI atom (Se). In turn each Se atom has two bonds to Cu and two to In. This semiconductor includes a wide range of band gap energies E_g from 1.04eV to 1.7eV. More important for the operation of solar cells, the minority –carrier life times, diffusion length and absorption length of CIGS are hundreds of ns, a few μm and below 1 μm, respectively.

CIGS conversion efficiency is also very stable over time, means its performance continuous unabated for many years. Also the high efficiency advancements allow CIGS to complete head-to-head with silicon from a performance standpoint, but with the potential of lower cost due to the thin film nature of the solar cell device give extra superiority. Reported analysis shows the 18.8% power efficiency of 0.5 cm laboratory CIGS solar cell and 16.6% for mini-models with an area of around 20 cm^{-2}[8]. Moreover, the flexibility of these cells allows for novel storage and deployment options. Reported study shows solar cell based on $CuIn_{1-x}Ga_xSe_2$ materials with $x < 0.3$ have reached efficiencies in the range of 20% [9, 10]. M. Chandramohan et al. studied the structural and optical properties of CIGS thin films prepared by chemical bath deposition technique [11]. They have reported the films are crystalline in nature with chalcopyrite phase (Fig.1).

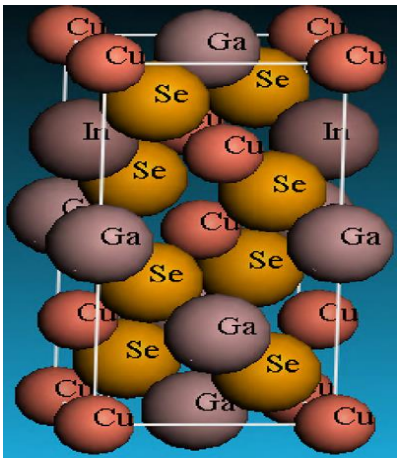


Figure 1: Shows chalcopyrite structure of CIGS [11]

Their molecular formulae are $CuIn_{0.24}Ga_{0.76}Se_2$ and $CuIn_{0.26}Ga_{0.74}Se_2$.Also they showed thin fundamental absorption edge arises at 1.15 eV for $CuIn_{0.24}Ga_{0.76}Se_2$and 1.1 eV for $CuIn_{0.26}Ga_{0.74}Se_2$due to the direct electronic transition.

OPTICAL PROPERTIES OF CIGS THIN FILMS:

The optical parameters like absorption coefficient, extinction coefficient, optical band gap, etc., play a vital role for fabrication solar cells. When these parameters meet the optical specific requirement of solar cell, one can easily say this material is good material for solar cell fabrication. These optical parameters can be directly calculated from spectrophotometry technique. Optical absorption, reflectance and transmittance spectra is very important tool for determine the optical parameters and developing the energy band diagram possible for materials. The values of absorption coefficient (α) are obtained directly from the absorbance spectra by using the relation given in the reported studies [12]:

$$\alpha = \frac{\text{Absorbance}}{\text{Film thickness}} (1)$$

The optical band gap can be determined from absorption spectra in the high absorbance region by applying the Tauc model [12]

$$(\alpha h\nu) = B\,(h\nu - E_g)^n \qquad (2)$$

Where B is a constant, (hν) is the photon energy and $E_g$is the optical band gap. The exponent n is an index decides the type of transition, which may be direct or indirect. Both kinds of transitions involve the interaction of photons with an electron in the valance band, which is excited across the gap to the conduction band. In fact n takes the values of 1/2, 2, 1/3 and 3 for allowed direct, indirect transitions, forbidden direct and forbidden indirect transitions respectively. The quantity $(\alpha h\nu)^{1/n}$ must be plotted as a function of the incident photon energy (hν) for all possible values of n and the one which fits Eq.(2) will be taken as the value of n.The extinction co-efficient of thin films can be calculated by using equation

$$K = \frac{\alpha\lambda}{4\pi} \qquad (3)$$

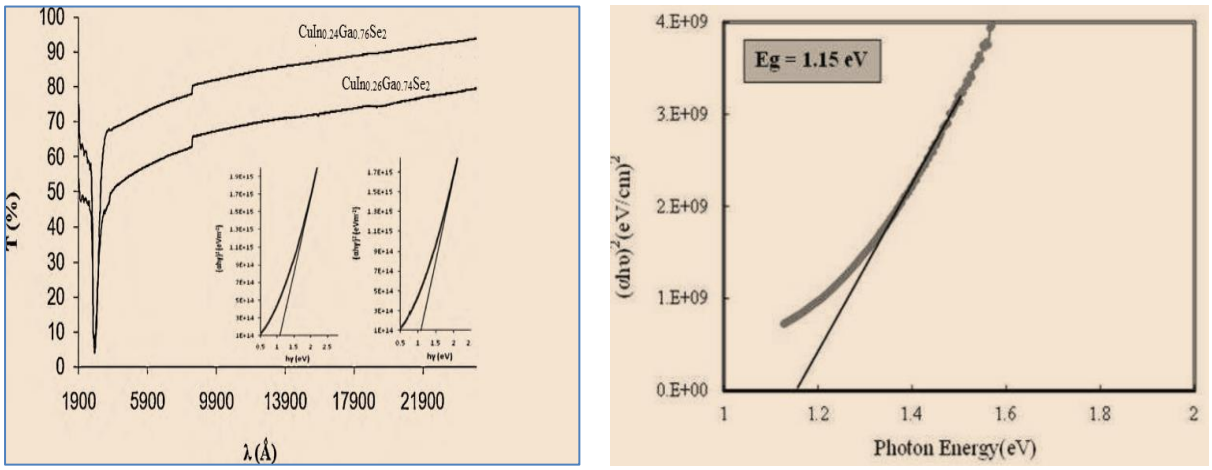
The value of refractive index (n) can be calculated from transmission spectra usingby using the method of Swanepoel [13]

$$n = \sqrt{N + \sqrt{N^2 - S^2}} \qquad (4)$$

Where $$N = 2s\frac{T_{max} - T_{min}}{T_{max}T_{min}} + \frac{S^2+1}{2} \qquad (5)$$

Where T_{max} and T_{min} are the transmittance values at which the maxima and minima tangentially touches the transmittance axis at different wavelengths. 'S' is the refractive index of the substrate and its value is taken as 1.5 for glass substrate.

Analysis has shown CIS thin films has an extremely high absorption that allows 99% of available light to be absorbed in the first micron of the material. The addition of small amounts of Gallium to the $CuInSe_2$ boosts its light-absorbing band gap, which makes it more closely match the solar spectrum, in that way improving the voltage and the efficiency of the solar cell. F B Dejene et al. have investigated the optical analysis of $Cu(In,Ga)Se_2$thin films prepared by thermal reaction of InSe/Cu/GaSe alloys with elemental Se vapour [14]. They reported 1 eV band gap for CuInSe2 and it increased to 1.12 eV with the addition of Ga.M. Chandramohan et al. reported the experimental and theoretical investigations optical properties of CIGS thin films. They showed thin fundamental absorption edge arises at 1.15 eV for $CuIn_{0.24}Ga_{0.76}Se_2$ and 1.1 eV for $CuIn_{0.26}Ga_{0.74}Se_2$ (calculated from optical transmission spectra) due to the direct electronic transition (see Fig.2a). Zainab Al-Ramadhan et al. have studied the Optical properties of CIGS Flexible Solar Cell [15]. They displayed optical band gap of 1.15 eV for CIGS thin film deposited by thermal evaporation technique (see Fig.2b).



a **b**

Figure 2 (a) Shows optical transmission spectra and the inset shows Tauc plot of $CuIn_{0.24}Ga_{0.76}Se_2$ and $CuIn_{0.26}Ga_{0.74}Se_2$ [14] (b) Shows Tauc plot of CIGS thin film [15]

ELECTRICAL PROPERTIES OF CIGS THIN FILMS:

A solar cell is a device (pn junction diode illuminated by light) which converts solar energy into electrical energy. The efficiency of these solar cells can be calculated by current-voltage (J-V) Characteristic. The dark conductivity can be calculated by using the equation

$I_d = I_0[\exp(qV/nkT) - 1]$ (6)

Where I_d is the net current flowing through the cell, I_0 is the dark saturation current (or leakage current), V is the applied voltage, q is the electron charge, n is the diode ideality factor, k is Boltzmann's constant, and T is the absolute temperature in Kelvins. However, when the solar

cell is illuminated by light, the total current is a superposition of both the dark current and the light generated current (I_L)

$I = I_d - I_L = I_0[\exp(qV/nkT) - 1] - I_L$ (7)

The two currents travel in opposite directions in the solar cell. The photo generated electrons and holes move through the external circuit with the ability to do work in the process. Equations (6, 7) can be used to generate J-V curves as shown in Fig.3.

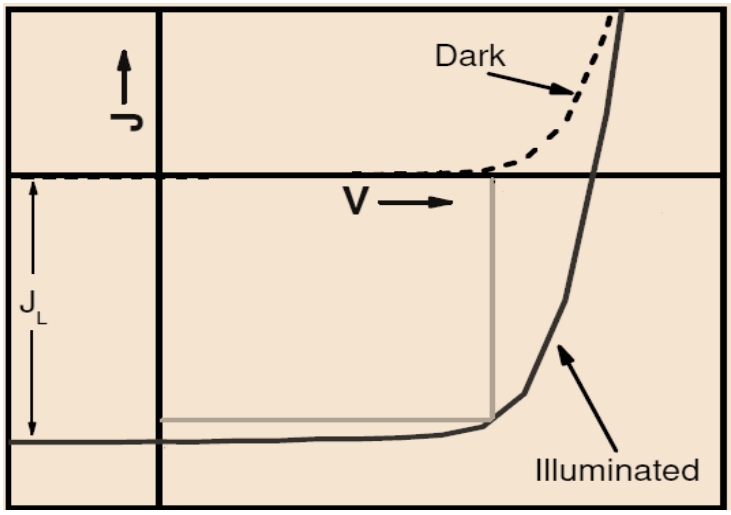


Figure 3 Example J-V curves for a solar cell in the dark and for the same solar cell under illumination. The two curves are offset by the current density J_L due to the current generated by illumination of the solar cell [http://utdr.utoledo.edu/theses-dissertations]

The efficiency of the solar cell is the ratio of the maximum power output of the solar cell to the incident power. The efficiency of a solar cell is given by:

$$\eta = \frac{V_{oc} J_{sc} FF}{P_{in}} \qquad (8)$$

Where FF fill factor, V_{oc} is open circuit voltage, J_{sc} is short circuit current P_{in} is the input power from the sun or a solar simulator.

TECHNIQUES FOR DEPOSITION OF CIGS THIN FILMS FOR PHOTOVOLTAIC DEVICES:

There are several techniques like chemical vapour deposition, solution deposition, electrode deposition, laser deposition etc. that can be used for preparation of CIGS thin film (absorbing layer for solar cells). These deposition techniques have direct impact on the efficiencies of the solar cells. Different researchers throughout the world have used different techniques records the different efficiencies of solar cells. A. Duchatelet et al. [16] showed atmospheric-based deposition process for Cu(In, Ga)Se_2 synthesis which consists of the electro deposition of a Cu–In–Ga mixed oxide/hydroxide layer from an aqueous solution, at room

temperature, followed by a thermochemical reduction and selenization and record 12.4% efficient Cu(In,Ga)Se_2 solar cell. Also 12.4% efficient solar cell has been recorded from the growth characteristics of indium sulfide layers deposited by ultrasonic spray pyrolysis (USP) [17].However the best solar cells with 10.1% efficiency have been reported by a wet-chemical approach involving the reagent hydrazine [18, 19]. In terms of scalability up to an industrial production level, less critical deposition methods such as co-evaporation or rapid thermal annealing of metal layers or of layers of intermetallic compounds seem to be more favorable. The best reported cells produced via these routes have shown efficiencies of 9.15% and 7.3%, respectively [20, 21]. The basic structure of a CIGS thin-film solar cell is shown in the Fig.4.

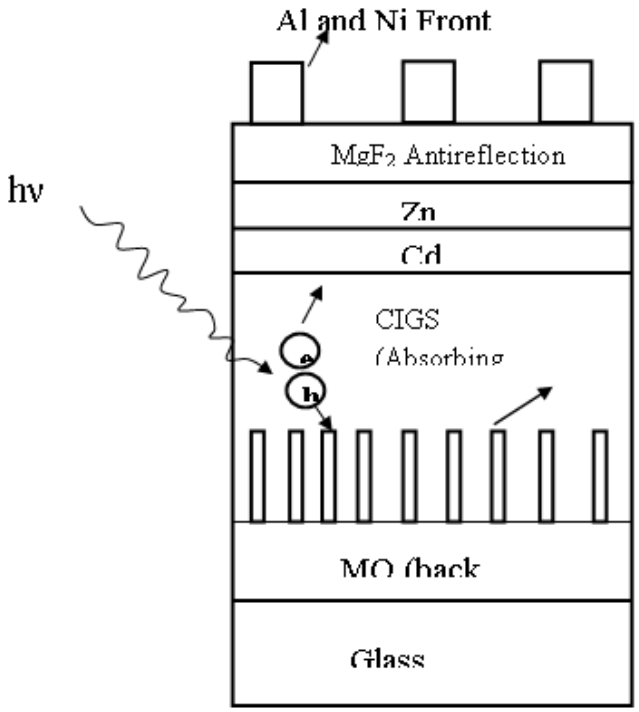


Figure 4: Shows fabrication of CIGS solar cell

The most common substrate is lime glass of 1–3 mm thickness containing sodium. A molybdenum (Mo) metal layer is deposited by sputtering which serves as back contact and will reflect most of the unabsorbed light into the absorbing layer. CIGS is coated by several methods on one side with molybdenum. The heterojunction is formed between the semiconductors CIGS and ZnO, separated by a thin layer of CdS and a layer of intrinsic ZnO. The CIGS is doped p-type from intrinsic defects, while the ZnO is doped n-type to a much larger extent through the incorporation of aluminum (Al). This will cause the space charge region to extend much further into the CIGS than into the ZnO with asymmetric doping of Al [22], matched to this are the layer thicknesses and the band gaps of the materials: the wide CIGS layer serves as absorber. Absorption is minimized in the window layer (upper layers), by the choice of larger band gaps

ZnO and CdS. The doped ZnO also serves as front contact for current collection. Laboratory scale devices, typically 0.5 cm^2 large, are provided with a Ni/Al-grid deposited onto the front side to contact the ZnO,[23]. Production of modules involves the deposition layer being cut into a series of parallel connected strips. A further transparent protective cover is applied to the module. This sandwich construction is then sealed against the ingress of moisture, [24]. Some method of physical support is required to prevent fracture of this fragile structure [23].

CONCLUSIONS:

This chapter concludes that CIGS is a good material for solar cell fabrication and shows noble efficiencies than other semiconductor thin film based solar cells.Researchers report 1.15 eV for $CuIn_{0.24}Ga_{0.76}Se_2$ and 1.1 eV for $CuIn_{0.26}Ga_{0.74}Se_2$.This optical band gap of CIGS thin film match's well with the optimum band gap of solar cell i.e.1.5 eV. Also the reported studies showed the optical and electrical properties of CIGS can be controlled by different Ga dopant concentration in CIS material and also by different deposition techniques.Reported analysis also shows the 18.8% power efficiency of 0.5 cm laboratory CIGS solar cell and 16.6% for mini-models with an area of around 20 cm^{-2}.

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GEOMAGNETIC STORMS AND THEIR RESPONSE IN IONOSPHERE

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ABSTRACT:

Geomagnetic Storms are highly disturbed conditions in the Earth's Magnetic Field induced by the energetic particle circulation around the Earth. This particle circulation forms a current circulation which in result induces a magnetic field which superimposes on the Earth's magnetic field and produce disturbance in its magnetic field. In this paper the response of the ionosphere to such disturbed geomagnetic conditions has been explored. As ionosphere is highly ionized conducting medium it gets affected by the Earth's magnetic field. An attempt has been made to see the nature of the disturbance in ionospheric parameters over the different latitudes all over the globe. Equatorial, Mid and High latitude ionospheric parameters have been taken and studied in time scale to see the effects of disturbed Earth's magnetic fields under geomagnetic storms.

INTRODUCTION:

The Coronal Mass Ejections (CMEs) are the clouds of plasma being thrown out from solar atmosphere into the interplanetary space. When these gigantic amount of solar plasma threaded by the solar magnetic field interacts with the earth's magnetosphere it results into intense disturbances in the geomagnetic field and referred as Geomagnetic Storms [1, 2]. Such geomagnetic storms, which last for some tens of hours to days, are a result of interaction of solar wind with the magnetosphere and are used to be characterized by depression in H component of the geomagnetic fields. This happens mainly due to the ring current encircling the Earth in westward direction [3, 4]. So the main cause of such storms is the significant development of ring current encircling the earth in westward direction which leads to depression in horizontal component of earth's magnetic field.

Due to the compression of earth's magnetosphere by the interaction with solar wind, during the geomagnetic storms, electric fields have been observed along the geomagnetic field lines in the high latitude ionosphere. This electric field penetrates to low latitudes as well [5], sometimes, and even at higher latitudes they enforce the rapid convection of plasma which drives neutral winds by collision and energetic particle precipitation into the lower thermosphere and increases the ionospheric conductivity by expanding the auroral zone [6]. Such intense electric fields play an important role in coupling of high latitude ionosphere with magnetosphere and in this process the enhanced energy input heats the ionized and neutral gases. This leads to uneven expansion of the thermosphere which generates pressure gradients and drives strong neutral winds. Disturbed thermospheric circulation leads to change in neutral composition and make the plasma move up and down along the magnetic field lines by changing rates of production and recombination of ionized gas [7, 8]. In this phenomenon polarization of electric fields get generated by the disturbed neutral winds by dynamo effects of the collision with the plasma in the presence of earth's magnetic field. These effects can be classified in view of response time as prompt and delayed one. Geomagnetic storms are examples of delayed effects which respond in different layers of ionosphere in different ways perturbing the normal characteristic conditions therein. Its effect in E region has been widely studied at high latitudes [9].

In the high latitude E region particle precipitation in cusp and aurora are a source of substantial ionization. The F2 layer of ionosphere contains most of the electron population of the ionosphere and tends to lie near a constant pressure in thermosphere [10]. Solar wind is able to raise and lower hmF2 which is characteristic height of F2 layer. A rise in the F2 layer peak height up to regions of reduced loss which in result increases electron density of F2 layer (NmF2) and are thought to be occurred due to equator-ward winds. NmF2 decreases due to drop in hmF2 enforced by the pole-ward winds. At middle latitudes negative ionospheric storm effects are found to occur in morning and positive storm effects in the afternoon and evening due to local time variation of winds and changes in neutral composition [5, 11, 12]. Equator-ward winds during geomagnetic storms result in buildup of westward winds which enforce the reversal of zonal electric field only if a zonally symmetric situation is concerned. This doesn't seem to be realistic situation especially in the latitude regions below 30^0, as ionospheric conductivity variations do exist. In this way the dayside eastward current results in charge accumulation and a dawn dust potential difference, being interrupted at termination. In this way it manifests a westward electric field on the dayside, however eastward electric field on the nightside [13, 14].

Chemical processes in neutral winds also play an important role in producing storm time effects in ionospheric characteristics. Intense Joule heating results in a strong upwelling of

atmosphere around the auroral oval during geomagnetic storms. Due to this upwelling of atmosphere the transportation of oxygen-depleted or nitrogen-rich air occurs up from much lower in the thermosphere into the F region [15, 16]. Then this nitrogenrich/oxygendepleted air gets redistributed by neutral winds over much of the high latitude region and part of the mid latitude region. A reduction in the ionospheric electron density gets observed due to nitrogenrich/oxygendepleted air and increase due to oxygenrich/nitrogendepleted air. The transport is found to be strongest during post midnight hours owing to wind surges arising from ion convection and the associated momentum transfer to neutrals. A various type of effects in ionospheric characteristics have been observed so far. In the present work we are trying to see the effects of geomagnetic storms on foF2, critical frequency of F2 layer, over different latitudinal cross section.

EVENT SELECTION CRITERION:

For this analysis we have selected those intense geomagnetic storms for which the Dst values has gone negative more than -100 nT and we have divided the whole globe in five sectors; Equatorial Regions (0^0 Lat – 20^0N, 0^0 Lat – 20^0S in latitude), Mid Latitude (20^0N – 40^0N, 20^0S – 40^0S) and higher latitude (40^0N – 90^0N, 40^0S – 90^0S) in order to investigate the effects of such geomagnetic storms on the ionosphere. Only those geomagnetic storms have been taken into consideration for analysis for which in the consecutive days, ionospheric datasets were found to be available from the ground based ionosonde station selected in the above mentioned sectors. The six geomagnetic storms; 29 Oct - 01 Nov 2003, 07-09 Nov 2004, 17-20 Jan 2005, 14-16 May 2005, 24-26 Aug 2005, 10-13 Sep 2005 have been considered.

DATA SETS AND THEIR SOURCES:

Data for Dst Index, with hourly resolution, has been taken from OMNI Data Web (http://omniweb.gsfc.nasa.gov/). In order to probe the ionospheric characteristics we have taken foF2, characteristic frequency of F2 region, under consideration for this analysis. We have taken hourly datasets for foF2 due to the availability of datasets with different resolution for different station. In order to have similar kind of observation we have taken hourly resolution of datasets from SPIDR database (http://spidr.ngdc.noaa.gov/spidr/).

ANALYSIS AND RESULTS:

Geomagnetic storms are the perturbations in the earth's magnetic field produced by the interaction of variable solar wind with the magnetosphere. During this process a number of electrical and magnetic perturbations do occur due the injection of highly energetic charged particles into the magnetosphere. For this we have found six intense geomagnetic storms for

which we found the maximum datasets available on the online databases. Here event by event response of ionosphere due to the geomagnetic storm is discussed.

GEOMAGNETIC STORM DURING 29 Oct - 01 Nov 2003:

Geomagnetic storm observed during 29 Oct – 01 Nov 2003 was a mixed event there were two consecutive decrement in the Dst Index before the complete recovery. The maximum decrease in Dst index observed at 23:00 UT on 30th Oct 2003 as -383 nT. Time Profile of Dst is plotted in Blue Color.

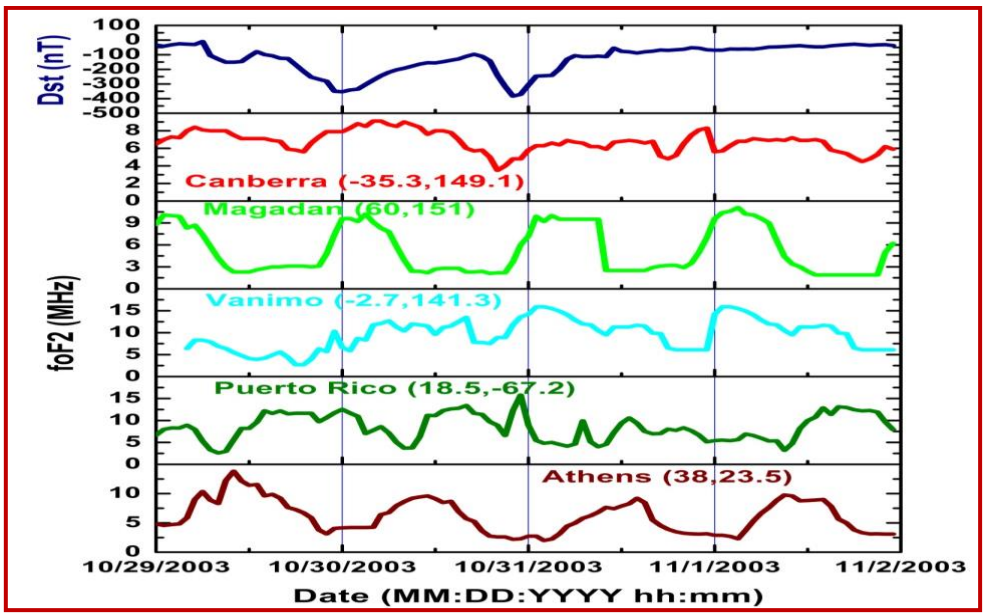

Figure 1: Time profile of foF2 in different latitudinal sectors over the globe along with Dst during 29th Oct – 01st Nov 2003

In order to see its impact on ionospheric ionization the foF2 profile for different stations over the globe in the latitudinal sectors are plotted in the stack and shown in Figure 1. In the above plot Puerto Rico (18.5^{0}N, 67.2^{0}W) and Vanimo (2.7^{0}S, 141.3^{0}E) has been taken in the equatorial region in the Northern and Southern hemispheres, respectively. At both the stations we have observed respective increase in the foF2 profile over the background (here we refer background as the daily pattern and its peak) shown in Cyan and Olive color, respectively. In the mid latitude sector we have taken data from the stations Athens (38^{0}N, 23.5^{0}E) and Canberra (35.3^{0}S, 149.1^{0}E) in Northern and Southern hemispheres, respectively. In this mid latitudinal sector the ionospheric response shows a decrement in the foF2 value in both the hemispheres over Athens and Canberra, represented in Brown and Red colors. In the High Latitudinal sector we got the data only from Magadan (60^{0}N, 151^{0}E) and didn't get the data for full coverage in the Southern Hemisphere. Here a small decrease in foF2 peak is observed but not promising due to

data saturation near the peak, plotted with Green color. An enhancement has been observed in foF2 peak after the recovery of the storm.

GEOMAGNETIC STORM DURING 07-09 Nov 2004:

The geomagnetic storm observed during 07-09 Nov 2004 leads to the maximum negative value of -374 nT for Dst Index at 07:00 UT on 08th Nov 2004. The observed Dst values are shown along with the respective ionospheric parameter foF2 in stacks in Figure 2. In order to investigate the effect of this geomagnetic storm over the ionosphere we have taken data from Puerto Rico (18.5^{0}N, 67.2^{0}W) and Vanimo (2.7^{0}S, 141.3^{0}E), shown in Brown and Green color, for Northern and Southern hemisphere, respectively. Here a dip in foF2 has been observed in both the cases but in the Northern hemisphere for Puerto Rico there is almost complete negation in the foF2. For Mid latitude sector we have taken the data from the observations at Athens (38^{0}N, 23.5^{0}E) and Canberra (35.3^{0}S, 149.1^{0}E) in Northern and Southern hemispheres, respectively, shown in Cyan and Red colors. In the southern hemisphere an enhancement is observed during the storm while at Athens at first, based on the plotted observed values, we can claim the effect to be a dip but as the values are saturated at various points in time we can't claim anything about the nature of variation. For high latitudes we have taken the datasets from Magadan (60^{0}N, 151^{0}E) and Mawson (67.6^{0}S, 62.9^{0}E) for the Northern and Southern hemispheres, plotted in Pink and Purple colors, respectively. A decrease in the foF2 is observed at higher latitudes in both the observations.

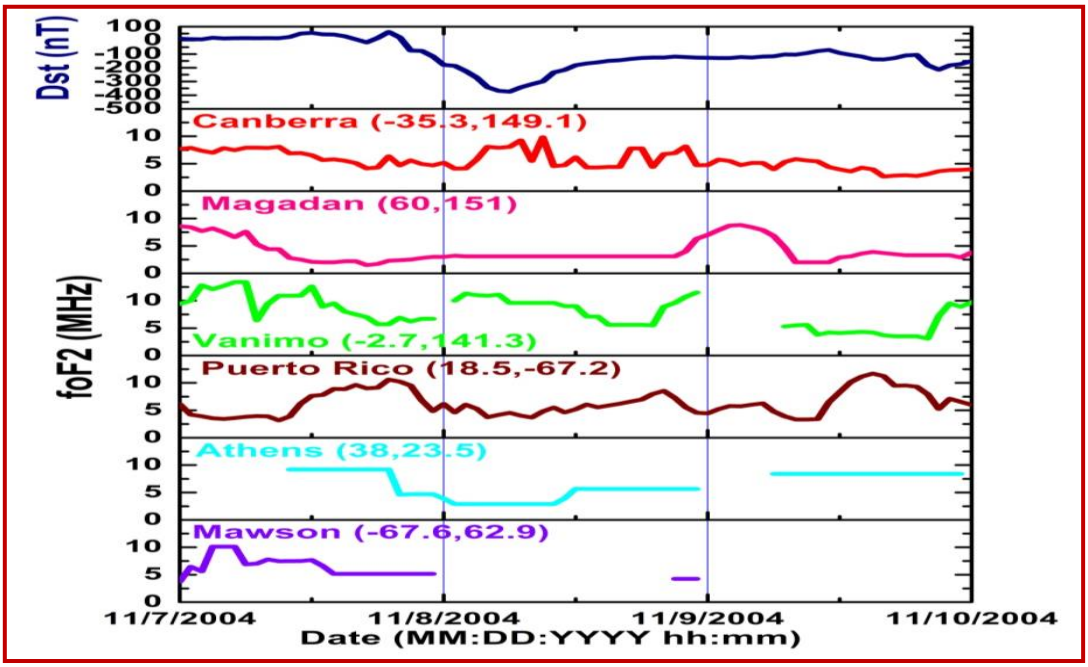

Figure 2: Time profile of foF2 in different latitudinal sectors over the globe along with Dst during 07th – 09th Nov 2004

GEOMAGNETIC STORM DURING 17-20 Jan 2005:

The geomagnetic storm observed during 17 – 20 Jan 2005, was a mixed event there were two consecutive decrement in the Dst Index before the complete recovery. The maximum decrease in Dst index observed at 09:00 UT on 18th Jan 2005 as -103 nT. Time Profile of Dst is plotted in Blue Color. In order to see its impact on ionospheric ionization the foF2 profile for different stations over the globe in the latitudinal sectors are plotted in the stack and shown in Figure 3. In the above plot Puerto Rico (18.5^{0}N, 67.2^{0}W) and Vanimo (2.7^{0}S, 141.3^{0}E) has been taken in the equatorial region in the Northern and Southern hemispheres, respectively. At both the stations we have observed respective increase in the foF2 profile over the background (here we refer background as the daily pattern and its peak) shown in Olive and Green color, respectively. In the mid latitude sector we have taken data from the stations Athens (38^{0}N, 23.5^{0}E) and Brisbane (27.5^{0}S, 152.9^{0}E) in Northern and Southern hemispheres, respectively. In this mid latitudinal sector the ionospheric response shows an increment in the foF2 value in both the hemispheres over Athens and Brisbane, represented in Cyan and Red colors. In the High Latitudinal sector we got the data only from Magadan (60^{0}N, 151^{0}E) and Mawson (67.6^{0}S, 62.9^{0}E), wherein the data for Southern Hemisphere is not available for the whole event duration. Here a small decrease in foF2 peak is observed but not promising due to data saturation near the peak, plotted with Pink color. An enhancement has been observed in foF2 peak after the recovery of the storm.

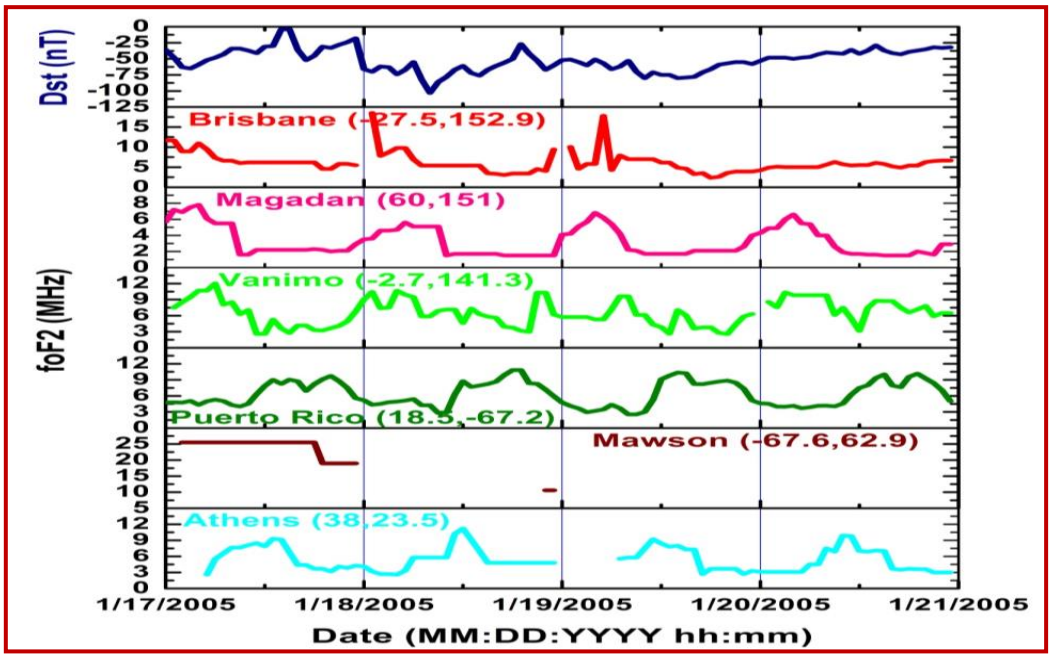

Figure 3: Time profile of foF2 in different latitudinal sectors over the globe along with Dst during 17th – 20th Jan 2005

GEOMAGNETIC STORM DURING 14-16 May 2005:

The geomagnetic storm observed during 14 - 16 May 2005 leads to the maximum negative value of -247 nT for Dst Index at 09:00 UT on 15th May 2005. The observed Dst values are shown along with the respective ionospheric parameter foF2 in stacks in Figure 4. In order to investigate the effect of this geomagnetic storm over the ionosphere we have taken data from Puerto Rico (18.5^{0}N, 67.2^{0}W) and Vanimo (2.7^{0}S, 141.3^{0}E), shown in Green and Cyan color, for Northern and Southern hemisphere, respectively. Here a dip in foF2 has been observed in both the cases but in the Northern hemisphere for Puerto Rico there is more negation in the foF2. For Mid latitude sector we have taken the data from the observations at Athens (38^{0}N, 23.5^{0}E) and Canberra (35.3^{0}S, 149.1^{0}E) in Northern and Southern hemispheres, respectively, shown in Olive and Pink colors. We have found the foF2 to be increased with the Dst peak. For high latitudes we have taken the datasets from Magadan (60^{0}N, 151^{0}E) and Mawson (67.6^{0}S, 62.9^{0}E) for the Northern and Southern hemispheres, plotted in Red and Brown colors, respectively. A decrease in the foF2 is observed at higher latitudes in both the observations.

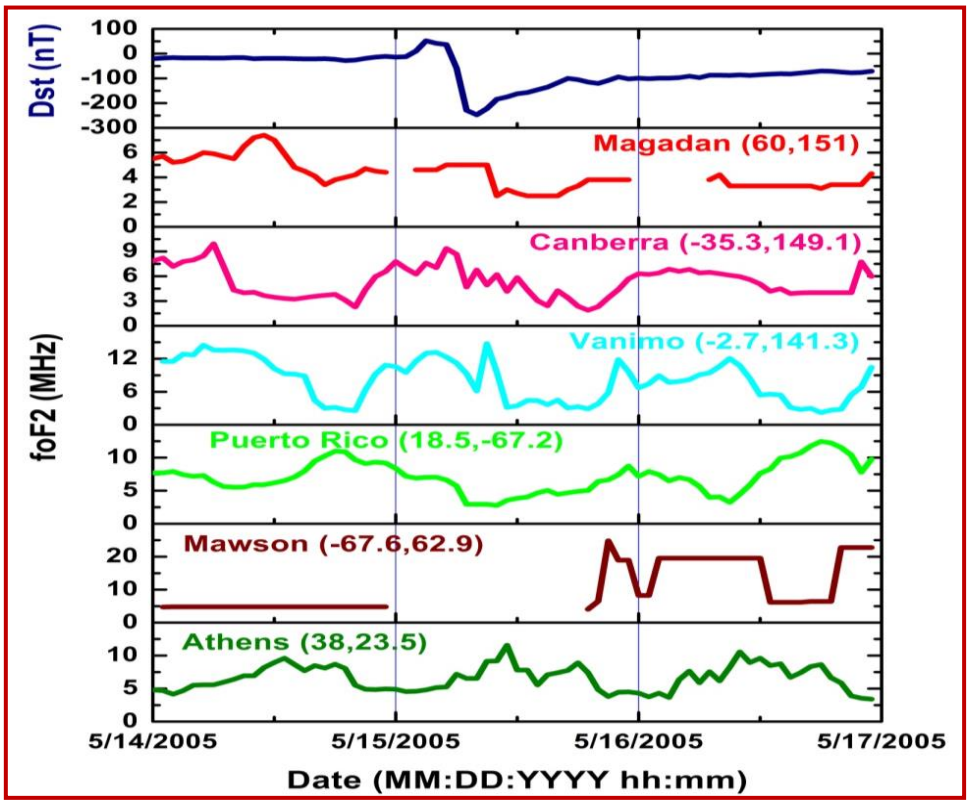

Figure 4: Time profile of foF2 in different latitudinal sectors over the globe along with Dst during 14th – 16th May 2005

GEOMAGNETIC STORM DURING 24-26 Aug 2005:

During the geomagnetic storm observed during 24-26 Aug 2005 the maximum dip in Dst observed at 12:00 UT on 24th Aug 2005 as -184 nT. The Dst Index with the ionospheric

parameter foF2 is shown in the Figure 5. Dst is plotted in blue color. In order to investigate the effects in ionosphere we have taken two stations Puerto Rico (18.5^{0}N, 67.2^{0}W) and Vanimo (2.7^{0}S, 141.3^{0}E) from the Equatorial Sector plotted in Green and Brown color respectively. In order to investigate the perturbation in mid latitude ionosphere we have taken the data from Athens (38^{0}N, 23.5^{0}E) and Canberra (35.3^{0}S, 149.1^{0}E) in Northern and Southern hemispheres, respectively, shown in Pink and Olive colors. Here somewhat different type of behavior is observed.

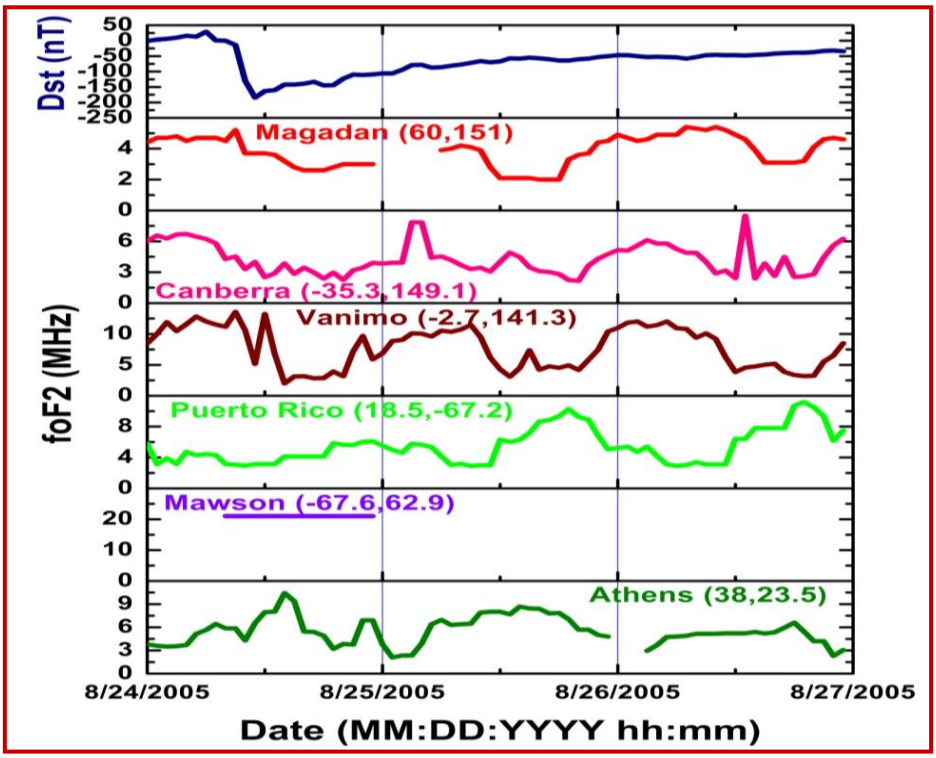

Figure 5: Time profile of foF2 in different latitudinal sectors over the globe along with Dst during 24th – 27th August 2005

An enhancement has been observed during the storm in Northern Hemisphere while a negative effect has been observed in Southern Hemisphere. For high latitude sector datasets from Magadan (60^{0}N, 151^{0}E) and Mawson (67.6^{0}S, 62.9^{0}E) for the Northern and Southern hemispheres, plotted in Red and Purple colors, respectively, have been used. We have observed a Peak with Dst peak in storm time and a decrease in recovery phase of the storm. Whereas at Mawson complete saturation is observed though the data for full time period was not found.

GEOMAGNETIC STORM DURING 10-13 Sep 2005:

During the geomagnetic storm occurred during 10-13 Sep 2005 the maximum decrement in Dst index was observed on 11th Sep 2003 at 11:00 UT as -139 nT. The variation in

foF2 for all the considered latitudinal sectors along with the Dst index is shown in Figure 6 where Dst is plotted with blue color.

