e-Content

Summaries of Lectures

UGC-Academic Staff College

Guru Nanak Dev University, Amritsar

Issues in Higher Education

Dr. Bharti Dogra
IGNOU, New Delhi

"University is the place where the right kind of leadership in all walks of life is developed". Gifted youth in different pursuits of excellence are identified. The University then helps in inculcation of physical fitness, the development of powers of the mind, cultivation of the right interests, attitudes and promotion of moral and intellectual values (University Education Commission, 1948-49).

Higher education in India has two phases, Pre-independence colonial phase set the beginning of modern higher education in 1854 with Wood's dispatch and creation of universities of Calcutta, Madras and Bombay in 1857.The post independence phase marks the transition from elite to mass higher education. Starting with 18 universities and 591 colleges with 210 students enrolled at the time of independence in 1947, these have increased to above 659 and 33,023 colleges and 25.9 million students. India now ranks second in the world in terms of enrollment of students after China; third being USA.

(Source: FICCI & EY: Higher Education in India: Twelfth Five Year Plan (2012-2017) and beyond, pg. 8)

Given the magnitude of the system and its operation, higher education in India is embroiled with host of issues and emerging challenges. Some of these significant ones are enumerated below.

1. **Equity**: Increasing access in higher education is also associated with increasing gender parity-something like 10 per cent to 40 per cent of women's enrollment from 1950-51 to 2002-2003 in higher education (degree and above level). Discipline-wise disparity is glaring. Very few girl students in professional courses. Social parity has improved over the years. The social and political forces at work, shaping the policy of the state ultimately benefited the rich. State policies in higher education must, therefore, provide space for increasing gender and social parity, as first wave of state supported higher education opened the doors of job opportunity for both sexes and socially deprived sections.
2. **Regional Bias**: There has developed a strong regional bias in the distribution of professional institutions. Here the divide exists between the north and the south. Southern