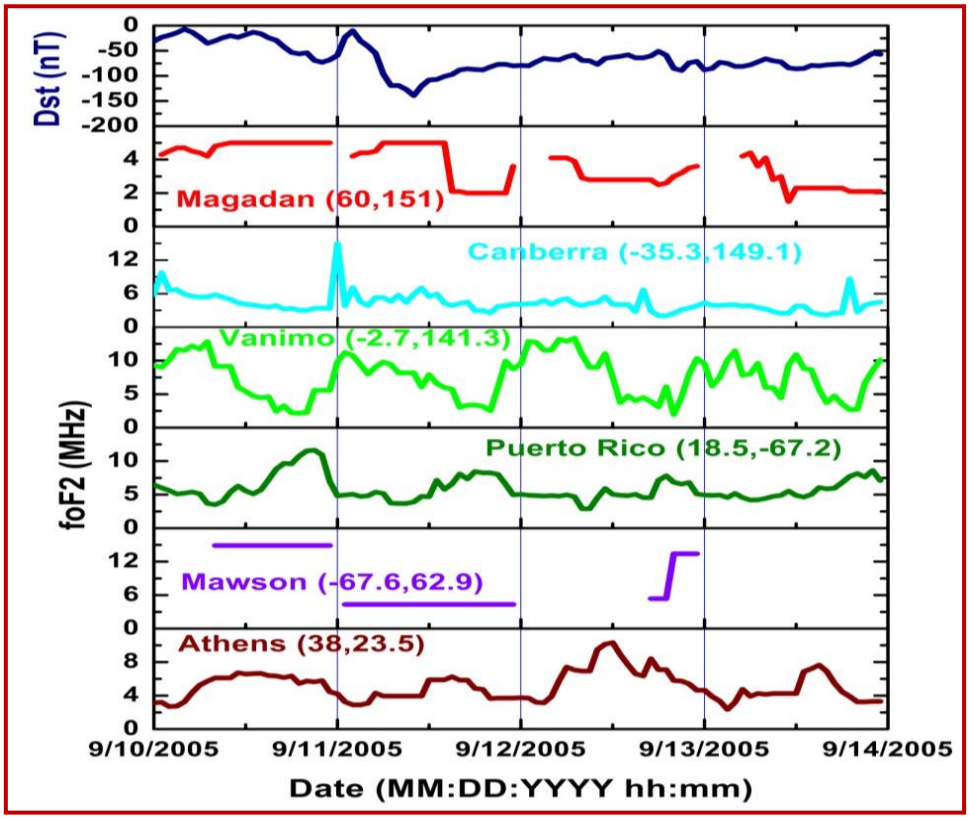

Figure 6: Time profile of foF2 in different latitudinal sectors over the globe alongwith Dst during 10th – 13th Sep 2005

In order to investigate the effect of this geomagnetic storm over the ionosphere we have taken data from Puerto Rico (18.5^{0}N, 67.2^{0}W) and Vanimo (2.7^{0}S, 141.3^{0}E), shown in Olive and Green color, for Northern and Southern hemisphere, respectively. Here a dip in foF2 has been observed in both the cases but in the Northern hemisphere for Puerto Rico there is more negation in the foF2 and for Vanimo a bit enhancement has been observed during the recovery phase. For Mid latitude sector we have taken the data from the observations at Athens (38^{0}N, 23.5^{0}E) and Canberra (35.3^{0}S, 149.1^{0}E) in Northern and Southern hemispheres, respectively, shown in Brown and Cyan colors. We have found the foF2 to be increased with the Dst peak at Canberra and the decrement in recovery phase whereas in data from Athens there is a bit enhancement during recovery phase. For high latitudes we have taken the datasets from Magadan (60^{0}N, 151^{0}E) and Mawson (67.6^{0}S, 62.9^{0}E) for the Northern and Southern hemispheres, plotted in Red and Purple colors, respectively. An enhancement in the foF2 is observed at higher latitudes in both the observations at first, but the data unavailability and saturation bound the inference in this case.

CONCLUSIONS:

Following the above investigated observations and analysis we have found the mixed kind of storm effects over the different latitudes. As the equatorial region is concerned we have observed both the negative and positive storm effects in ionospheric parameters. For the mid latitude ionosphere we have found negative storm time effect to occur and it reflects in positive with the recovery phase which is thought to occur in morning and positive storm effects in the afternoon and evening due to local time variation of winds and changes in neutral composition [5, 11, 12]. Equatorward winds during geomagnetic storms result in buildup of westward winds which enforce the reversal of zonal electric field only if a zonally symmetric situation is concerned. In case of high latitude sectors an enhancement in the ionospheric parameters have been observed with storm time which responds in negative in the recovery phase.

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TRANSPARENT CONDUCTIVE OXIDE THICK FILMS FOR PHOTOVOLTAIC CELL

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ABSTRACT:

Transparent conductive oxides (TCO) have been the potential contender for the creation of minimal effort straightforward conductors having applications in vitality change gadgets, for example, thin-film sunlight based cells and light-transmitting diodes. In this part we have talk about the significance of above material, their applications and part of thin/thick movies for photovoltaic gadgets.

KEYWORDS: TCO, LED, Solar cell and TFT.

INTRODUCTION:

Semiconductors are the materials whose electrical resistivity lies between 10^{-2} to 10^{9} ohm-cm at room temperature. The band gap of these materials falls between 0 to 4eV and this group of materials show many commonality in their physical properties. Semiconductors have pulled in extensive consideration especially after the revelation of transistors in 1947 and are the most imperative materials for creation of electronic and optoelectronic gadgets today. In spite of the fact that there is countless demonstrating semiconducting conduct, silicon rules in its generation and use over every single other semiconductor. Silicon is an essential semiconductor and is available in bunch IV of the intermittent table. Gathering IV components are remarkable as in external orbital of an individual molecule is precisely half filled. So every iota can finish its external shell by offering electrons to four different particles of a similar kind through covalent bonds. Thus bunch IV components can just solidify in precious stone structure in the entire occasional table. The precious stone structure can be comprehended as two interpenetrating face-focused cubic (fcc) Bravais grids in which one fcc Brava is cross sections is uprooted along the body askew of the other one by a quarter of its length. In this way, the precious stone structure has a place with the cubic gem framework where the primitive unit cell

contains two molecules. Since every particle contains four electrons in the valence shell, the primitive shell contains 8 valence electrons.

It ought to be noticed that semiconducting properties of a material is identified with the precious stone structure and number of valence electrons per primitive unit cell [1]. The amass II iotas can make covalent bond with bunch VI particles and gathering III molecules with aggregate V iotas. The vast majorities of these mixes take shape in zinc blend structure and show semiconducting conduct. These materials are named as II-VI or III-V compound semiconductors. Zinc blende structure can be comprehended as two interpenetrating fcc cross sections, precisely like precious stone structure, with the exception of that one fcc grids comprises of one sort of particles and the other one of another kind. Unquestionably, these compound semiconductors have both preferred standpoint and detriments over silicon. Maind is preferred standpoint of silicon is that it is a circuitous band hole semiconductor. Association of phonon is basic amid light ingestion and radiance handle with a specific end goal to moderate vitality and energy. Henceforth radiative move likelihood lessens fundamentally contrasted with coordinate band crevice semiconductors, and make it unacceptable or wasteful in numerous applications especially in optoelectronic applications. In this way, incorporating semiconducting materials, both known and new sort, of craved quality and concentrate their properties for conceivable mechanical applications is a standout amongst the most essential fields of research in material science. In the table one can see that, there are couple of semiconducting exacerbates that don't have a place with cubic precious stone family. In this theory work three wide band hole II-VI semiconducting materials, having a place with hexagonal precious stone family and including each of the three primordial components of gathering IIB (viz. Compact disc, Hg, and Zn), are contemplated. For example, CdS, HgS, and ZnO have been picked remembering their potential mechanical application.

It ought to be noticed that a few properties of material (viz. It ought to be noticed that a few properties of material (viz. piezoelectric, pyroelectric, ferroelectric) are for the most part identified with its precious stone structure. Also, materials having a place with hexagonal precious stone family have a specific bearing in which engendering light will experience a symmetric structure however some broad way will experience a lopsided structure. So they demonstrate properties like birefringence and dichorism. The materials under examination have many preferences over silicon since they are altogether immediate band crevice semiconductors.

Energy sources:

Today world is confronting gigantic vitality emergencies, if just 1/106 piece of sun oriented vitality is gotten on the earth, we will dispose of this issue. Oil and gas which at exhibit

the principle wellsprings of vitality are quick draining and will in the end fumes after constrained timeframe. Atomic vitality is an option alternative however is related with genuine condition concern [2]. The most ideal method for using sun based vitality is to change over sun powered vitality specifically to power using photovoltaic. Daylight like all other electromagnetic radiations, comprises of photons. Photon notwithstanding acting like particles, additionally show wave carry on trademark. The wave length, related with photons is identified with photon vitality given by

$$E_{\lambda} = \frac{hc}{\lambda}$$

Where, h speaks to boards steady and c is the speed of light.

Photons have vitality more than band crevice vitality of semiconductor (Eg), embed electron opening sets in the semiconductor and add to the vitality change handle. The capacity of daylight is a noteworthy for planning sunlight based cells.The temperature of the surface of the sun is around 5760 K. This high temperature makes the sun carry on like a dark body radiator. Since earth is at an extraordinary separation from sun, in this manner light falls on the surface of the earth in parallel stream of photons. The Air mass 0 and Air mass 1.5 g radiation range from sun are appeared in figure 1 [3].

Solid and minimal effort sustainable wellsprings of vitality, especially electric vitality are being looked for using various transformation frameworks. Photovoltaic cells for application might be required to expect one of two primary structures, huge range, thin-film cells or concentrating frameworks utilizing single – precious stone cells. In the thin film approach, lessening of cost is accomplished by utilizing little measure of material and cheap handling. Thin film sun powered cells speak to one such innovation which is currently being effectively sought after utilizing a wide range of material frameworks. Thin film polycrystalline sunlight based cells require less material and are more suited to large scale manufacturing methods and are along these lines seen as a practical low- cost option. In request to portray the properties and utilization of photovoltaic sun oriented cells, it is useful to consider the arrangement of wonders required from the radiation gotten from the sun, through the procedures of ingestion of this radiation, era and transport of charge bearers in the semiconductor, partition of charge bearers by the intersection, gathering of these bearers at the contacts to the gadget, lastly to the different sorts of energy molding and capacity that may be utilized, and the genuine use of energy created.

A sun based cell comprises of a potential obstruction inside a semiconductor material that is fit for isolating the electrons and openings that are produced by the retention of light inside the semiconductor. The four most basic sorts of boundaries are

(1) Homojunctionp/n intersections, inside a similar semiconductor material.

(2) Heteroface structure, like homojunctions yet with a window layer of vast band-hole semiconductor added to lessen surface recombination misfortune.

(3) Heterojunctionp/n intersection between two distinctive semiconductor materials,

(4) Schottky hindrances; metal/semiconductor redressing intersection.

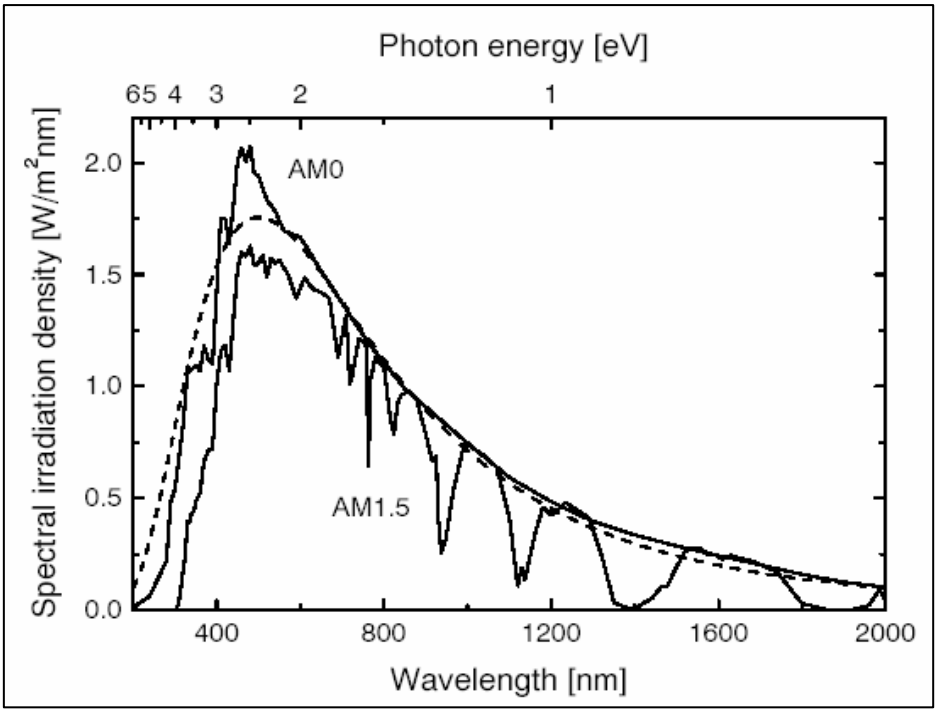

Figure 1: Solar spectrum irradiation density versus wavelength at AM 0 and AM 1.5

Transparent leading oxide (TCO):

In this cutting edge age, it is apparent that the materials of high straightforwardness and low electrical resistivity are essential for the photovoltaic applications; however there is gigantic interest for minimal effort straightforward directing oxide (TCO) movies. Because of their physical-synthetic properties and exceptional geometry, TCO movies have turned out to be promising contender for sensor based applications. They have been gotten to by particular research bunches for their potential applications in gas sensors, photograph transistors, optical radiators, fluid precious stone presentations, photovoltaic sun oriented cells, straightforward cathodes and other optoelectronic gadgets [4–6]. The basic, optical and electrical properties of the movies can likewise be changed alongside the adjustment in the convergence of the dopants. Essentially the utilization of dopants controls the surface morphology and presents surprising refinements in crystalline structure and the grain estimate. The optical attributes, for example, the band crevice vitality are very subject to the precious stone size [7, 8].

Among the TCO semiconductors, ZnO and CdO semiconductors are in fact fundamental in view of their high electrical conductivity because of direct electron portability and high

transporter fixation, and high straightforwardness in the obvious rangeof the electromagnetic range [9]. These two metal oxide semiconductors have been comprehensively explored by specialists in immaculate and doped structures. ZnO is a n sort hexagonal organized, multifaceted material with a wide band hole of 3.37 eV and substantial exciton restricting vitality of 60 meV. It obtains uncommon physical and concoction properties, for example, high electron portability, high nonlinear optical coefficients, high compound dependability, wide scope of radiation assimilation huge piezoelectric constants and biocompatibility. The security of ZnO movies has been observed to be a particular substitute to such oxide movies whose optical and electrical properties corrupt at high temperatures. ZnO has been broadly utilized as a part of hardware and opto gadgets on account of its previously mentioned unprecedented attributes. So also, CdO is a great TCO from II–VI semiconductor bunches in the obvious and NIR otherworldly district. Looking like to ZnO in numerous properties, CdO is a n-sort semiconducting material having an immediate band hole of 2.8 eV and a high electrical conductivity of almost 10−4 cm. Significant consideration has been paid to the investigation of the electrical and optical properties of CdO movies and thus they are utilized as a part of numerous mechanical creations like sun oriented cells, shrewd windows, optical correspondences, level board shows, photograph transistors and other optoelectronic applications [10, 11].

Classification of TCO materials:

TCOs are extremely valuable materials to straightforward optoelectronics in light of the fact that they have one of a kind elements of optical properties in the unmistakable light area, for example, the straightforwardness over ~85% and optical band crevice more prominent than 3 eV and controllable electrical conductivity, for example, transporter groupings of no less than 1020cm-3 and resistivity of around 10-4 ohm cm. Notwithstanding their exceptionally wide controllable conductivity extend including that of semiconductor conduct, their applications are constrained to straightforward cathodes. We can't help thinking that the birthplace of this restricted application is because of an absence of p-sort leading straightforward oxide materials. TCO materials are normally n-sort decline semiconductors and the absence of a superb p-sort TCO dependably has been the principle obstruction before the creation of a completely straightforward integral metal-oxide semiconductor (CMOS)- like gadgets. In spite of the fact that n-sort TCO, for example, ZnO, SnO2 and ITO are enter segments in an assortment of innovations, p-sort TCO are a rising region with little work past to four years back. Be that as it may, acknowledgment of good TCO could fundamentally affect another era of straightforward electrical contacts for p-sort semiconductors and natural optoelectronic materials and in conjunction with n-sort TCOs could prompt an up and coming era of straightforward electronic.

Application of TCO movies:

The uses of straightforward conductive oxide (TCO) coatings have incited huge research on their testimony and portrayal strategies. Different TCO movies are connected in optoelectronics, including touch boards, electroluminescent, plasma, and field discharge shows. Likewise, these coatings are additionally utilized as warmth intelligent mirrors, vitality effective windows, gas sensors, as straightforward anodes in photovoltaic cells, and as flame hindering materials. As straightforward conductors, these movies discover applications in vehicle and air ship windscreen defrosters. Heterojunction sun based cells with an essential directing straightforward layer offer the likelihood of manufacture of minimal effort sun powered cells with execution qualities appropriate for extensive scale earthbound applications. The leading straightforward film allows the transmission of sun powered radiation specifically to the dynamic district with next to zero weakening. What's more, the TCO movies can likewise fill in as a low resistance conductor to the intersection and as an antireflection covering for the dynamic locale. Sun powered cells using these sorts of coatings are presently broadly manufactured, e.g. SnO2/Si, In2O3/Si. Besides, these movies can be utilized as gas sensors, by using the extensive changes in their conductance delivered by the accuse trade of assimilated gas particles.

The electron fixations in the conduction band in a semiconductor sensor can fluctuate around straightly with the weight of the vaporous condition, for a range up to eight requests, while the varieties in transporter portability are by and large little. This huge and reversible variety in conductance with dynamic gas weight has made semiconducting materials exceptionally alluring for the gas detecting gadgets .Among the few sorts of TCOs, the SnO2, ZnO, In2O3, Ga2O3, and CdO are the notable paired mixes. Doping component is by and large acquainted with enhance their electrical conductivity, and the every now and again useddoped TCOs are In 2O3:Sn, In2O3:F, SnO2:F, SnO2:Sb, ZnO:Al. In2O3:Sn(ITO) due to its superb electrical and optical properties. Be that as it may, a few issues have been experienced while utilizing ITO, especially, the high cost, shortage of In, and furthermore the inclination to crack on adaptable substrates.

Throughout the previous two decades, endeavors have been taken to create elective materials to supplant ITO. These endeavors risen with the improvement of an assortment of ternary and significantly more perplexing TCO materials, for example, Zn2SnO4, Cd2SnO4, In4Sn3O12, and GaInO3, in view of mixes of parallel mixes like ZnO, CdO, In2O3, and SnO2, delivering multicomponent oxides past the ternary mixes. Be that as it may, the utilizations of these multicomponent oxides are once in a while announced. The utilization of ternary and multicomponent oxides makes conceivable to outline TCO movies reasonable for particular applications because of the way that their electrical, optical, compound and physical properties

can be controlled or adjusted by changing their substance arrangement. In spite of the fact that they have low resistivity, the thin movies containing Cd, for example, In-doped CdO, Cd2SnO4, and CdSnO3, are of lower commonsense use because of their danger and material cost.

Reported work:

On the nuts and bolts of results revealed by different specialists it is watched that According to Y. Caglar [12] Zinc acetic acid derivation get dried out and cadmium acetic acid derivation get dried out of 0.5M were combined in various ostensible arrangement volume proportions to acquire ZnO, Cd(0.25)Zn(0.75)O, Cd (0.50) Zn(0.50)O, Cd (0.75) Zn (0.25)O, CdO films. Cd1-xZnxS sintered movies arranged by sol gel system. They have repeated these sintered movies in nine times, our comes about decently coordinates.

A few examinations have been made on the semiconductor parts of unadulterated CdO however the development and the impact of pollutions have gotten little consideration. An assortment of strategies have been accounted for the readiness of CdO-ZnO compound movies, for example, electrodeposition [13], sub-atomic shaft epitaxy [14], sol-gel handle [15,16], splash pyrolysis [17] and screen printing[18]. Among these techniques, screen printing is a quick rising, multifaceted strategy known for its consistency, reproducibility and attainability of delivering shoddy vast region movies. A compound semiconductor of ZnO, CdO and CdZnO i.e. for our situation has been once in a while considered.

Due to high sintering temperature substrate utilized by different laborers has boro-silicate glass substrate and quartz which are expensive. Other than the need of nitrogen climate raised up the cost of sintered hetrojunctions sun based cells. Keeping in the psyche above outcomes, we propose to do deliberate investigations on Cd1-xZnxO sintered movies. We ponder the optical, basic and electrical properties of Cd1-xZnxO movies of different, keeping in mind the end goal to use them for ease sun based cells.

All Thin Film Device:

Specialists trust that keeping in mind the end goal to diminish the volume of cells, to decrease mass transporter recombination inside the semiconductor and to lessen the cost brought about in manufacture, thin film sun oriented cells might be created on minimal effort substrates like glass. The more slender cells can yield high voltages and high fill factors. CdO and Copper indium diselinide based thin movies sun powered cells are among the promising possibility to be set up on business scale. Thin film CdO/ZnO heterojunction sun powered cells might be created in either substrate or superstation design. In either case light enters the cell through TCO window layer. Retention and thus era of transporters happens in CdO safeguard

layer and the bearers are cleared to outside circuit through ohmic contacts. Most heterojunction CdO gadgets utilize CdO as window layer.

This decision depends on the great grid match of CdO and ZnO and low minority bearer recombination at the CdO/ZnO interface bringing about high quantum efficiency. It is attractive that the CdO layer ought to be as thin as conceivable so the photons can pass through the layer without encountering calculable vitality misfortune and come to the CdO safeguard layer. The bandgap of window layer might be expanded by supplanting CdS with ZnxCd1-xO. The band hole of ZnxCd1-xO can be designed by differing the Zn fixation. The bearer thickness in ZnxCd1-xO is bigger than the transporter thickness in CdO. HenceZnxCd1-xS might be securely utilized as window layer in CdO based sunlight based cells. In this work, ZnxCd1-xO sun oriented cells are set up in super state configuration. Transparent glass is utilized as substrate onto which a thin layer of straightforward leading oxide and ZnxCd1-xO thin layers are stored (figure 1.2). Thick layers of polycrystalline CdO are utilized as safeguard layer. Indium oxide is utilized as straightforward directing oxide because of its higher optical transmittance and as a result of its dependability at higher temperatures around 500oC.

In the present examination thin movies of ZnxCd1-xO are kept on In2O3 covered glass substrate held at room temperature by physical vapor statement which comprises of dissipating ZnO and CdO source material covering unit. The creation of thin film sun based cells is settled by shaping an ohmic contact that can convey photograph produced current to external circuit. The option is delivering an intensely doped layer on the surface of CdO which creates a low resistance contact by the way toward burrowing. In this work we have created p+ layer by keeping ZnO thin film by electron bar dissipation. At the highest point of the ZnO film, silver directing paint is utilized to shape metal contact. The schematic chart of ZnxCd1-xO all thin film sun oriented cells created on In2O3 covered glass substrates is appeared in figure 1.2.

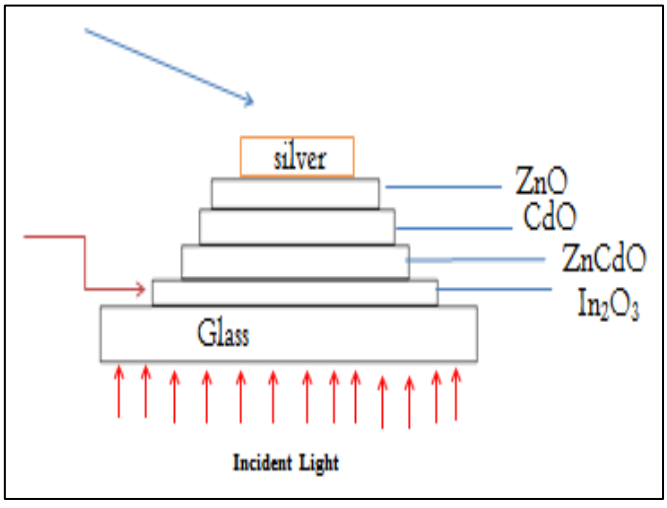

Figure 2: Schematic diagram Glass/In_2O_3/ $Zn_xCd_{1-x}O$ /Silver of all thick films solar cell

CONCLUSION:

In summary, Transparent conductive oxides play important role in electronics,due to suitable band gap and other optical properties such films are utilised for chemical sensors, spintronics and other optoelectronics devices.

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DEVELOPMENT OF MEDICAL SCIENCE DURING MEDIEVAL ERA

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INTRODUCTION:

Medicine is the most important branch of learning meant for the sustenance and welfare of living beings. Since, living beings need treatment and remedies against various diseases for sustaining a healthy life. With the development of culture and civilization, Man has been striving for removing his multifaceted problems. Scholars are divided on the origin of the science of medicine into two groups. Some are of the opinion that the science of medicine existed since the day life began on the Earth. They say that it has been the need of the man since his existence. The other group thinks that this branch of learning is accidental. This group is further subdivided into two groups; one of them supposes its beginning with the assumptions and experiments while the other says that its beginning was possible because of "*Waḥy*" and "*Ilhām*" (Divine revelation and intuition) which later became more popular. Most of the Greek Scholars including Galen, Plato and Hippocrates recognize this view as more correct, on the other hand two important students of Hippocrates, Felos and Asalis were against this view. They say that existence and beginning of medicine was not possible without the efforts and experiments of man [1].

Various religions and civilizations believe that it has been sent from the Lord of the Universe and produce diverse views according to their own religious scripts. The Jews in this regard say that Allah has bestowed the knowledge of medicine on Moses, the Prophet of Allah (A.S.).The Asaibs think that it was spread from *Haykals*, their worship houses and their religious heads (*Kāhins*) who received this knowledge from the Lord of the universe. The Zoroastrians are of the view that four books were given by our Lord to Zoroaster, of which one was of medicine. According to Hindus, the Ayurvedic system of medicine belongs to the *Vedas* which they believe to be heavenly books. Islam gives a quite different view from all others. The '*Ulamā*' (Islamic scholars) and Muslim Physicians believe that its existence and beginning was on the basis of thinking, manual and intellectual efforts, experiments and observations. Nevertheless, some Muslim Physicians think and believe on other theories as they include Abū Ja'far a

physician of Maghrib and Shaykh Muwaffiqal-Dīn Asad bin Ilyās who narrated from ‘Abdullah ibn ‘Abbās that the Prophet Sulaymān (A.S.) was also an expert of Medicine [1].

Throughout the human history, different civilizations, nations, ancient and medieval societies and religious groups contributed to the development of medical sciences. Among them the ancient civilizations are; the Babylonian, the Egyptian, the Chinese, the Greek, the Indian, the Iranian and the Roman.

The history witnessed that the Babylonian medicine began before 5000 B.C. In the very beginning they believed that the disease and suffering was the result of the anguish of any god or goddess. The patient was also laid at some public place and it was voiced whether anybody knew its treatment. If anybody suggested some treatment for him it was experimented and only after its successful results it was written and put in the neck of the gods. In this way different observations and experiments became recorded in the form of manuscript and the medical sciences slowly but soundly developed throughout the ages [1].

After the down fall of Babylonian civilization, the center of development of medical science was shifted to Egypt. The period when Egyptians started contributing to the field of medicine is traced back to 6000 B.C., which is authenticated by different inscriptions and the books known as *Babyras*, one of which is written by Athosis - the King of Egypt. In this period the field was thought to be the field of exploration and magic [1].

Another civilization that contributed to medical sciences was China. They are of the view that medical science was started in China and the first man to introduce medical Science was Huang Ti - the King of China during 3687 B.C [1]. It may be a plausible statement, because of his influence, the king called some Physicians to China from Babylonia or imported some medicines or works on the subject from there and then presented the medicine before the country. With the development of this science in the field of plant medicine along with the zoological and geological medicines, various rules of treatment were formulated. Like the Egyptians, the patients were treated by the Greek clergymen who supposed Asqalibeus, a pupil of Prophet Idrīs (A.S.), as the Lord of the treatment and worshiped him at the fixed place of worship. They cured patients by laying them in a special room of some temples and considered that in dream the patient would see God proposing the treatment for him/her. After healing up the patient used to mention it on the golden and silver plates that became the record for future. In the later period, they cured the patients with the real medicine and the sleeping in the temples and dreams remained only the tradition of the Greek society. In the later period the compilation of medical works were started from the period of Hippocrates. He not only compiled various earlier works but, wrote a number of works in various branches of medicine. The Greeks contributed to the field more than any other civilization. Among the physicians whose contributions are supposed to be the most important were Aristotle, Dioacorides, and Galen.

The Greeks unlike the others are credited to introduce their own methods of treatment known as *Unani* medicine and this system is still prevailing in various parts of the world. It is worthy to mention that Galen is credited to present this science with his writings in its complete form. He made a large number of observations and experiments in the field of surgery and composition of medicines [2].

The system of treatment of Hindu medicine is called Ayurvedic (science of cure). It is supposed by the Hindus that it was revealed on *Brahmaji*, who was the first Physician in the Hindu civilization. Hindus following their predecessors developed it and wrote some valuable works, some of which were later translated into Arabic and used by Muslims while writing their works. Some of the Hindu scholars on medical science were Charak the writer of *Charakaksang hata and Dhanomatweri,*Vag Bhat, *Rag Bhat* and Devdas. These were great scholars of this field who not only laid foundation of this field in India but developed its various branches [1].

Iran (Persian Empire) has also played an important role in the development of this science. For being a closer centre of various civilizations it was more benefitted than others from the development of medical sciences. Since its empire covered a vast portion of land, there were many centers of studies of this science including that of Jundishapur. After the invasion of Iran by Alexander (Sikandar) all the works were destroyed. However, the ancient books of Osta show that they were far advance and much dependent on the roots and leaves (for medicinal purposes) which always had favorable climate to be grown. Because of the large number of plants used for the purpose of medicine, the Iranians knew no disease that might be left uncured. The Iranian rulers also patronized the physicians both of Iran and other countries also and they were honored and given all types of facilities. Kanzyas – an eminent physician was also attached to the ruler's court and was patronized by the ruler of the time [1].

The Romans in the beginning were superstitious people and their system of treatment was based on magic. But subsequently they imported the Greek medical science to Rome. Among the earliest who spread this science of the Greeks in Roman Empire was Arkhaftus. Kalos is said to be the earliest Roman Physician who compiled the history of medicine along with the principles of treatment. He also critically evaluated the medical works of Hippocrates and Alexander on the diseases of the woman. Sarnawees is credited to have written an important book. Kalwdus, who was the king of Rome and treated the patients with *Rubbine* after making them senseless, was among the celebrated Physicians of Rome [1].

Muslims contribution to medical science is not restricted, it develops and contributes in the field more and more as Islam is the religion that encourages its followers to seek knowledge. Muslims, along with other fields of knowledge like the religious sciences of Qur'ān and *Ḥadith*, and natural sciences like Mathematics, Astronomy, Physics, Chemistry etc., studied and modified the medical science as well. There are various verses in the Qur'ān and various traditions of

Prophet Muḥammad (ﷺ) that depict the usage of many fruits, vegetables, stones, honey, birds, fish, minerals, milk, and others as the medicine and the means to cure different diseases although, they have not been mentioned as the medicine directly.

Prophet Muḥammad (ﷺ) had also mentioned various things to cure different diseases directly. The *Sunnah* of the Prophet are worthy of mention as far as the hygiene is concerned. The washing of hands before having meal, the way of sitting while eating one's meals, to sit during drinking water and others is best example of hygiene of Prophet Muhammad (ﷺ) which were proved by science in later days. He also stressed upon the benefits of the honey, saying that it is beneficial to cure different diseases. A large number of books on the medicine of the Prophet (*Ṭibb-e Nabawī*) have been written by many scholars. The field of surgery was also developed by preparing ointments for wounds and by the invention of their encounters between the Muslims and the non-Muslims during the period of Prophet Muhammad (ﷺ)and in subsequent periods. Nursing department may also be said to have been introduced, as many women companions of the Prophet (ﷺ) served the injured soldiers in the battle field.

They also felt its need when they conquered many other countries and faced different kinds of diseases quite strange to them after having settled in these regions [2].

Development of Medical Sciences under the *Umawī Khilāfah*:

The medical sciences of ancient Greeks revolutionized the initial ideas of the study of medicine in the early Arab scholars of the east. The Muslim conquest of Egypt and Persia paved a way for Muslims to gain control over both Alexandria and Jundishapur (Modern Shah Abad, Iran) the earlier centers of science and medicine. The translation movement for Muslims was launched during the Umayyad period, but not as a movement, but few individuals have started this work.

The first *Umawī Khalīfah* (Amīr Muʻāwiyah) was the first to appoint Ibn-Athal, a Christian physician as the district magistrate of Hams. There he translated several medical books into Arabic for the Khalifa. Prince Khālid-bin-Yazīd the grandson of AmīrMuʻāwiyahwas an expert in Islamic Sciences who wanted to learn chemistry and medicine. During this period the Jewish and Christian scholars were the only skilled persons in this discipline. However, Khālid studied chemistry with Miryānī, a Christian from Rubban. Astafan translated books from Coptic to Arabic for Prince Khālid and he also authored three treatises on chemistry and patronized much translation of different classical books into Arabic. These gave a fillip to study of science among the earlier Muslims, which lead to the Islamic resurgence in scientific learning [3].

Maserjaway is a Jewish physician was directed by the Khalifah Marwān bin- Ḥakam to render Bishop Aaron's books on pharmacopoeia from Syriac into Arabic and Caliph 'Umar

ibn'Abdul 'Azīz ordered multiple copies of the book. Ibn Abjar, a Physician from Alexendria, embraced Islam at the hands of 'Umar ibn'Abdul 'Aziz and was appointed as the chief physician at his Court [3].

After the advent of Islam, the first hospital (*Shifā Khānah*) was constructed during the period of Umayyad Caliph, Walīd bin 'Abdul Malik (86-96 A.H./705-715 C.E.) in Damascus. This was inaugurated by the Caliph himself in (88/707 C.E.) and is believed to be the first hospital in Islamic world. Besides the Caliph appointed doctors and the patients were served with the food and kept under supervision until they improved in the health [4].

Thus, during the Umayyad period the translation of classical Greek medical works into Arabic was started, however, there was not a great deal of success in this field. Hospitals available with doctors and other facilities were constructed in a sizeable number.

Development of Medical Sciences under the Abbasid Khilafah:

With the start of the Abbasid rule, Baghdad became the highest seat of learning. The conquests and introduction of non-Muslim dominion into Muslim culture brought Muslims into contact with the scientific and philosophic heritage of Ancient Greece as well as the vestiges of the Indian and Persian cultures. Under the munificence of the broad minded and tolerant Caliphs who were quick to support and encourage the translators, systematic translations in every branch of knowledge on a large scale were carried. The Caliphs were deeply interested in obtaining the costly original Greek manuscripts from the bulk of the works translated, but Indian and Persian literature was also taken into account at first. Medical, Mathematical and astronomical works were translated from the Syriac version of Greek authors but later directly from Greek into Arabic. At the end of 9th century C.E. not a single important scientific work was left without being translated into Arabic. It was chiefly through the Nestorian medical center at Jundishapur in Persia, that the Arabs became acquainted with Greek medicine [5].

Muslims came into contact with Jundishapur during the reign of second Abbasid ruler Al-Manṣūr. He suffered from the disease - Dyspepsia throughout his life, he tried his personal physicians but all in vain, then he turned to physicians of Jundishapur medical school. A cosmopolitan center attracting scholars and physicians from Egypt, Syria, India, Greek and Persia, it was great flourishing centre of medical learning near the present city of Ahwaz in Iran. The chief physician of Jundishapur was Jarjis ibn Bakhtishu whose reputation as a skilled Medical practioner had reached Al-Manṣūr. He was invited to Baghdad and his treatment was successful. After his successful treatment Al-Manṣūr became a zealous patron of the translation of medical works into Arabic, which lead to the Islamic reawakening. The vast translation movement that started at the end of 8th century left an indelible mark on the history of mankind [3].

At first the Muslims made arrangements for the translation of Greek, Indian, Persian and Chaldean medical works into Arabic and thus gained the knowledge of medical system of these civilizations. But they did not accept as such what these systems had offered. They made research in various branches of medical science and accepted what was found to be useful. Besides, they made many valuable and new discoveries in theory and practice of medicine. They evolved an entirely new system of medicine. When the Europeans learnt the system from the Muslims, generally through the Arabic medical literature, they properly called it Arabian medicine acknowledging on the one hand their indebtedness to the Muslims and on the other hand putting a seal of testimony to the gigantic and original contributions of the Muslim scientists to medicine. Since, the medical knowledge was primarily borrowed for Greeks; the new system was named by the Muslims of the south Asian sub-continent as *Ṭibb-e-Unānī* (Greek medicine). This act gives a proof of the Muslim spirit of liberalism [6].

The Abbasid caliphs were profoundly involved in obtaining original Greek classical tomes by providing funds and by using diplomacy and also selected Indian and Persian books were considered to be equally important. Initially, the books of medicine, mathematics and astronomy received translators' attention. Later, Muslim scholars directly translated Greek books into Arabic and not from Syriac. By the end of 9th century most important titles had been translated into Arabic. It clearly shows that all available early books were translated and thus, transferred into Arabic. The Muslim scholars did not imitate blindly the texts of their Greek pioneers, but they examined critically, collected and enriched significantly the major texts of Greek medicine. With this goal, Muslim scholars paid serious attention and devoted their energy to serving the cause of learning. They enriched their knowledge by observing the accomplishment of early Greeks as well as enhancing their intellectual scope for Syriac, Persian and Indian sources.

The underlying impetus, however, for taking such scientific endeavors in fact was embedded in the teachings of the Qur'ān and *Sunnah* of the Prophet (ﷺ) [7].

Caliph Al-Manṣūr after being successfully treated by Bakhtashu, appointed him as the court Physician. Baktashu family which had been associated with the court translated a number of Greek books on medicine. Jarjis pioneered this field. His grandson Jibril (d.828 C.E.) was an illustrious member of this family. Yuhāna-ibn-Masawayh (777-857C.E.) was famous in Europe as "Massive Senior",[5] one of the earlier distinguished physicians in Islam. He was born in Jundishaphur and later he moved to Baghdad for living a better life and studied under Jibril ibn Bakhtishu. In this affluent city he became a renowned Ophthalmologist and the private physician of Caliph Hārūn al-Rashīd [3].

The case of the Nestorian Jibril ibn bakhtashu (who was court physician of Al-Rashīd, Al-Manṣur) and the Barmakids is said to have amassed a fortune of 88,800,000 Dirhams, shows

that medical profession was a paying one. As private physician of Al-Rashīd, Jibril received 1,00000 Dirhams for cupping the caliph twice a year and an equal sum for administrating a semi-annual purgatives draught. The Bakhtashu family produced 6/7 generations of distinguished physicians, the last of whom flourished in the second half of the 11th century [8].

Establishment of Hospitals during Medieval Islam :

The Muslim organizational talents, along with their special clinical and surgical skills, were applied with particular success in the development of great hospitals in the major cities of medieval Islam. Both in size and professional expertise, these institutions far surpassed virtually all medical institutions known in ancient times or outside of Muslim lands during the middle age.

The term *Bīmaristān* meaning hospital, indicates the concept of treating patients in the hospital is of Persian origin. The Persians are considered to be the first to have built hospital for this purpose. But as is natural the hospital system was in its preliminary stage, when the Arabs first appeared in this scene to play their role as benefactors to humanity in the field of medical science. They knew the medical school of Jundishpur which was established by during the sixth century B.C. Some of their Physicians Al-Ḥārith bin Kalda who lived in the time of Prophet Muḥammad (ﷺ) was a product of same school [9].

The *Bīmaristān* (Hospitals) were of two sorts-fixed and the moving. The moving hospitals were transported upon beasts of burden and were erected from time to time as required. The practitioners who travelled with the moving hospitals were of the same standing as those who served at the fixed hospitals. The Muslims highly developed the art of nursing and treating patients in public hospitals organizing both mobile and permanently built hospitals.

The history of mobile hospitals in Iran goes back to the time of Prophet Muḥammad (ﷺ), who set up a camp for nursing the wounded in the *Battle of the Trench*. Saʻīd bin Muʻādh, a Companion of the Prophet (ﷺ), was wounded in that battle and was nursed by Rafayday in the same camp.

This was not only the first mobile war hospital in Islam, but also served as a model for later Muslims to follow. In the course of time the mobile hospital was expanded and developed by Arab caliphs and rulers, so much so that it was equipped with all the requirements needed by patients, like drugs, syrups, dresses, eatables, physicians, etc. One among such mobile hospitals during the time of Sultan Muḥammad al-Saljūqī was so huge that it had to be carried on as many as forty camels [9].

The hospitals also served as institutions of learning, in as much as most of the teaching of clinical medicine was carried out here. While the theoretical aspect of medicine continued to be dealt with in both *Masjid* and *Madrasah*, the practical work was done in the hospitals, many

of which were equipped with libraries and schools designed to serve the purpose. The earliest hospital in Islam was built in 707C.E by the Umayyad caliph Walīd ibn 'Abd al-Malik in Damascus. Very likely he was influenced by the model hospitals of the pre-Islamic period, such as that of Jundishapur, which was quite sophisticated even for that time. The Abbasid caliphs organized medical education for students, who after completion of the course were given permission by the experts to practice medicine. They also had to take the Hippocratic oath [10].

Many great hospitals were built either by rulers or by private individuals throughout the Islamic world, such as the Manṣūrī hospital in Cairo, which is still standing, or the Nūrī hospital of Damascus of the 12th century, one of the largest hospitals ever to be built in the Islamic world. Hospitals were either constructed for a particular physician or later put under the direction of a particularly eminent doctor. For example, Al-Rāḍī was placed in charge of a hospital, thus served as an institution of learning as well, and became an auxiliary of the M schools attached to *Masājid* in which the theoretical principles of natural philosophy and its branches, including medicine, were taught [10].

The reign of Abbasids is specially famous for the establishment of numerous hospitals run by state functionaries. During the days of the Abbasids. Hārūn al-Rashīd. Instructed his personal Physician Bakhtashu to get constructed the extencive hospital in Baghadad, and Mesus was appointed as its resident Medical officer. Besides this hospital various branches hospitals in different provincial centers were also established. Many other hospitals were established during the tenth century. Yaḥyā bin Kh̄alid, the Governor of Hārūn al-Rashīd, constructed hospital, on the name of *Baramaka* and the Hindu physician. Ibn Dahān became the superintendent of this hospital. During 9th and 10th century hospitals were constructed almost in every Muslim dominion. The most famous hospital of Abbasid period was *Adudī* Hospital, Baghdad, which was built by *'Alā' Dawlah bin Buwayh*in 981 C.E. The most renowned medical expert Al-Raḍī (*Rhazes* of Europe) selected the site for this hospital by keeping a piece of fresh meat at each of the four different proposed sites for it, in the city of Baghdad, at night. On examination in the morning the place where the pieces were found least affected by degenerative changes, was considered suitable for the hospital and construction was undertaken. A magnificent building was constructed at a huge cost and twenty-four specialists were selected including surgeons and ophthalmologist. A library, pharmacy, a store and a kitchen were provided for the hospital and were well equipped with the paraphernalia [10].

There were various kinds of hospitals – Military hospitals, Jail Hospitals, Hospitals for general public; they were mannered by special physicians and surgeons. Primary health centers were also set up in the vicinity of *Masajid* and places of public gathering.

The organizational set up of the medieval Muslim hospitals was considerably advanced. Separate wards were provided for male and female patients. Special wards were maintained for

internal diseases, ophthalmic disorders and orthopedic cases, as well as for other surgical patients, the mentally ill and patients with contagious diseases. Extensive trainings and pharmacological facilities were standard. All great hospitals were host to Physicians who came from all parts of the Muslim world to function as resident administrators, specialists, practitioners and visiting teachers. Apprenticeships were offered to deserving students, and movable clinics and dispensaries provided professional treatment and care [11].

The Muslim hospital system was organized on advanced lines. There were different words for different diseases, some hospitals had specialized physicians under the supervision of head of department(s). Thus there was a chief physician for the department of internal disease, the chief surgeon for the department of surgery and the chief ophthalmologist for the department of eye diseases. Besides, there was a chief superintendent to supervise the functions of all the wards. Both physicians and paramedical personals, like attendants, technicians, druggists etc., worked on shift bases as they had fixed hours of duty, during which they were available in their respective rooms and places, attractive salaries were paid to them from the state exchequer, treatment was given gratis to rich and poor, men and women, slave and free person, Muslim and non-Muslims. The sleepless were provided with soft music, professional story tellers, and perhaps books of history. Food, drug and dresses were also given to them without any charge. Each hospital has laboratories, dispensaries, outdoor clinics, kitchens and baths. Since the hospitals served as the medical schools also, each hospital had a big lecture hall, in which lectures were delivered and practical education was imparted to the students as is done today in the hospitals attached to the medical colleges [12].

Another note worthy innovation was that the patients were discharged from the hospital only after they were fully cured and had spent the stage of convalescence to the satisfaction of the physicians. The convalescent was considered fit to be discharged when he could eat and digest one full chicken along with bread in a single meal. At the time of his convalescence, he was gifted a new suit of clothes and a sum of money, so that he would not be forced to work immediately for his livelihood [12].

It is worth mentioning that each patient had his own card on which the Physicians recorded his observation while treating the patient. Also the Physician had his own special register to record his observations on the diseases he was treating. The physician performed his experiments and tests according to his observations. If the physician faced any problem in any matter of diagnosis, he went to the head of his division or the chief physician. Frequently the physicians held meetings to discuss cases [13].

The Muslim hospitals served as models for the hospitals established in different parts of Europe, particularly in Italy and France in the wake of renaissance. The establishment of hospitals throughout Europe during 14th century was partly due to the influence of crusades.

The magnificent hospitals of the Saljūq ruler Nūr al-Dīn in Damascus, and those of the Mamlūk Sultān, Al-Manṣūr in Cairo, significantly inspired the crusaders in this regard.

CONCLUSION:

The above discussion amply brings to limelight the emergence and gradual development of sciences especially the medical science in the Muslim world right from the time of the Prophet until the expiry of the medieval period, the 'Golden era of Islam'. The Muslim scholars, scientists and intellectuals gained an unprecedented expertise in the fields of scientific learning as passed on to them from the scholars of antiquity particularly, the Greeks. They modified and extended the branches of learning besides contributing their own observations, experiments, discoveries and inventions that eventually brought the era of enlightenment in European world mainly through Muslim Spain.

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IMPACT OF *ASPARAGUS RACEMOSUS* AS A GROWTH PROMOTER IN THE SUPPLEMENTARY FEED OF COMMON CARP, *CYPRINUS CARPIO*

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ABSTRACT:

In this experiment, the dry root powder of a medicinal plant, *Asparagus racemosus* was mixed with the supplementary diet containing groundnut oil cake, rice bran and fishmeal to formulate seven types of fish diets. These formulated diets were fed to the fingerlings of common carp, *Cyprinus carpio*. *Asparagus* was mixed with the conventional diet at 20%, 30%, 40%, 50%, 60% and 70% proportion and control diet was kept without *Asparagus*. Experimental diets including control were fed at 5% body weight of fish per day for 90 days. The fingerlings fed with 30% *Asparagus* gave the highest growth (weight gain) among all diets. Analysis of variance indicated that the final individual fish weight (g), Specific Growth Rate (SGR, % per day), Feed Conversion Ratio (FCR) and Protein Efficiency Ratio (PER) were significantly higher ($P< 0.001$) in 30% *Asparagus* diet compared to control.

KEYWORDS: *Asparagus racemosus*; *Cyprinus carpio*; Growth performance; Feed utilization

INTRODUCTION:

Aquaculture is the fast growing food production sector of the world. Compared with other food production sectors, aquaculture achieved 10% annual increase since 1984; while, production increase rate of meat is only 3% annually [1].

Fisheries play an important role in the world food economy. Fish is the primary source of protein for some 950 million people worldwide and represents an important part of the diet of many more. In less than 50 years, the world's average per capita consumption of fish has almost doubled. Globally, fish provide about 16% of the animal protein consumed by humans and are a valuable source of minerals and essential fatty acids [2].

Aquaculture's strong growth has generated a consequent 30% annual growth in the production of aquatic species feeds and has made raw material supply a continuous challenge in this industry. Attaining truly sustainable growth in the aquaculture industry will depend on a progressive decrease in the use of marine protein and lipids in feed for farmed fish [2, 3].

In fish farming, nutrition is critical because feed represents 40-50% of the production costs. Fish nutrition has advanced dramatically in recent years with the development of new, balanced commercial diets that promote optimal fish growth and health. The development of new species – specific diet formulations supports the aquaculture industry as it expands to satisfy increasing demand for affordable, safe and high-quality fish products.

Medicinal herbs are efficacious for growth, health management and for the immune systems of land mammals and humans. Studies have been done in which herbs as dietary additives were fed to fish. The focus of these studies includes their use as feeding attractants and their effects on growth, survival and immune system activity. There is a developing interest in using medicinal herbs as a kind of dietary supplement in aquaculture and in showing the positive effects on growth and the immune response [4, 5].

The present study was undertaken to study the partial replacement of fish meal with a medicinal plant, *Asparagus racemosus* for the growth of freshwater carp fish, *Cyprinus carpio*.

MATERIALS AND METHODS:

Experimental fish, *Cyprinus carpio* fingerlings were obtained from governmental nursery ponds in Kolhapur Centre, M.S. (India) brought to the laboratory and acclimatized in glass tanks for 15 days while being fed on a commercial pelleted diet.

The feeding experiment was conducted in triplicate for 90 days. Fingerlings of *Cyprinus carpio* weighing 2.00 to 2.50 g were used for the experiment. Seven types of pelleted feeds were formulated using different ingredients such as rice bran, groundnut oilcake, fishmeal, guar gum binder, Vitamin – Mineral mixture, fine powder of *Asparagus racemosus* root powder in different proportions (Table 1). Experimental diets were analyzed for proximate composition such as moisture, total ash, crude protein, crude fat and crude fibre.

Fishes were fed at the rate of 5% body weight in two equal rations daily. At fortnightly intervals a minimum of 50% of fishes were sampled to record the growth. At the end of experiment the growth performance of experimental fishes was determined in terms of final individual fish weight (g), Specific Growth Rate (SGR, % per day), Feed Conversion Ratio (FCR) and Protein Efficiency Ratio (PER).

Table 1: Formulation and proximate composition of fish diets containing increasing levels of *Asparagus racemosus* root meal (per 100 g):

Diet							
	Control	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**
Ingredients (%)							
Groundnut oilcake	43	35	29	24	19	13	08
Rice bran	36	27	23	18	13	09	04
Fishmeal	10	09	09	09	09	09	09
Guar gum Binder	10	08	08	08	08	08	08
Mineral – Vitamin mixture	01	01	01	01	01	01	01
A. racemosus root powder	00	20	30	40	50	60	70
Nutrient content (%)							
Moisture	7.05	5.54	5.86	6.87	6.89	6.63	7.09
Total Ash	12.13	10.90	11.80	13.08	11.47	12.54	13.26
Protein	26.24	24.12	25.61	28.47	29.75	29.45	28.32
Fat	3.81	8.24	8.00	7.63	6.38	7.20	5.32
Fibre	10.54	8.16	10.54	10.79	12.26	12.78	13.67

RESULTS AND DISCUSSION:

The growth performance and feed utilization in terms of body weight gain (WG), specific growth rate (SGR), feed conversion ratio (FCR) and protein efficiency ratio (PER) of *Cyprinus carpio* fed with different levels of *Asparagus* diets are presented in table 2.

Table 2: Growth performance and feed utilization in *Cyprinus carpio* fed diets containing *Asparagus racemosus* root meal

	Control	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**
Initial body weight (gm)	2.15 ± 0.02	2.4 ± 0.05	2.3 ± 0.05	2.3 ± 0.06	2.1 ± 0.05	2.2 ± 0.05	2.2 ± 0.04
Final body weight (gm)	17.23 ± 0.49	19.25 ± 0.55 ^{NS}	27.54 ± 0.74 ***	24.26 ± 0.70 ***	21.42 ± 0.61 **	16.58 ± 0.47 ^{NS}	13.95 ± 0.40 *
Weight gain	15.08 ± 0.43	16.85 ± 0.48 ^{NS}	25.24 ± 0.72 ***	21.96 ± 0.63 ***	19.32 ± 0.55 ***	14.38 ± 0.41 ^{NS}	11.75 ± 0.33 **
Specific growth rate (SGR) % day $^{-1}$	0.95 ± 0.02	0.96 ± 0.02 ^{NS}	1.13 ± 0.03 **	1.08 ± 0.03 ^{NS}	1.06 ± 0.03 ^{NS}	0.93 ± 0.02 ^{NS}	0.85 ± 0.02 ^{NS}
Food conversion ratio (FCR)	2.38 ± 0.06	2.42 ± 0.06 ^{NS}	1.66 ± 0.04 ***	2.02 ± 0.05 *	1.80 ± 0.05 ***	2.25 ± 0.06 ^{NS}	2.14 ± 0.06 ^{NS}
Protein efficiency ratio (PER)	0.57 ± 0.01	0.85 ± 0.02 ***	1.16 ± 0.03 ***	0.95 ± 0.02 ***	0.83 ± 0.02 ***	0.60 ± 0.01 ^{NS}	0.52 ± 0.01 ^{NS}

(Value expressed is mean of n (n=3); ±: SE) *P<0.05, **P< 0.01, ***P< 0.001, NS – Non Significant

Fishes fed with 30% *Asparagus* diet showed better growth. The 30% diet group showed highest final body weight (27.54 ± 0.74 gm), weight gain (25.24 ± 0.72 gm), SGR (1.13 ± 0.03) and PER (1.16 ± 0.03). The lowest growth and feed utilization was recorded from 70% diet group. The lowest final body weight (13.95 ± 0.40), weight gain (11.75 ± 0.33), SGR (0.85 ± 0.02) and PER (0.52 ± 0.01) was recorded in 70% *Asparagus* diet.

Most of the growth parameters showed their peak for 30% diet group except FCR (Fig. 1). The highest FCR value was observed for 20% diet group (2.42 ± 0.06), which is non significant with control. The lowest FCR value was associated with 30% diet group (1.66 ± 0.04).

It is evident from this study that, *Asparagus* meal could be incorporated up to 30% level in formulated diets for *Cyprinus carpio* without affecting fish growth. Above the said limit the reduction in fish growth was observed. As like *Asparagus*, other medicinal plants in fish feed formulation were reported. The Dietary inclusion of oriental and Chinese herbs or algae improved the growth performance of fish [6, 7].

Higher inclusion of plant protein in formulated fish diet causes the retarded growth of fish. In the present study, it was observed that incorporation of *Asparagus* above 30% affects the fish growth. The data of the present study agree with the finding of Pereira & Oliva – Teles [8], who reported that significant decreases were found for both, growth and feed utilization with the highest replacement levels of dietary fish meal with plant proteins for gilthead sea bream. Gomes [9] and Fontainhas – Fernandes [10] also support the negative growth of fish with higher inclusion of plant sources in fish diets.

In the present study it was seen that, the increased inclusion of *Asparagus* hampers the specific growth rate (SGR). 20% and 30% *Asparagus* diet showed higher SGR whereas 40% to 70% diets showed decreased SGR. The same trend of decreased SGR with increased plant protein was recorded by Dada & Ikuerowo [11]. They used *Garcinia kola*, herbal medicinal plant, as a feed ingradient for the growth of *Clarias gariepinus* broodstock. Fish fed with diets containing *Garcinia kola* seeds showed a significant increase in SGR compared to the control upto 40% inclusion and sudden decreed SGR above 40% inclusion.

Feed utilization and protein efficiency ratio was seen improved by addition of *Asparagus* upto 30% inclusion level. As inclusion of *Asparagus* increases both these paramerts show fluctuated results. This type of result fluctuation was also observed by Kumar et al. [12]. They studied incorporation of the roots of a medicinal herb mulethi (*Glycyrrhiza glabra*) in the diet of *Cirrhina mrigala*.

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ETHNIC STUDIES OF KORKU, GOND AND NIHAL TRIBES OF EAST NIMAR (M.P.), INDIA

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INTRODUCTION:

India is known to be world's top twelve mega diversity countries, with remarkable ethnical wealth, which still remains to be fully explored, documented, conserved and utilized. Forests and tribal have been co-existed since time immemorial. Several cottages and rural industries drive the bulk of their raw material from the wild to finished goods/articles like gum, resins, kattha, bidi, pattal and dona, herbal drugs, fiber and floss, cordage, drums, mats, basketry, toys, musical-instruments, brooms and brushes etc.

The present work mainly covers the tribal villages situated at the foothills of Satpura, which are inhabited by Korku, Gond and Nihal, tribes of East Nimar. The tribes are original inhabitants of this region. There are about six more tribes like Bharia-Bhumia, Bhil, Bhunjia, Oraon, Pradhan and Pardhi residing in this region. The three tribes have been chosen due to the following reasons:

- Korku, Gond and Nihal are numerically significant tribes of this area.
- They are primitive tribes (Protoaustraloid).
- Gondi has a script but Korku and Nihal lack a written form for documentation of the traditional knowledge.
- No study has been done in East Nimar.
- It may help the economic upliftment of the Korku, Gond and Nihal tribes which are backward tribal communities residing mostly in remote areas. It may partly fulfill World Health Organisation's (WHO) need for studying the traditional system.
- The Intellectual Property Right (IPR) of the tribes needs to be protected in some way or the other. This documentation may lead in doing so.

FIELD STUDIES:

It has been conducted through extensive field visits and observation among the tribal people. It is the outcome of careful and planned fieldwork with selected tribal: Korkus, Gonds and Nihals during the last 4-5 years. The areas selected for study were those where the concentration of these ethnic groups is believed to be intense. During investigation, frequent field trips were made to the remote villages. The field trips were so, planned as to cover maximum sites of the study area.

STUDY AREAS:

The present district of East Nimar includes only a small portion of the old Prant Nimar. Prior to the States Reorganization (1956) the district was officially known as Nimar district and formed a part of Mahakosal region of the erst-while Madhya Pradesh. The western part of the old Prant Nimar originally held by the Holkar, became a part of Madhya Bharat, when the State was formed in 1948.

As on the re-organization of states, Madhya Bharat region was merged in Madhya Pradesh. The western part of old Prant Nimar eventually became a part of Madhya Pradesh. In new Madhya Pradesh Nimar was divided into two independent districts i.e. East Nimar and West Nimar. In this division, Khandwa district situated in the East was named as East Nimar with Khandwa as the district headquarter, while the West Nimar is Khargone district, having Khargone as the district head quarter.

ORIGIN OF NAME-NIMAR:

The name Nimar happens to be spelt in certain books as Nimaur. In course of time and by stages Nimwar, Namavur or Nimaur may have assumed the simple form, Nimar. It is generally said that the name is derived from the '*neem*' tree (*Azadirachta indica)* which is very common in the district.

LOCATION AND BOUNDARY:

East Nimar is situated in the South West corner of Madhya Pradesh. It lies between 21^0 05` and $22^0$ 25` N Latitude and between 75^0 57` and $77^0$ 13` E Longitude and 304 M above sea level. It is bounded by Betul, Hoshangabad and Amravati districts of Maharastra on the East, Buldhana and Amravati district on the South West and Khargone and Dewas district on the West and North. The total geographical area is 10779 sq. Km. out of which forest occupies 3516 sq. Km.(32.63%). It lies between the valleys of Narmada and Tapti rivers and occupies a strip of mixed hill and plain country.

ADMINISTRATIVE SET UP:

East Nimar comprises of two districts viz. Khandwa and Burhanpur. The Khandwa district lies between $21^0$05' to 22^0 20' N and 76^0 01' to 76^0 40' E. The total geographical area of the district is 6206 sq. Km. Khandwa town is head quarter of the district. The district has 3 Tehsils viz Khandwa, Harsud, and Pandhana. There are 7 development blocks, 7 Janpad Panchayats and 332 Gram Panchayats. Each Panchayat consits of few villages most of the towns of the district are connected by motorable roads.

Burhanpur district lies between 21^0 05' to 22^0 37' N and 75^0 57' to 76^0 48' E. It has an area of 4573 sq.Km. Head quarter of this district is Burhanpur, which is the lone main town. It is situated at the bank of River Tapti. This district also has 3 Tehsils viz. Burhanpur, Nepanagar and Khaknar. It includes 2 development blocks, 3 Janpad Panchayats and 220 Gram Panchayats. Itarsi-Bhusawal line of Central Railway cuts across the central region of East Nimar and connects both Khandwa and Burhanpur.

POPULATION:

According to Census 2001 the total population of East Nimar is 17,13,134 out of which 5,08,532 is tribal forming 29.68% of the total. The population of Khandwa is 1078251 out of which the percentage of tribal is 340336 i.e. 31.56%. The same for Burhanpur is 6,34,883 and 1,68,196 i.e. 26.49% respectively. The major concentration of tribal is found in Harsud, Khaknar and Khandwa Tehsils.

THE TRIBES:

The aboriginal and hill tribes met within this region are the Korku, Gond, Nihal, Bhil, Pradhan, Pardhi, Bharia-Bhumia, Bhujiya, Oraon etc. The 1991 census records 2,95,842 tribal (Adiwasi) population. The scheduled tribe's population of East Nimar is as follows:

Table 1: The scheduled tribe's population of East Nimar:

Sr. No.	Name of Tribe	Population	Percentage
01	Korku	2,31,982	78.41
02	Gond	49,152	16.01
03	Nihal/Nahal	12,256	04.14
04	Bhil and Bhilala	1,965	00.67
05	Others (Pradhan, Pardi, Bhujiya, Oraon and Bayare etc.)	487	00.17

The number of Korkus is maximum (78.41%) in the district. The Gonds are second (16.01%) and Nihals are third in number (4.14%). The major tribes taken for study are Korkus, Gonds and Nihals. The description includes the aspects, which are of ethnobotanical importance.

ETHNIC HISTORY:

Korkus are akin to the 'Korwas' and are an offset of the Munda of Kolarian tribe. The original place of Korkus is Chhota Nagpur in Bihar from where they have migrated to Raipur, Bilaspur, Balaghat, Chhindwara, Betul, Hoshangabad and up to East Nimar. The tribe is believed to be descendents of the Mundas. According to Rajley Gonds, they have originated from the "Dravids" while Hutton opinions that they are Pre-Dravidians. Hutton and Guha state that they are Prota-australiods.

Russell and Hiralal consider that social complex of Gonds arose along the bank of river Gondawari. In course of time, they migrated to other parts of Maharashtra and settled in Central India. Another group of sociologists considers the origin of Gond from the historical "Gondwanaland", whose inhabitants later called themselves as 'Gonds'. This tribe enjoys an historical impotence in M.P. In fact in the 'Gondwanaland' area of M.P., Gonds were the rulers.

The Nihals, also called 'Nahals' are an ancient tribe of Dravidian origin and are the primitive inhabitants of this region. According to Kitts (1881) when Korkus reached Vidarbha (Berar), they found the Nihals in possession of Melghat hills with the passage of time over the years; Korkus dominated the Nihals in all respects and today, Nihal claim Korku language as their mother tongue. Gradually the latter tribe lost its power, become the village drudges and has almost ceased to exist as a separate tribe. The tribe as a whole for all practical purposes in merged with Korkus.

Korkus:

The word Korku is a combination of two words i.e. 'Koro' meaning 'forest dweller' and 'Ku' is the plural, or in short, forest dwelling group of people. These people have a dark complexion, flat nose with expanded nostrils, long whiskers, thick lips and black tangled hair. They are of medium height but strongly built. Normally they move about naked footed. The Korku tribe is divided into two groups: i.e., Raj or Thakur and Patadya. The Raj of Thakur Korku are land owing members from whom, the Brahmins accept water. The two divisions have been replaced by for sub casts with territorial names like Movasi, Bavaria, Rumas and Bondoyas.

Gonds:

The word 'Gond' is originated from 'Telugu' (Dravid) word 'Kond' which means a mountain. The inhabitants of Kond (hills) are called Gond. They do not introduce themselves as Gond but through their sub-tribal name 'Koitor'. The term 'Koitor', Koia or Kotor in the local dialect stand for man of hills or mountains.

Gonds are of medium height, built and have a dark complexion. The skin colour ranges between moderate black to dark tan. Head is long and narrow; face broad form the front tapering towards the chin; lips are broad and project out wards. The nose is a bit flat, not on the tapering side and eyes are bright black. They are tough and muscular and can walk for several kilometers. They have 3 sects in East Nimar:

Raj Gond: They were rulers and have a higher status due to inter caste marriage between Rajputs and Gonds.

Thatiya Gond: They are cattle grazing people.

Jadi Gond or Salam Mishri Gond: They sell herbal medicines and usually live out of village in tents called 'Tora' (Tent).

Nihals (Nahals): Nihals are a mixture of Korkus and Bhils. They are much mixed with Korkus and more or less similar in appearance. They are divided into 3 categories:

Korku Nihal - very much related with Korku.

Nihal Thakur - related with Rajputs.

Marathi Nihal - related with Marathi of Vidarbh.They can also be divided into hill Dwelling Nihals, Agricultural Nihals and daily wage earning Nihals.

DRESS:

Korku tie up a loin cloth around the waist and their head gear is a 1 to 1.5 meter long and narrow cloth wound tightly around the head. Some of them wear a jacket. The women folk prefer about 6-7 meter white/red leeja (lugda or saree) where one end is tied around the waist in a brief langot pattern and the other end covers their head. Their chest is covered by a polka (blouse). Children up to 8 to 9 years of age wear only briefs (langoti).

Gond wears a dhoti (loin cloth), kurta and piece of cloth as a head gear. Women's dress consists of 'lugda' and 'choli'. The lugda is 9 yards in length put on so as to form a sort of peticot with the free end covering the breast and head falling like veil over the right shoulder. The choli is a very small, short sleeved bodice covering breast. However, now a days people use variety of dresses.

The Nihal male folk wrap a long cloth (dhoti) around their waist followed by a vest and a long, narrow cloth tightly tied around the head as a head wear. The young generation is now a days refraining from using the head wear. The woman folk wear a sort of sari (6-9 yards long) but instead of wrapping it around the waist, they put one end of the cloth through both the legs and the other end covers their breast and head. They also wear a blouse.(Plate-1)

ORNAMENTATION:

Both the men and women prefer silver ornaments. However, financial stringency has compelled them to wear brass, bronze and ornaments made from melted coins. This is in

addition to glass or plastic or lac bangles. The lower part of ear lobe is compulsorily pierced to wear some sort of ornaments is both the sexes. This hole in the earlobe is meant to ward off evil spirits. Ornaments made from different type of raw materials consists of necklace, bracelets, rings in both fingers and toes, arm and waist bands, ear rings etc. (Plate-2)

TATTOOING:

Tattooing is desired among tribal women. It is supposed to protect or save from the anger and displeasure of God and Goddesses. However, the modern generation does not like this and tattooing is fast disappearing. The elders have tattoos on their face, arms and legs.

GOTRA (TOTEM):

Table 2: List of Some traditional Gotras of tribals related with plants

Sr. No.	KORKU		GOND		NIHAL	
	GOTRA	**PLANT**	**GOTRA**	**PLANT**	**GOTRA**	**PLANT**
1	Mavsi	Wora / *Ficus benghalensis*	Irpati	Iruk ta palla/Leaf of *Madhuca longifolia*	Bhilwa	Bhilawa/ *Semecarpus anacardium*
2	Bachhanya	Vachan/ *Cocculus hirsutus*	Usendi	Gudbel/ *Tinospora cordifolia*	Palwe	Leaf of *Ficus religiosa*
3	Kherya	Kher / *Acacia catechu*	Ureti	Amarbel/ *Cuscuta reflexa*	Barsuma	Salai/ *Boswellia serrata*
4	Kansal	Kans/ *Saccharum spontaneum*	Kunjam	Kunje ta Marra/ *Pongamia pinnata*	Takher	Kakadi/ *Cucumis callosus*
5	Jamunkar /Jamboo	Jamboo/ *Syzygium jambos* (L.) Alston	Adam	Bhabhuda ta Marra/*Acacia catechu* (L. f.) Wild.	Darshima	Bad/ *Ficus benghalensis* L.
6	Sawalkar	Sipna/ *Tectona grandis*	Golam	Gola ta Marra/ *Haldinia cordifolia*	Ghai	Bor/ *Ziziphus mauritiana*
7	Kolyari	Kalihari/ *Gloriosa superba*	Tekam	Teketa ta Marra/ *Tectona grandis*	Jambu	Jambu/ *Syzygium jambos*
8	Seelu	Gondi/ *Cordia gharaf*	AAtram	Anjan/ *Hardwickia binata*	Sakom	Sipna/ *Tectona grandis*
9	Usrawa	Thaudi / *Bombax ceiba*	Alam	Alla ta Marra/ *Zingiber officinale*	Dehi	Aonla/ *Phyllanthus emblica*
10	Sirali	Sirali/ *Nyctanthes arbor*- tristis	Keram	Karmada/ *Musa paradisiaca*	Sawle	Thaudi/ *Bombax ceiba*

Clans or Gotra is an important basis of tribal organization. The clans have derived their names from some plants, animals or physical matters. They are called their totems. Korku, Gond and Nihal have great respect for and worship them. They do not marry in the same Gotra. Korkus and Nihals have 42 Gotras of which 27 are traditional and 15 are less prevalent. Gonds have 108 Gotras of which 65 are traditional. The table shows the names of clans, which are related to plants in study area. Such plants are called "Totems".

SHELTER:

A Korku village is called 'Dhana' found in the interior of the forest. They live in huts arranged in two rows on the high hills. Huts are of folding pattern with two-sloped roof. The roof comes down on both sides about 1 to 1.5 m. from the ground. The walls of the hut are made from a network of Tuwar (*Cajanus cajan*) or Jowar (*Sorghum vulgare*); Sticks of Bans (*Dendrocalamus strictus*). The walls are constructed by plastering mud on bamboo mat. Finishing touch of the walls is given by a paste of cow or buffalo dung. The huts have two doors at opposite ends. The hut is divided into two parts; bigger portion for human beings and smaller for cattle.

The dwelling of Gonds is simple structure having mostly two rooms separated by a row of tall baskets in which they store their grains, adjoining the house is a cattle shed. Both the house and the cattle shed are enclosed with a bamboo fence for protection from wild animals. Besides the house, there are large fenced enclosures where they grow vegetables. The study area does not have a single village occupied totally by the Nihals. In fact Nihals inhabit those villages where Korku is a dominant community. However, these two tribes never live together. There is a separate Nihal basti called 'Nihal Dhana' or 'Nihal Aawar'.

Nihal hut is 3½ to 4 m high in the centre, tapering on both sides to a height of 3 m. The walls of the hut are made from a network of Tuwar (*Cajanus cajan*) or Jowar (*Sorghum vulgare*); Sticks of Bans (*Dendrocalamus strictus*) and plastered on both sides with mud which is impregnated by husk of wheat/rice or jute. There is only one entrance to the hut. The door is single made from the same material as used for the walls. Every Nihal house has a backyard where they grow vegetable and corn.

AGRICULTURE:

Main occupation of these tribes is agriculture. Poor cultivation practices and uncertainty of rains result in less than normal production. They practice primitive agriculture and grow millets like Kodo (*Pasplum scrobiculatum*), Kutki (*Panicum sumatrense*), Sanwa (*Echinochloa colonum*), Jowar (*Sorghum vulgare*) and Makka (*Zea mays*) etc. Both men and women work in agricultural operations while their children work as cattle keepers.

Income from agriculture is supplemented by collecting and selling minor forest produce like Acacia, Dhawda gum, Salai, Guggal, Chironji, Lasoda, Honey, Safed Moosli and Lac etc. Now a day these tribes have adopted the practice of raising fowl and also are regularly catching fish. During summer, most of the people migrate to urban areas and work on various projects as labourers.

FOOD:

The common staple food of Korku, Gond and Nihal is corn, Jowar and to a lesser extent rice. This is consumed with boiled green vegetables and whey (buttermilk). On many occasions flour of Kodo, Kutki, Bhadi, Sanwa is consumed with whey. In rainy season Puhadya/Puwada (*Cassia tora*) leaves are repeatedly boiled and taken with corn bread. They also consume many wild roots, flowers and fruits.

These tribals like non-vegetarian food such as meat of wild pigs, fowls and deer etc. They take self-prepared hard drink 'Sidu' from *Madhauca longifolia* and *Phoenix sylvestris* and smoke or chew tobacco. They take 3 meals a day. Breakfast consists of leftovers from previous night or else a salty porridge of some flour. Lunch consists of bread and cooked vegetables, supplemented by some tuberous roots or corm. At night rice or rice and pulse are cooked together and eaten.

HUNTING AND FISHING:

There is a ban on hunting wild animals. However, these people stealthily hunt quails, hares, wild pigs, deer and wild pigeons etc. After rains, one can see groups of men, women and children hunting fish in rivers and ponds. They prepare their own nets to catch fish or else hold their loin cloth against the flow of water to catch the fish; they also catch fish by applying vegetable poisons like *Annona reticulata, Careya arborea, Casearia elliptica, Euphorbia tirucall* and *Jatropha curcas* etc. Gonds consider field mice, rats and moles a great delicacy and take much trouble in finding and digging out their holes.

LANGUAGE:

Korku and Nihal tribes speak Korku (Koromandi) language, which belongs to Munda group. It is supposed to be the oldest language in India and is the last remnant of the Predravidian population. There is no written script of Korku. In Khandwa, Harsud and Burhanpur Tehsils Korku is the second most widely spoken dialect in the rural areas. Only 3 to 4% of them can claim to be literate and educated.

The Gonds speak Gondi, which belongs to Dravidian family of languages. They have their own script (Plate-3). Nearly 10-15% Gonds are educated. Both Korku and Gondi languages are supplemented by regional languages like Hindi, Nimadi and Marathi.

RELIGION:

Religion of Korku, Gond and Nihal is admixture of some beliefs and practices. The core of their religion is tribal in nature and corresponds to Hindu Pantheism. The worship of ancestors is also an integral part of their religion. They are quite ignorant of religious principles and customs of Hindus but there is definite mixture of Animism and Hinduism. Christianity does exist among the tribals in the district. Korku call a deity 'Gomej'. They worship 'Muthua Dev' (Village God); 'Kheda Dev' (God of Village boundary); 'Dongar Dev' (God of hills and forests); 'Dulha Dev' (Bridge Groom God); 'Mata Mai' (Goddess of Small pox); 'Narayan Dev' (Sun God) and the Hindu Gods: Mahadev, Hanuman, Ravan and Meghnath. Korkus also worship the rivers Narmada and Tapti as goddess.

The Gonds belong to three groups on the basis of worshiping seven, six or three gods. However most of them know little of these distinctions and continue the practice of the ceremonies handed down to them. The sevendevs are Bada Dev, Kunwar Dev, Pardhan Dev, Miri Dev, Kala Dev, Polo Dev and Budha Dev. The sixdevs are Aheodal, Maheodal, Upayodal, Tipaiodal, Bhandesurodal and Koyedalodal. The threedevs are Nurmal pen, Soma pen and Doma pen. However there is no agreement regarding these deities among various clans of the tribes.

The principle deity of Gonds is 'Bada Dev' who is supposed to reside in a Saj tree (*Terminalia crenulata*); 'Narayan Dev' is a household deity; Nag Dev is their serpent God and Hardul Dev is worshipped at weddings. Mata Mai is the Goddess of small pox. Dulha Dev is the most cherished deities of Gonds. In almost every house, there is also a set of Gods for daily worship. Sacrificing cock, goat and pig to please the gods, goddess and ancestors is a common practice.

RELIGIOUS BELIEFS:

Padihar and Bhumkas are the two most important religious and spiritual persons in the Korku, Gond and Nihal tribes. Padihar has the capacity to call divine souls in his body. He can awaken ghosts and vampires and tell the reasons of illness and their solutions. They also have a number of evil spirits commonly called Bhuts and Dains. They are very much afraid of them. Evil spirits(Bhuts and Dains) are considered responsible for troubles and diseases. They must be propitiated at certain muhurtas by means of sacrifices. The fear prompts them to worship these spirits. The best way to get over them is to have recourse to the medicine man (Bhumka) and witchfinder (Padihar).

At the new moon of Chait (March-April), the Korkus worship all spirits and offer them cakes of sugar and wheat crumbled into fragments so that there may be enough to go around for all the spirits and also goats, eggs and vermillion. Muthua Dev is the most important and the first God of Korkus since the tribe is supposed to be its descendent. No function, festival or ritual takes place without first worshiping it.

Village worship: The whole village worships on these occasions.

In Aashadh (July): The Padihar spiritually binds the whole village so that bad souls do not enter the Village. In this worship a red goat is sacrificed. Along with this a red cloth, dates, almonds, water, chestnut and roasted whole grain is also presented.

The second worship takes place on moonless day. One hen sacrificed along with the some dry fruits.

The third worship takes place on Dussera day. Here black goat sacrificed.

In an addition to the above there are some more occasions to perform worship.

They are:

Gerbo pooja:

It is performed when the foetus is 7-8 months old (in utero). Here 5 cocks are sacrificed. Korkus strongly believe that if during this period an egg laying hen and five cocks are not sacrificed the foetus would die in the uterus and also exposed to dangers when born.

The Mutandi pooja:

When the child is one year old this worship is performed in the belief that god is kind in letting the child to grow to this age. **This pooja** is performed when the family think that it is sufficiently large and no more children are now required. Korkus believe that having or not having a child depends upon God's will. **Bidari Pooja:** It is performed by Korkus and Gonds. It takes place on the full moon day of Jyestha (June-July). The whole village is informed of this worship. Bhumka performs this pooja. The tribals would not sow their fields unless this worship is performed. On this day white wash of huts, grinding of grains and cattle grazing are strictly forbidden.

On this day, the Bhumka, after announcing the pooja, puts some parts of plants after chanting the religious verses, on all outgoing roads. This is supposed to prevent 'bad souls' from entering the village. Then all worship the God Bhimsen, who is located on the East. The Bhumka digs some soil and puts some grains in it. Then he redistributes a few grains to each former. From now on, the land is suitable for sowing. The farmer mixes these few grains received from the Bhumka with his lot of grains to be sown.

Nawa Khana Pooja or Navann Pooja:

Gonds celebrate this in the month of Kuwar or Kartik. This festival is associated with the first consumption of the new crop and fruits. They clean and white wash their houses, bring the new crops of paddy, maize and Jowar and prepare food. This first food is offered first to house deities and then other village deities along with fruits and liquor. They keep the offering on the leaves of Saj tree, chant names of deities, and pray to accept the Bhog. The villagers participate in the songs and dances. Only after this pooja the tribals start eating the new crop and fruits.

Khero Mata pooja:

Khero Mata is the chief Goddess of the village. She is usually worshiped in the month of October on Dussera festival. The tribals collect money and purchase a goat, pig, coconut and other articles of pooja. There is a fixed pillar on a plat form at the place of rituals. The tribals go to the place of Khero Mata out of village singing in a group. There articles of pooja are kept in a large plate and offered to the sacrificial animal. When the animal consumes this, it is sacrificed. A part is offered to the Goddess and the people return to their village.

The tribes from birth to death:

The different stages of life i.e. birth, childhood, puberty, marriage, parenthood, death and cremation of the dead of the tribes have their own peculiarities. Their close association with various plants and related traditional knowledge can be, envisaged in their practices. When a child is born, a pit is dug and filled with fruit and twig of Bhilawa (*Semecarpus anacardium*); twig of Salai (*Boswellia serrata*); twig of Bija (*Pterocarpus marsupium*) and sticks and leaves of Temru (*Diospyros melanoxylon*). Country liquor and fish are added in the pit and 'pooja' is performed. This 'pooja' is called 'Khamcha'.

The ritual of fixing the date of wedding is done by keeping Kodo-Kutki or barley and rice or wheat in two plates. Then in the name of bride and groom, two grains are drop in a pot containing water. If both the grains cling together, then it is considered a very good omen and both will have long love relations. Marriage pandal is prepared from the wood of five types of plants like Lendiya (*Lagerstroemia parviflora*); Salai (*Boswellia serrata*); Bans (*Dendrocalamus strictus*) and Jamboo (*Syzygium jambos*). The central pole is made from the wood of Mahua (*Madhuca longifolia*). This pole is called 'Manda' or 'Magrohan'. In addition to this central pole, a smaller one, called 'Sala', it also planted. When the marriage procession of the bridegroom reaches the village of the bride a person called 'Sistya' thorns a green leafy branch of same tree on the pandal of the bride. This branch is brought from the pandal of the groom. After this ritual only, the precession reaches the pandal of the bride.

After the death of a person, the corpse is buried and on return from the cremation ground, bark of Palash (*Butea monosperma*) and Jamun (*Syzygium cumini and Syzygium jambos*) is removed and kept at the hut of the dead person. Then some women in the house put water in the dried, hollow fruit of Tumbi (*Lagenaria siceraria*). This water is then sprinkled over all the people who participated is the burial procession, to 'purify' them. In some cases the mourners chew the leaves of the Ber (*Ziziphus mauritiana*) in order to establish enmity (bair) between themselves and dead person, so that his spirit may not return and trouble them.

MUSIC, DANCE AND SONGS:

The tribes have an inherent taste of music, songs and dance. They assemble by night and dance and sing. Dance in Korku tribe is mainly based on their festivals and myths. They perform dance throughtout a year. Chachri and Gongalia (Chaitra), Thapti (Baishakh), Dhandhal (Jaishtha), Danda or Gedi (Sawan), Horrorua and Chilladi (Kuvanr), Dhatya (Kartik) and at the time of marriage Gadli dance of women is common. (Plate-7)

Bichchhu dance of Korku:

Men, women, boys and girls keep one hand on the shoulder of other and the other on their own waist. Each wears two or three brass anklets on their feet and start dancing to the clang of these they keep step. Songs are recited at dances over broad ranges of subjects involving names of certain plants. Such songs interpret the ethnic uses of plants. The dancing is accompanied by the music of big drum (Dhol) and two-sided drum (Dholki) with the music of nimble pipe (Pungi). The dholkibeater stands in the midst and others dance around.

Gedi dance of Korku:

Gedi is the main dance of Korku and is performed next day of Jiroti festival. Boys are use the stumps of bamboo on this day. They take decorated elephants, horses and bulls made up of clay or wood to the river. In some places all the boys go to the east of the village and hang the stumps on the trees and collect and bring certain herbs like wild cotton, shernukh, the leaves of bamboo and wild onion at home. They tie these herbs on the pillars of their home and animal sheds too, with this belief that it would prevent the family from diseases.

Karma dance of Gonds:

Karma is the main dance of Gonds and is performed during the rainy season. They take a branch of Haldu (*Haldinia cordifolia*) tree, wrap it up in a new cloth, and keep it in their house. Both men and women sing and dance around the branch. They are arranged in two rows apposite each other, while the musicians playing drum called 'Timki' sit in the middle. The

dances are graceful and regular with measured steps and are correctly performed. They continue dancing with intervals for drinking throughout the night.

Some of the musical instruments used by tribes accompanying songs in the praise of deities or festivals are Nagada, Bansuri, Chikada, Turbudi, Jhanj, Lohathali, Ghungroo, Kartal, Turra, Chimlo, Damroo, Ramtoola, Tarbudi, Timki, Algonja, Gudum and Dafla etc.

CULTURE AND CULTURAL CHARACTERISTIC:

The tribals celebrate all festivals with faith and tradition. The main festivals of Korku, Gond and Nihal are:

Dodbali:

This festival is celebrated at the beginning of rainy seasons to invite rains. All the boys and girls assembled and cover a boy with leaves of Jamun (*Syzygium cumini*) called 'Jamnya'. A girl also follows them keeping a basket with artificial frogs on her head. The boys and girls go round the village and chant : **'Dedar mata pani de, Dhan kodo pakne de'** means "Frog mother brings rain and let the rice and mallets (kodo) ripen." The householders pour some water over the ' Jamnya' boys collect grains, which is cooked next day.

Jiroti:

It is celebrated as moonless night (Amavashya) of shravan month. On this day, walls of huts are decorated with painting. The young women hang a swing and the young persons perform 'Phavda' dance and play with sticks. The padihar worship the Munda and after pink powder vermillion whole rice grains, turmeric powder, along with blood of cock or goat.

Sidoli:

Sidoli is most titillating ritual related with death in Korku. This ritual has a unique artistry beauty, sanctity and poetic expressions of intense deep excitement along with spiritual height. This is not necessary that Sidoli should be done just after the death. This can be done after a year or two or ten or more than that. They make the Munda Dev from teak wood (*Tectona grandis*). They keep Bamboo (*Bambusa orundinacea*) in the graveyard on this day. Then they make basket (Dhabli) with this bamboo and keep seven crabs and seven chickens in this basket along with the root of Dongli (*Cyperus rotundus*). The root Dongli is considered to be the bone of the dead person. They celebrate this singing and dancing whole night.

Pola:

Moonless night in the month of 'Bhado' (Bhadrapada-Amavashya) is the day of celebration. The horns and body of the bullocks are decorated with the fruits of *Abelmoschus*

esculeantus. They are worshiped red offered sweets. This festival is celebrated to show indebtedness of the people to them. *Asparagus racemosus* plant is used as broom to clean whole house.

Dussera:

Korkus celebrates three dussera in year-overall; first Dussera in month of Aswin (October), second comes in the month of Magh and third in Agahan month of Baishaka. In Quanr Dussera, Muthua Dev and Goddess Durga is worshiped and celebration accompanied by scarifying a cock or goat or Bhura Kaddu (*Benincasa hispida*). A stick of Temru (*Diospyros melanoxylon*) fixed in the ground near Muthua Dev and dance lasting for the whole night. In Magh Dussera, they all contribute money for the celebration, then they buy goat to sacrifice at the place of the Muthua Dev. They also offer Porridge (Kadhai). In Agahan month all the great and important gods are worshiped including the main god of their clan.

Deepavali (Divdi):

Thatyas decide the Deepavali date. They prepare a dish made from rice, black mung and fish to feed the bulls. It is believed that this would prevent them from the disease of hooves. They bathe the bulls; decorate them and the next day they are made to run. The thatiyas dance and get gifts from people. They make a large figure of cow-dung called 'Govardhan', ghee, milk and curd are offered to Govardhan and the thatiyas stent fighting each tying to throw another in to the heap of dung.

Holi (Phag, Phagna):

Full moon day in Phalgun (March) is destined for Holi celebrations. This corresponds to the harvesting season of Rabi Crop. Korkus burnt two Holi, major (Badi Holi) and minor (Chhoti Holi) They collect wood from every house and place them in each Holi. Both the Holi are decorated with Butea flowers and twigs of Bamboos. (Plate-4,5,6)

Minor Holi called Suiku Holi or dry Holi. Major burnt on next day there are again two. One is the mother and other is daughter. Padihar performs the pooja and he burnt the Holi. The sing and dance for 5 days.

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Plate 1: Couples from various tribes

Plate 2: Dress and Ornaments of Kokru

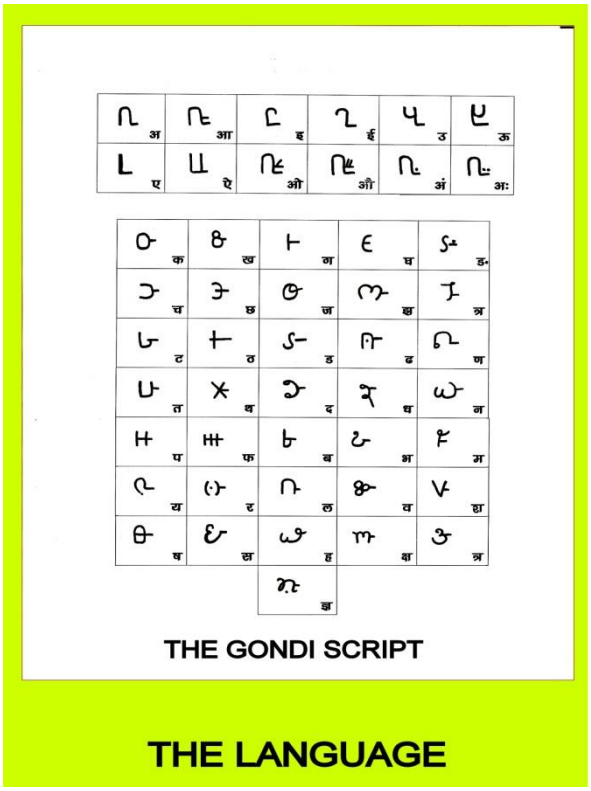

Plate 3: The Gondi Script

HOLIKO DANDO

GWALA DEV

A PADIHAR WORSHIPS MUTHUA DEV

A PROCESSION ON FIRST DAY OF DIVDI

THE CULTURAL PRACTICES

A KORKU WEDDING

AN OFFERING TO GOMEJ DURING A WEDDING

A GADLI DANCE BY KORKU WOMEN

THE CULTURAL PRACTICES

Plate 4 and 5: Cultural Practices

Plate 6: Cultural practices and traditions

Plate 7: Musical instruments of tribes

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GROWTH OF GLOBAL TOURISM

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ABSTRACT:

Tourism as we know is the fastest growing industry across the Globe in the modern times. It not only generates employment opportunities in a particular region or a country but also contributes spontaneously to generate foreign exchange earnings. This chapter noted the remarkable growth in International tourist arrivals and international tourism receipts. It is found that the tourism activities were still concentrated in the developed nations of Europe and Americas, and Asia and the Pacific regions. Maturity of the tourism sector in Europe and Americas was indicated by the high tourist arrivals and tourism receipts and the steady growth rates. The remarkable growth rate in tourist arrivals and tourism receipts are attributed to the technological, economic, social, cultural, ecological, institutional and political developments of the post-World War II era. The dominance of countries of Europe and Americas was noted in the case of outbound tourism also. The Tourism Vision of the WTO outlined in this chapter noted a bright future for international tourism in the coming years. This chapter also recognized the adverse consequences of globalization on tourism. It further pointed out that the inclusion of tourism as a part of IMF's Structural Adjustment Programmes and World Trade Organization's General Agreement on Trade in Services are likely to affect the sustainability of tourism, especially in developing countries.

INTRODUCTION:

The peace and prosperity witnessed by the post-World War ll population (independent nations) nourished an unhindered growth of tourism. Many countries stimulated tourism development to enhance their national economic growth. Uncontrolled growth of tourism however, leads to baneful economic and ecological consequences. It may be the economic leakages from the higher order consumer demands of the tourists or it can be the detrimental effect by the over use or abuse of the environment which leads to these consequences [1, 2]. This chapter examines the growth in global tourism in terms of tourist arrivals and tourism

receipts. The following section analyses international tourism data with special emphasis on spatial variation in growth. Region-wise, sub region-wise and country wise variations have been found out and the best performers in tourism business were identified. The social, cultural and economic factors that influenced the growth have been indicated, along with the role played by international organisations in promoting tourism.

Trends in Global Tourism:

The objective of this section is to describe the status of international tourism.

This will be done by presenting tourism developments over time using WTO's Tourism Statistics (UNWTO, 2008). The generating forces (macro level influences on tourism) will be examined to explain the striking changes in tourism industry.

International Tourist Arrivals:

WTO's tourism statistics are published in Tourism Highlights released annually on the occasion of World Tourism Day (September, 27). Tourism Highlights provide a consolidated set of data and trends for international tourism in the year prior to its date of publication. Instead of giving country wise data, WTO publishes consolidated data region-wise and sub-region-wise. Six regions are recognized; Europe, Asia and the Pacific, South Asia, Americas, Africa and Middle East. Data on international tourist arrivals, 'region-wise, for selected years between 1950- 2010 are given in table 1.

Table 1 shows that the international tourist arrivals growth from 25.3 million in 1950 to 903.0 million in 2007. The maximum arrivals were recorded for the European region, 16.8 million in 1950 and 484.4 million in 2007. This was followed by Americas which recorded 7.5 million in 1950 and 142.5 million in 2007. Asia and the Pacific region (which included arrivals for South Asia) started at a meager number of 0.2 million in 1950, but recorded 184.3 million in 2007. Other regions Middle East and Africa also recorded similar trend in international tourist arrivals. The data clearly show wide disparity in tourist arrivals among the tourism regions [4]. International tourist arrivals grew from 25.3 million in 1950 to 439.5 million in 1990 showing about 17 times enhancement over a span of 40 years. Between 1990 and 2007 it almost doubled to reach 903.0 million. Up to 1990 Asia and the Pacific, Africa and Middle East regions recorded comparatively lower number of tourist arrivals but the performance of these regions, thereafter, improved very much. Though the share is less in the global tourism market, the African region (15.2 million to 44.4 million) and the Asia and the Pacific region (56.2 million to 184.3 million) recorded about 3 times increase, whereas the Middle East region recorded about 5 times (9.6 million to 47.6 million) increase in international tourist arrivals between 1990 and 2007. At the same time, Americas and the Europe, the dominant regions in international tourist arrivals

marked only about 1.5 times (92.8 million to 142.5 million) and 2 times (265.6 million to 484.4 million) increase respectively.

Table 1: International tourist arrivals (region-wise) for selected years between 1950 - 2010:

Year	Africa	Americans	Asia and Pacific	Europe	Middle East	World
	Millions					
1950	0.5	7.5	0.2	16.8	0.2	25.3
1960	0.8	16.7	0.9	50.4	0.6	69.3
1970	2.4	42.3	6.2	113.0	1.9	165.8
1980	7.2	62.3	23.0	178.5	7.1	278.1
1990	15.2	92.8	56.2	265.6	9.6	439.5
2000	28.3	128.1	110.5	393.9	24.2	687.0
2001	29.1	122.1	115.7	395.2	24.5	686.7
2002	30.0	116.7	124.9	407.0	28.5	707.0
2003	31.6	113.1	113.3	407.1	29.5	694.6
2004	34.5	125.7	144.2	424.4	36.3	765.1
2005	37.3	133.5	155.4	441.5	39.0	806.8
2006	41.4	135.8	167.0	462.2	40.9	847.0
2007	44.4	142.5	184.3	484.4	47.6	903.0
2008	42.6	146.1	147.7	468.5	48.2	882.1
2009	45.9	141.7	182.7	463.5	52.4	885.0
2010	49.7	150.7	205.0	477.3	59.9	943.0

Source: UNWTO [5]

INTERNATIONAL TOURISM RECEIPTS:

As per UNWTO estimates, worldwide receipts from international tourism were US$ 1030 billion in 2011, up from US$ 927 billion in 2010. During 2011, all regions posted positive growth with the exception of Middle East (-11.2%). Asia and the Pacific (13.4%) and Europe (13.2%) showed the highest growth.

Table 2 gives the year-wise receipts from international tourism by regions during the years 2009-2011. During the year 2011, Europe accounted for about 45% of the world's total receipts from international tourism followed by Asia & the Pacific region (28.1%), Americas (19.3%), Middle East (4.5%) and Africa (3.2%).

Table 2: International tourism receipts worldwide and by regions, 2009- 2011:

Region	**2009**	**2010**	**2011***
World			
Receipts	853.0	927.0	1030.0
% Annual Change	-9.4	8.7	11.1
Africa			
Receipts	28.4	30.4	32.6
% Annual Change	-4.9	7.0	7.0
% Share in World	3.3	3.3	3.2
Americas			
Receipts	166.1	180.7	199.1
% Annual Change	-12.1	8.7	10.2
% Share in World	19.5	19.5	19.3
Asia & the Pacific			
Receipts	204.2	255.3	289.4
% Annual Change	-2.6	25.0	13.4
% Share in World	23.9	27.5	28.1
Europe			
Receipts	412.3	409.3	463.4
% Annual Change	-12.9	-0.7	13.2
% Share in World	48.3	44.2	45.0
Middle East			
Receipts	42.2	51.7	45.9
% Annual Change	5.3	22.5	-11.2
% Share in World	4.9	5.6	4.5
India			
Receipts	11.13	14.19	16.56
% Annual Change	-5.0	27.5	16.7
% Share in World	1.31	1.53	1.61

Source: UNWTO Tourism Highlights [6]

The international tourism receipts worldwide and India's share in them during the years 1997- 2011 are given in Table 3 The share of India in the world tourism receipts has remained between 0.64% and 0.72% during 1997-2002. However, it has been increasing steadily since 2002, and has reached 1.61% during 2011.It is clear from Table 2.3 that international tourism

receipts worldwide, which were hardly US$ 442.8 billion in 1997, have reached US$ 1030 billion in 2011, more than double in 14 years' time. Whereas, in terms of international tourist arrivals worldwide, the number has grown from 593 million in 1997 to 990 million tourist arrivals in 2011 only.

Table 3: International tourism receipts and india's share and rank, 2000-2011:

Year	World Tourism Receipts				% share of India in world	India,s rank in world
	Receipts (US$ billion)	Growth Rate	FEE in India (US$ billion)	Growth Rate		
2000	475.3	4.3	3.46	15.0	0.72	36th
2001	463.8	-2.4	3.20	-7.6	0.69	36th
2002	481.9	3.9	3.10	-3.0	0.64	37th
2003	529.3	9.8	4.46	43.8	0.84	37th
2004	633.2	19.6	6.17	38.2	0.97	26th
2005	679.6	7.3	7.49	21.4	1.10	22nd
2006	744.0	9.5	8.63	15.2	1.16	22nd
2007	857.0	15.2	10.73	24.3	1.25	22nd
2008	939.0	9.6	11.83	10.3	1.26	22nd
2009	853.0 -	-9.4	11.13	5.0	1.31	20th
2010	927.0	8.7	14.19	27.5	1.53	17th

Source: UNWTO Tourism Highlight, [6]

India's rank has also witnessed improvement from 34th in 1998 to 17th in 2010. In terms of International Tourism Receipts, top 4 positions were occupied by USA, Spain, France and China during the year 2010-11. During 2010 and 2011 the top 10 countries remained the same.

Top Ten Performers in Global Tourism

Table 4 presents the data on the performance of top ten countries in international tourist arrivals for 2009 and 2010.

Table 4: International tourist arrivals of top 10 performing countries of the world (2009 and 2010):

Rank in 2010	Country	2009	2010	Change (%) 2009/2010
		(millions)		
1	United States	94.2	103.5	9.9
2	Spain	53.2	52.5	-1.2
3	France	49.4	46.3	-6.2
4	China	39.7	45.8	15.5
5	Italy	40.2	38.8	-3.6
6	Germany	36.6	34.7	0.1
7	United Kingdom	30.1	30.4	0.8
8	Australia	25.4	30.1	18.6
9	Hong Kong	16.4	23	39.5
10	Turkey	21.3	20.8	-2.1

Source: World Tourism Organization UNWTO [5]

Major Tourist Destinations:

When ranked according to the two key tourism indicators – international tourist arrivals and international tourism receipts – it is interesting to note that eight of the top ten destinations appear in both lists, even though they show marked differences in terms of the characteristics of the tourists they attract, as well of their average length of stay and their spending per trip and per night. The most significant change among the top ten by international arrivals in 2010 was the rise of China to third position, ousting Spain, having overtaken both the United Kingdom and Italy during the past few years [4]. In terms of receipts, China (+15%) also moved up the ranking to fourth position, overtaking Italy (+1%). Furthermore, among the ranking by receipts, Hong Kong (China) entered the top ten at nine, moving up from the 12th position. Among the remaining top ten destinations, France (77 million tourists) continues to lead the ranking in terms of arrivals and ranks third in receipts. The USA ranks first in receipts with US$ 104 billion and second in arrivals. Spain maintains its position as the second biggest earner worldwide and the first in Europe, and ranks fourth in arrivals. Italy ranks fifth in both arrivals and receipts. The United Kingdom is sixth in terms of arrivals and seventh in receipts, while Germany is sixth in receipts and eighth in arrivals. Turkey occupies the seventh position in arrivals and the tenth in receipts. Completing the top ten ranking in arrivals are Malaysia (9th) and Mexico (10th) and in receipts, Australia (8th) (WTO, 2011).

Table 5: International tourist arrivals in millions:

RANK	COUNTRY	2009	2010	Change %
1	France	76.8	76.8	0.0
2	United States	55.0	59.7	8.7
3	China	50.9	55.7	9.4
4	Spain	52.2	52.7	1.0
5	Italy	43.2	43.6	0.9
6	United Kingdom	28.2	28.1	-0.2
7	Turkey	25.5	27.0	5.9
8	Germany	24.2	26.9	10.9
9	Malaysia	23.6	24.6	3.9
10	Mexico	21.5	22.4	4.4

Source: World Tourism Organization (UNWTO)[6]

In 2010, world tourism continued to rebound from the setbacks of 2008-2009, suffered due to the global financial crisis and economic recession. International tourist arrivals worldwide registered a growth of 5.0 % during the year 2011, as compared to a growth of 6.6% during 2010 over 2009. The international tourist arrivals during 2011, 2010 and 2009 were 990 million, 943 million and 885 million, respectively. France maintained the top position in terms of arrivals in 2011, followed by USA, China, Spain, Italy, Turkey, UK, Germany, Malaysia and Mexico. These top 10 countries accounted for 44.4 % share of international tourist arrivals in 2011. As regards the regions, the highest tourist arrivals were in Europe, which attracted 509.4 million tourists in 2011, with a positive growth of 6.7 % over 2010, followed by Asia & the Pacific with 218.1 million tourists with 6.4 % growth over 2010, Americas with 157.1 million tourists with growth of 4.2 % over 2010, Middle East with 55.7 million tourists with a decline of 7 % over 2010 and Africa with 49.9 million tourists with growth of 0.3 % over 2010.

Globalization and Tourism:

The impact of globalization on tourism has not been understood fully. The increase in flows of trade and investment with progressive liberalization and integration between countries has been fundamental factors in the growth of tourism [7]. These processes lead to the growth of business travel, which, in tum, entails the expansion of leisure and recreation tourism. According to the International Labour Organisation (ILO), globalization will give rise to increased migration pressures in the years ahead. International Monetary Fund (IMF) has included tourism as part of its Structural Adjustment Programmes (SAPs). The SAPs open up the local economy to foreign investments and multinational corporations, while eliminating

subsidies and protection to local industries. Under IMF-World Bank prescriptions, tourism is classified as an export product. With its capacity to earn billions of dollars, tourism is being promoted by IMF-WB as a means for Third World Countries to repay their debts to them. Third World Governments have, therefore, tried to fulfill their commitments to these SAPs by large-scale investments in tourism related ventures. The General Agreement on Trade in Services (GATS) became part of the "New World Trade Order" under the aegis of the World Trade Organisation as established by the Uruguay Round in 1994 [8]. The World Trade Organization's General Agreement on Trade in Services (GATS) sets a framework for future liberalization of service trade. It develops rules and disciplines that apply both to specific sectors (e.g. tourism, transport, energy) and the modes of supply of the services rendered (e.g. cross-border, commercial presence in another country). The objective is to open up service market and prevent World Trade Organisation member governments from changing their domestic regulations to introduce new barriers to entry into these specific sectors and modes.

In February 2000, World Trade Organisation members entered into a new round of multilateral negotiations on services, mandated by GATS. Tourism is one of the major areas of economic activity covered under the World Trade organization's General Agreement on Trade in Services (GATS). In order to generate much needed foreign exchange revenues, 120 member countries made commitments to facilitate market access and foreign direct investment in tourism.

To sum up, GATS claims that it makes easier for big travel and tourism transnational corporations to invest in the local, tourism business of third world countries and to transfer staff from one country to anywhere in the world. But the existence of GATS is feared to adversely affect the sustainability of tourism development. Williams summarized the negative impacts of the GATS as: The GATS would allow foreign companies to merge or take over local companies. This is a threat to indigenous-owned and operated sustainable tourism initiatives,

The GATS would allow upward pressure on the exchange rates with implications for real wages, the price of land and other resources as well as for traditional exports such as agriculture, mining and fishing. Domestic regulations/rules may impact governments' use of taxation policies to prevent de-industrialization and de-agriculturalization. With liberalization, governments may not be able to impose commodity taxes to increase the welfare effects of tourism [9]. Governments will not be able to mitigate or limit the impact of the outflow of repatriated earnings of Foreign Direct Investment, which will result in reduced welfare, and GATS may prove detrimental to eco and heritage tourism development.

Global Industry Organizations:

World Travel and Tourism Council (WTTC):

A trade association based in Brussels and London and made up of around 70 chief executives of major airlines, hotel chains, cruise lines and catering companies.

World Tourism Organisation (WTO):

This organization consists near about plus 130 governments and more than 350 private enterprises, it was created by the United Nations.

American Society of Travel Agents (ASTA):

The largest travel trade association in the world, representing 26,500 travel agents in 170 countries [10].

Association of British Travel Agents (ABTA):

The trade association of the major British tour operators.

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STRATEGY IMPLEMENTATION

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ABSTRACT:

Strategy is a blueprint indicating the course of action to achieve the desired objectives. The objectives are achieved by proper activation of the strategy. The activation or implementation step in the strategic management encompasses the operational details to translate the strategy into effective practice. A good strategy by itself does not ensure success. The success depends, to a very large extent, on how it is implemented. Many strategies fail to produce the expected results because of the failure in properly implementing the strategy.

KEYWORDS: Strategy implementation, management, programs, policies, budget.

INTRODUCTION:

System usage is the aggregate of the exercises and decisions required for the execution of a vital arrangement. It is the procedure by which methodologies and approaches are put without hesitation through the advancement of plans, projects, spending plans and systems. Despite the fact that usage is generally thought to be after technique has been planned, execution is a key piece of key administration. System plan and technique usage should therefore be considered as two sides of a similar coin. Methodology usage, regularly portrayed as the activity period of the vital administration process, covers procedure actuation and assessment and control. Any procedure prompts a progression of plans, projects and activities. The procedure of system usage begins with extend execution. Regardless of whether huge or little, ventures go through the periods of origination, arranging, sorting out, usage and tidy up.

Who Implements Strategy?

In most huge, multi-industry enterprises, the implementers will be everybody in the association. VPs of practical regions and chiefs of divisions or SBUs will work with their subordinates to assemble extensive scale execution designs. Each operational chief down to the

principal line administrator and each representative will be engaged with some route in the actualizing of corporate, business and utilitarian methodologies.

What Must be Done?

The administrators of division and practical zones work with their kindred chiefs to create plans, projects, spending plans and strategies for the usage of methodology. They likewise work to accomplish cooperative energy among the divisions and utilitarian ranges to stablish and keep up an organization's particular fitness.

How Develop Programs, Budgets, and Procedures?

What Programs must be developed?

Projects are the blend of objectives, approaches, techniques, rules, spending plans and so forth produced for the particular reason for doing a specific strategy. A program is an announcement of the exercises or steps expected to fulfill a solitary utilize design. The reason for a program is to make the procedure activity situated.

What Budgets must be developed?

A financial plan is an announcement of expected outcomes communicated in numerical terms for a positive timeframe later on. After projects are produced, the spending procedure starts. Arranging a financial plan is the last genuine check a company has on the possibility of its chose methodology.

What new Procedures must be developed?

Methods, now and again named standard working strategies (SOP), are an arrangement of successive strides or procedures that portray in detail how a specific undertaking or employment is to be finished. After program, divisional and corporate spending plans are endorsed, SOPsmust be created or updated. They regularly detail the different exercises that must be done to finish an organization's projects.

How does a Company Achieve Synergy?

One of the goals to be achieved in strategy implementation is synergy between and among functions and business units, which is why corporations commonly reorganize after an acquisition. The acquisition or development of additional product lines is often justified on the basis of achieving some advantages of scale in one or more of a company’s functional areas.

Strategy to be Implemented- Organizing for Action:

Before designs can prompt real execution, top administration must guarantee that the partnership is fittingly composed, programs are enough staffed, and exercises are being coordinated toward the accomplishment of sought targets. A change in corporate system will probably require some kind of progress in authoritative structure and in the aptitudes required specifically positons. Key directors should along these lines intently look at how their organization is organized to choose what, assuming any, progressions ought to be made in the way work is refined. Should exercises be gathered in an unexpected way? Should the expert to settle on key choices be incorporated at central command or decentralized to supervisors in removed areas? Should the organization be overseen firmly with many standards and controls or freely with few guidelines and controls? Should the enterprise be sorted out into a tall structure with many layers of chiefs, each having a limited traverse of control (that is, couple of representatives to administer) for better control of subordinates; or should it be composed into a level structure with less layers of directors, each having a wide traverse of control (that is, more workers to manage) to give more opportunity to subordinates.

Does Structure Follow Strategy:

It is a relevant to recall here the well-known conclusion of Alfred Chandler that structure follows strategy.

The role of structure in the effective implementation of the strategy is clear from the following observation. The experience of McKinsey supports the view that "neither strategy follows nor structure can be determined independently of the other. Strategy can rarely succeed without an appropriate structure. In almost every kind of large scale enterprise, examples can be found where well-conceived strategic plans were thwarted by an organization structure that delayed the execution of the plans or gave priority to the wrong set of considerations. Good structure is inseparably linked to strategy."

Many strategies call for changes in the organizational structure. Organizational restructuring is common throughout the world. It has become widespread in India since the liberalization.

In a classic study of large U.S. corporations such as DuPont, General Motors, Sear, and Standard Oil, Alfred Chandler concluded that structure follows strategy, that is, changes in corporate lead to the changes in organizational structure. He also concluded that organizations follow a pattern of development from one kind of structural arrangement to another as they expand. According to him, these structural changes occur because inefficiencies caused by the old structure have, by being pushed too far, become too obviously detrimental to live with. Chandler therefore proposed following sequence of what occurs:

i. New Strategy is created.
ii. New administrative problems emerge.
iii. Economic performance declines
iv. New appropriate structure is invented.
v. Profit returns to its previous level.

Research generally supports Chandler's proposition that structure follows strategy. As changes in the environment tend to be reflected in changes in a corporation's strategy, thus leading to changes in a corporation's structure. Strategy, structure, and the environment need to be closely aligned otherwise, organizational performance will likely suffer. For example, a business unit following a differentiation strategy needs more freedom from headquarters to be successful than does unit following a low-cost strategy.

Stages of Corporate Development:

Successful corporations tend to follow a pattern of structural development, called stages of development, as they grow and expand. Beginning with the simple structure of the entrepreneurial firm, they usually get larger and organize along functional lines with marketing, product lines in different industries and organizes itself into interconnected divisions.

Stage 1: Simple Structure:

Stage 1 is completely centralized in the entrepreneur, who founds the company to promote and idea (product or service). The entrepreneur tends to make all the important decisions personally and is involved in every detail and phase of the organization. The stage I company has little formal structure, which allows the entrepreneur to directly supervise the activities of every employee. Planning is usually short range or reactive. The typical managerial functions of planning, organizing, directing, staffing, and controlling are usually performed to a very limited degree, if at all. The greatest strengths of a Stage I corporation are its flexibility and dynamism.

Stage II: Functional Structure:

At stage II, a team of managers who have functional specializations replaces the entrepreneur. The transition to this stage requires a substantial managerial style change for the chief officer of the company, especially if he or she was the Stage I entrepreneur. Otherwise, having additional staff members yields no benefits to the organization. Lawrence Ellison's retreat from top management at Oracle Corporation to new product development manager is one way that technically brilliant founders are able to get out of the way of the newly empowered functional managers. Once into Stage II, the corporate strategy favors protectionism

through dominance of the industry, often through vertical or horizontal integration. The great strength of a Stage II corporation lies in its concentration and specialization in one industry. Its great weakness is that all of its eggs are in one basket.

Stage III: Divisional Structure:

The stage III, organization concentrates on overseeing differing product offerings in various enterprises; it decentralizes the basic leadership expert. These associations develop by broadening their product offerings and growing to cover more extensive geographic ranges. They move to a divisional structure with a focal central command and decentralized working divisions; every division or specialty unit is a practically sorted out Stage II organization. They may likewise utilize an aggregate structure if top administration keeps its accumulation of Stage II backups working self-sufficiently. Central station endeavors to arranged control and revealing frameworks, and by focusing corporate arranging methods. The divisions are not firmly controlled but rather are considered in charge of their own execution comes about. In this way, to be compelling, the organization needs to have a decentralized choice process. The best quality of a Stage III company is its practically boundless assets. Its most noteworthy shortcoming is that it is typically so extensive and complex that it has a tendency to end up plainly generally unbendable. General Electric and DuPont are Stage III enterprises.

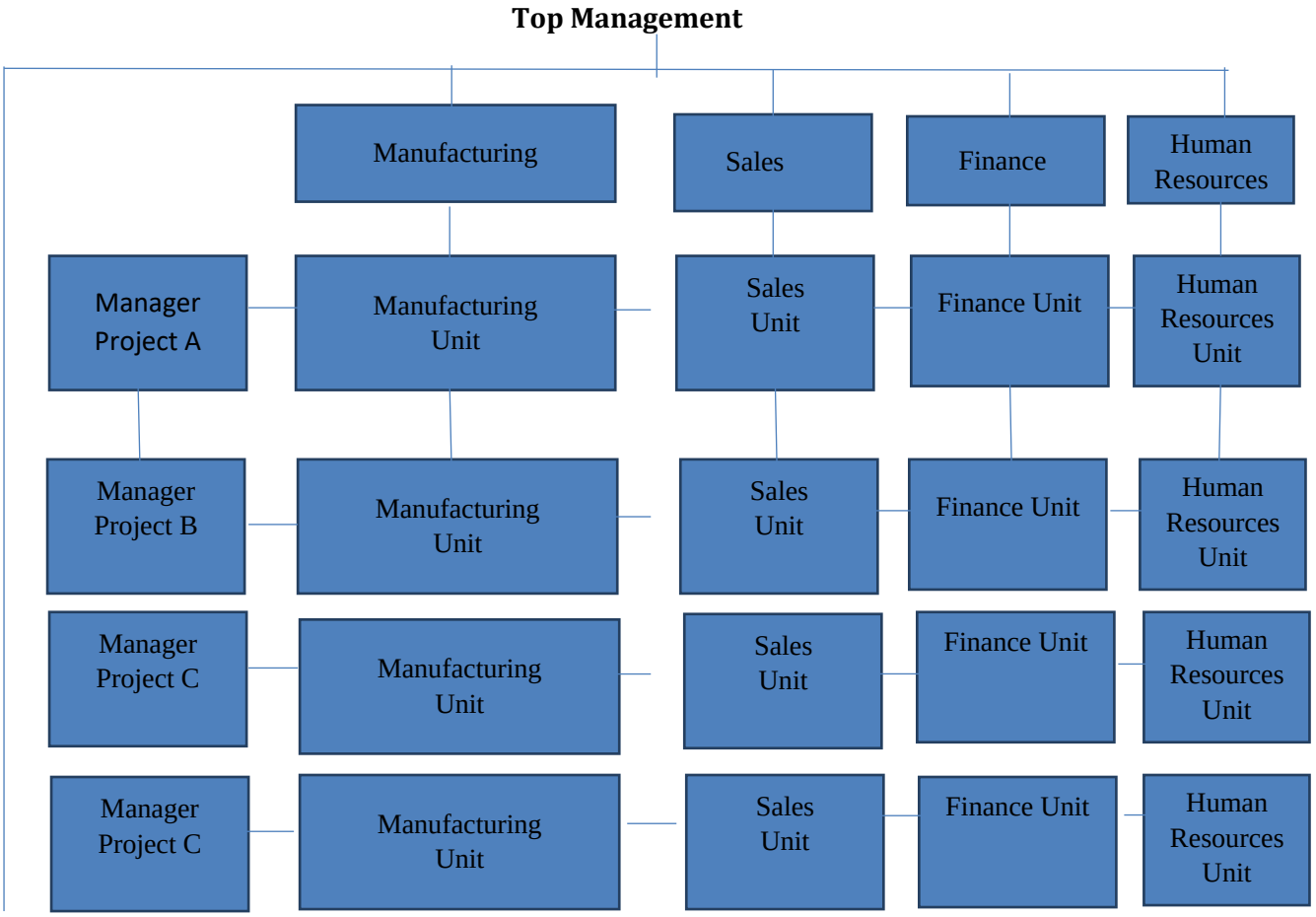
Matrix Structure:

Most organizations find that organizing around either functions (in the functional structure) or around products and geography (in the divisional structure) provides an appropriate organizational structure. The strategic business unit form in simply a more advanced version of the divisional structure. The strategic business unit form simply a more advanced version of the divisional structure pioneered by General Motors and DuPont. Under matrix structure direct contact replaces bureaucracy.

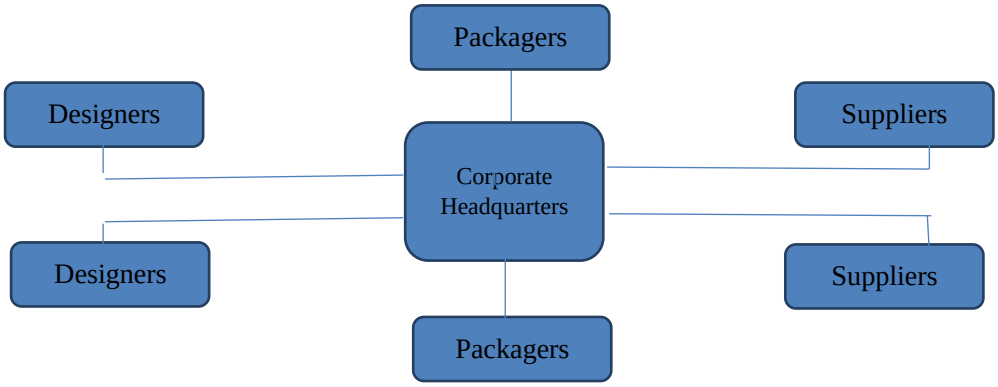
Network Structure:

Maybe the more up to date and most radical hierarchical plan, the system structure is a case of what could be named a non-structure since it for all intents and purposes wipes out in house business works and replaces them with long haul contracts with providers and merchants. Infrequently called a "virtual association," the system structure turns out to be most valuable when the film's condition is insecure and is relied upon to remain so. Under such conditions, the requirement for advancement and speedy reaction for the most part is solid. The organization draws up long haul contracts with providers and merchants to supplant administrations that it could accommodate itself through vertical incorporation.

Matrix Structure



Network Structure



Electronic markets and modern data frameworks decrease the exchanges expenses of the commercial center, hence supporting a purchase over a settle on choice. As opposed to being situated in a solitary building or zone, an association's business capacities are scattered around the world. The association is in actuality, just a shell, with a little central command going about as a "merchant," electronically associated with some totally possessed divisions, halfway

claimed auxiliaries, and other free organizations. In its definitive shape, the system association is a progression of free firms or specialty units connected by PCs in a data framework that plans, makers, and markets an item or administration.

CONCLUSION:

Technique is the fundamental heading of an association which is set at the best and has a noteworthy significance for the survival of an association. The above part presents some key factors, system and structure. Their interchange is responsible for the execution of a system. A higher execution runs with powerful and progressive usage. Directors should know the basic parts of compelling system execution and think of them as when they design and actualize methodology as needs be. Regularly supervisors put a considerable measure of time in arranging yet the truly essential part about methodology is the usage.

Structure and framework constitute the main issue that strategists need to experience in system usage. Structure is the setting of vital administration is the path in which the assignments and subtasks required to execute the technique are orchestrated. The working of the basic instrument should be possible through the case of new association that has chosen to actualize a procedure to accomplish its targets. The relationship of structure and methodology makes its own particular unique prerequisites that ought to be fulfilled by the structure.

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DEVELOPMENT OF TOURISM IN INDIA

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ABSTRACT:

As we all know that our country (INDIA) is known as the "Golden Sparrow" in world, the trend in the flow of international tourists to India and foreign exchange earnings. Though India's performance in terms of PTAS (present tourist arrivals) and FEEs (foreign exchange earnings) is improving, it is too little compared to the other tourism developed economies of the world. The growth rate of tourism in India was, however, more than that of the world as well as that of Asia and the Pacific region.in this chapter it will further discussed the major source countries of foreign tourist arrivals (FTAs) in India. Among them the developed nations like USA, UK, Canada and France and the neighboring countries like Sri Lanka and Bangladesh are found as the major contributors. A brief review of tourism performance of states in India made clear that Delhi, Maharashtra, Uttar Pradesh, Tamil Nadu, Rajasthan, West Bengal, Andhra Pradesh, Karnataka, Kerala and Goa are the major destinations of foreign tourists. Air traffic is the major mode of travel for the foreign tourists and cities like Delhi, Mumbai, Chennai and Kolkata act as the major port of entry for them. The analysis of domestic tourism showed that it is a strong pillar in the tourism structure of India. States like Andhra Pradesh, Uttar Pradesh, Tamil Nadu, Karnataka, Rajasthan and Maharashtra, were the major performers of domestic tourism in India. The ratio between foreign and domestic tourist visits in India is found to be increasing at a fast rate. The current ratio is very high when compared to the situation in developed economies of the world. It also appears from the discussion that although the infrastructure for tourism in India is increasing, it is not sufficient to meet the growing requirements of the sector.

INTRODUCTION:

Tourism is the most important industry in the service sector of the Indian economy. It is one of the world's fastest growing industry and it can play role in accelerating the economic development of the country is widely recognized. It has generated a number of social and

economic benefits, promotes national integration and international understanding, and creates employment opportunities to a large number of people and foreign exchange earnings. Tourism also supports local handicrafts and cultural activities. For many developing countries, particularly the small countries they are mainly dependent upon tourism; this tourism offers a more reliable source of income to them [1, 2].

The tourism of today is the outcome of the combined efforts of its various constituents. There are possibilities of more constituents being attached in the future. In fact what we may define as Tourism Industry is a mix of the output and services of different industries and services. On the one hand Tourism industry comes up as a huge industry where as on the other "it also leads to perceptions of a highly fragmented industry". It is based on the assumption that tourist's expenditures reflect the existence and scale of Tourism Industry, and does not take into account how certain businesses are managed in relation to tourists or to one another [3]. Number of factors, such as, population growth, shorter working days, larger paid holidays, increases in general awareness among people for traveling and the need for recuperation from tensions of modern life; have created favorable conditions for the growth of tourism. So this industry has registered a tremendous growth all over the world during the last few years.

Tourism policy of Government of India:

Tourism emerged as the largest global industry of the 20th century and is projected to grow even faster in the 21st century. India has immense possibilities of growth in the tourism sector with vast cultural and religious heritage, varied natural attractions, but comparatively small role in the world tourism scenario. The government of India announced the first tourism policy in November 1982, but new initiatives towards making tourism as the catalysts in employment generation, environmental re-generation. It would lead to larger foreign investment. After ten years government has feels the need to improve first policy, then newly introduced by the name the National Action Plan for Tourism in 1992. The report of the National Committee on Tourism was submitted in 1988, in this report two five-year plans provided basic perspective framework for operational initiatives.

The tourism policy, 1982 was more aggressive statement in marketing than a perspective plan for development. Following measures were suggested by the policy-

- To take full advantage of the national heritage for attracting tourists.
- To increase tourist resorts.
- The status of an export industry to tourism
- To adopt the approach to develop few tourist circuits.
- To invite private sector.

In the National Action Plan for Tourism, seven objectives are given they are as follows-

- Socio - economic development of region.
- Increasing employment opportunities.
- Development of domestic tourism.
- Preserving national heritage and environment.
- Development of international tourism.
- Diversification of the tourism products.
- Increase in India's share in world tourism.

Our mission is to promote sustainable tourism as a means of economic growth and social integration and to promote the image of India abroad as a country with glorious past, a vibrant present and a bright future. The new tourism policy is announced in 2002, which incorporates the 7-S mantra of *Swaagat* (welcome), *Soochanaa* (information), *Suvidhaa* (facilitation), *Surakshaa* (security), *Sahayog* (cooperation), *Saurachna* (infrastructure) and *Safaai* (cleanliness).

The key elements of the National Tourism Policy, 2002 are-

- To consider tourism as a major engine of economic growth.
- Multiplier effects of tourism for employment generation, economic development and rural tourism.
- Focus on international and domestic tourism.
- Critical role of the private sector.
- To create and develop integrated tourism circuits based on unique heritage.
- Tourist coming to India should get physically invigorated, mentally rejuvenated, culturally enriched and spiritually elevated.
- Advantage of the burgeoning global travel and trade and the vast untapped potential of India as a destination.

Organizations involved in Tourism:

There are various organizations involved in the development of tourism in India they are as under:-

Department of Tourism:

It is responsible for promotion of India as a tourist destination, development of tourism Infrastructure and facilities in the country, and performing regulatory functions in the field of tourism. It has four regional offices at Delhi, Mumbai, Kolkata, and Chennai and a sub-regional office at Guhawati. The regional offices supervise the working of other tourist offices situated at

different places throughout the country. Tourist offices are also located at various places abroad.

India tourism Development Corporation (ITDC):

It was established In October 1966. Its includes following activities;Construction, management and marketing of hotels, restaurants and travelers lodges at various places in the country;provision of tourist publicity materials;Provision of entertainment facilities in the shape of soundand light shows, music concerts, etc,Provision of shopping facilities in the shape of duty free shops; andProvision of consultancy-cum managerial service in India and abroad.

Indian institute of Tourism and Travel Management (ITTM):

It was set up in January 1983 with registered office at New Delhi. It offers different level academic courses in tourism and travel management and related areas. It has embarked upon a series of alternative educational courses for supervisory and grass root-level workers of the Industry. Universities in 20 developing countries are sending their faculty members for being trained in IITTM courses.

National Council for Hotel Management and Catering Technology:

It acts as an apex body to coordinate training and research in hotel and catering management. Its head office is In New Delhi. It is the main agency for planning and monitoring the activities of more than 700 Institutes of Hotel Management and 100 Food Craft Institutes end ensures uniformity in academic standards and procedure for selection and admission of candidates for various courses conducted by these institutes.

Tourism Finance Corporation of India Ltd. (TFCI):

This Corporation, sponsored by the Industrial Finance Corporation of India, was set up In April 1988 with Initial seed capital of Rs. 50 crores to provide institutional assistance to tourism projects other than those in the accommodation sector, as the Industrial Finance Corporation of India at concessional rate of Interest was financing these. It started its operations from l-2-1989. In addition to the above mentioned organisations at the Central level, the State governments and Union territories have their own Departments of Tourism, Tourism DevelopmentCorporations and other Institutions or organisations formed for the purpose of helping the development of tourism industry in their areas. Besides this institutional support, a large number of other agencies, such as the Department of Archaeology, International Airport Authority of India, Indian Airlines, Vayudoot, Indian Railways, Customs Department, Reserve Bank of India, Forest Departments, Handloom and Handicrafts Boards and Corporations and

Individual travel agents, hotels and tour operators are engaged in the promotion of tourism in India.

Growth of Tourism:

India's glorious traditions and rich cultural heritage are closely related with the development of tourism. Its magnificent monuments attract a large number of tourists from all over the world. The natural surroundings, the architectural masterpieces, the music, dance, paintings, customs and languages all these go to make India as tourist paradise. India is a land of great variety and contrast. Its unique cultural mystique, exotic heritage, aesthetic environment and outstanding natural resources have attracted international tourists. Tourism has emerged as one of India's important industry. Today tourism is a major source of foreign exchange earnings and employment. India is a huge market for tourism for outbound and inbound tourists.

Foreign Tourists Arrivals:

The number of Foreign Tourist Arrivals (FTAs) in India during 2010 increased to 5.78 million as compared to 5.17 million in 2009. The growth rate in FTAs during 2010 over 2009 was 11.8 per cent as compared to - 2.2 per cent during 2009 over 2008. The growth rate of 11.8 per cent in 2010 for India was better than UNWTO's projected growth rate of 5 per cent to 6 per cent for the world in 2010.

Table 1: Arrivals of Foreign Tourists in India, 2000-2010:

Foreign tourists arrivals (ftas) 2000-2011

Year	FTA,S in millions	Annual Growth %
2000	2.65	6.7
2001	2.54	-4.2
2002	3.38	-6.0
2003	2.73	14.3
2004	3.46	26.8
2005	3.92	13.3
2006	4.45	13.5
2007	5.08	14.3
2008	5.28	4.0
2009	5.17	-2.2
2010	5.58	8.1

Source: Annual Report of Tourism Dept.2010

The share of India in international tourist arrivals in 2010 was 0.61per cent, which is 0.02 per cent improvement over 2009. However, India's rank improved to 40th in 2010, from 41st in 2009. India accounted for 2.83 per cent of tourist arrivals in Asia Pacific Region in 2010, with the rank of 11. The following table shows the number of foreign tourists‟ arrivals in India during 2000 – 2010

It is understood from the Table 1that, the foreign tourists arrivals in India continued to grow from 2.65 million in 2000, 2.73 million in 2003, 4.45 million in 2006, 5.17 million in 2009 and reaching 5.58 million in 2010. The compound annual growth rate in FTAs in India during 2000 – 2010 was 13.5 per cent. During the year 2009, India witnessed a negative growth rate of 2.2 per cent over 2008. Because of global financial meltdown, terrorist activities, H1N1 influenza pandemic etc. However growth rate for India was better than that the negative growth of 4.2 per cent registered for the world during 2009. In the year 2010, the tourism sector witnessed substantial growth as compared to 2009. The Foreign Tourists Arrivals (FTAs) in India during 2010 of 5.58 million as compared to the FTAs of 5.17 million in 2009, showing a growth of 8.1 per cent.

Foreign Exchange Earnings:

The revenue through foreign exchange is analyzed in respect of growth of exchange earnings from tourism over a period of time and percentage of exchange earnings from tourism. Tourism is one of the important sectors in India for Foreign Exchange Earning. The following table depicts the Foreign Exchange Earning from tourism in India, from 2000 to 2010 are as follows.

Table 2: foreign exchange earning (fee), 2000 to 2010

Year	FEE (in crores)	Annual Growth %
2000	15626	20.5
2001	15083	-3.5
2002	15064	-0.1
2003	20729	37.6
2004	27944	34.8
2005	33123	18.5
2006	39025	17.8
2007	44360	13.7
2008	51294	15.6
2009	54960	8.3
2010	64889	18.1

Source: Annual Report of Ministry of Tourism, 2009

Table 2 Foreign Exchange Earnings from Tourism in India, 2000-2010. It reveals that, the foreign exchange earnings (FEE) from tourism in India continued from 15626 crore in 2000, 54960 in 2009 and reach up to 64889 in 2010.

The following Figure 1 shows clear picture of FEE from tourism in India during 2000- 2010.

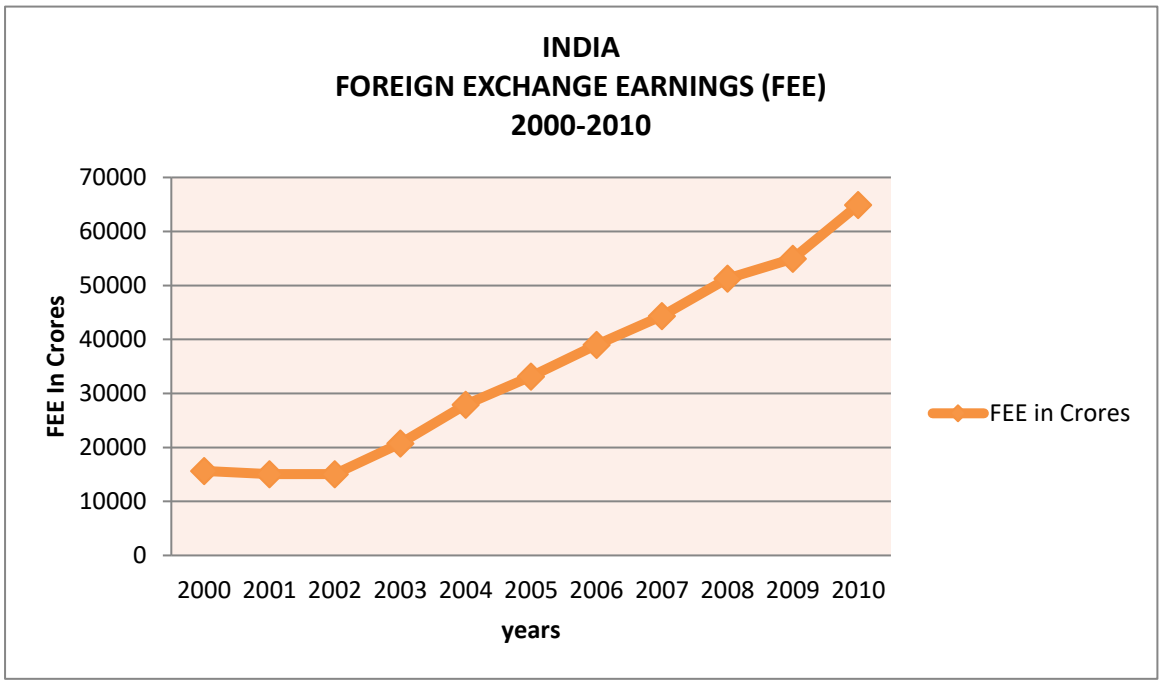

Figure 1 Foreign Exchange Earnings from Tourism in India, 2000-2010

As shown in Figure 1, FEE from tourism during 2010 were 64889 crore as compared to 54960 crore during 2009, registering a growth rate 18.1 per cent. The growth rate in FEE from tourism during 2009 over 2008 was 8.3 per cent. The decline in growth rate in FEE in 2009 over 2008, due to global financial crisis, terrorist activities H1N1 epidemic etc.

Employment Generation:

Being a labour intensive Industry, tourism has immensepotential for generating employment, particularly for the educated unemployed. By the rule of thumb, one additional tourist from an affluent country creates one more job in India, for a foreign tourist spends Rs.18, 000 during his stay in the country on an average. The expenditure by tourists has a multiplier effect on employment. According to the Tata Economic Consultancy Services Report of 1982, for every job created by tourism sector 2.57 jobs were created elsewhere. The multiplier effect of tourism in terms of employment generation is clearly indicated by the fact that out of 4.5 million persons engaged in this industry in India in 1988, 1.5 million persons were directly employed. In 1991, 5.3 million people were directly related to the tourism industry and another 13.8 million indirectly.

Tourism is a basic industry which provides employment. In India Jammu and Kashmir is completely depending on tourist arrival only. So the economy can developed, sub area of economic activities like, Hotels, Transports, Telephones, Caterings, Food processing, local handy Craft, so this sector can generate large number of opportunities and possibilities for growth of social sector. Good road-highway, hotels, telecommunication, Restaurant etc. tourism related sectors which can be growth according to the growth of this sector.

Table 3: Direct Employments by Indian Tourism Industry:

Year	Direct Employment
2000-01	12500000
2001-02	13500000
2002-03	14500000
2003-04	15700000
2004-05	17000000
2005-06	18300000
2006-07	19100000
2007-08	19900000
2008-09	20500000
2009-10	21200000
2010-11	22200000

Source *Facts for You February 2003. p.16*

Table 3 indicates the data above direct employment by Indian Tourism industry. It shows increasing trends every year. So this industry can play its important role in economic and social developments

Problems of Tourism Industry in India:

The tourism industry of India no doubt is getting high ranks over the last few years as we have seen there are continuously increasing the ratio of domestic as well as foreign tourists in the country. In order to get a place in the top ten tourist destinations in the world we have to build such an infrastructure within the country which will attract and satisfy the foreign and domestic tourist's aspirations and needs. Over the long period of time we are trying our best to eradicate the problems which becomes the hurdles in the growth of tourism industry in our country. The various problems faced by the tourism industry in India are as under:-

- Growing terrorist threats
- Inadequate transport facilities
- Inadequate air transport

- Lack Accommodation facilities at state as well as centre level
- Lack of up to date information regarding tourist destinations
- Lack of coordination between the centre and the state governments
- Less time given to tourism industry
- Less collaborations with different countries for tourism growth
- Lack of promotion programmes
- Lack of coordination between the centre and the states

Measures Taken For Promotion of Tourism:

The status of the Indian tourism is being increasing tremendously day after day on the Globe level. India has a diversified, multidimensional culture in the world that is why the flow of foreign tourists is on an increasing side. To become the world best and capture the eyes on the growth of our tourism industry following suitable measures need to take are as under:

- Better infrastructure facilities which suits international standards
- Sound coordination between the centre and the state governments
- Incentives should be given to those who are engaged for the promotion of tourism industry
- New circuits have been identified for development
- New pilgrimage centers have been selected for development which will enhance the growth of tourism in the country
- New collaborations with different countries for tourism growth
- Large amount of new hotels have been activated in the country
- Tourist packages have been stated by the Government of India

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A STUDY ON THE INFLUENCE OF ADVERTISEMENTS ON THE BUYING BEHAVIOUR OF COLLEGE STUDENTS

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ABSTRACT:

Advertising is the non-personal communication of information usually paid for and usually persuasive in nature about products, services or ideas by identified sponsors through the various media. This study is conducted to determine whether the college students shape their purchasing decisions through the media advertisement or not, and if they are, then which media specifically has the most influence on them more. The result indicates that majority of respondents are influenced by advertisement and Advertisements can be a powerful potent instrument in cosmetic marketing. It is observed that, television is the most influencing mode of advertisement followed by newspaper social media and radio Traders and manufacturers earn huge profit by creating brand loyalty among consumers by means of repetitive advertising and effective sales promotion. At the same time they should think about the consumers' welfare and produce quality goods at cheaper prices, because "consumer is the king" of the market.

KEYWORDS: Advertising, Buying behaviour

INTRODUCTION:

"Advertising is the non personal communication of information usually paid for and usually persuasive in nature about products, services or ideas by identified sponsors through the various media". The word advertising comes from the Latin word "advertere" meaning to turn the minds of towards. Advertising in said to be a form of business communication used to encourage, persuade, or manipulate an audience to take some action to buy the desired product in the market. It drives consumer behaviour with respect to a commercial offering. Advertisement is a non-personal presentation of an idea or a product acquired great importance in the modern India characterized by tough competition in the market and fast changes in technology, fashion and customers taste. It's a part of social, cultural and economic environment

and created in just a way that people will want to adjust themselves to and acts as a perfect window to reflect the different aspects of society and culture. Every advertisement tries to persuade the people, in the modern competitive market each advertiser wants to win over his rivals by effective advertising. In this process, there are chances of hiding truth and facts in order to succeed in increased sales and profit. But the advertiser has social and moral duty or obligation towards consumers.

STATEMENT OF PROBLEM:

The problem that will be highlighted in this study is to determine whether the college students shape their purchasing decisions through the media advertisement or not, and if they are, then which media specifically has the most influence on them more.

OBJECTIVES:

1. To evaluate the extend of influence of advertisement in purchasing decisions of college students.
2. To identify the factors influencing the purchase of cosmetic products by the college students.
3. To assess the level of satisfaction of college students with respect to cosmetic products purchased based on advertisement.

HYPOTHESES:

1. Ho: There is no significant difference between the mean ranks towards the reason for selecting advertising media.

H_1: There is significant difference between the mean ranks towards the reason for selecting advertising media.

2. Ho: There is no significant difference between the mean ranks towards the most preferred product.

H_1: There is significant difference between the mean ranks towards the most preferred product.

3. Ho: There is no significant difference between the mean ranks towards the motivating factors of purchase.

H_1: There is significant difference between the mean ranks towards the motivating factors of purchase.

4. Ho: There is no association between gender and number of purchases.

H_1: There is association between gender and number of purchases.

METHODOLOGY:

Sources of the data:

Both primary and secondary data has been used for this study.

A) Primary data:The data collected by the investigation through original study is called primary data has been collected with the help of questionnaire for this purpose questionnaire has been preparedand distributed among sample respondents.

B) Secondary data: The secondary data are those, which have already been collected by some other persons for their purpose, and published. It has been collected.

Research Approach:

In this particular research quantitative approach has been used and the data was the primary one gathered from the college students of cosmetic products.

Research Instrument:

A questionnaire was developed to gather the data from the respondents. Likert's scale was used in the questionnaire. A survey was conducted in various colleges to gather the primary data from the users of cosmetic industry. The data gathered from the authentic source and it was clearly defined to them that this response will only be using in research purpose.

Sample Size:

A size of 60 respondents was taken under consideration. Sample was taken from the premises of Ranni Taluk.

Statistical Tools and Analysis:

The data gathered from the respondents were put in the SPSS to analyze the various factors and dependability of the variables.

The world has become a global market. Modern market is more dynamic, competitive, and consumer-oriented. Entire marketing process is aimed at satisfying consumers more effectively than competitors. Consumer satisfaction can be achieved by receiving information from market and sending information to the market.

In order to inform, attract, and convince the valued customers, a marketer undertakes a number of promotional means. Advertising is one of the powerful means to inform about company's total offers. Advertising is a dominant element of market promotion. Many times, the entire promotional efforts are replaced by advertising alone.

Major portion of promotion budget is consumed by advertising alone. Advertising is so powerful and popular that it is taken as equal to marketing!! Mass media are used intensively to advertise various products. Marketing without advertising seems to be impossible. Advertising works like a magic stick to actualize marketing goals!

TESTING OF HYPOTHESIS:

- **Most influencing medium of advertisement**

An attempt has been made to find out the most influencing medium of advertisement among college students. 1) Newspaper 2) Radio 3) Television 4) Social media are identified and the respondents are asked to express their opinion about these factors on a three point scale. Thereafter Friedman's test has been applied to findout the most influencing mode of advertisement.

Ho: There is no significant difference between the mean rank towards medium of advertisement and buying decisions.

H_1: There is significant difference between the mean rank towards medium of advertisement and buying decisions.

Table 1: Most influencing medium of advertisement:

	Mean Rank	Chi-Square	P value
Newspaper	2.30	57.180	< .001
Radio	3.47		
Television	1.72		
Social media	2.52		

Interpretation:

Since p value is less than 0.05 the Ho is rejected at 5% level of significance. Hence we can conclude that there is significant difference between mean ranks towards reasons for selecting advertising media. Based on mean rank, television (1.72) is the most influencing mode of advertisement followed by newspaper(2.30), social media (2.52), radio(3.47).

- **Influence of advertisement on product–wise buying behaviour**

An attempt has been made to find out the most preferred product on the basis of advertisement among college students.1) Moisturising cream 2) shaving cream 3)lip balm 4)shampoo 5)body lotion 6)face wash 7)others are identified and the respondents are asked to express their opinion about these factors on a three point scale. Thereafter Friedman's test has been applied to find out theinfluence of advertisement on product–wise buying behaviour.

Ho: There is no significant difference between the mean ranks towards the most preferred product.

H_1: There is a significant difference between the mean ranks towards the most preferred product.

Table 2: The influence of advertisement on product-wise buying behavior:

	Mean Rank	Chi-Square	P value
Moisturising cream	3.38	116.157	<.001
Shaving cream	4.25		
Lip balm	4.45		
Shampoo	2.47		
Body lotion	3.45		
Face wash	3.63		
Others	6.37		

Interpretation:

Since p value is less than 0.05 the null hypothesis is rejected at 5 percent level of significance.Hence it is concluded that there is a significant difference between the mean ranks towards the most preferred product.From the mean rank,it is clear that most of the customers buy shampoo on the basis of advertisement.

- **Motivating factors of purchase**

Ho*:* There is no significant difference between the mean ranks towards the motivating factors of purchase

H_1: There is a significant difference between the mean ranks towards the motivating factors of purchase

Table 3: Motivating factors of purchase:

	Mean Rank	Chi-Square	P value
Price	2.02	17.700	<.001
Message delivered	2.37		
Celebrity	2.65		
Offers	2.97		

Since P value is less than .005 the Ho is reject at 5% level of significant. Hence conclude that there is significant difference between mean ranks towards the purchasing decisions based on mean rank price (2.02), most important reason for selecting purchasing decisions followed by message delivered (2.37), celebrity (2.65), offers (2.97).

ACCEPTED H1:

There is significant difference between the mean rank towards factors motivating purchase decisions of cosmetics among college students.

- **Gender-wise classification of number of purchases of cosmetics**

Ho: There is no association between gender and number of purchases.

H_1: There is association between gender and number of purchases.

Table 4: Gender-wise classification of number of purchases of cosmetics:

GENDER * NUMBER OF PURCHASE Cross tabulation									
			NUMBER OF PURCHASE				Total	Chi-Square	P Value
			1-2	3-4	5 or more	none			
Gender	Male	Count	4	9	7	2	22	.055[a]	.997
		% of Total	6.7%	15.0%	11.7%	3.3%	36.7%		
	Female	Count	7	15	13	3	38		
		% of Total	11.7%	25.0%	21.7%	5.0%	63.3%		
	Total	Count	11	24	20	5	60		
		% of Total	18.3%	40.0%	33.3%	8.3%	100.0%		

Interpretation:

As p value is greater than 0.05, accept the null hypothesis.So,there is no association between gender and number of purchase.

- **Gender-wise classification of purchasing behaviour of cosmetics**

H_0:The respondents does not differ significantly gender wise as regards their purchasing behaviour of cosmetics.

H_1: The respondents differ significantly gender wise as regards their purchasing behaviour of cosmetics.

Table5: Gender wise classification of purchasing behaviour of cosmetics:

	Gender	N	Mean	Std. Deviation	T Value	P Value
Moisturizing cream	Male	22	1.73	.703	-.776	.441
	Female	38	1.87	.665	-.765	.449
Shaving cream	Male	22	1.59	.666	-3.699	.343
	Female	38	2.26	.685	-3.728	.501
Lip balm	Male	22	2.23	.752	.997	.323
	Female	38	2.03	.753	.997	.324
Shampoo	Male	22	2.00	.690	.516	.608
	Female	38	1.89	.798	.537	.594
Face wash	Male	22	1.91	.811	1.425	.160
	Female	38	1.63	.675	1.356	.183
Body lotion	Male	22	2.18	.664	1.124	.266
	Female	38	1.95	.837	1.195	.237

Interpretation:

The above table exhibits that p value for all purchasing behaviour of cosmetics is more than.05 so the null hypothesises accepted. Hence the respondents do not differ significantly gender wise as regards their purchasing behaviour of cosmetics.

Findings

1. It is clear that majority of respondents are influenced by advertisement(88.3 percent) and only 11.7 percent are not influenced by advertisement for making their purchasing decisions.
2. Advertisements can be a powerful potent instrument in cosmetic marketing.
3. It is observed that,television (1.72) is the most influencing mode of advertisement followed by newspaper(2.30), social media (2.52), radio(3.47).
4. After a study on the influence of advertisement on product-wise buying behaviour of a college student, it is clear that most of the customers are buying shampoo on the basis of advertisement.
5. It is observed that price is the most important reason for making purchasing decisions.
6. It is found out that there is no association between gender and number of purchases.

SUGGESTIONS:

In order to expand the demand pattern of cosmetics, following suggestions are made:

1. Traders and manufacturers earn huge profit by creating brand loyalty among consumers by means of repetitive advertising and effective sales promotion. At the same time they

should think about the consumers' welfare and produce quality goods at cheaper prices, because "consumer is the king" of the market.

2. The cosmetic market becomes more complicated and competitive. So the display of cosmetic must be attractive. Then only the sale of cosmetics will be increasing.
3. It can be seen from the study that, on average, advertising does have influence on the purchase of cosmetic products and it is a must for cosmetic firms to continue advertising on their products if they require maximum sales. Also, we found out that, though advertising does influence the purchase of consumers, other factors like income and others' recommendation do play a role in one's purchase.
4. Businessmen should take steps to bring down the prices of cosmetics, as all the consumers are influenced by price. There is no doubt such reduction in price would be compensated by increase in the volume of sales.
5. Proper research should be carried out to produce quality cosmetics, to know consumer behaviour and to analyze the brand loyalty which will certainly enhance the demand pattern of cosmetics.

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IMPACT OF CO-OPERATIVE LEARNING ON B. Ed. STUDENT TEACHER

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ABSTRACT:

Co-operative learning is a successful teaching strategy in which small teams, each with students of different ability levels, use a variety of learning activities to improve their understanding of a subject & also enrich their own skills also. By using this method, each of our students will feel that he or she is an important member of the class, and this feeling will improve their achievement in any subject. Because of various classroom activities they have academic & social learning experiences. Usually in senior college we use lecture method. So Researcher decided to find out the impact of co-operative learning on B.Ed. student teacher. This research paper summarizes the concept of co-operative learning, Jigsaw & Think-pair-share co-operative learning strategies, What is the impact of these co-operative learning strategies on B.Ed. student teacher ? which skills are developed through this co-operative learning among student teacher ?

KEYWORDS: Impact, Co-operative learning

INTRODUCTION:

Co-operative learning is a teaching method where students of mixed levels of ability are arranged into groups and rewarded according to the group's success, rather than the success of an individual member.

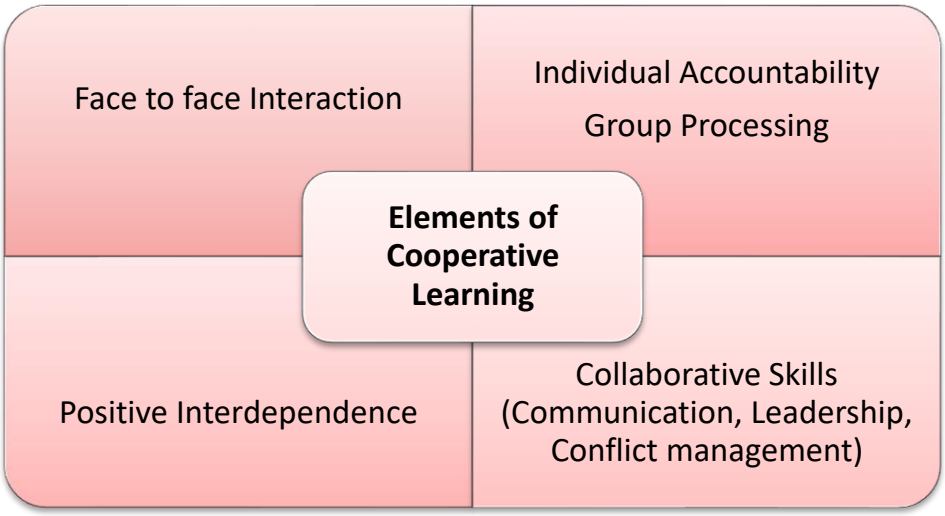
Definition of Co-operative learning:

Co-operative learning is a technique that allows students to learn from each other and gain important interpersonal skills. - Peggy Olsen.

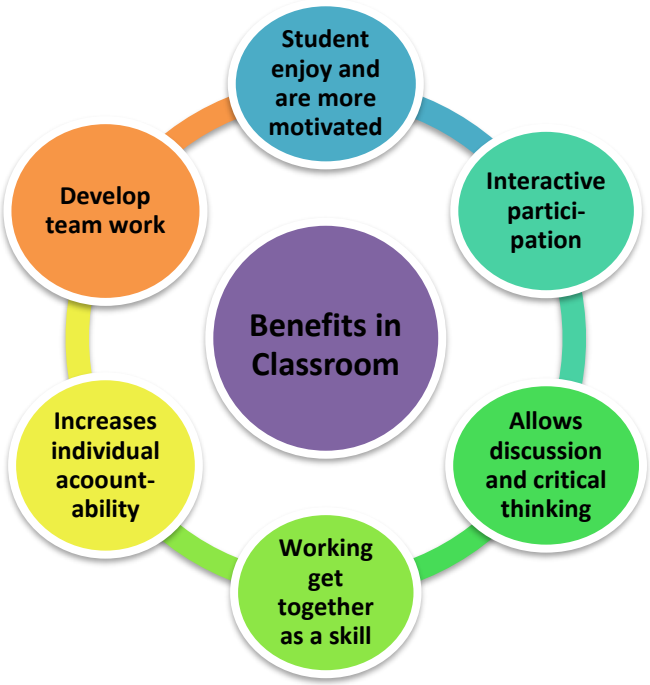
Students also learn how to work as a part of a team and have others depend on them.

Elements of co-operative learning:

Co-operative learning researchers David & Roger Johnson have identified five elements that define co-operative learning.



Benefits of co-operative learning in the Classroom:



OBJECTIVES OF RESEARCH:

1. To find out the co-operative learning strategies according to B.Ed. Course one - childhood and growing up.
2. To find out the impact of co-operative learning on B.Ed. student

3. Teacher

TOOLS OF RESEARCH:

1. Observation schedule: Researcher prepared
2. Achievement Test: Researcher prepared

   These two tools are used for this research.

RESEARCH METHODOLOGY:

The Researcher has used the experimental method for the present research.

RESEARCH DESIGN:

Researcher has used equal group design.

SELECTION OF SAMPLE:

Twenty five student Teachers are selected for experimental & control group. Researcher has used purposive sampling.

SCOPE OF RESEARCH:

1. All student teachers from DT Ed., B.Ed. and BA B.Ed. training
2. All students & teachers of primary and secondary stage

LIMITATIONS OF RESEARCH:

This research is limited to/for:

1. Acharya Jawadekar College of Education, Gargoti
2. Marathi medium student teachers
3. For academic year 2015-17
4. Course-one childhood & Growing up subject of B. Ed. syllabus, Shivaji University, Kolhapur

IMPORTANCE OF RESEARCH:

1. Impact of Co-operative learning on B. Ed. student teachers
2. Skills develop through this co-operative learning among student teachers
3. To motive the student teachers to acquire various skills such as co-operation, inter personal relation, critical thinking decision making, presentation skill, good listener, self esteem
4. Student teachers can use these skills for learning and teaching activity in the classroom

5. It is useful to the teachers of secondary & primary level & higher secondary school level also

CONCLUSION:

1. **Objective 1:**

   To find out the co-operative learning strategies according to B. Ed. Course one - childhood and growing up.

   B. Ed. Course 1 (Childhood and Growing up) content according to cooperative learning strategy

Sr. No.	Co-operative learning	Content
1	Concept of Growth & development	Think pair share strategy
2	Difference between growth and Development	Think pair share strategy
3	Stages of Growth & their importance	Group discussion
4	Concept formation concept, types, importance	Jigsaw strategy

2. **Objective 2:**

   To find out the impact of co-operative learning on B. Ed. Student Teacher

	Experimental Group	Control Group
Mean	21.32	19.24
S. D.	2.0341	3.5471

- Calculated ' t ' value : 2.5434
- Table 't' value : 2.06

Calculated 't' value (2.5434) > Table 't' value (2.06)

Calculated 't' is Significant

So, Null Hypothesis is rejected

CONCLUSION:

1. Use of Cooperative learning on B.Ed. Student teacher is impactful.
2. Qualitative analysis by observation shedule.
3. Increase in skill development among student teacher such as interpersonal relation, cooperative nature, critical thinking, decision making, individual responsibility, Group responsibility, self esteem.

RECOMMENDATIONS:

1. Every college teacher should have knowledge of co-operative learning and various teaching-learning strategies.
2. Every college teacher should use co-operative learning for impactful teaching learning process.

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PERFORMANCE OF PHOSPHOROUS FERTILIZER SUBSIDY IN VIDARBHA

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ABSTRACT:

Present study entitled performance of phosphorous fertilizer subsidy in Vidarbha was carried out in Vidarbha region of Maharashtra state with objective to know the growth rates and variability in phosphorous fertilizer subsidy. The data pertained to the period of 11 years i.e. from 2004-05 to 2014-15. From study it was observed that, in period-I (2004-05 to 2009-10) positive and significant growth was observed in all districts of Vidarbha region except Yavatmal district. The growth ranges from 2.13 percent in Chandrapur district to 20.03 percent in Amravati district while least variability 7.34 percent was observed in Chandrapur district and highest variability was observed in Amravati district. In period-II (2010-11 to 2014-15) the growth ranges from 2.60 percent in Wardha district to 10.01 percent in Yavatmal district. The least variability 7.05 percent was found in Wardha district while the highest variability was found in Akola district i.e. 27.27 per cent.

KEY WORDS: Subsidy, phosphorous fertilizer, growth rate, instability

INTRODUCTION:

The agricultural subsidy programme in India originated during the Green Revolution of the 1960s. It aimed to aid food self-sufficiency, lower food prices and benefit farmers. Electricity, water and fertiliser were subsidised, while high-yielding crop varieties were introduced. Agricultural input costs have risen in recent decades, yet the Indian Government continues to provide these inputs at little or no cost to farmers. Consequently, costs of agricultural subsidies now account for almost 25 percent of government spending. While

productivity has increased and food prices have fallen as a result of the scheme, it seems that the costs now outweigh the benefits.

Subsidies can be defined as financial aid or financial transfers from the exchequer to certain pre-determined sections of the population or sectors of the economy, with a view to improving the distribution of income or reducing the cost of production or price. They include the payments given for rebate on the sale of handloom fabrics or for loss on the sale of fertilizers, improved seeds, pesticides and agricultural implements, distribution of food grains and promoting exports.

OBJECTIVES:

1. To examine growth in phosphorous fertilizer subsidy
2. To examine the instability in phosphorous fertilizer subsidy

METHODOLOGY:

For present study, district wise secondary data on phosphorous fertilizer subsidy in Vidarbha region for the period 2004-05 to 2014-15 were collected from Mahadesh website, Agriculture Department of Maharashtra Government, District Statistical Office and other government publications.

ANALYTICAL TOOLS:

Growth and Instability of selected input subsidies

The compound growth rate in phosphorous fertilizer subsidy was worked out by using secondary data on phosphorous fertilizer subsidy for the period 2004-05 to 2014-15 by fitting an exponential function as given below.

$$Y = ab^t$$

$$CGR(r) = [\text{Antilog } (\log b)-1] \times 100$$

where,

r = compound growth rate in per cent.

In fertilizer subsidy, subsidy rates for phosphorous was different for two periods i.e. period-I (2004-05 to 2009-10) and Period-II (2010-11 to 2014-15). Therefore for estimation of growth rates for two different period's compound growth rate between two points of time were estimated

$$A_n = A_0 \left(1 + \frac{r}{100}\right)^t$$

Coefficient of variation:

$$\text{Coefficient of variation (C.V.)} = \frac{\sigma}{\bar{X}} \times 100$$

Coppocks Instability Index:

$$\text{m} = \frac{\sum[\log(X_{i+1}) - \log(X_i)]}{(N-1)}$$

$$\text{V Log} = \frac{\sum\{[\log(X_{i+1}) - \log(X_i)] - m\}}{(N-1)}$$

$$\text{Coppocks Index} = [\text{Anti log}(\sqrt{\text{V Log}}) - 1] * 100$$

RESULTS AND DISCUSSION:

Growth and Instability of Phosphorous Fertilizer Subsidy (Period-I) at Current Price

Table 1: Growth and instability of phosphorous subsidy in Vidarbha at current price:

Sr. No.	District	Period-I (2004-05 to 2009-10)		
		CGR	CV	CII
1.	Akola	16.64**	39.48	26.20
2.	Amravati	20.03**	54.58	30.08
3.	Buldhana	7.84*	26.43	22.55
4.	Washim	13.21**	34.29	19.88
5.	Yavatmal	8.21	19.22	9.71
Amravati Division		11.71**	30.19	18.93
6.	Nagpur	9.19**	21.57	18.57
7.	Wardha	13.00**	32.28	15.71
8.	Bhandara	12.59***	30.00	13.88
9.	Gondia	10.07***	20.78	11.16
10.	Chandrapur	2.13**	7.34	5.76
11.	Gadchiroli	7.99**	16.15	13.38
Nagpur Division		8.90***	20.30	8.13
Vidarbha		10.50**	25.74	19.39

Note- ***, ** & * Significant at 1 %, 5 % & 10 % level of significance

From table 1 it was observed that, in period-I (2004-05 to 2009-10) positive and significant growth was observed in all districts of Vidarbha region except Yavatmal district. The growth ranges from 2.13 percent in Chandrapur district to 20.03 percent in Amravati district. Similar results were found by Gulati [1], [2]. In Amravati and Nagpur division the growth was 11.71 percent and 8.90 percent respectively. In Vidarbha as a whole, the growth was observed positive and significant i.e. 10.50 per cent. In Amravati district, major crops are soybean and cotton. Farmers of Amravati district utilized more phosphorous for increasing the yield of crops. The least variability 7.34 percent was observed in Chandrapur district while highest variability was observed in Amravati district. In Nagpur division lowest variability 20.30 percent was found than Amravati division 30.19 per cent. Chandrapur district stood first in least Coppock's instability index i.e. 5.76 percent while the highest index 30.08 percent was found in Amravati district.

From this table it was concluded that more consistent growth was observed in Amravati division than Nagpur division over a period of time. The least variation was observed in Nagpur division than Amravati division.

Growth and Instability of Phosphorous Fertilizer Subsidy (Period-II) at Current Price

Table 2: Growth and instability of phosphorous subsidy in Vidarbha current price:

Sr. No.	District	Period-II (2010-11 to 2014-15)		
		CGR	CV	CII
1.	Akola	-11.97*	27.27	24.76
2.	Amravati	3.94	12.40	10.91
3.	Buldhana	-7.49*	19.59	12.05
4.	Washim	7.81	21.84	18.49
5.	Yavatmal	10.01**	19.29	13.09
Amravati Division		0.08	8.68	11.10
6.	Nagpur	-5.14	17.64	15.68
7.	Wardha	2.60*	7.05	5.99
8.	Bhandara	8.39**	20.83	14.64
9.	Gondia	6.56**	14.14	11.32
10.	Chandrapur	9.42*	18.72	12.78
11.	Gadchiroli	8.56**	14.50	8.42
Nagpur Division		3.04	6.89	7.01
Vidarbha		1.28	6.79	7.86

Note- ** & * Significant at 5 % & 10 % level of significance

From table 2 it was revealed that, in period-II (2010-11 to 2014-15) the growth ranges from 2.60 percent in Wardha district to 10.01 percent in Yavatmal district. The major crop of Yavatmal district was cotton for raising the yield of cotton crop, farmer s utilized more phosphorus as subsidy rates increases large amount in period - II as compare to period-I. The negative and significant growth i.e. -11.97 percent and -7.49 percent were found in Akola and Buldhana district respectively. Positive and significant growth was found in all districts of Nagpur district except Nagpur district. The least variability 7.05 percent was found in Wardha district while the highest variability was found in Akola district i.e. 27.27 per cent. In Nagpur division, the least variability 6.89 percent which was less than Amravati division i.e. 8.68 per cent. More consistency was found in case of variability in Nagpur division than Amravati division. In Vidarbha region 6.79 percent variability over a period of time. On going through the table it was observed that Wardha district stood first in least instability index i.e. 5. 99 percent while the highest index i.e. 24.7 percent was found in Akola district.

From this table it was concluded that consistent growth was observed in Nagpur division. Nagpur division was lowest variability than Amravati division.

Table 3: Growth and instability of phosphorous fertilizer subsidy in Vidarbha at constant price:

Sr. No.	District	CGR	CV	CII
1.	Akola	9.76***	38.12	30.81
2.	Amravati	19.79***	52.64	26.69
3.	Buldhana	10.50***	34.87	20.25
4.	Washim	13.74***	45.32	23.19
5.	Yavatmal	8.19***	31.99	31.12
Amravati Division		11.72***	35.84	17.77
6.	Nagpur	7.56***	27.29	18.19
7.	Wardha	13.05***	39.01	19.32
8.	Bhandara	11.66***	39.10	26.70
9.	Gondia	12.39***	37.89	13.67
10.	Chandrapur	7.98***	29.94	13.50
11.	Gadchiroli	12.05***	38.10	14.16
Nagpur Division		10.15***	31.23	12.38
Vidarbha		11.02***	33.65	14.43

Note- *** Significant at 1 % level of significance

From table 5.3.3 it was revealed that, positive and significant growth was observed in all districts of Vidarbha region in case of distribution of phosphorous subsidy amongst farmers at constant price. The growth ranges from 7.56 percent in Nagpur district to 19.79 percent in Amravati district. Similar results were found by Garg *et al.* [3]. The farmers of Nagpur district utilized high phosphorus for crop production where as farmers of Nagpur district utilized low phosphorus for crop production. In Amravati and Nagpur division the growth were11.72 and 10.15 respectively this was positive and significant. In case of variability, the highest variability was found in Amravati district where as lowest variability was found in Nagpur district. In Amravati and Nagpur division the variability were 35.84 percent and 31.23 percent respectively. In Vidarbha region as a whole, the variability was found 33.65 per cent. On going through table, it was observed that the Chandrapur district stood first in least Coppock's instability index i.e. 13.50 percent while the highest index was found in Yavatmal district i.e. 31.12 per cent.

From table it was concluded that, consistent growth was found in distribution of phosphorus subsidy among farmers in all districts of Vidarbha region. The least variability was found in Nagpur division than Amravati division.

CONCLUSIONS:

From study it was concluded that, in phosphorous subsidy for period-I (2004-05 to 2009-10) positive and significant growth was observed in all districts of Vidarbha region except Yavatmal district. For period-II (2009-10 to 2014-15) the growth ranges from 2.60 percent in Wardha district to 10.01 percent in Yavatmal district. The least variability 7.05 percent was found in Wardha district while the highest variability was found in Akola district i.e. 27.27 per cent. Consistent growth was found in distribution of phosphorus subsidy at constant price among farmers in all districts of Vidarbha region. The least variability was found in Nagpur division than Amravati division.

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MUSLIM POLITICAL THOUGHT IN THE TWENTIETH CENTURY INDIAN SUBCONTINENT: A STUDY

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EARLY MUSLIM RULE IN INDIA:

The contact between Islam and Indian subcontinent is reported to have taken place during the prophetic era and *Khulafā-i-Rāshidūn* (rightly guided caliphs). It was in the South of India (Deccan) that Arab traders spread the message of Islam while the North of India was still unaware of changes taken place in the Arabia. People and the Rajas of Deccan were very open to accept the Muslims from Arabia, provided them the facilities to spread the message of Islam and cooperated with them in several aspects. There was the cordial relationship between local Hindu population and settled Arab Muslims. The peaceful penetration of Muslims took place during the Ummayad rule, when Muslims conquered the Sind under the leadership of Muhammad bin Qasim in 711 C.E. He ruled according to the Islamic guidelines and followed the dictates of *Khalīfah* (caliph) and treated local non-Muslims as *Mushabeh Ahl al Kitāb* (similar to people of the Book). He did not attempt any forceful conversion; he left the people to their ancient faith, except in the case of those who wanted to become Muslims [1]. He did not discriminate against local population, the fact is that, when Muhammad bin Qasim was removed from the office, the local people of Brahmanabad showed solidarity with him and built his statue at Brahmanabad. This showed respect and love of local people towards him. Moreover, he did not demolish the temples of Hindus rather he adopted the tolerant policy towards them. Baladhurī quotes the statement which he made at Alor, close to the strategically important straits of the Indus (near present day Rohiri): "The temples shall be unto us like the churches of the Christians, the synagogues of the Jews, and the fire temples of the Magians" [2]. Later, the Ghaznavids and Ghorids initiated a new wave of conquests towards Indian subcontinent. The policy of Mahmud Ghaznavi became the load star for the future rulers of India. Finally in 1206 C.E, Qutubudin Aibak (a Military commander of Mahmud Ghori) founded his independent kingdom (Delhi Sultanate) in India. The Sultanate of Delhi consisted of Mumluk Dynasty (1206-1290), Khalji Dynasty (1290-1320), Tughluq Dynasty (1320-1414), Sayyid Dynasty (1414-1451) and Lodhi Dynasty (1451-1526 C.E) [3].

MUGHAL EMPIRE:

The collapse of Delhi sultanate took place in 1526, when Ibrahim Lodhi of Lodhi Dynasty was defeated in the battle of Panipat by the founder of Mughal Dynasty, Zahir ud Din Mohammad Babar. The Mughals of India were of Turkish origin [4], who had devised their own system of rule in India. Their ideas became inter fused with the customs and usages of the country. The Mughal administration was therefore a mixture of Indian and foreign elements, and, to use Professor Sarkar's expressive phrase, it was 'Perso-Arabic system in Indian setting' [5].

After the death of Babar, he was succeeded by his son. Babar counselled his son, Humayun, 'to ignore the disputations of the *Shīa* and *Sunnis*; for therein is the weakness of Islam'. He pointed out that, 'The realm of Hindustan is full of diverse creeds. It is but proper that thou, with heart cleansed of all religious bigotry, should dispense justice according to the tenets of each Community and the temples and abodes of worship of every Community under the imperial sway, you should not damage. The progress of Islam is better with the sword of kindness, not with the sword of oppression. And bring together subjects with different beliefs by advocating the policy of toleration, so that the body politic may be immune from the various ailments [6].

Alamgir's death on 1707 marks the beginning of the downfall and disintegration of Muslim power in the subcontinent. Pernicious forces so far contained by the audacious endeavours of *'Ālamgīr*, thrived after his death. None of his successors was able to retain previous glory and control vicious forces. The lack of proper leadership left the Muslims confused and ineffective. They had no sense of purpose or direction left. Now for the first time since the establishment of Muslim rule in the subcontinent, the Muslim community was facing threats on the external as well as internal front. Not only the disintegration of its political rule, challenged by external forces such as Marathas, Jats, and Sikh uprising, but also internal decay (spiritual and moral) and disunity of conflicting factions: *Sunni* and *Shīah*, *Hadīth* and legal scholars, '*Ulamā'* and *Sufis*, precipitated crises. Amid this confusing and pathetic situation of Muslims in the subcontinent Shah Walli Allah of Delhi started his endeavour and provided the foundation for revivalism in the subcontinent [7].

The British government which was the most powerful representative and advocate of western civilization in the east was rooted firmly in India. It had brought with it a whole army of ideas, institutions and techniques. The Indian Muslims, on the other hand, while at that time a beaten lot, dejected, baffled and humiliated. The failure of the uprising of 1857 had dealt a cruel blow to their morale and prestige, as a result of which a host of new and terrifying problems had cropped up. There was the ignominy of defeat, a complete turning of the tide and the dread of the new masters. Multitudinous charges were being levelled against them; they were being treated with suspicion and mistrust on all sides [8].

CHALLENGES FOR MUSLIMS IN THE 20TH CENTURY:

The challenges faced by the Muslim *Ummah* in the course of the 20th century may be classified into external challenges and internal challenges. The major external challenges include the colonisation of Muslim lands and its disastrous consequences, the dismemberment of the Ottoman Empire in which the machinations of European powers played a major role, the creation of the state of Israel in the heartland of the Arab world, which continues to be a permanent source of tension in the Middle East in particular and in the Islamic world in general, the continuing domination of the West in the global scenario, the pressures of assimilation and de-ethnicization of Muslim minorities in non-Islamic environments and the growing demonization of Islam and Muslims in the West in particular and in the world in general. The internal challenges faced by Muslims includes- the persistence of the colonial legacy in politics, administration, economy, education and culture in the ex-colonised countries of the Islamic world, political, territorial and ethnic conflicts between Muslim countries, the suppression of democratic and human rights by repressive regimes in the Islamic world, excessive dependence on Western military technology and on the import of Western goods and commodities, endemic communitarian disunity and dissension, fragility of Islamic commitment, growing consumerism and individualism in affluent Muslim countries, and callousness towards education have left the long lasting impact on the Muslim thought [9].

In view of the above circumstances, the Muslim *Ummah* produced the influential movements and personalities in the 20th century, who had left no stone unturned in order to respond the colonial rule--their impact and policies. Indian subcontinent too played a crucial role in the revival and rejuvenation of Islamic consciousness. The 20th century Indian subcontinent witnessed the diversity of political thoughts because after the downfall of the Muslim rule in the subcontinent and the growing hand of the Britishers changed the fate of the society. In the subcontinent several personalities endeavoured to restore and reinvigorate Islam as per their own understanding of the situation which results the diversity of Muslim political discourse. Some intellectuals argued that Islam was not inimical to the adoption of new Western political ideologies, while others explained that Islam is self-sufficient and itself an ideology. The policy of the Britishers affected the whole society especially the Muslim population, because they were most hostile towards the Muslims. Britishers had played a crucial role in the disintegration of Ottoman Empire which instigated the Indian thinkers to counteract them in each and every way.

During the Balkan War, to convey the Muslim opinion to the British government regarding its attitude towards Turkey and to cover Balkan War, Muslim scholars founded many newspapers, such as Maulana Muhammad Ali Jauhar founded '*Comrade*' on 1 January 1911 and started writing articles and speaking openly against British government [10]. Maulana Abul Kalam Azad founded '*Al- Hilāl*' in June 1912. He wrote in favour of Ottoman Empire and criticized British government for its indifferent attitude towards Turkey and considered the

British responsible for all ills of Islam. The third important newspaper, which became the mouthpiece of Muslims during Balkan War, was Zafar Ali Khan's '*Zamindār'*. Similarly, in 1912, Maulana Shibli Numani, a teacher at Aligarh College, started a newspaper '*Muslim Gazette'*, in which he suggested to the Indian Muslims to give up the fad of loyalty to the government, so that Muslim politics become independent [11]. In addition to this several Muslim thinkers emerged in the Indian Subcontinent who worked for the betterment of the Indian society in general and fot the Muslims in particular. The noteworthy among them are discussed below as:

MAULANA MOHAMMAD ALI:

Maulana Mohammad Ali was born on 10 December 1878 in a feudal family in Rampur, a princely State in India [12]. He joined the University of Oxford in 1899 and graduated three years later in Modern History. He joined the civil service in Baroda in 1903 and stayed there for next seven years after that he decided to quit the Baroda civil service and assist his community in taking its proper share in the political life of the country. He took part in Muslim politics and wrote articles in Indian press. He became one of the founders of the All India Muslim League and attended the session in 1906 at Dacca [13]. When the Ottoman empire was about to end, Indian Muslim had no choice but to launch a protest movement to generate support for their demands and to force British to change her Turkish policy. As the first effort, to mobilize the support of the *Khilāfah* on 20 March 1919, a public, meeting of 15,000 Indian Muslims was held in Bombay. This meeting setup a local organization named as *Majlis-i-Khilāfah* or Bombay *Khilāfah* committee'. The meeting asked, "the Indian government to make it sure that Constantinople would remain in Turkish hands; a delegation of Indian Muslims should attend Paris Peace Conference and recommended that the Indian Muslims deputation should meet the viceroy to acquaint him about the dissatisfaction of Indian Muslims regarding British government's attitude towards Turkey" [14]. On 23 November the *Khilāfah* Conference held its first session at Delhi under the chairmanship of A.K. Fazl-al-Haq. In the meantime the Indian government had announced that official peace celebrations were to start from 13 December 1919. At this *Khilāfah* Conference, the leaders appealed the Muslims not to participate in the official celebrations and hold protest meetings and to organize an effective movement against the government. It was also decided to send a deputation to England under the leadership of Maulana Muhammad Ali. It was also decided that as the government had rejected Muslim demands, they would boycott British goods and will not cooperate with the government. The scheme of non-violent non-cooperation was adopted on the advice of Gandhi [15]. Mohammad Ali's role in the *Khilāfah* Movement was unprecedented; he attended several conferences in which he demanded the exclusion of British rule from India and the restoration of the Ottoman legacy. The British government convened a Round Table Conference in London in 1930, where he elaborated the Muslim position in India, he said:

"I have a culture, a polity, an outlook on life- a complete synthesis which is Islam. Where God commands I am a Muslim first, a Muslim second, and a Muslim last and nothing but a Muslim. If you ask me to enter in your empire or onto your nation by leaving that synthesis, that polity, that culture, that ethics, I will not do it. My first duty is to my Maker, not to His Majesty the King, but where India is concerned, where India's freedom is concerned, where the welfare of India is concerned, I am an Indian first, an Indian second, an Indian last and nothing but an Indian" [16]. Moreover he said: "I belong to two circles of equal size, but which are not concentric. One is India, and the other is the Muslim world. When I came to England in 1920 as head of the *Khilāfah* Delegation, my friends said, "You must have some sort of a crest for your stationary". I decided to have it with two circles on it. In one circle was the word "India", in the other circle was Islam, with the word *Khilāfah*. We as Indian Muslims come in both circles. We belong to these two circles, each of them of more than 300 million, and we can leave neither. We are not nationalists but super nationalists, and I as a Muslim say that God made man and the Devil made the nation. Nationalism divides: our religion binds" [17].

Lastly he said, "I want to go back to my country, if I can go back, with the substance of freedom in my hand. Otherwise i will not go back to a slave country. I would even prefer to die in a foreign country so long as it is a free country; and if you do not give us freedom in India, you will have to give me a grave here" [18]. He died in London on 4th January 1931 and was lie buried in Jerusalem in the precincts of the Dome of the Rock.

DR. SIR MUHAMMAD IQBAL:

Mohammad Iqbāl was born on 9th November 1877, at Sialkot [19]. He was the most influential poet, philosopher, thinker and Muslim intellectual of the Indian subcontinent. He was profoundly influenced by Afghani's vision of Islamic solidarity. Regarding the development of his ideas it is necessary to divide Iqbal's life into two periods–the period of seeking and the period of discovery. The period of seeking extends roughly from 1895-1912. He was fascinated by nature, expressed himself on topics like love, solitude, loneliness etc. The period of discovery commences from 1912 and ends in 1938. The works which are included in his period of discovery are: *Asrār-i-Khudī* (1915), *Rumūz-i-Bekhudī* (1918), *Payām-i-Mashriq* (1922), *Khizr-i-Rah* (1922), *Talūʿi-i-Islām*, both *Khizr-i-Rah* and *Tulūʿi-i-Islam* are included in his Urdu collection *Bāng-i-Darā*, which appeared in 1924. *Zabūr-i-ʿAjam* (1927), The Reconstruction of Religious Thought in Islam (1930), *Bāl-i-Jibraʿīl* (1935), *Zarb-i-Kalīm* (1936) and *Armughan-i-Hijāz* (1938), the year in which he died [20].

Iqbal's thinking regarding Islam was universal. While discussing the nationalistic ideas in Islam, Iqbāl asserted that Islam constructed nationality out of a purely abstract idea, i.e., religion. The conception of nationality in Islam had no material basis because a sense of belonging to each other among the Muslim peoples really depended on a sort of mental agreement in a certain view of the world, and a desire to lay down their lives in defence of it.

Hence for a Muslim, Islam was itself nationalism as well as patriotism [21]. Proposing in 1930 the idea of preserving the identity of the Muslims living in North-West of the Indian subcontinent, Dr. Muhammad Iqbāl stated two major goals of his proposal: one, to solve the communal problem in India by achieving internal balance and giving the North-Western Muslims of India a sense of responsibility; and two, to provide the Muslims an opportunity to rid Islam of the stamp that Arabian Imperialism was forced to give it, to mobilize its law, its education, its culture, and to bring them into closer contact with Islam's original spirit and the spirit of modern times [22]. The reason behind the demand for Muslim majority area in Indian Subcontinent was to bring in form the common wealth of Muslim nations. He did not only dream of carving out a majority area for the Muslims of Indian subcontinent but he asserted that the realization of this goal was merely a means for achieving the unification of the entire Muslim world. In order to create really an effective political unity of Islam, Iqbāl asserted that all Muslim countries must first become independent: and then in their totality they should range themselves under one Caliph. In the meantime the Caliph must reduce his own house to order and lay the foundations of a workable modern State. Every Muslim nation must sink into her own deeper self; temporarily focus her vision on herself alone, until all are strong and powerful to form a living family of republics. A true and living unity, according to the nationalist thinkers, is not so easy as to be achieved by a merely symbolical over lordship. It is truly manifested in a multiplicity of free independent units whose racial rivalries are adjusted and harmonized by the unifying bond of a common spiritual aspiration. It seems to me that Allah is slowly bringing home to us the truth that Islam is neither Nationalism nor Imperialism but a League of Nations which recognizes artificial boundaries and racial distinctions for facility of reference only, and not for restricting the social horizon of its members [23]. This unification according to him was possible either through the establishment of a single Muslim state, or through a league of Muslim nations, or through a combination of several independent Muslim states tied to each other for purely economic and political considerations. He even suggested Tehran as the capital of the future Commonwealth of Muslim Nations [24]. Regarding Islamic State he said the believers of *Tauhīd* must show to the world by founding Islamic State on the principles of human solidarity, equality and freedom. In his opinion the real purpose of Islam was to respect all religions and to establish a spiritual democracy [25]. He was an antagonistic to western concept of democracy, where there is the supremacy of general will. He went back to the Islamic conception of the sovereignty of God expressing itself in the total governance of all the aspects and phases of man's life by the laws of the *Sharīʿah*. The physical world is not a distinct autonomous entity but is to be regarded as a sphere for the materialization of spiritual principles [26]. Regarding the importance of power and authority in the life of a human being, he is of the opinion that God has two main attributes-- *Jamāl* and *Jalāl*, beauty and majesty, mercy and authority. The one reflects His aspect of love, and other of power. Hence moral discipline of man consists in the cultivation of love and power. Love is the principle of creation,

power of preservation. Love unites man in social wholes, and draws man to God or to perfection. Power is necessary to obtain mastery over what is not God, namely, nature, or that which is Satanic in the individual and the group. Thus Islam attaches the highest value to the spiritual development of the individual and at the same time does not neglect the worldly [27].

MAULANA UBAIDULLAH SINDHĪ:

Maulana Ubaidullah Sindhī (1872-1944) was a great scholar and revolutionary of the 20th century Indian Subcontinent. He was deeply impressed by the thought of Shah Walī Allah and was the loyal disciple of Maulana Mahmūd al Hasan of Deoband. He visited several countries viz Afghanistan, Russia and Turky. Ubaidullah Sindhi started his political career in 1908 when he was made the secretary of an association of Deoband graduates - *Jamīʿat al-Ansār* (Society of Helpers) in Deoband founded by Mahmūd al Hasan [28]. Before leaving India, Sindhi had a heightened vigour for Muslim unity, but his pan-Islamic dream began to fade when he was in Kabul where he realized that the Arabs, Turks and Afghans have their own interests and specific needs [29]. He was the man who wanted to do something practical in order to combat the growing encroachment of European colonialism in the Indian subcontinent and to maintain the religious understanding which according to him was the need of the time. Mr. Zafar Hasan Aibak, a companion and disciple of Maulana in Turky, has narrated in his autobiography Maulana's activities in Afghanistan, South Union and Turky. According to him Maulana was striving for the complete freedom of India and for the establishment of a Federal System of government in India. He wanted to preserve the pristine glory of Islam and to protect the right of Muslims and other minorities in India. He also wanted to establish the government of the labouring classes and the abolition of *Zamindari* and capitalism so that communism may not prevail in the Indian social system.

He wanted to have an Asian Federation in order to combat Imperialism. In Kabul he had formed a party in 1924, called '*Sarva Raj Party*' of Congress Committee i.e., a party of the rule of all men, without any discrimination on the basis of religion and wealth. Maulana was the president, and Zaffar Hassan acted as Secretary General of this committee. He had published its manifesto that was eventually banned in India [30]. He was of the opinion that the central government was to be secular in nature. The federating units or republics were allowed to declare their state religions, but the Centre was not to be concerned with the matters of faith. The Centre was not to interfere in the religious policies of the units, unless and until they contradict the cardinal socio-economic and political principles laid down by the *Sarv raj Party* [31]. Sindhi's approach was altogether different from the Indian Muslim nationalists like Abul Kalam Azād and Husain Ahmad Madanī (d. 1957). To him, separate nation-states could not be formed since the Indians were ethnically and linguistically very rich and diverse. Therefore, to him, the only solution was the formation of an Indian Federation of autonomous Republics. The teachings of Islam, according to him, do not stand in contradiction to the establishment of

Muslim nation-states all over the globe. Thus, he presented a blend of the communal and nationalist stances represented by the All India Muslim League and the Indian National Congress respectively. His program envisaged the formation of an autonomous Muslim state in North-Western India within the Indian Federation. Sindhi also professed internationalism since he wished other countries to join the regional bloc after becoming autonomous units or federated republics professing his socio-economic and political principles [32]. After all he wanted to liberate India from the colonial rule as one of the statements of Maulana compelled us to think so. Maulana was always seen bareheaded. Once Maulana Said Ahmad Akbarabadi asked him while they were passing near the *Jāmiʿa Masjid* as to why Maulana did not wear any head dress? Maulana pointed towards the Red Fort and partly with sorrow he said, "My cap was snatched off my head the day we lost this Red Fort. I shall put on my cap, the symbol of our oriental dignity, the day we get if back from the Britishers" [33].

MAULANA ABU AL KALĀM ĀZĀD:

Maulana Abu al Kalām Āzād (1888-1958) was an Urdu journalist, Islamic thinker, *Muffasir* and political activist of Indian Subcontinent. He started his career as a journalist and brought out his own paper *Lisān al Sidq*. He was quite familiar with the policies of the British rule in the Indian subcontinent for which he had taken the help of his weeklies, namely *Al Hilāl* and *Al Balāgh* in order to formulate the fate of Indians, especially, of Muslims in a reasoned way. Azad systematically developed political ideas within the frame work of Islamic political theory, which were universal in application. In fact, the pan-Islamic orientation was glaringly clear in his writings, speeches and activities from the very beginning. He was much concerned about the Muslim world and its inhabitants [34]. Maulana Azād regarded the preservation of the territorial integrity of the Turkish Empire and independence of the Ottoman Sultan indispensable for the preservation and security of Islam as well as for the unity of Muslim world [35]. The fundamental principles of Islam required international solidarity of all Muslims; they must remain united in an organic whole. According to Azad, the unity of the Muslim community was integrally connected with the centralised guidance of the *Khalīfah*, the successor of the Prophet (S.A.W). Just as in the world of nature God had placed powers of centralised direction in one particular unit; he had created the office of the *Khalīfah* for the Muslims. The 'Law of Centre' that obtains in the functioning of the world of nature must operate in the functioning of the Islamic world. The *Khilāfah* knits scattered individual Muslims together in an organic whole. Without the *Khalīfah*, the collective existence of the Muslims as ordained in the *Qurān* is not possible. If the Islamic society fails to acquire the character of an organic whole (*Jamāʿat*), it reverts to the state of ignorance and chaos (*Jahālīyah*) [36]. There was a change in the political orientation of Azad after the First World War. This has been interpreted as a complete change in the "Pan-Islamic romanticism" to the "realistic Indian nationalism" [37]. Azad was a staunch supporter of Hindu-Muslim unity. He believed that the emancipation of the Muslims was

unrealisable without the independence of India. But the independence of India could not be achieved without the unity of the Hindus and Muslims of India [38]. He further asserts "If an angel were to descend from beyond the clouds in the heavens and were to stand on the top of the Qutb Minār of Delhi and proclaim that India could attain Independence (*Swarāj* in 24 hours) provided India abandons Hindu Muslim unity, then in the case I will surrender this demand for *Swarāj*, but I will not give up unity, for if there is delay in the advent of *Swarāj* the loss will be that of India only, but if our unity is destroyed then it will be the loss of the entire human race" [39].

MAULANA SAYYID ABUL ALA MAUDUDI:

Maulana Sayyid Abul ala Maududi was born on the third of *Rajab*, 1321 A.H. corresponding to 25th September 1903 in the city of Aurangabad in the princely state of Hyderabad Deccan [40]. Aurangabad nowadays is a part of the state of Maharashtra. He died in 1979 and was buried in Ichrra Lahore. He is the author of more than hundred books on Islam discussing its several themes like sociology, economics, morality, politics, education, women issues and others. Some of his main works are: Islamic Law and Constitution, Khilafat wa Mulukiyat (Urdu) Caliphate and Monarchy, Khutbat (Urdu), *Tafhim al Qurān* (translation and commentary of *Qurān* in Urdu language). He presented the political thought of Islam and its conception of government at the time when the Western thought and ideologies had marginalized the Muslim thought in the whole world especially in the Indian Subcontinent. His presentation of Islam in the modern times is systematically in accordance with the situation. Maududi argued relentlessly to think within the totality of the Islamic system and recognize its relevance to the contemporary situation. Without moral values as internal to and constitutive of it, the system is bound to aberrant. Consequently, government and political office became an instrument for self-gratification and the brute exercise of power. The present malaise could be corrected only if people are mobilized and a total transformation of society is actualized. This could be done not by borrowing alien ideologies but by the very tradition that other secular ideologies consider as the opium of the masses. But in order to achieve this, Islam has to be presented into the terms of modern reality. Maududi's greatness lay in accomplishing this herculean task of explaining the real nature of the faith [41]. The Western ideas like nationalism, capitalism, communism, secularism and democracy have gained the impetus in the transformation of the Muslim legacy into the secular models. According to him, the government for the people of faith is *Khilāfah* (caliphate) [42].

According to Maulana Maududi, there are two types of vicegerencies: one is popular vicegerency and the other is individual vicegerency. It becomes popular when Allah promises those persons with *Khilāfah* who are doing good deeds as Quran says in the verse (*Surah Nūr* v. 55). It means that each and every Muslim is the holder of the title of *Khilāfah*. It becomes individual when the believers took an oath of allegiance (*Bay'ah*) in favour of the most pious and

competent person in order to run the affairs of the state and religion and to remove chaos and confusion in the society [43]. Maududi laid more emphasis on the political situation of the Muslims at that time and he put forward a new theory on political thought based on divine message. Regarding the freedom struggle of the Indian Subcontinent, he made it clear that Muslims and Hindus are thinking at nationalistic bases which became a great hinderance to it. He thought that Islam as the system which could be a solution to all problems especially of the Muslims. Again he said, ideologically the freedom struggle of India gets divided. It is because of the nationalistic feelings gets evolved among the Indian masses in general and Intellectuals in particular. Maulana Maududi neither supported Muslim League nor Congress, because according to him the ideologies presented by both of them are contrary to the real spirit of Islam. He criticized Muslim League on the grounds that Muslim League leadership is Western oriented but being Muslims they are also interested in Islam. The League leaders have borrowed their political views from Western sources, but being Muslims, whatever they want to project they do it under the banner of Islam. They neither have the knowledge of Islam nor the wisdom; therefore, their thinking, acts and deeds are at variance. The result is the mix-up of the Western political theories with Islamic terminology [44]. The concept of Muslim League is, Maududi writes, totally at variance with the concept of Islam in the following aspects: their speeches, their resolutions, their writings clearly indicate that their concept of 'Muslim Nation' is to unite the Muslims against the Hindus to protect their national interest. As the freedom fighters united against the British to obtain independence, the champions of Muslim league have targeted the Hindus by uniting the Muslims against them. As a result of this Islam and Muslims have become a party to it and are being targeted. Therefore, the Hindus consider the Muslims as their political and economic rivals [45].

He discussed the compatibility of religion and politics in response to the secularism propounded by the West, which had crept into the minds of the Muslim world in general and Indian subcontinent in particular. According to Maududi, state is the agency through which the reformation of the society is easy, influential and can formulate the everlasting impact in the Muslim society. He clearly differentiates between secular state and Islamic state. The secular state is based on the laws, the end of which is the welfare of the people, while as an Islamic state is that, the end of which is the pleasure of Allah and the supremacy of *Sharī'ah*.

SUMMARY:

When the fall of Mughal rule took place in 1857, the fate of Indian Muslims turned upside down as the rulers of yesterday became the subjects of today. This change impacts the thought process of the Indian subcontinent and varied responses emerged with regard to the future of the Indian Muslims. In the 20th century, Indians especially the Muslims faced so many grievances because of the colonial policies. The Britishers dominated each and every aspect of life of the Muslims. The situation instigates Maulana Mohammad Ali, Allama Iqbal, Maulana

Ubaidullah Sindhi, Maulana Abul Kalam Azād and Maulana Sayyid Abul ala Maududi to present the reformative cum political thoughts for the rejuvenation of the Muslim Rule. Mohammad Ali was of the opinion that the *Khilāfah* of the Ottomans should revive and Indian Muslims should be the part of it. Allama Iqbāl was of the opinion that the Muslims of Indian subcontinent should be separate community where they can implement the *Sharīʿah* in an organised way. Maulana Ubaidullah Sindhi, who was influenced by the thought of Shah Wali Allah wanted to formulate the federal state in which different cultures can implement their respective laws. The one community cannot interfere with the community of other. Maulana Abul Kalam Azād asserted that unless and until Hindu-Muslim unity cannot be maintained in the subcontinent, the freedom from the yoke of the Britishers is impossible. He was the staunch supporter of the Hindu-Muslim unity. He further asserted that there is no need of separate state for the Muslims of Indian subcontinent. According to Maududi, Muslims should be self sufficient in terms of political system. He was also of the opinion that the implementation of *Sharīʿah* in total is highly connected with the leadership because it carries weight in the society.

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ICT AND KASHMIRI WOMEN: PROSPECTS AND FUTURE PERCEPTIONS

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ABSTRACT:

Information Communication Technology (ICT) has changed all the ways people think, behave, communicate, and work. As a result, digital literacy, become an essential skill for professional development, skill learning, freedom of expression and social inclusion, is now one of the most important issues faced by women today. This chapter investigates stories of the professional women who are working in the information and communications technology (ICT) sector and their Prospects and Future Perceptions through the development of a theoretical and methodological stance. Given concerns about the future of the ICT sector in terms of skills shortages and gender imbalances, an understanding of how women ICT professionals view this future is vital. Notwithstanding the multifaceted suffering Kashmiri women are going through, a positive trend has been witnessed regarding their participation in ICT. This chapter studies the prospects and perceptions regarding future of ICT in Kashmir vis-à-vis Kashmiri women

INTRODUCTION:

The women of Kashmir, whether Hindu or Muslim, have led a life of relentless suffering; a life dictated by the patriarchal structure of Kashmiri society. Fighting a decadent system and society has been extremely hard for such women and a number of issues warrant examination in assessing the politics of identity surrounding them. It may come as no surprise that Kashmiri women have struggled and continue to struggle against societal discrimination and inequality. Not only have these women been subject to violence by the police, but many have also experienced intense suffering at the hands of militants as well as Indian security forces. A prominent issue in the general literature on Kashmiri women examines definitions about their identity; definitions which portray them as victims of armed conflict.

"If all mankind minus one were of one opinion, and only one opinion where off the contrary opinions, mankind would be no more justified in silencing that one person, than he, if he had the power, would be justified in silencing mankind." (J. S. Mill)

August 2003 was an important turning point for Kashmiri people as mobile phone services in the state of J&K were launched. It created a new job sector in the state particularly for women because; in the ICTs & BPOs give more opportunities to women than men for instance; that charming voice people are preferable in the ITs & BOPs sector. But what is particularly striking from the perspective of women's issues in Kashmir is the active participation of women in the ICT sector. In Jammu and Kashmir ICT is helping the women of Kashmir with a platform to raise concerns about their status in society and many argue that these ICTs provided the women with an opportunity to "translate their experiences of conflict into technical for better surveillance". Now in this post-modern, post-informatics society Kashmari women are well known throughout the whole world, they are participating in day today activities like recently one of the Kashmari girl perform her role in the picture (Dangal, 2016) "Zaira Waseem" is one of the examples. In this post industrial age, ICT influences the whole world, particularly the Women in Kashmari society also came under its influence. From a latter perspective, Wajcman writes, "What has been missing from much of the debate about getting women into techno-science is that their under-representation profoundly affects how the world is made. Every aspect of our lives is touched by socio-technical systems, and unless women are in the engine rooms of technological production, we cannot get our hands on the levers of power [1]."

He also highlights the importance of imagining how different, if at all, our socio-technical world might be, what will be the role and how they shape the society as well as family, if women had a greater involvement in the shaping of technologies now and in the future. All this is possible through the agencies of socialization. It is the socialization which modifies the behaviour of an individual, so that the agencies can create a way for the women to enter in the industrial and educational sectors where as we found the low numbers of women participating in computing and ICT precisely because computer competence and engagement with ICTs has a broader impact on social life. It has been analyzed by so many feminists that there is a lot of difference between biological and anatomical differences. One signifies the physical body organs and that are created by the nature and another is social creation i.e. Gender - sex and gender. But in our society emphasis is on the tradition of sex roles and politics of gender norms.

The fact that women have practically no voice in the creation of major technological innovations that control our lives is surely to the detriment of the industry and society as a whole [2].While it is laudable to focus on current female under-representation, this can leave largely unexplored the relationship between gender and ICTs, and the role the future plays in (re)producing gender relations. Looking at the co-construction of gender, technology, and the future through the eyes of professional women involved in the ICT sector means that we can

challenge the assumptions embedded in these futures, and better reflect on the present state of play.

India as well as in the entire world especially in Jammu and Kashmir, the setting of ICT has reformed the entire lifestyle especially the spearheading idea of instruction, learning and research by offering new open doors and difficulties in manifestations and spread of data. ICT can be utilized as an apparatus to take care of various sorts of issues being developed of ladies considering or in innovative exercises, to help coordinated effort among all members of learning process as a standard segment of instructive condition in the valley. A standout amongst the most regularly refered to explanations behind utilizing ICTs in the schools has been to set up the present era of understudies for a work environment; when ICTs, especially PCs, the web and related innovations are winding up increasingly pervasive. According to the statistics 2011 demonstrates that the status and states of the ladies in the Jammu and Kashmir or we can state that ladies' instruction at look (Srinagar), the normal proficiency rate of Jammu and Kashmir is 67.16% for urban locales was 77.12% in which guys were 83.92% education while females education remained at 56.65% in country ranges the education rate for guys and females remained at 73.76% and 46.00% normal education rate in Jammu and Kashmir for rustic was 63.18% this investigation is a push to investigate the ICT wonders in Jammu and Kashmir with a unique reference of ICT pervasiveness in Srinagar city to layout connection amongst ICT and sexual orientation in Kashmir.

Participation and perception of the Kashmari women in professional sector:

As the rightly says by Mehbooba Mufti, Chief Minister of Jammu and Kashmir, women empowerment should start from the family giving her equal rights in love, care, confidence, education, property and decision making. Women empowerment needs all the three powers; psychological power, social power and political power and the best example in front of us is the Chief Minister of Jammu and Kashmir Mehbooba Mufti. The year 2001 was declared as the year of the ‘empowerment of women’ by the government of India and was marked by the compilations of the National Policy of the Empowerment of Women (NPEW). Accordingly in the 2001 census of India, women as an independent target group, account for 495.74 million and represent 48.3 % of the country’s total population.

As we have seen that globalization has changed the entire world at a fast especially the monetary, political and social divisions, amid the previous decades, progresses in data innovation have encouraged a worldwide correspondence organize that rises above national limits and affects open strategy, private demeanors and conduct, particularly of the young ladies. Wherever the potential exists for the media to make it for more noteworthy commitments to the headway of ladies. Same condition endures even in Jammu and Kashmir in

regards to ladies business. When all is said in done, Kashmari ladies work to supplement the family wage. Her entrance to the work advertise is limited by social and social boundaries. Occupation isolation and segregation is confronted by them in everyday life. The status of ladies can be delineating by the social relations in India. The inclination of child over a little girl proceeds in India and the young lady tyke is denied the privilege to be conceived through the evil routine with regards to feticide and appropriate to survival through the unforgivable strategy for child murder. As the logicians of sexual orientation, Tripathi and Mishra [3] dissected it in their examinations that ladies deceived of latent separation rather the dynamic segregation and inclined to the two sorts of separation. Stereotyping is showing in the general public by the sexual orientation based parts. With respect to as aggressive behavior at home is concerned, it is a key measurement in the Indian culture so the ladies are as yet unequal with men in the power and basic leadership. In perspective of the women's activist, clarifies about unjustifiable avoidance and out of line consideration [4].

The social truths are portraying that Women are subjected to various separations. Separation is polished inside an as of now segregated area of society in light of sex. Ladies in Jammu and Kashmir are about not as much as half as prone to be utilized. The greater part of the white and hands on employments are commanded by guys. While ladies laborers are separated as a rule, there are many layers of segregation which are controlled by auxiliary factors, for example, financial status. Ladies from urban zones will probably be occupied with average work rather country ladies. Level of ladies working is higher among the lower standing gatherings, through their portrayal is less in better than average employments. Ladies from bring down area of the general public are working not by their decision but rather to help their families. As family resource or pay builds number of ladies going outside for work decays. Religious hindrances observed to be more for Muslim ladies though Christians are now in the front and Hindu ladies are developing in the business field. As indicated by a CSO ponder in 2000, ladies invested 17% more energy in monetary exercises in addition to in broadened financial exercises.

Women and ICT:

The illiterate of the 21th century will not be those who cannot read and write, but those who cannot learn, unlearn and relearn." – Alvin Toffler

Empowerment of women is one of the central concerns of the tenth plan (2002-2007) which spells out a three pronged strategy for it:

(a) Social Empowerment: create an enabling environment for development of women and give them easy and equal access to all the basic minimum service so that they can realize their full potential.

(b) Economic Empowerment: ensures provisions for training employment and income generation activities to make women economically self-reliant.

(c) Gender Justice: elimination all forms of gender discrimination so that women are able to enjoy equal rights not only in theory but also in practice.

Empowerment to women has been made by the constitution of India by giving universal Adult franchise and in terms of legal and administrative measures as well as enabling support to improve the working and living conditions of women, many initiatives has been taken since 1947 to empower women. Empowerment of women through education is most important in India. Gender differentiation in economy is not to be seen merely on the basis of sexual division of labour in the home or at the workplace, but factors like the new technological development and surplus and also women's entry in the ICT sector will have to be taken into consideration. Real empowerment of women requires their active participation in the ICT sector. As rightly analyzed by Gurumurthy [5] and Salaas and Accesso [6] that the new economy rides on the power of ICTs and the influence of ICT professionals in the power centers is increasing. If woman doesn't enter the field of ICT she will lag behind and will be further marginalized. As everybody know that women are less engaged with information and communication technology than men. For the social development the basic element is to rise the status of women and give her a more equitable share of development benefits in the whole social sphere of life, hence the government as well as private strategy should secure the better rights for them. ICT are for everyone both the sexes have to be an equal beneficiary to the advantages offered by ICT. The spectrum of information and communication technology can put a greater control in the hands of women is wide and continuously expanding. Information and communication technology in combination with other forms of communication have the potential to reach those hitherto have not been reached by any other media, thereby empowering them to participate in the development of an economic and social progress. In gender perspective of technology both women and technology are independent; the technology which is not appropriate for women is not truly a technology. In this modern world ICT is the powerful tool for the women empowerment.

The IT insurgency is clearing each edge of the globe. USA, UK, China, Australia, Singapore, etc– all are utilizing the innovation in their different activities and plans. Maximum capacity of IT can be tapped and use in each part of life, for example, instruction, wellbeing, keeping money, water and influence supply, transport and open appropriation. In this cutting edge world it is conceivable to raise a noteworthy division of the ladies groups in a more cooperative advanced system which concentrates on limited data and modified arrangements, takes a shot at the topic of worldwide advances for neighborhood utilize. Womens still face colossal unevenness in the control, possession and direction of these new innovations. It is said that the headway of ICT has

changed the hands, for example, the incompetent hands has been supplanted by machine, if ladies does not gain the new abilities they will lose their place in this advanced world, for the improvement of the nation both the genders ought to go one next to the other thus, it is the obligation of the legislature to give an uncommon instructional classes to the untalented ladies, so the computerized hole amongst male and female ought to be destroyed. From the ways and methods for ICT, it is discovered that the poor ignorant and semi-educated were massively profit by it especially ladies.

ICT has had a huge effect in granting learning on current innovation and its utilization. Henceforth it is imperative that past only utilizing ICT, ladies must access it professionally. Faulkner and Lie [7] additionally legitimize the same and express that "Specific measures are expected to select more ladies into the ICT calling to control underestimation inside the calling". In like manner the quantity of ladies entering programming calling is on rise.

Data and correspondence innovation have made new occupations in the field of data preparing for heating, protection, printing and distributing particularly for ladies. The utilization of ICT crosses over any barrier between individuals' chances for independent work in the casual economy and the high development segments of the world economy. Through the web access every one of the parts casual and additionally formal acquire simple access of the data accessible in it. The best approach to change the position and status of the ladies in the general public is conceivable just through the ICT. Ladies, due to their natural and social parts are by and large more established than men in the bounds of their region. They are in this way more cognizant than men of the social, monetary and natural prerequisites of their own groups.

Future of Kashmari professional women:

The future is also something we all ‘do’. Futures are created in our everyday lives, may or may not be acted on in the course of these everyday lives, and are profoundly shaped by our socioeconomic backgrounds and, as of interest to us here, our gender. It is in this sense that the inequities of contemporary times are profoundly implicated in the nature of the futures thought possible. In terms of gender and technology, we have noted the differential interpretation of present-day trends (of technology, of gender relations, of working patterns) in terms of their impact upon the future and women's standing in that future. Rather than thinking about the future as a moment in time that will bring change to our social world, which we may or may not be able to predict, we can interrogate the future as a domain made meaningful through people's mundane, yet politically charged accounts. Rather than looking into the future, we can look at contested futures in terms of how people construct their own personal trajectories and how gender relations may shape the possibilities they see for themselves (and others).

To the extent Kashmari ladies are concerned, globalization is twofold edged process. From one perspective, lion's share of ladies in Kashmir get themselves peeled off the advantage of standardized savings, government sponsorship insurance of work rights and after that security nets. Then again there are conceivable outcomes of better instruction offices and openings at the transnational sense, which are exceptionally appealing to the special few. Regardless of the quick financial and institutional changes in Kashmir that had positive effect on the womens status and part. It is however important to comprehend that powerful improvement process as operators of progress and additionally recipients on the grounds that Kashmari ladies can be used as advancement asset from numerous points of view. The changing circumstance of Kashmari society affectation incredible challenges to ladies and influenced their parts when all is said in done and the part of ICT working ladies specifically. Where as in the customary society ladies confronted some kind of issues, and in the contemporary society they confront the difficulties and encounters this issue for what's to come. The view Kashmari ladies began experiencing change from early decades to the twentieth century. The progressions which are recognized; the rising level of political awareness, growing present day instruction, spreading of social learning and expansive scale social advancement made a circumstance in which ladies felt associated about their position. Then again the solid effect of new innovation which alludes to a procedure of effect of the outside advancement on the tenants in the Kashmiri society.

The future as an abstract temporal entity is posited as the harbinger of change in itself. It is deemed to be an active force in the social sphere, a force that can impact upon what we know to be social life in the present. Further, notions of the 'natural', 'nature' and (technological/social) 'evolution' and 'revolution' are all enrolled to strengthen the stability and perceived viability of certain versions of the future. Without going so far as to maintain that (temporarily) accepted versions of the future wholly determine present and future-possible talk and action, we can consider the possibility that having 'ownership', however transitory, of a version of the future that is considered viable or even inevitable, may have implications for the talk and action that is deemed acceptable and feasible in the present. It is in this way that future-orientated discourses can be thought of as being implicated in producing the very 'reality' they anticipate, via the enrolment of significant people, material artifacts and discursive resources.

In relation to the Kashmir the area is dominated by the Muslims in relation to that the future of the Kashmari women and their empowerment varied enormously from rural to urban. It can be analyzed in terms of their participation in decision making, access to the opportunities in education, training, employment and income, health and demographic details like life-expectancy, mobility, family planning and many other such areas, such as gender justice,

protection against violence so as to allow then to realize their full potential. Personal futures are political futures, shaped as they are by the wider social and historical context. Social futures are also technological futures, produced in the context of contemporary industrial societies through scientific-technological, economic and political means [8].

The changes come in the attitudes as well as in the perception of women about themselves the women understood the real values of proper education as well as the IT development , the parents most of them illiterates, began to think that their daughters should get the advantage of what they were deprived of. Women also began to be aware on the importance of modern technical education, and this led to the modern situation where women today fill more than half of the allotted seats in many of the colleges and universities. Like men, women also have an idea about their future life. The achievements of the small and beautiful state in the north most top of India known as Switzerland of Asia can be adopted liberally by other states of the country which may help them to achieve heights in empowerment of women, especially in Srinagar city.

Information and Communication Technology (ICT) and gender in Kashmir:

Not ancient decades we the people of Kashmir live in the globalised world but since August 2003, it was the month when the mobile service was launched 1st time in the state. Through this service the internet and other information tools like television are having ever more control in our lives – we chat, blog, e-mail and e-shop, leaving behind our foot prints in this version of public space. ICT has revolutionized human life across the globe particularly the life of women. Womens have created the space for themselves with the help of this information society. Internet usage is one of the standard indicators of the use of ICT. By 2003, there were approximately two million internet users in India. SEWA (The Self-Employed Women's Association) is one of the 1st organizations globally to realize the potential of using ICT for the productive growth of the informal sector. SEWA is established technological information centres to provide computer awareness training and basic computer skills. Due to poverty, lack of education and financial resources of women, ICT by itself cannot answer all the problems facing women empowerment, but it brings new information resources and can open new communication channels for the marginalized communities. According to the World Bank (2004), the main key service fails poor people – in access, quantity and quality. Jawaharlal Nehru, first prime minister of India in 1957 said that the greatest revolution is one that affects the status and living conditions of its women.

It has been suggested that the ICT sector, particularly in the western world, faces a predicted 'skills time bomb' unless a more diverse workforce in terms of gender, age and ethnicity is created. Within future-orientated discourses it is posited that women will be the vita

I pool from which to draw candidates in order to diffuse this predicted ICT time bomb. Now these days more women are involved in careers in the ICT sector in Kashmir, however; there are now enough experiences to show that when women are trained, they show the remarkable understanding and control in using technologies effectively. The women in Jammu and Kashmir comprise a large portion of urban population and play a substantial role in the urban development particularly the ICT sector. Their involvement in the number of productive works particularly in IT sectors work their experience in the BPO and call centers is a case in point.

When we look towards the ICT, gender and their future in Srinagar city from the particular view point it is clear that female ICT professionals held a very mixed view of the future of the ICT industry, particularly in relation to the position of women within it and their relations with the other staff members. It is regarded that women imagining more or less utopian and dystopian futures. Most women in Srinagar city are relatively positive about the future reduction of female under-representation. However, they also presented the more pejorative view that the ICT industry's image was unlikely to become more female friendly in the future. The social construction of technology as masculine is clear from these results. While the world of work may be expected to change in terms of gender relations, the 'masculinization of technology' appears to be more obdurate.

Communications? I think it's about … communications is a very good opportunity for women, I think. Certainly in companies that need … if they're going to outsource, have any of their operations, business operations, in India, Asia, wherever, communications is the most important item of any organization. Therefore, communications linked with web design or whatever, that's the area, I'd say, where women could work. (Caroline, senior ICT consultant)

Women professionals think that ICT as becoming high increasingly integrated with business needs and processes; an integration that would require both 'soft' as-well-as 'hard' skills from ICT professionals, forming this demand for the ideal gendered hybrid worker. Here, by juxtaposing female ICT professionals with (male) 'sad geeks', a future is conceived in which women have a particular, positive role to play. The gender construction of women as 'naturally' better with people, and so more likely to be adept at managing the integration of ICT and business needs and processes, is problematic [9], due to its essentialist assumptions about naturalized gender roles (that is, women as caring and people-orientated, men as technical). However, in the face of the continued physical and symbolic under-representation of women in ICT careers and in SET fields in general, female professionals are able to draw on the future as a positive discursive resource to recast ICT as the natural domain of women, in which the hybrid women workers discourse plays a part in the continuous reshaping of gendered experiences of technology.

When we see the culture of the society since ancient times the women in Jammu and Kashmir particularly in Srinagar city were always afraid to come out of their homes due to the bad conditions in the society, now a day's situation is different the women has came out of their homes for the work and they are ready to face the any challenge, now they are found relatively positive in relation to the future in ICT sector. However, some saw more negative futures, of further (essentialist) stereotyping of women's relationships with technology and of the need for a caring element to their ICT work before it could be 'natural'. As Kelkar et al. [10] suggest, we feel the shadow of the cultural ceiling [that] exhibits itself starkly in relation to women. The idea that technology is not for women; that women are not technologically-minded, is strongly embedded not only in Asian thinking, but also that of Europe and America.

ICT sector being gender neutral:

Data and correspondence innovation division is an intense segment for financial strengthening by utilizes the ladies in the post present day ventures for data preparing, managing an account, protection, printing, distributing and call focuses and so on inside the administration segment, the significant wellspring of work for ladies is in data handling employments, especially call centre and information passage. Indian economy has incredibly been affected by the mechanical part similarly as with 30% of incremental fare amid 2005-09; giving work to almost 8 million individuals in auxiliary ventures; and spreading up the business to the level 2 and 3 urban communities. Many considered this as a 'statistic profit 'for India. It is assessed that India has more than 4 million specialized laborers, more than 1,832 instructive organizations and polytechnics, which prepare more than 67,785 PC programming experts consistently. The colossal base of talented labor is a noteworthy draw for worldwide clients. India gives IT administrations at one-tenth the cost [11].

In the underlying phases of IT insurgency or computerization there was a dread of expanded "joblessness" and 'specialists excess' however subsequently a similar IT industry turned into an incredible manager. Ladies must be paid for each work they perform. This will prompt the financial freedom of ladies which is the central point for the sexual equity. It might speak to that ladies will procure as equivalent as men and they will spend themselves as indicated by their exhibitions and needs. Panchamukhi [12] noticed this capability of IT industry and opined "If the divisions of horticulture, learning and data ventures are urged to develop in a predictable way then the issues of neediness, joblessness can be tackled". Also, IT industry has ended up being a trying industry for the youthful era. IT industry with its distinctive rising branches utilized both profoundly talented youth in equipment and programming divisions and individuals with less specialized and formal instruction in ITES-BPO industry. Henceforth it has made business open doors for both very talented and formally

graduated. As per [13] separated from making employments programming industry has given chances to extending the nearby base of business. Encourage the business not just lessened the degree of the mind deplete by making compensating work openings inside the nation yet in addition incited various non-inhabitant Indians to come back to begin programming wanders. As for business, in the year 2009, IT-BPO utilized 2,200,000 straightforwardly. Out of which 958000 were utilized in IT administrations, 738000 in BPO and 500000 in household showcase section. Encourage for the year 2010 the evaluated add up to coordinate business is of 2,290,000 out of which 993000 in IT, 768000 in BPO and 525000 in local market [11].

However, [14] and [15] found employment opportunities created by IT industry compared to the total work force is not significant i.e. only 0.08% of the aggregate workforce. But it has changed the whole set of employment conditions, recruitment pattern, work conditions etc. the working women in different sectors in relation to the wages for all standard work, especially in BPO and ICT sector must be fixed according to the relevant and standard criteria. In this direction, the government as well as private sector, in cooperation with the concerned staff and their associations/ organizations has to determine wage of all major and minor items and to enforce these set wages according to the proper rules and regulations for both the genders. IT employment has changed all the traditional employment patterns and conditions. Regarding the quality of the IT employment, 'high stress' is highlighted as prime negative feature. Corporate HR practices are under concern for creating inexperienced workforce in the industry. There have also been raising concerns on violation of laws by corporate and harassment.

Due to the processes of information and communication technology in this modern era the mobility and interactions of the womens have changed their pattern of labour as well as access and control over resources, political social activities and build self confidence and self esteem. Change in the women's control over decision making in social political and economic life of nation. On the other hand, there are many problems faced by the women is decision making at the local level and inequality of power sharing with men and the worst suffering cross border terrorism faced by women and violence against women is ever on rise; it is all due to the gap between the professed goal enshrined in the constitution and the government and the situation ground reality of the exploitation, oppression and discrimination of the women in India.

CONCLUSION:

It has been reasoned that the ladies of today have settled on new skylines and ways, to fulfill their mission for self-articulation and imagination. They endeavor to be monetarily, mentally, socially free and accomplish their own particular social statuses, prompting

symphonious family presence. This new way of life and example gained to suit the fantasies and any expectations of ladies is at fluctuation with the regular social standards of society. The impediments in accomplishing these disguised desire are from both inwards and outwards. The idea of self, social taboos, family obligations, conventional establishments make clashing circumstances and peculiarities. There is a progressing battle with the internal identity, made by these circumstances, which should be tended to and comprehended at each progression. In Jammu and Kashmir, the setting of ICT has reformed the spearheading idea of training, learning and research by offering new open doors and difficulties in manifestations and scattering of data. ICT can be utilized as a device to tackle distinctive sorts of issues being developed of ladies considering or in inventive exercises, to help coordinated effort among all members of learning. To the extent in the process as a standard segment of instructive condition in the valley, a standout amongst the most generally refered to explanations behind utilizing ICTs in the schools has been to set up the present era of understudies for a work environment.

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CURRENT TRENDS IN SCIENCE AND TECHNOLOGY- BASED SUSTAINABLE DEVELOPMENT

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ABSTRACT:

The relationship between climate change and sustainable development hasn't gotten much attention, particularly when it comes to the methods used to evaluate urban planning projects and the methods for coping with both short- and long-term effects of climate change. In order to facilitate adaptation to the effects of climate change, this study intends to propose a framework for evaluating the performance of sustainability evaluation methods, taking into account both physical and social elements. Along with the growing significance of issues like pesticide use, pollution, emissions of greenhouse gases, and soil deterioration, the two main ecological concerns are water reserves and deforestation. Particularly in developing countries where there is a critical need for both the building of new roads and the upgrading of existing ones, transportation infrastructure continues to play a crucial role in supporting economic and social progress.

KEYWORDS: Sustainable development, climate change, pollution, deforestation etc.

INTRODUCTION:

Many scholars and policymakers, both domestically and internationally, have conducted extensive research on energy conservation, carbon reduction, and the promotion of low-carbon development in response to climate change. They typically approach this topic from three distinct angles, tailored to the specific conditions in different nations. Firstly, they examine the factors that drive carbon emissions and the connection between carbon emissions and economic growth. Secondly, they explore methods and mechanisms for achieving a low-carbon economy, such as investigating carbon trading and carbon taxation systems. Thirdly, they investigate collaborative and coordinating mechanisms for international efforts to reduce

carbon emissions on a global scale (Shih-Feng Tsai, 2014). Human beings require water to fulfil various needs such as domestic use, sanitation, agriculture, industrial processes, and urban expansion. Approximately one-third of the global population resides in countries with moderate to high water stress, particularly in arid and semi-arid regions, which disproportionately affects the less affluent. In these areas, groundwater has emerged as the primary source of clean drinking water for rural and peri-urban regions through methods like hand-dug wells, hand-pump-equipped boreholes, and mechanized boreholes. Groundwater is preferred due to its natural availability, generally favorable quality, and relatively lower development costs when compared to surface water sources (Musah Saeed Zango *et al.,* 2014). Governments, communities, non-governmental organizations, and businesses are progressively addressing environmental issues. Specifically, they have embraced the task of inspiring citizens and society as a whole to adopt sustainable behaviors. Indeed, the engagement of various actors, including research institutions, local governments, corporations, investors, and civil society, is essential to expedite the shift towards a sustainable society. The notion of public involvement entails actively engaging individuals in planning, decision-making, and actions aimed at conserving and preserving the environment (Patrizia Grifoni *et al.,* 2014). Aligned with this perspective, the energy industry stands as a pivotal catalyst in propelling the nation's sustainable progress, given its unique blend of economic potency and ecological significance. Moreover, the mounting need for energy, coupled with dwindling supply and escalating CO_2 emissions from excessive reliance on fossil fuels, poses a sustainability challenge. Consequently, there arises a need for reconfiguring the developmental blueprint (Mohammed Ebrahim Hussien *et al.,* 2016).

Human actions continue to be the primary contributors to the rising levels of CO_2 in the atmosphere over time. There is also a cautioned projection of a temperature rise exceeding 2 degrees Celsius. Notably, the effects of producing biofuel materials on land encompass both direct and indirect alterations in land use, along with the potential displacement of food cultivation (Balogun *et al.,* 2016). Poor waste disposal practices and irresponsible human actions result in the escape of plastic waste into the environment through various means, including transportation, wind-driven litter from landfills, and pollution of water bodies. This facilitates the eventual journey of plastic waste into the oceans, which currently hold 80% of the world's plastic waste (Daniel DeNeve *et al.,* 2017). Considerable strides have been taken across various domains to integrate sustainability into our everyday routines, yet there is still significant ground to cover in attaining the sought-after equilibrium between the environment and human activities. In accordance with the Millennium Development Goals, the primary emphasis lies on maintaining the well-being, prosperity, economic growth, and improved living standards of individuals. This research endeavors to address one of these development goals, specifically cantered around the built environment, with transportation infrastructure being a

significant facet of this endeavour. Drawing from the principles of sustainable development, numerous investigations have been undertaken regarding the sustainable development of industrial regions, often referred to as industrial sustainability. In order to enhance the capacity for sustainable development within the industrial sector, a range of actions need to be adopted by government bodies, businesses, and other stakeholders.

These measures encompass the adoption of sustainable production practices, establishment of industrial ecology, and fostering the growth of green industries. The integration of sustainable development principles guides the industrial domain towards a novel trajectory marked by cleaner production, incorporation of green technologies, advancement in high-tech manufacturing and remanufacturing, and reduced resource consumption and environmental pollution (Qu *et al.,* 2015). After conducting a pragmatic evaluation of the adaptability made possible by the available resources, sustainability assessment can serve as a significant catalyst for enhancing practical adaptive capacity, especially in the physical domain.

Role in supporting economics:

Throughout history, urban areas have presented significant hurdles for human populations, demanding adjustments to thrive within environments where critical ecological functions (such as waste management, air quality, and comfort) require careful management to enhance personal and communal welfare. Nevertheless, in contemporary times, the emergence of climate change, aging demographics, and the depletion of natural resources has introduced novel challenges (Mateus Magarooto *et al.,* 2017). Within the context of sustainable development, diverse strategies and approaches are employed to promote energy efficiency and engage consumers in regional energy conservation initiatives. Energy companies provide incentives such as price reductions on energy-efficient devices to both buyers and suppliers of these appliances, thereby generating a market demand and supply. This practice leads to a decrease in retail prices and a shortened return on investment period for new equipment, rendering it more attractive to consumers. The determination of these discount rates involves a comparison between equipment investment costs and potential energy savings, contingent on the efficiency attributes of the specific equipment. Direct investments encompass the cost of implementing equipment for consumers, encompassing complimentary devices and installations like electricity meters, controllers, high-efficiency electric motors, energy-efficient lighting fixtures, and similar items. Reductions in electricity tariffs are integrated into load dispatch management and heat accumulator system development programs, functioning as deductions from electricity bills. These reductions are accounted for as annual program costs, factored into the assessment of program effectiveness. Additionally, financial assistance is

extended to consumers through consumer loans, a component integrated into multiple programs offered by energy companies (Gitelman *et al.,* 2017).

Establishment of industrial ecology:

From an industrial standpoint, it's advisable to steer clear of the growth of industries centered around high-carbon technology. The government should implement policies and offer financial incentives to direct businesses towards adopting production methods that prioritize significant emission reduction, even if they come with higher technological costs. Additionally, the government should facilitate an atmosphere for industries to adopt "innovative technology," paving the way for the emergence of novel business models (Shih-Feng Tsai, 2014). Regarding energy matters, the government should create a range of policies and regulations aimed at promoting the advancement of new energy technologies. It should consistently engage in collaborations and information sharing with different nations. Furthermore, the government should enhance the progress of energy-related technology, strategize for the extended growth of such technology, and adeptly employ energy policy tools. It should craft policies and establish frameworks with an emphasis on environmental preservation and the pursuit of sustainable development. The people's economic and social situation is unstable, indicated by their meagre earnings, literacy levels falling below the national mean, and insufficient access to sanitation, healthcare, and jobs. These factors illustrate that establishing the industrial zone hasn't led to a decline in poverty or societal disparities. Unless governmental strategies and actions are implemented to enhance the residents' living standards by generating employment prospects, professional education, and appropriate physical and communal facilities in line with the changes introduced by the industrial ventures, there will persist a potential for heightened susceptibility to social challenges and unrest (Tatiana Cristina Santos de Castro *et al.,* 2017).

Policymakers should aim to enhance the adoption of emission objectives within companies. To illustrate, in order to stimulate the adoption of emission targets, policymakers might explore methods to establish or reinforce governmental influence on companies through regulatory actions. Immediate measures such as carbon taxes or emission limits might not be feasible, but alternatives like mandatory emission reporting or even the potential for stricter regulations can be employed by policymakers to increase pressure on companies. When introducing emission targets, policymakers should particularly consider smaller, slower-growing, and less innovative businesses, which studies have shown are less inclined to utilize emission targets. Additionally, policymakers need to exercise caution regarding emissions from rapidly expanding companies, as these firms tend to rely on intensity metrics to manage greenhouse gas emissions, and there is no imposed cap on overall emissions (Haoyu Yin et al ., 2017).

Pollution control for sustainability:

Given the ongoing escalation of environmental pollution, economists have contended that the extent of resolving this issue is gauged through the level of actual income per individual. They have established a benchmark for advancement, focusing on elevating the average real income per person, all the while ensuring that economic pursuits do not persistently escalate due to higher consumption rates of finite natural resources. The execution of production and consumption practices results in the generation of waste in the environment, necessitating proper disposal methods. The volume of waste generated directly correlates with higher pollution levels in the human-inhabited surroundings. In an era where humans are the focal point of development, they also serve as a crucial instrument for attaining it. Safeguarding their health and overall welfare stands as a paramount goal within various plans and initiatives. Research in this context has revealed the adverse outcomes stemming from human contributions to the pollution of land and water resources, which in turn affect agricultural progress within society. A significant obstacle in infrastructure development involves raising awareness about the imperative to change the approach to designing and building transportation networks. Employing conventional materials in road construction brings about several adverse economic outcomes and contributes to ecological instability. There's a necessity for fresh guidelines that align with and support alternative sustainable materials and construction techniques. The objective of this research was to explore substitute sustainable materials suitable for road construction and identify factors that highlight the environmental benefits of utilizing these alternatives. In terms of factors like embodied energy, the study demonstrated that incorporating industrial waste materials (recycled tires, glass, and plastic) into road construction entails lower energy expenditure and poses no harm to the environment (Asutosh *et al.,* 2017).

CONCLUSION:

1. Direct investments involve implementing equipment for consumers, including devices and installations.
2. Tariff reductions integrated into load dispatch and heat accumulator programs.
3. Policymakers should encourage company adoption of emission objectives through governmental influence through regulatory actions.
4. Policymakers should be cautious of rapidly expanding companies' emissions, as they rely on intensity metrics without imposed caps.
5. Research explores sustainable road construction materials and their environmental benefits.

6. Study shows incorporating industrial waste materials in road construction reduces energy expenditure and environmental harm.

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FEMINIST PERSPECTIVES IN ANITA DESAI'S NOVELS

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INTRODUCTION:

During the last three decades a large number of Indo-Anglian novelists have attracted a great deal of attention and favorable comment. Male writers like R. K. Narayan, Mulk Raj Anand, Raja Rao, Babhani Bhattacharya etc. are regarded as the pioneers of Indian English fiction who laid the foundation of Indian English novel. They have presented a highly exaggerated picture of Indian life whereas the women writers like Kamala Das, Sarojini Naidu, Anita Dasai, Shashi Deshpande, Jai Nimbkar, Kamala Markanday, Githa Hariharan, Nayantra Sahgal, Bharti Mukherjee, Shobha De, Arundhati roy, Anita Manjoshi, Rama Mehta etc.have portrayed their women characters with courage to fight for their emancipation and empowerment. The contribution of both male and female novelists in Indian English writing is praiseworthy as they have enriched Indian English fiction at international level.

Indian writing in English is a literature born of confluence of Indian and European culture. The rise of the novel in India is associated with social, political and economic conditions in India. Indian English fiction has flourished in the last hundred years. Indian writers in English have made significant contributions to the area of fiction. Since the dawn of independence, Indian women writers have made conscious and sustained efforts to present the predicament of women. They also tried to convey their ideas of social reform. The most significant feature common to all the Indian women writers in English of this period is that their theme is invariably the Indian woman. The writers were preoccupied with the problems and suffering of women. It is well remarked that in the Indian literary scenario, the crux of feminism is that the Indian woman is caught in the trap of transition from tradition to modernity. The early novels in Indian English show, in a male dominated culture, woman in her traditional role, mainly as a housewife and child-bearer, mostly they were illiterate and they were not allowed to go out of the home. The writers of this period are preoccupied with the suffering of women. The Indian

women suffer mostly because of the husband's infidelity, childlessness or a harsh treatment given by mother-in-law. Indian English novelists have mostly shown the mother pure and protective and they have glorified Indian mother. In Indian culture, the mother image is all pervasive and so quite naturally, appeared in Indian literature in a glorified manner. Idealized characters of mothers loom across over the pages of Indian English novels. The woman in the family as pictured in the early Indian English novels is more traditional image than a rebellious one. Later when she stepped into society, she became bolder. The rebellious women who came out of the family set up are found initially in the novels dealing with the freedom movement or in the novels which reflect the East-West encounter. The traditional image became an object of pity and later realistic images of women were presented. Through education, women emerged in society from the kitchen and ignorance.

The writers clearly demonstrate an awareness of the new situation. They showed women's frustration because of the double standards adopted by men in relation to women. In the later novels the woman suffers because of the incompatibility between her individuality and awareness of herself and the traditional views of her husband and the in-laws or a refusal to submit meekly to the double moral standards implicit in a male dominated society. The attitude of women underwent a change when they started learning and earning. They became aware of their own individuality and identity. The change in society required a corresponding change in literature. The change in women's attitudes is portrayed with greater awareness in the novels by women writers in India. Anita Desai is the best example in this regard who has portrayed suppression and oppression of Indian women in her novels. The aim of the present paper is to focus male-female relationships depicted by Mrs. Anita Desai in her novels.

Anita Desai as a Feminist Novelist:

The Indian women novelists of recent times have very strong links with Western life and culture, either by virtue of their parentage or through marriage. But they all show a special attachment and love for their mother country India and its life and culture. Their writings are characteristically Indian in spirit and tone. They represent a significant creative surge in the Indian English literary scene which was set in motion by writers of great promise like Toru, and being carried forward by writers of much greater promise like Anita Desai. Anita Desai is a unique writer, who tries to explore the interior world of her characters. R.S. Pathak rightly says that: Anita Desai is one of the few Indian novelists in English who has tried to understand intimately the predicament of the female characters. She represents the welcome creative release of feminine sensibility which began to emerge after the World War II. Anita Desai is a novelist of considerable merit and has enriched the Indian novel in English in more ways than one. Anita Desai emerged in the Indian English literary scene with the publication of her first

novel *Cry, the Peacock* in *1963.* As Desai is no exception to the fact that the Age influences the writing of a novelist, a close look into the cross section of the period in which she wrote the novels is necessary to understand the theme of her works and the perspective she has developed.

Woman as a subordinate or the second sex:

From the beginning up to the present day, woman has always been regarded as being subordinate to man. Of course, now, the structures of the society and the ways of women's subordination have changed due to different political and social ideologies. The society has also begun to consider more seriously about the status and security of women inside as well as outside the home. This social concern has, ultimately, increased the area of research for the scholars. Women since ages have been scorned and humiliated by the self centered patriarchal society. Women now want to come out of their so-called protective walls and stand firm to get their rightful position in the society. And some of them have turned rebellious, in their fight, against male atrocity. As our country India is independent and democratic, women, as equal citizens, deserve equal rights. So, the protest of women against this injustice has resulted in the formation of various women's liberation movements and now there is also a well articulated ideology for this liberation which takes the name of 'feminism'. In fact this concept has come into existence as a result of the realization, by women themselves, about their power and status and it has made the society to revise the norms which, so far, have considered women as only the 'second sex'. After the emergence of the English language in India, Indian English writers have begun to articulate women's aspirations for equality as well as respect in the society. Women novelists have achieved greater success than man, by bringing a greater urgency to this problem of women's emancipation by their imaginative recreation of it in their fiction which has now received worldwide reorganization.' If we go deep into the historical stories, then we can realize that women were honored in ancient India. But later when self centered men took control of religion and they have misinterpreted religious myths to suit their convenience and have turned religious norms and traditions against women. But social reformers, with genuine concern in their hearts for women's wale fare, tried to reform society and improve the position of woman.

In this way, through their efforts society tried to get rid of many social evils that harmed women greatly. However, it is difficult to root out entirely the entrenched social traditions. The Government can't interfere in the religious and personal laws; so this is the main draw- back to give total freedom to Indian women. Yet, society should not forget that woman is the creator of life as well as destroyer of life too. A woman is made from one of the ribs-that the most crooked part of man's body- so the disparity between man and woman and the man dominates over

woman. But today woman is not a doll in the hands of man. She is establishing her own identity in every walk of life. Man and woman are the two sides of the same coin. With woman man's life is a flower without fragrance.

In India, our traditional concept of family is deeply rooted in the joint-family set up. Due to the social and the economic changes after independence of India, this family set up got shaken up. Some of the traditional values could not find a place in the newly evolved style of life, and the people longed for changes from the old set up. In the last three decades the gap between the old and the new generations has considerably widened. Modern materialistic culture has disintegrated the old Indian traditions and the modern youths in India are face to face with different types of challenges. These changed conditions have caused a sense of alienation in the Indian family life, wherein each individual feels alienated from one another. Dr. Srivastava rightly observes that, being a sensitive woman novelist and gifted with good observation, sensitiveness, a penetrating analysis and a skill to paint with words, Anita Desai creates a rich gallery of characters, both male and female, though dominated by the latter. Anita Desai speaks of the concept of woman in Indian mythology: Her ample bosom and loins, her enticing curves and buxom proportions make her not merely the ideal mother but the ideal woman-consort, lover, plaything around her exist a huge body of mythology. She is called by several names-Sita, Draupadi, Durga, Parvati, Lakshmi and so on. In each myth, she plays the role of the loyal wife, unswerving in her devotion to her lord. . . . The myth keeps her bemused, bound hand and foot. To rebel against it-either in speech or action-would mean that she is questioning the myth, attacking the legend, and that cannot be permitted: it is the cornerstone on which the Indian family and therefore Indian society are built. (972) it is her preoccupation with this Indian background that gives psychological depth to most of her novels.

Feminism in Anita Desai's novels:

Anita Desai is acclaimed as the well-known woman writer in Indian English fiction. Being a woman writer, she depicted realistically the exploitation of women by the men in a male dominated society. Her novels are deeply rooted in the background of Indian culture and Indian society. Female characters are given supreme importance in almost all her novels. In all her major and early novels like *Cry, the Peacock, Voices in the* City, *Where Shall We Go This Summer? Bye- Bye Blackbird* and *Fire on the Mountain,* she lays stress on the female characters. In all these works, women are portrayed as chief protagonists who suffer in a world dominated by man in the guise of a father, a husband, a brother or a lover. These men are presented as constant threats to their integrity and happiness. The women characters react sometimes violently and some other times silently. In *Cry, the Peacock,* the most important character, Maya, suffers a lot due to the indifference of her husband Gautama. Monisha in *Voices in the* City reacts violently

and proclaims in the end that death is more welcome than mean existence. Sita as wife in *Where Shall We Go This Summer?* is against any compromise. For Nanda Kaul in *Fire on the Mountain,* the terrible betrayal of her husband prompted her to a life of silence. Anita Desai's treatment of feminism is unique in the sense that her heroines are by nature not often violent but silent sufferers. K.R.S. Iyengar says that in Anita Desai, "the inner climate, the climate of sensibility that lour's or clears or rumbles like thunder or suddenly blazes forth like lightning is more compelling than the outer weather, the physical geography of the visible action" (464).

Anita Desai most often gives stress on the feminine tragedy arising out of the marital disharmony. Cry, *the Peacock* in three parts deals with the various forms and aspects of Maya's struggles. The first part is about the death of her pet-dog, the second part, narrates the tragic death of Maya's husband Gautama. The third part is about the protagonist's loneliness and isolation after her husband's death. ', In *Voices **in** the* City, the elder sister of Nirode after marriage leads a servile existence within the rigid confines of a traditional Hindu family and dies a tragic death. Sita in *Where Shall We Go This Summer?* is leading a dead life-a disillusioned and loveless life. Nanda Kaul in *Fire on the Mountain* is *a* victim of loveless marriage. All these novels underline the tragedy of the fair sex. Desai's women characters are always seen hypersensitive, lonely and helpless and they are tormented by the patriarchal domination. Desai's early novels best illustrate that they are feminist novels. Sita in *Where Shall We Go This Summer?* goes beyond Elaine Showalter's "female phase." Sita returns from the island to her husband and family not to be accepted. She comes back with a courage to face life with all its, ups and downs. She illustrates that feminism is a sense of courage. Sita's return was not a search for identity but for reintegration. Ila Das in *Fire on the Mountain* illustrates the problem of a woman social worker in a male-dominated society. She challenges male authority and tries to emancipate the poor and suppressed village women. "As a heroine and a feminist, Ila Das combines energy, determination and courage to protest male-dominance which relegates women to positions of subservience and submission".

Anita Desai is mainly concerned with women's emancipation. Maya urges for understanding, Sita looks for dignity and Monisha pleas for privacy-a room of her own to read and a little money she could give to a brother. These women firmly press their claims. Desai is a great champion of women's cause and she suggests very powerfully, that the status of women should be raised or upgraded and that woman's active participation in every field of life can change the tragic undertones of her life. She opines: Privacy and silence are unnatural conditions to Indian women, intensely social as they are. Without silence and privacy, no two consecutive and comprehensive lines can be written. The social system, from long has opposed to independent work and intellectual exercise by women*.* Anita Desai has presented in her novels the tragic predicament of sensitive women characters who look for personal identity.

Sarah in *Bye -Bye* Blackbird is a victim of male-chauvinism. She is sensitive and an ill match to her husband in tastes and attitudes. The novel depicts the psychic turmoil of Sarah who longs to have a face of her own. Desai presents mostly married women, who are conscious of their lack of identity and oppressive conjugal bond. Sarah faces identity crisis after her marriage. She had become nameless, she had shed her name as she had shed her ancestry and identity, and she sat there, staring, as though she watched them disappear.

Anita Desai's female protagonists belong to the patriarchal family system. They have little power in their family and they remain marginal. They are social outsiders as well as existential outsiders. Maya, Monisha, Sita and Nanda Kaul are all best examples. Though they are endowed with feminine sensibility, they are sensitive individuals. Hence they don't have a respectable identity in the male-dominated society. They are forced to live according to the traditional roles ascribed to women. As Krishnaswamy remarks: Through her characterization, Anita Desai has fashioned a new concept of feminist fiction, not only to lock horns with male supremacy but also to make us aware that we are not to settle for existence itself being absurdity, nausea or nothingness. The woman is on a ceaseless quest, for a meaningful life not only for herself but for humanity in general. Her themes are about women. The characters sometimes react strongly and sometimes sensitively to the male-dominated society. She writes about sensitive women in an insensitive male world. Her theme is the existential predicament in the present social milieu where the male is the ruler and female is ruled over. Through the characterization of Monisha, the novelist presents the plight of women who are like caged birds. Her female characters are beleaguered by men. In Cry, *the Peacock,* Maya's integrity is dissolving under various pressures mainly because of her life partner of intellectual sensitivity. Though she had a European tradition, her novels remain essentially Indian.

Anita Desai challenges the image of Indian women stereotypes, especially of the middle class. She presents their original pathetic situation with a longing for fulfillment in the family and society. Most of her women are housewives, but they are unhappy one way or the other. Desai thrusts a voice and desire into the being of these women. In her early novels *CV, the Peacock, Voices in the City, Bye- Bye Blackbird* and *Where Shall We Go This Summer?* Her focus is on the women caught in the male-centered world. In *Cry, the Peacock* she presents a neurotic woman, and neurosis is identified as a way out for women from the society where men rule. The marriages of her female characters collapse or are on the verge of collapse because of the emotional incompatibility between partners. Her female characters are role models of bold feminist assertion. She looks at Indian feminine sensibility with great psychological insight. The traditional roles were inadequate in the altered context. Both men and women find it difficult to define the new contexts and to play the new roles.

Post-independent period opened up innumerable avenues for women to work or to play roles other than the domestic. Hence a depiction of her status is needed. In the post-independent fiction, the suppressed women came to light through Anita Desai. In Clear Light of Day, Desai tells the story of Bimla and Tara, the two sisters of Das family. Bimla has no time for her own life because she is so much preoccupied with family responsibilities. Though she sacrifices a lot for the family, what she gets is acrimony and bitterness. The widow Mira Masi is discarded by her in-laws. Her transformation into a mentally disordered alcoholic is the final blow that marked her fate. She dies as **an** insane person. She is deprived of her property and financial liberty. What she got in her life is a feeling of insecurity and seclusion. Her life symbolizes the violence against widows. The marital life of Tara and Bakul is under strain. Tara's individuality is lost by her dominating husband. He even came close to her and touched her cheek, very lightly, as if he could hardly bear the unpleasant contact but forced himself to do it out of compassion. . . . She felt that she had followed him enough, it had been such an enormous strain, always pushing against her grain, it had drained her of too much strength. This shows male's archetypal power over female. Tara always desired to come out of the gloomy disease-ridden house into the world of laughter, love and comforts. On seeing Baba's calm sleep, Bimla sees the clear light of day. She thinks: How she loves him, loved Raja and Tara and all of them who had lived in this house with her.

There could be no love more deep and wide than this one, she knew. No other love had started so far back in time in which to grow and spread. Nor was there anyone else on earth that she was willing to forgive more readily or completely or defend more instinctively and instantly. (CLD 101) In Bim, the novelist presents a woman whose education makes her to go against the conventional marriage plot. She says no to marriage, but she does not reject womanhood. She can be seen as the new Indian woman. Through Mira Masi, Anita Desai personalizes the social suppression of women.

Although through the different female characters, Anita Desai describes various issues related to women, she does not prescribe a solution, and hence the artistic value is not compromised. In 'In Custody', Nur Sahib rejects his ugly wife for the glamorous temptress, Imtiaz Begurn. When Deven recollects that Sarala was not his choice but that of his mother and aunts, Anita Desai delineates the gulf between the husband and wife. Sarala remains a devoted housewife and she never tries to liberate herself. Here also Desai presents a feminine issue. The two wives Sarala and Imtiaz Begum do not revolt or complain against their marital disharmony. They are not economically independent and so they remain submissive to their husbands. It seems that through these characters Anita Desai ties to convey the fact that if women are not self-sufficient, they have to suffer a lot from the hands of men. Deven ignores the stark reality of his family life: Deven had been more a poet than a professor when he married Sarala-he had

only been taken on as a temporary lecturer-and still had confidence in his verse and for the wife of a poet she seemed too prosaic. Of course, she had not been his choice, but that of his mother and aunts, crafty and cautious women . . . what they had not suspected was that Sarala, as a girl and as a new bride, had aspirations too; they had not understood because within the grim boundaries of their own precarious lives they had never entertained anything so abstract. *In Journey to Ithaca,* along with the theme of quest for spirituality,

Anita Desai depicts the revolt of female characters against the social environment. Laila is sent to places like Cairo, Paris and Milan for studying the Arabic language. But she longs for individual freedom and joins the troupe of Indian dance. The idea of eternal freedom always haunts her. Finally she comes to the Himalayan regions and seeks her regeneration through her master. Part I of *Fasting, Feasting* portrays the picture of women in postcolonial Indian society. Part II describes familial existentialism in America and the plot revolves around female characters. In the novel we are introduced to a couple called Mama Papa and their three children Uma, and Arun. The birth of Arun, the long waited heir of the family rings the death knell of Uma's academic pursuits. Urna fails to come up to the expectations of her mother, being clumsy and lacking confidence for either housework or babysitting. The parents make efforts to get her married, the ultimate aim in the life of an Indian girl. The boy's family demands the hand of Aruna, Uma's younger sister. Another proposal comes for Uma. The boy's parents ask for dowry under the pretext of using it to build a house for Urna and their son. But they broke off the betrothal with the excuse that the boy was going for higher education. The money was not returned as it had been utilized for the construction of the house. Though Urna was married to Harish, a man of fatherly age, he was away in Meerut and did not return. He was already married and the father of four children. Urna is brought back to her parents' home as a divorcee. Through the characterization of Uma, the novelist tells us that a girl's life in India is that of subjugation both in her parents' home and in her in-laws'. What Urna depicts is an issue of feminine existentialism.

SUMMING UP:

Ladies scholars in Indian English writing in the post freedom time are exceptionally aware of the idea of the recently freed lady. All these women's activist authors as activists, delineate ladies with a practically evangelist energy who battle against the foul play and the abuse executed by male hawkishness. In India especially women's activist scholars relate the subject of women's liberation with efficient and political issues too. It is on account of these things question the disparity of the genders and weakness of ladies in the public eye. In this way, these works are dependably observed to be worried about the social issues of ladies that are ordinarily India-based. The Indo-Anglican journalists amid the early period of impersonation demonstrate impressive authority over English dialect and versification

however they likewise sowed the seeds for the new period of Indianization, by composing with a national awareness. They translate the brain and heart of India toward the west. Along these lines, their books have an all-Indian character and are probably going to be having a tendency to clarify local traditions, customs, conventions and services which are skillfully woven into the texture of the aggregate plan of the story. Srinivasa Iyenger says: "ladies writers of value have started advancing Indian fiction in English. Of these scholars, Kamala Markandaya and Ruth Prawer Jhabvala are verifiably the most remarkable." Anita Desai, Jai Nimbkar, Nayantra Sahgal, Santa Rama Rau, Shashi Dshpande are likewise some other most essential names to be specified in this association. The existential weight made amid the trip of ladies from convention towards the advancement, is voiced by ladies journalists is very much encapsulated in their most noteworthy anecdotal works. Their abstract works are identified with the dangerous self-area underscored in the man-lady relationship, female organic dream, fanciful deceptions and ladies' liberation and ladylike sensibility. Myths are still more intense in Indian due their soundness and impact in our lives since a long stretch. These essayists depict their anecdotal characters such that it demonstrates the truth of the contemporary issues, so the man-lady relationship which frequently demonstrates the similitude of the security between an ace and a slave.

Anita Desai explores patriarchal oppression through the embedded code of social imagination with regard to the ‘desirable’ image of the woman ‘the Sati-Savitri-parampara’. Women are physically and sexually too repressed to find their subjectivity. Desai’s novels explore the neurotic explosions due to sexual repression in women. As a feminist critique, Anita Desai’s novels seek to analyze how the category of women as the subject of feminism is produced and restrained by the power structures through which emancipation is sought. The works interrogates the prevailing patriarchal set up through women’s consciousness and raise questions on the intellectual and psychological dimensions of Indian male consciousness. If her early novels depict gender and feminist concerns in middle class Indian society with some authenticity, the last novel betrays the limitations of expatriate writing by metaphorically raising voice against oppression on women through the portrayal of a feminized hero. Without any hesitation we can say that Indian English feminist writers have created a new dimension for Indian English fiction.

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आपदा प्रबन्धन में जन सहभागिता

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आपदा मानव जीवन के सामान्य घटनाक्रम से पूर्णतः भिन्न एवं विजातीय प्रकृति की घटना है। जीवन के ये अप्रत्याशित, आकस्मिक दुःखद घटनाक्रम संपूर्ण जीवन धारा को प्रभावित करते हैं– चिरकाल तक। विडंबना यह भी है कि प्रभावकारी घटनाक्रमों को मानव प्रयत्नों से केवल आंशिक रूप में ही नियंत्रित कर सकते हैं। अधिकांशतः ये अनियंत्रित ही रहते हैं। प्रत्येक आपदा एक नवीन प्रकार की घटना होती है। प्राकृतिक आपदाएँ प्रकृति के विकराल स्वरूप से परिचित कराती हैं तो तकनीकी दुर्घटनाएँ मानवीय त्रुटियों एवं अक्षमताओं को अभिव्यक्त करती हैं। अतीत की दुर्घटनाओं से बहुत कुछ सीखा जा सकता है बहुत से सुधार कार्यक्रम बनाए जा सकते हैं। लकिन व्यावहारिकता में ऐसा कुछ नहीं होता। इसलिए कहा गया है कि **'अतीत को यदि हम याद नहीं रखते तो घटनाक्रम दोहरा दिए जाते हैं।'**

पिछले कुछ दशकों में प्राकृतिक तथा मानवकृत आपदाओं की संख्या में भारी वृद्धि देखने को मिली है। इसी के साथ आपदा प्रबन्धन भी एक शास्त्र के रूप में स्थापित हो गया है। वैसे तो प्रबन्धन अपने आप में एक शास्त्र है किंतु आपदा प्रबन्धन इस दृष्टि से महत्व रखता हे कि आपदा के घटने के बाद उससे प्रभावित लोगों के कष्टों का निवारण एक आकस्मिक और तात्कालिक आवश्यकता बन जाता है जिसे पूरी निष्ठा, सेवाभाव, ईमानदारी, पारदर्शिता और इनसे बढ़कर मानवीय संवेदना क साथ सम्पन्न करना शासन और जनसामान्य सभी का परम कर्त्तव्य है।

आपदा की समानार्थक शब्दावली आकस्मिक संकट है। आपदा भी विशेष प्रकार की संकटपूर्ण स्थिति है। ऐसी स्थिति में निदान या उपचार तत्काल किये जाने आवश्यक हैं अन्यथा जान–माल दोनों की अपार क्षति हो सकती है। आपातकालीन परिस्थिति में बाधित समुदाय की परिस्थितियों से झूझने की शक्ति पर्याप्त नहीं होती, उसे अन्य समुदाय की सहायता लेनी पड़ती है। हम संकट को रोक तो नहीं सकते किन्तु आपदापूर्व तैयारी करके काफी हद तक लोगों के जीवन की रक्षा कर सकते हैं। अत्याधिक असुरक्षित क्षेत्र में रहने वाले लोग अपनी बुद्धि, ज्ञान और कौशल तथा सामुदायिक संसाधनों का उपयोग

करके आपदाओं का सामना करते आ रहे हैं और वे सदियों से प्रकृति का कोप झेलने में कामयाब रहे हैं।

प्राकृतिक आपदाएं सृष्टि के आरम्भ से ही घटित होती रही हैं। भूकम्प, सुनामी, चक्रवात, ज्वालामुखी विस्फोट, बाढ़, सूखा जैसी आपदाओं का एक लम्बा इतिहास हैं। मानव सभ्यता के विकास के साथ जीवन शैली के परिवर्तन और प्रकृति से दूर होने के कारण अनेक मानवकृत आपदाएं भी घटने लगी हैं, आतंकवाद, रासायनिक एवं जैविक दुर्घटनाएँ, नाभिकीय विस्फोट, महामारियाँ और एड्स जैसे रोग भी अब आपदा का रूप लेने लगे हैं। इन सबका सामना करने के लिए पहले से तैयारी रखना और घटित होने पर बचाव और राहत उपलब्ध कराना आपदा प्रबंधन का अंग है। आपदाओं के कारण विस्थापित लोगों का पुनर्वास भी महत्वपूर्ण है। आपदा की तीव्रता के सूचकांक विभिन्न प्रकार के होते हैं और इस कारण भ्रामक एवं त्रुटिपूर्ण भी हो सकते हैं। आधुनिक वैज्ञानिक उपकरणों की सहायता से इन आपदाओं की पूर्व सूचना मिल सकती है। लेकिन इन पूर्व सूचनाओं की प्रायः अवहेलना कर दी जाती है और इस कारण समुदायों को आपदा के घातक प्रहार सहन करने पड़ते हैं। जीवन रक्षण के प्रयास भी इस संदर्भ में समर्थ नहीं रह पाए। भविष्य की घटनाओं में भी जीवन रक्षण के मानवीय प्रयास विफल ही रहे हैं। वास्तव में पर्यावरण क्षति के कारण प्राकृतिक आपदाएँ भयानक रूप ले लेती हैं। बाढ़, तूफान, वनाग्नि की घटनाएँ अधिक व्यापक प्रकृति की हो जाती हैं। मानवीय गतिविधियों के प्रभावों से मुक्त प्रकृति की गतिविधियाँ संभवतः अधिक निश्चिता से व्यक्त की जा सकती हैं। न्यूटन एवं आइन्सटाइन ने केप्लर की खोजों की सराहना की। अपने पूर्वकालिक वैज्ञानिकों की भाँति केप्लर के अर्न्तमन में भी प्रकृति की सामंजस्यता के प्रति आकर्षण एवं सम्मोहन के भाव मानव मन में सदैव बने रहे। प्राकृतिक गतिविधियों में अन्तनिर्मित एकरूपता एवं सरलता को समझने की अभिलाषा वैज्ञानिकों के मन में सदैव बनी रही। मानव एवं प्रकृति की सामंजस्यता एवं आश्रितता को समझने के लिए वैज्ञानिक प्रयास आवश्यक है। विज्ञान प्रकृति के नियमों की सार्थक नियमावली दे सकता है जिसे अनुभवों के आधार पर स्वीकार कर सकते हैं। इन तथ्यों के आधार पर विकसित एवं विकासशील देश भयमुक्त होकर प्रगति के पथ पर अग्रसर हो सकते हैं। विकास पथ को आपदाओं की संभावनाओं से यथासंभव मुक्त करने की आवश्यकता अब अनिवार्यता बन गई है। गत वर्षों की इस नवीन धारा में आपदाओं के मूल कारणों के प्रति एक दार्शनिक दृष्टिकोण की आवश्यकता भी सर्वत्र अनुभव की जा रही है। संयुक्त राष्ट्र संघ की ओर से नियोजित आपदा प्रबंधन अध्ययन एवं प्रशिक्षण कार्यक्रम इसी दिशा की ओर किये गये प्रयास हैं। आपदाओं के सामाजिक एवं आर्थिक पक्षों की अवहेलना अब और अधिक समय तक नहीं की जा सकती है। विकास कार्यक्रमों की योजना बनाते समय इन व्यावहारिक वास्तविकताओं की ओर ध्यान देना आवश्यक है।

प्राकृतिक आपदाओं की पूर्व सूचना अनेक सन्दर्भो में सही नहीं रह पाती। अतः संकट के समय प्रशासनिक अधिकारियों की भूमिका एवं जीवन रक्षा के भार और अधिक महत्वपूर्ण हो जाते हैं। **फ्रायड ने 1930 में अपने विचार व्यक्त करते हुए कहा 'मानव समुदाय को इन प्राकृतिक आघातों के लिए वैज्ञानिक रीति से संरक्षण के उपाय खोजने होंगे।'** विज्ञान के माध्यम से इन आपदाओं को कितने अंशों में समझा जा सकता है तथा कितनी निश्चितता से उनकी पूर्व सूचना संभव हो सकती है। इस प्रकार के अनेक

प्रश्न हमारे समक्ष हैं। वैज्ञानिक रीति से प्राप्त की गई आपदा संबंधी जानकारियाँ अभी अपूर्ण हैं। इस दिशा में अभी और बहुत अधिक प्रयासों की आवश्यकता है। आपदाओं को सदैव ही संकटपूर्ण स्थिति के रूप में स्वीकार किया गया और उनके तत्कालिक उपचार और निदान के प्रयास किए गए। स्थायी रूप में आपदा संरक्षण प्रयासों को विकास योजना कार्यक्रमों के अनिवार्य एवं अन्तर्निहित तथ्यों के रूप में समन्वित करने की आवश्यकता अब समय की माँग बन चुकी है। प्राकृतिक आपदाओं की स्थिति में राहत–बचाव तथा पुनर्वास कार्य करने का प्राथमिक उत्तरदायित्व संबंधित राज्य सरकारों का है। केन्द्र सरकार तो वित्तीय तथा संचारतंत्र संबंधी सहायता देकर राज्य सरकारों के प्रयासों में योगदान करती है। सभी प्रकार की प्राकृतिक आपदाओं में आपदा प्रबंधन कार्य का समन्वय करने के लिए केन्द्र में गृह मंत्रालय एक नोडल मंत्रालय है। सूखा पड़ने के मामले में आपदा प्रबंधन का कार्य कृषि मंत्रालय के अधीन कृषि तथा सहकारिता विभाग द्वारा किया जाता है। राज्य स्तर पर राज्य के मुख्यमंत्री द्वारा सचिव की अध्यक्षता में एक समीति गठित की जाती है जो राहत कार्यो की देखभाल करती है। जिला प्रशासन सभी सरकारी योजनाओं के कार्यान्वयन और गतिविधियाँ का केन्द्र बिन्दु होता है। जिला मजिस्ट्रेट की अध्यक्षता में जिला स्तर पर एक आपदा प्रबंधन समीति गठित की गई है तथा खण्ड विकास अधिकारी ब्लॉक स्तर पर आपदा प्रबंधन सम्बन्धी सभी क्रियाकलापों के लिए नोडल अधिकारी होता है। गांव स्तर पर ग्राम आपदा प्रबंधन समीति का अध्यक्ष सरपंच होता है और वह ग्राम आपदा प्रबंधन योजना तैयार करने और आपदा प्रबंधन दलों को प्रशिक्षण प्रदान करने के लिए विभिन्न एजेन्सियों के साथ समन्वय करने के लिए उत्तरदायी होता है।

प्राकृतिक आपदाओं के कारण प्रतिवर्ष हजारों अकाल मृत्यु के शिकार हो जाते हैं और उससे कहीं अधिक लोग घायल और बीमार हो जाते हैं।संपति, परिसंपति और आधारभूत संरचनाओं का ह्रास हो जाता है। आपदाओं के कारण असुरक्षित एवं वंचित वर्ग के लोगों के लिए खतरा बढ़ जाता है और आपदा प्रभावित तथा आपदा संभावित समुदायों में सामाजिक–मनोवैज्ञानिक तनाव और सदमा व्याप्त हो जाता है। बाढ़ जैसी बारम्बार आने वाली आपदाओं से आपदा– संभावित समुदाय संकट से जूझने के सामर्थ्य और शक्ति से हीन हो जाने के कारण विश्वास की कमी के शिकार हो जाते हैं। आपदाओं के अचानक आने से विशेषकर तब जब विस्थापित लोग अस्थायी राहत शिविरों में शरण लेने के लिए विवश हों, बच्चों, शिशुओं और बुजुर्गो के प्रति उपेक्षा और अभाव का खतरा और अधिक बढ़ जाता है। विश्व बैंक के अध्ययन का अनुमान है कि आपदाओं में मारे जाने वाले लोगों में से 97 प्रतिशत लोग विकासशील देशों के होते हैं। आपदाओं से होने वाली क्षति, प्रभावित देशों के सकल घरेलू उत्पाद (जी. डी.पी.) का 2 से 15 प्रतिशत के बीच हो सकती है। मानव समुदाय इन आपदा प्रभावों को कम करने के लिए सदैव प्रयत्नशील रहते हैं। सभी प्रयासों के बावजूद जीवन की सुरक्षा कभी भी सुनिश्चित नहीं हो सकती, समय की गति के साथ–साथ इनमें भी अभिवृद्धि होती जाती है। प्राकृतिक आपदाओं की सघनता एवं निदान उपायों की सीमितता के कारण अविकसित और निर्धन देशों के लिए इनकी महत्ता विशेष रूप से बहुत अधिक है। निदान उपयों की सफलता अधिकांशतः समुदायों की प्रक्रिया पर आश्रित रहती है। जन समुदायों की आपदा संबंधी जागृति उनके निदान कार्यक्रमों को भी सुगम बना देती है।

जागृत जन समुदाय की यह स्वस्थता राजनैतिक एवं निर्णयात्मक स्तरों पर भी अभिव्यक्त होती है। इसलिए आवश्यकता यह है कि आपदा संबंधी जानकारी केवल वैज्ञानिक समुदाय अथवा पत्र–पत्रिकाओं तक ही सीमित न रह जाए। समाज के सभी वर्ग उनसे परिचित रहें। सामान्य जन जीवन की यह जागृति समस्या निदान में महत्वपूर्ण योगदान देती है।

आपदा प्रबंधन की प्रचलित तकनीक और सरकारी पहल से इतर अलग–अलग क्षेत्रों और आपदाओं के अनुसार विभिन्न स्थानीय समुदायों अथवा नागरिक समूहों को एक स्थानीय एवं जनपक्षीय आपदा प्रबंधन नीति या योजना बनानी चाहिए। इसमें एक प्रभावी प्रबंधन समूह, आपदा एवं राहत कार्य सूची बनाकर स्थानीय युवाओं को प्रशिक्षित करना चाहिए। सूचना व संचार तंत्रों के लिए इलाके के उत्साही युवाओं का समूह बनाकर हैम या कम्युनिटी रेडियों की स्थापना कर सकते हैं, जनस्वास्थ्य एवं पुनर्निर्माण/नवनिर्माण समिति बनाई जा सकती है। उड़ीसा में महाचक्रवात के बाद वहां सरसामा गांव में स्थानीय युवाओं ने **'ए सार मानव निर्माण समिति'** बनाकर अच्छा पुनर्वास कार्य किया।

प्रायः आपदाओं से मानवता खण्डित होती दिखती है लेकिन हमें धीरज और विवेक से आपदाओं से निपटना चाहिए। आपदाओं के लिए मानव समाज का संवेदनशील होना बेहद जरूरी है। यदि संकट में हमने धीरज और संवेदना खो दी तो यकिन मानिए हमारी जान तो बच सकती है लेकिन हम जीने लायक नहीं रह पाएंगे। इसलिए हर खास और आम व्यक्ति को चाहिए कि आपदाओं में धीरज, सहनशीलता और सहिष्णुता को न छोड़ें। महज थोड़े अनुशासन से हम न केवल समुचित राहत सामग्री प्राप्त कर सकते हैं बल्कि दूसरों को भी जीवन दे सकते हैं। हमने देखा है कि संकट के समय एक ही स्थान पर खतरनाक जीव और मनुष्य एक साथ टिके होते हैं और वे सब सुरक्षित बच जाते हैं।

वर्तमान में समुदाय आधारित आपदा प्रबंधन आपदा की संभावना वाले क्षेत्रों में काफी लोकप्रिय हो गया है। इसके अन्तर्गत आपदा प्रबंधन के स्थानीय उपायों में समुदाय को प्रमुख केन्द्र बनाया जाता है। बाहरी एजेंसियों स्थानीय प्रयासों को सुगम बनाने में अहम भूमिका अदा करती है। समुदाय आधारित आपदा प्रबंधन के जरिये लोगों द्वारा संसाधनों और बुनियादी सामाजिक सेवाओं पर नियंत्रण किया जाता है, जिससे इन आपदाओं के समय उपयुक्त कदम उठाने की क्षमता बढ़ जाती है। समुदाय आधारित आपदा प्रबंधन दृष्टिकोण से स्थानीय समुदाय को अपने पहले के अनुभवों के आधार पर अपनी स्थानीय स्थिति के मूल्यांकन के अवसर मिलते हैं। इससे स्थानीय समुदाय योजनाएं लाने और निर्णय करने में न सिर्फ भागीदारी करते हैं बल्कि उनको लागू करने में भी महत्वपूर्ण भूमिका निभाते हैं। कार्यान्वयन में भी समुदाय को बेहतर भूमिका दी जाती है, फिर भी समुदाय आधारित आपदा प्रबंधन जोखिम के वस्तुपरक आकलन और नियोजन की वैज्ञानिक प्रक्रिया की अनदेखी नहीं करता। स्थानीय लोगों को भावी खतरों से बचाने और उनमें सुरक्षा की भावना के संचार के उद्देश्य से समुदाय आधारित दृष्टिकोण के महत्व से सभी भलीभांति वाकिफ हैं। अनेक सामुदायिक समूह इन दृष्टिकोणों के अनुरूप कार्य करते हैं। इनमें राष्ट्रीय, अन्तर्राष्ट्रीय संगठन और सरकारी विभाग शामिल हैं।

ग्लोबल वार्मिंग के कारण हो रहे पर्यावरण सम्बन्धी परिवर्तनों ने समुदायों के समक्ष नयी चुनौती पेश कर दी है। मौसम सम्बन्धी परिवर्तनों के चलते लोगों की रोजी–रोटी का बड़ा संकट पैदा हो गया है। जलवायु परिवर्तन के कारण कहीं बाढ़ तो कहीं सुखा पड़ता है। समुदाय आधारित आपदा प्रबंधन से

प्रभावित लोगों को मदद मिलेगी। समुदाय आधारित आपदा प्रबंधन प्रक्रिया स्थानीय सोच निर्मित करती हैं, वर्तमान कार्यनीतियों को मजबूत बनाती है और जीवन तथा जीविका की सुरक्षा बढ़ाती है। इस प्रकार की क्षमताओं का निर्माण करके स्थानीय समुदायों को उन आघातों और आफतों से बचाया जा सकता है जो ये आपदाएं अपने साथ लाती हैं। साथ ही समुदाय आधारित आपदा प्रबंधन सतत विकास को जारी रखने में मदद करता है। अब **ह्यूगो ऑफ एक्शन (2005–2015) तथा आपदा प्रबंधन अधिनियम (2005)** बन चुका है तथा इसके लिए संस्थागत रूपरेखा तैयार कर ली गई है जिससे प्रभावित लोगों को राहत प्रदान किये जाने का कार्य जोरों पर चल रहा है। अकेले सरकार आपदा प्रबंधन की सम्पूर्ण जिम्मेदारी नहीं निभा सकती। राष्ट्रीय, राज्य, जिला और स्थानीय स्तरों के अतिरिक्त अनेक ऐसे संस्थान हैं जो देश में विभिन्न स्तरों पर आपदा प्रबंधन में लगे हुए हैं। इनमें शामिल हैं–पुलिस तथा अर्द्ध सैनिक बल, नागरिक सुरक्षा तथा होम गार्डस, अग्नि शमन सेवाएं, नेशनल कैडर कोर (एनसीसी), युवा संगठन, राष्ट्रीय एजेन्सियां, राष्ट्रीय एवं अन्तर्राष्ट्रीय स्वयंसेवी दल, सार्वजननिक एवं निजी क्षेत्र के उद्यम, मीडिया आदि सभी आपदा प्रबंधन में अहम भूमिका निभाते हैं। इन सभी संसाधनों का उचित और विवेकपूर्ण उपयोग किया जाना चाहिए तथा राहत कार्यों में पूरी ईमानदारी तथा पारदर्शिता बरतनी चाहिए जिससे आप आपदा पीड़ितों का विश्वास जीत सकें। आपदा ग्रस्त क्षेत्र में आवश्यक राहत सामग्री की व्यवस्था करना, उसे प्राप्त करना, भंडारण करना, उचित स्थान पर पहुँचाना और सही जरूरतमंद को वितरित करना, इन सभी कार्यों में अत्यधिक सजगता, तालमेल और पारदर्शिता आवश्यक है अन्यथा आपदा प्रबंधन का पावन दायित्व पूरा नहीं हो सकेगा। आपदा पीड़ित लोगों को सामान्य जीवन जीने योग्य बनाने के लिए उनका पुनर्वास करना आवश्यक है और शासन का यह परम कर्त्तव्य है कि स्वयंसेवी संस्थाओं, सरकारी मशीनरी और जन सहभागिता के माध्यम से आपदा प्रभावित जनता का उचित पुनर्वास किया जाए।

आपदा प्रबंधन की प्रभावकारी प्रणालियाँ सभी देशों के लिए नितान्त आवश्यक है। क्योंकि कोई भी देश प्राकृतिक अथवा मानव केन्द्रित आपदाओं से मुक्त नहीं रह सकता। आपदा प्रबंधन प्रणाली 3 मुख्य वर्गो में विभक्त रहती है। प्रथम उपक्रम ;तैयारीद्ध अथवा आयोजन द्वितीय प्रतिरोध एवं तृतीय उपशमन अथवा राहत कार्यक्रम। आपदा न्यूनीकरण कार्यक्रमों में सबसे अधिक प्रभावशाली कार्यक्रम प्रबंधन कर्मियों के प्रशिक्षण कार्यक्रम हैं। आपदा प्रभावित क्षेत्रों में सहायता कार्यक्रम कठिन प्रकृति के होते हैं। इस दृष्टि से सहायता कर्मियों के प्रशिक्षण कार्यक्रम और अधिक महत्वपूर्ण हो जाते हैं।

इस प्रकार यह स्पष्ट है कि प्रत्येक आपदा के फलस्वरूप उत्पन्न हानि का संकलन कठिन है। अविकसित देशों में इन प्राकृतिक आपदाओं के कारण जीवन हानि अधिक होती है। जीवन क्षति के 90 प्रतिशत भाग इन्हीं देशों में व्याप्त हैं। विश्व जनसंख्या का 1/4 भाग ही समृद्ध भूभाग है। साधन सम्पन्नता के कारण यहाँ जीवन सुरक्षा अधिक है। अविकसित देश सुरक्षा के लिए अधिक साधन नहीं जुटा पाते। इस प्रकार यहां प्राकृतिक आपदा जान–माल की क्षति अधिक होती है। भूस्खलन जैसी प्राकृतिक आपदाओं से प्रभावित क्षेत्रों के साधन–सम्पन्न निवासी एवं विवशता के कारण असुरक्षित क्षेत्रों में रहने वाले निर्धन समुदाय दोनों ही समान रूप से प्रभावित होते हैं। लेकिन पहली परिस्थिति में साधन

सम्पन्नता के प्रभाव से जीवन सुरक्षा अधिक सक्षम रहती है, जबकि निर्धन समुदाय में धनाभाव के कारण जीवन हानि व्यापक होती है। तकनीकी सुविधाओं एवं साधन सम्पन्नता के मिले–जुले प्रभाव देखने को मिलते हैं। सुरक्षा के सभी उपायों के रहते हुए भी असंभावित घटनाचक्र जीवन की वास्तविकता है। धनी–निर्धन दोनों ही समुदाय इन सत्यों से भली भाँति परिचित हैं। समाज के सभी वर्ग एक –दूसरे से घनिष्ठता से सम्बन्धित रहते हैं। आवागमन एवं संचार माध्यमों के द्वारा विश्व के सभी भाग एक दूसरे के निकट आ जाते हैं। वर्तमान युग में समुदायों में निकटता स्थापित करने के ये महत्वपूर्ण एवं सुगम उपाय हैं। इस प्रकार **'आपदा'** आज के संदर्भ में प्रभावित क्षेत्रों की भौगोलिक सीमाओं से परे सहभागिता एवं सहकारिता से सम्बन्धित हैं। वास्तव में प्रभावित जनसमुदाय प्रशासन से बहुत दूर स्थित होने के कारण साधारण परिस्थितियों में भी उपेक्षित रहते हैं। राजनैतिक प्रभावों से आपदाओं की प्रकृति और अधिक जटिल हो जाती है। वास्तविक समाधान प्राप्त करने के लिए सभी दलों में एकजुट होकर कार्य करने की तत्परता अवश्य होनी चाहिए। ऐसे समाधान प्राप्त करने के लिए दलो की सहमति **'मानवीयता के आधार पर सहायता कार्यक्रमों'** के अन्तर्गत समुदायों के व्यापक हितों को ध्यान में रखते हुए एकीकृत की जाती है।

वस्तुतः विभिन्न आपदाओं से निपटने के लिए लोगों द्वारा कामचलाऊ आकस्मिक योजना बनाने के लिए सामान्यतया बुनियादी सूचना, जोखिम का मूल्यांकन और आसूचना का विश्लेषण उपलब्ध होना भी पर्याप्त होता है। कार्य योजना बनाना किसी अकेले व्यक्ति का कार्य नहीं हो सकता क्योंकि अधिकाधिक लोगों के अनुभव और सूचना के आधार पर बनाई गई कार्य योजना अधिक सही साबित होती है। आकस्मिक योजनाएं विभिन्न स्तरों पर तैयार की जाती हैं जैसे कि आस–पड़ोस, ग्रामीण, खण्ड, जिला, राज्य तथा राष्ट्रीय स्तर। इसमें सरकारी तथा गैर सरकारी दोनों ही संगठनों को शामिल करते हुए अधिक प्रभावी बनाया जाता है जिससे अधिक प्रभावशाली एवं विश्वसनीय तरीके से आपदाओं का प्रबंधन किया जा सकता है। आपदा प्रबंधन में लोगों की भागीदारी अनिवार्य है जिसके आपातकालीन परिस्थितियों में समुदाय द्वारा समान्वित कार्रवाई किए जाने की संभावना बढ़ जाती है। आकस्मिक योजना बनाने का कार्य समाज के सभी वर्गो के लिए भाग लेने का एकमंच और सुअवसर है। योजना के निर्माण में प्रत्येक व्यक्ति को उचित महत्व दिया जाता है।

अतः निष्कर्ष रूप में कह सकते हैं कि आगामी वर्षों में आपदाओं की संकटपूर्ण घटनाएं और अधिक विषम बन सकती है। विश्व पर्यावरण में परिवर्तन एवं भूमण्डलीय ताप की अभिवृद्धि और अधिक समस्याएँ उत्पन्न कर सकती हैं। सामाजिक अस्तव्यस्तता एवं निर्धनता सम्मिलित रूप में विश्व समुदाय के वंचित जन–समुदायों को पर्यावरण शरणार्थियों के रूप में परिवर्तित कर देंगे। विश्व सुरक्षा को संभव बनाने के लिए अवसरों के सदुपयोग के लिए अभी सही दिशा में बहुत अधिक प्रयत्न आवश्यक हैं।

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पशुपालनः वृद्धि एवं विकास के प्रयास

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पशुपालन का आशय एक या अधिक पशुओं के समूह को, कृषि सम्बन्धी परिवेश में भोजन, रेशे तथा श्रम आदि सामग्रियां प्राप्त करने के उद्देश्य से पालतू बनाने से है। पशुओं को पालना ;पशुपालनद्ध आधुनिक कृषि का एक महत्वपूर्ण भाग है। पशुपालन कई सभ्यताओं में किया जाता रहा है यह शिकारी–संग्राहक से कृषि की ओर जीवनशैली के अवस्थांतर को प्रदर्शित करता है। वह व्यक्ति जो विशिष्ट रूप से व्यवसाय की दृष्टि से पशुपालन करना चाहता है, उसे पशुपालन संबंधी तकनीकियों के विषय में ज्ञान होना बहुत जरूरी है। पशुपालन के तहत मुर्गी पालन तथा मछली पालन सम्मिलित नहीं है हालांकि इन्हें विशेष रूप से मुर्गीपालन को, साधारण रूप से पशुपालन में सम्मिलित किया जाता है। पालतु पशुओं का प्रजनन तथा जीवन अवस्थाएं मनुष्यों के द्वारा संचालित होती हैं। समय के साथ पशुपालन का सामूहिक व्यवहार, जीवन चक्र तथा शरीर क्रिया विज्ञान मौलिक रूप से बदल गया है। कई आधुनिक फार्म पशु अब जंगली जीवन के लिए अनुपयुक्त हो चुके हैं। कुत्तों को पूर्वी एशिया में लगभग 15,000 वर्ष पूर्व पालतू बनाया गया था, बकरियां तथा भेड़ें लगभग 8000 वर्ष ई.पू. एशिया में पालतू बनायी गयी थी। शूकर अथवा सूअर 8000 वर्ष ई.पू. पहले मध्य एशिया व चीन में पालतू बनाए गए थे। घोड़े को पालतू बनाये जाने के सबसे प्राचीन प्रमाण लगभग 4000 ई.पू. से समय से प्राप्त होते हैं।

बाईबल के किंग जेम्स संस्करण में पशुपालन को **'कैटल'** (मवेशी) द्वारा इंगित किया जाता है न कि **'डीयर'** (हिरन) के द्वारा इस शब्द का प्रयोग ऐसे जंगली पशुओं के लिए किया जाता था जो किसी के स्वामित्व में नहीं होते थे। आगे चलकर अंग्रेजी में कभी–कभी छोटे पशुधन को **'स्माल कैटल'** भी कहा जाने लगा तथा जिसका चल–सम्पति अथवा भूमि के अभिप्राय में प्रयोग होता था। आज, मवेशी शब्द का अर्थ, बिना किसी विशेषक के, आमतौर से पालतू गोवंशीय पशु होता है।

भारत में पशुओं की संख्या शुष्क एवं अर्द्ध शुष्क प्रदेशों में सर्वाधिक पायी जाती है। भारत की प्रमुख पशु मेखला भारतीय मरूस्थल के चारों और उत्तर–पश्चिमी भाग में फैली हुई है। भारत में पशुपालन के क्षेत्र अन्य शीतोष्ण देशों के समान ही है। भारत का प्रधान पशुपालन क्षेत्र पंजाब, हरियाणा,

राजस्थान, मध्यप्रदेश, गुजरात और उत्तरप्रदेश है। इन क्षेत्रों में वर्षा की कमी के कारण कृषि कार्य के प्रति लोग कम ध्यान देते हैं और पशुपालन पर अधिक। भारत के आर्द्र प्रदेशों के पशु दुबले–पतले, रोगी और कम दूध देने वाले होते हैं। यही कारण है कि अधिक आर्द्र भागों में शुष्क प्रदेशों की अपेक्षा उतना ही दूध प्राप्त करने के लिए अपेक्षाकृत अधिक पशु पालने पड़ते हैं।

वर्तमान समय में पशुपालन की जो नवीन तकनीकें विकसित हुई हैं, वे मानवीय हस्तक्षेप को न्यूनतम करने, पैदावार को बढ़ाने तथा पशु स्वास्थ्य को बेहतर बनाने पर ध्यान देती हैं। लाभ, गुणवत्ता तथा उपभोक्ता की सुरक्षा, ये सब पशुओं के पालन के तरीकों पर निर्भर करते हैं। दवाईयों का प्रयोग तथा भोजन अनुपूरक पर उत्पाद को उपभोक्ता के स्वास्थ्य, सुरक्षा तथा पशुओं की देखभाल की कीमत पर न बढ़ने देने के लिए नियंत्रण अथवा निषेध किया जा सकता है। आधुनिक पशुपालन तकनीकों से प्राप्त पशुओं का बेहतर स्वास्थ्य पर अब प्रश्न उठने लगे हैं। मवेशियों को मकई खिलाया जाना जो सदैव घास खाती रही हैं, इसका एक उदाहरण है जहां पर मवेशी इसके अधिक अभ्यस्त नहीं है, वहाँ इनका अधिक प्रयोग हानिकारक हो सकता है।

पशुपालन शब्द से साधारण तथा स्वस्थ पशुओं के वैज्ञानिक ढंग से आहार, पोषण, प्रजनन एवं प्रबन्ध का बोध होता है। पाश्चात्य देशों में पशुपालन एवं पशु चिकित्सा दोनों भिन्न–भिन्न माने गए हैं पर भारत में ये दोनों एक–दूसरे के सूचक समझे जाते हैं 1827 ई. में भारत में सर्वप्रथम पूना में सैनिक पशुचिकित्सा विद्यालय की स्थापना की गई थी। पशु रोग के निदान के लिए सर्वप्रथम प्रयोगशाला 1890 में पूना में स्थापित हुई थी। पशु चिकित्सा का सबसे पहला विद्यालय फ्रांस के लिओन में 1762 में खुला था। मानव स्वास्थ्य की दृष्टि से मांस एवं दूध देने वाले पशुओं और पक्षियों की चिकित्सा पर विशेष ध्यान दिया जा रहा है। प्राणि उद्यान तथा पशु पार्कों में रखे घरेलू या जंगली पशुओं, पशुशालाओं, गोशालाओं और कुक्कुटशालाओं के पशुओं की भी देखभाल चिकित्सकों को करनी पड़ती है। पशु रोग अनुसंधान एवं रोग निदान केन्द्र, इज्जतनगर केन्द्रीय प्रयोगशाला के रूप में काम कर रहा है। उक्त प्रयोगशाला भारतीय पशु चिकित्सा अनुसंधान संस्थान के अन्तर्गत है।

पशुओं की देखभाल से कहीं न कहीं मानव का हित भी जुड़ा हुआ है। हालांकि, पशु कल्याण खेती प्रथाओं पर वैज्ञानिक अनुसंधान की एक व्याख्या के परिप्रेक्ष्य पर आधारित है। इसके विपरीत, पशुओं के अधिकार का दृष्टिकोण है कि लाभ के लिए पशुओं का उपयोग, अपनी प्रकृति के अनुसार, पालन प्रथाओं के बावजूद आमतौर पर शोषण ही है। पशु कल्याण समूह आम तौर पर पशुधन पालन की प्रथाओं पर सार्वजनिक चर्चा करते हुए पशुधन के उद्योगों पर अधिक नियंत्रण तथा जांच का अनुमोदन करते हैं। पशु कल्याण समूह जैसे आरएसपीसीए, अक्सर पहली दुनिया के देशों में सरकारी स्तर पर नीति के विकास पर आवाज उठाते हैं। पशु अधिकार समूह अपनी बात रखने में कठिनाइयां महसूस करते हैं, अतः वे और अधिक आगे बढ़ते हुए जन अवज्ञा अथवा हिंसा पर उतर आते हैं। जहां पशुधन को शक्ति के स्त्रोत के रूप में इस्तेमाल किया जाता है, उन्हें अपनी श्रम सम्बन्धी सीमाओं से परे धकेल दिया जाता है। भारत के आर्द्र प्रदेशों के पशु दुबले–पतले, रोगी और कम दूध देने वाले होते हैं। गायों

का 5 प्रतिशत और भैसों का 57 प्रतिशत भाग भारत में मिलता है। किन्तु पशु संख्या का लगभग आधा भाग निम्न कोटि का एवं दुर्बल होता है। पशुओं की तुलना में भारत में चरागाह क्षेत्र भी बहुत कम हैं अर्थात कुल क्षेत्र के 4 प्रतिशत पर स्थायी चरागाह पाये जाते हैं। उत्तरप्रदेश में सर्वाधिक 15 प्रतिशत गाय, बैल पाये जाते है। इसके बाद अन्य प्रदेशों में जैसे– मध्यप्रदेश में 14 प्रतिशत, बिहार में 9.2, महाराष्ट्र में 8.8, राजस्थान में 7.2, आन्ध्रप्रदेश में 7.3, प. बंगाल में 6.5, तमिलनाडु में 6.2, प्रतिशत है। राजस्थान के पश्चिमी जिले बाड़मेर, जैसलमेर, जोधपुर, नागौर आदि क्षेत्र प्रमुख रूप से गाय बैलों के लिए प्रसिद्ध है। देश में भैंस पालन सर्वाधिक उत्तर प्रदेश, हरियाणा, पंजाब, राजस्थान, महाराष्ट्र, गुजरात, पूर्वी और पश्चिमी बिहार, झारखण्ड, आन्ध्रप्रदेश तथा मध्यप्रदेश में किया जाता है। कुल भेड़ों का 60 प्रतिशत राजस्थान, आन्ध्रप्रदेश एवं तमिलनाडु में पाया जाता है। कुल बकरियाँ का 50 प्रतिशत राजस्थान, महाराष्ट्र, बिहार और तमिलनाडु में मिलता है। 65 प्रतिशत घोड़े और खच्चर उत्तरप्रदेश, मध्यप्रदेश और महाराष्ट्र तथा अन्य राज्यों में पाए जाते हैं।

पशुधन में सुधार लाने के उद्देश्य से गुणवत्ता के आधार पर विभिन्न प्रयास किये जाने चाहिए, जैसे – पशुओं के देखभाल की अच्छी व्यवस्था और चारे के उत्पादन को बढ़ाना। पशुओं को स्वच्छ रखने के लिए अच्छी व्यवस्था करके उनके खान–पान, स्वास्थ्य एवं बीमारियों पर तत्काल नियंत्रण हेतु समुचित चिकित्सकीय सहायता ग्रामीण स्तर तक शीघ्र उपलब्ध की जानी चाहिए। उनके बाड़ों को भी साफ सुथरा, बीमारी रहित एवं सूखा रखा जाए। समुचित चारे की उपलब्धता पशु सुधार के लिए सबसे महत्वपूर्ण है। बरसीम, हरा चारा एवं पशु आहार तथा अन्य पौष्टिक चारे को वैज्ञानिक विधि से सुरक्षित कर अधिक पौष्टिक चारा प्राप्त किया जाए। साथ ही पशुओं की श्रेष्ठ, उत्तम दुधारू बलशाली प्रजाति का वैज्ञानिक प्रविधियों से विकास कर सकते हैं। कितने की सरकारी फार्मों पर विभिन्न नस्ल के सांड तैयार किए जाते हैं और फिर उन्हें नस्ल सुधारने के लिए विभिन्न क्षेत्रों में वितरित कर दिया जाता है। प्रजनन के लिए प्रतिवर्ष लगभग 10 लाख सांड उपलब्ध होते हैं। परन्तु यह संख्या देश की आवश्यकता का थोड़ा ही भाग पूरा करती है। पशुधन की दशा में सुधार लाने के उद्देश्य से सरकार द्वारा विभिन्न योजनाएं संचालित की गयी, जिनमें–उत्तम सांड केन्द्र, गौ सदन, गौशालाएं, ग्राम केन्द्र योजना तथा पशुओं से सम्बन्धित बीमारियों के इलाज से सम्बन्धित व्यवस्था की गई है। केन्द्रीय पशु प्रजनन फार्म पशुओं की नस्ल में सुधार करने के लिए **सूरतगढ़ (राजस्थान), चिपलिमा और कोरापुट (उड़ीसा), धमरोद (गुजरात) तथा अलामघी (तमिलनाडु)** में स्थापित हैं। अच्छे वर्ण संकर नस्लों का आयात योजना के अन्तर्गत आस्ट्रेलिया और न्यूजीलैंड से जर्सी और हॉल्स्टीन फ्रीजियन नस्लों का आयात कर उन्हें विभिन्न राज्यों में बांटा जाता है। विस्तृत पशु विकास परियोजनाओं के अन्तर्गत 1964–65 से ही मुख्य दुग्ध उत्पादन क्षेत्र में दुग्ध का उत्पादन बढ़ाने के लिए 127 परियोजनाएं कार्य कर रही हैं। आज भी देश में लगभग 3500 बूचड़खाना स्थापित हैं जिनमें सालाना लगभग दस लाख टन मांस उपलब्ध होता है। दूध देने वाले चौपायों की प्रजाति सुधार में **राष्ट्रीय डेयरी विकास बोर्ड (NDDB) आनन्द, गुजरात**

और **खेड़ा डेयरी विकास आनन्द** द्वारा विस्तारित योजना के तहत शोध तथा सहयोग एवं अनुदान तथा सहकारिता के माध्यम से प्रशंसनीय सेवा की जा रही है। **राष्ट्रीय डेयरी विकास बोर्ड (NDDB) आनन्द (गुजरात)** के मुख्य वैज्ञानिक डॉ. वर्गीज कुरियन की देखरेख में **ऑपरेशन फ्लड** अर्थात् दुग्ध क्रांति से देश में दुग्ध उत्पादन में अचानक वृद्धि देखने को मिली।

यदि कोई व्यक्ति पशुपालन व्यावसायिक दृष्टि से करता है तो उसे पशुपालन सम्बन्धी तकनीकी ज्ञान प्राप्त करना अति आवश्यक है। बैंक के तकनीकी अधिकारी/पशुचिकित्सक आदि की सहायता से स्वस्थ एवं अधिक उत्पादन वाला पशु ही खरीदना चाहिए। खरीदे गये पशु को तुरन्त रोगों के बचाव के टीके लगवाने चाहिए। कम उत्पादक अथवा अनुत्पादक पशुओं की भी समय–समय पर छंटनी करते रहना चाहिए तथा उनकी जगह नये पशुओं को रखना चाहिए। पशुओं को खरीदने से पूर्व एक पशुपालक के लिये पशुओं की आयु के विषय में पूरी जानकारी होना अति आवश्यक है। पशुओं के सींग के छल्लों एवं दांतों की संख्या से आयु का पता लगाया जा सकता है। पशुशाला का निर्माण स्वच्छ, ऊँचे एवं हवादार स्थान पर किया जाये। गाय एवं भैंस के नवजात बच्चों को खीस (कोलेस्ट्रम) अवश्य पिलायें। पशुओं की तंदुरूस्ती के लिए संतुलित पशु आहार एवं हरा चारा अवश्य दें। प्रजनन योग्य पशुओं को गर्भाधान कराने हेतु कृत्रिम गर्भाधन तकनीकी का प्रयोग किया जाना चाहिए क्योंकि सांड द्वारा प्रजनन से जनन अंगों की बीमारी फैल सकती है। जबकि कृत्रिम गर्भाधान द्वारा अति उत्तम प्रजाति के सांड के वीये से नस्ल सुधार होता है एवं बीमारी नहीं फैलती है। संकर नस्ल की गायों में संकर नस्ल के सांड के वीर्य से कृत्रिम गर्भाधान करवाना चाहिए, इससे उत्पन्न वत्स में विदेशी एवं देशी रक्त का 50–50 प्रतिशत रहता है। भैसों में मुर्रा सांड के वीर्य से कृत्रिम गर्भाधान करवाना चाहिए। गर्मी आने के 12–14 घंटे के पश्चात् ही कृत्रिम गर्भाधान अथवा प्राकृतिक गर्भाधान कराने पर बल दिया जाना चाहिए। पशु को कृत्रिम गर्भाधान कराने के 21 दिनों के बाद गर्मी के लक्षणों का पुनः निरीक्षण करना चाहिए। कृत्रिम गर्भाधान के 90 दिन बाद गर्भ परीक्षण भी करवाना चाहिए। गर्भवती गाय/भैंस को आमतौर पर 30–35 किलोग्राम हरा चारा, 3–4 किलोग्राम सूखा चारा, 2.5 किलोग्राम दाना तथा लवण मिश्रण देना चाहिए। नवजात शिशुओं को जन्म के 15 दिनों के बाद पेट के कीड़ों से बचाव हेतु पशुचिकित्सक की सलाह पर दवा पिलायें। दूध दुहना प्रारम्भ करने के लगभग एक मिनट पूर्व गाय को पुंसरा लेना चाहिए। सामान्यतः दुग्ध एवं दुग्ध उत्पाद विपणन राज्य के जन सामान्य उपभोक्ताओं के साथ–साथ तीर्थ यात्रियों, पर्यटकों तथा मरीजों द्वारा किया जाता है। इस हेतु असंगठित क्षेत्र में मैदानी क्षेत्र में अनेकों दुग्ध व्यापारी/डेयरियां क्रियाशील हैं, जो गांव स्तर से दूध का उपार्जन करके स्वच्छ कर वातावरण में दूध एवं दुग्ध पदार्थों को तैयार करके उनका विपणन करते हैं। इस स्थिति के निराकरण हेतु सहकारी क्षेत्र में राज्य के सभी जनपदों में ग्रामीण क्षेत्र में दुग्ध उत्पादन सहकारी समितियां जनपद स्तर पर जिला दुग्ध उत्पादन सहकारी संघ और प्रदेश स्तर पर उत्तरांचल सहकारी डेयरी फेडरेशन का गठन हुआ है। मार्केटिंग पद्धति को और व्यापक करने के उद्देश्य से शासन के प्रयास से **राष्ट्रीय डेयरी**

विकास बोर्ड एवं उत्तरांचल सहकारी डेयरी फूडस लि. संस्था का संगठन किया है, जिनके द्वारा दुग्ध एवं दुग्ध पदार्थों के विपणन का कार्य किया जाता है। **राष्ट्रीय कृषि एवं ग्रामीण विकास बैंक (नाबार्ड)** देश में कृषि से जुड़े क्षेत्रों में विभिन्न कार्यों हेतु ग्रामीण बैंक, सहकारी बैंक, राष्ट्रीयकृत बैंक आदि के माध्यम से किसानों/पशुपालकों को ऋण सुविधाएं मुहैया कराता है। पशुओं के अभिलेख रखने के साथ ही बीमा भी करवाना चाहिए।

वर्तमान युग में भारत में दुग्ध उत्पादन उद्योग के रूप में संगठित रूप से किया जा रहा है। जिसके अन्तर्गत सार्वजनिक क्षेत्र के साथ निजी क्षेत्र की भी समान भागीदारी है। वर्तमान में **राष्ट्रीय डेयरी विकास बोर्ड** दूध को संरक्षित करना, उससे विभिन्न पदार्थ बनाना एवं शुद्ध दुग्ध वितरण की सबसे बड़ी इकाई है। **अलीगढ़ के कैवेण्डर्स, आगरा की राधास्वामी संस्था, मुंबई की आरे, आनन्द की अमूल, दिल्ली की मदर डेयरी, मैसूर की रायकेरा, बिहार की सुधा डेयरी और राजस्थान की अमूल डेयरी** देश के प्रमुख डेयरी उद्योग केन्द्र हैं। सन 1970 के बाद राष्ट्रीय डेयरी विकास बोर्ड के प्रयास से सहकारिता क्षेत्र में प्रत्येक 50,000 से एक लाख या अधिक जनसंख्या वाले शीतायन एवं डेयरी केन्द्र स्थापित किये गए हैं। विश्व बैंक के सहयोग से राजस्थान, मध्यप्रदेश, और कर्नाटक में तीन एकीकृत पशु एवं दुग्ध विकास परियोजना चल रही हैं।

भारत के लगभग सभी हिस्सों में मुर्गीपालन किया जाता है। समाज के कमजोर एवं निर्धन व्यक्तियों, भूमिहीनों, श्रमिकों तथा छोटे किसानों के लिए अतिरिक्त आय एवं पौष्टिक आहार का सबसे उत्तम कम व्यय वाला साधन मुर्गीपालन है। डेनमार्क की सहायता से पुणे में 30 लाख रूपये की लागत से एक आधुनिकतम मुर्गी प्रक्रिया संयंत्र स्थापित किया गया है। मुर्गीपालन में प्रशिक्षण देने के लिए एक **केन्द्रीय प्रशिक्षण संस्थान, बंगलौर** के निकट हसारघट्टा में स्थापित किया गया है। रेशम के कीट का पालन भारत में काफी बड़े स्तर पर किया जाता है। इसकी प्राप्ति शहतूत के वृक्ष पर पोषित कोकूनों से होती है। देश के कई राज्यों में रेशम का कीड़ा पालने के अनुकूल परिस्थितियाँ विद्यमान हैं। भारत में कीड़ों के संपोषण के लिए शहतूत, महु, साल आदि के वृक्ष बहुतायत से मिलते हैं।

वर्तमान समय में भारत में मत्स्य उद्योग काफी तीव्र गति से फल फूल रहा है। सम्पूर्ण पूर्वी तटीय भाग में जहाँ मछली की खपत एवं निर्यात हेतु मांग बढ़ती रही है वहीं इसकी फर्मिंग का एवं मत्स्य उद्योग का वैज्ञानिक विकास भी होता रहा है। जो भविष्य में मत्स्य उद्योग के लिए एक शुभ संकेत है। भारत की अर्थव्यवस्था में इस उद्योग का सराहनीय योगदान है। मछलियों को सुरक्षित रखने के लिए शीत भण्डार एवं सुखाने व परिष्करण की इकाईयां स्थापित की गई हैं। **The central Institute of fisheries Nautieal & Engineering Training(CIFNET)** द्वारा कोच्चि और विशाखापट्टनम में मछुआरों को ट्रेनिंग दी जाती है।

भारत सरकार के समन्वित कार्यक्रम के अन्तर्गत राज्यों और केन्द्र शासित प्रदेशों को सहायता प्रदान की जाती है, जिसमें टीकाकरण, मौजूदा पशु चिकित्सा, जैविकी उत्पादन इकाईयों को सुदृढ़

करना, मौजूदा रोग निदान प्रयोगशालाओं को सुदृढ़ बनाना और पशु चिकित्सकों तथा इस क्षेत्र में काम कर रहे अन्य व्यक्तियों को प्रशिक्षण देने का कार्य चल रहा है। इसके अलावा सभी राज्यों और केन्द्रशासित प्रदेशों में पशुओं या मुर्गियों में होने वाली बीमारियों से सम्बन्धित सूचनाओं को एकत्र करना भी इस कार्यक्रम में शामिल है। पशुओं की सही देखभाल न होने से उन्हें जानलेवा रोग अपना शिकार बना लेते हैं। अतः रोगों के नियंत्रण हेतु स्वच्छता के नियमों का कठोरता से पालन, रोगग्रस्त पशुओं का पृथक्करण तथा आयात किए हुए पशुओं का संगरोधन किया जाना आवश्यक है। पशुओं को यदि रोगों से मुक्त तथा उन्हें बलशाली बनाए रखना है तो उन्हें संतुलित तथा पौष्टिक चारे का सेवन कराया जाना चाहिए।

यह कहना कतई गलत न होगा कि ग्रामीण क्षेत्रों में किसी व्यक्ति की संपन्नता को पशुधन से आंका जाता रहा है। इसलिए ग्रामीण आंचल में यह कहावत प्रचलित है कि **'जिसके घर में काली, उस घर सदा दीवाली।'** हरियाणा के हिसार जिले के गांव मुकलान के किसान पशुधन के महत्व को समझते हुए आज भी इस कहावत को चरितार्थ किए हुए हैं और इस दिशा में ग्रामीणों का नेतृत्व कर रहे हैं। हरियाणा दुनिया की सबसे अच्छी मुर्राह भैंस के लिए विख्यात है। हरियाणा सरकार भी इस नस्ल की भैंस के संरक्षण व विकास के लिए सतत् प्रयास कर रही है। मुर्राह जाति की विश्व प्रसिद्ध भैंसों के पालन के लिए इस क्षेत्र में ओम प्रकाश आज मुकलान व आस पास के गांवों के युवकों के लिए प्रेरणा का स्त्रोत बना हुआ है। अगर मुर्राह नस्ल की भैंसों के निर्यात पर प्रतिबंध लगाया जाए तो हरियाणा दूध दही को खाने वाला प्रदेश पुनः बन सकता है। आर्थिक साधन के रूप में पशुओ की भूमिका के आधार पर यह अवश्य ही कहा जा सकता है कि किसी देश की संपन्नता को पशुधन के आधार पर आंका जा सकता है।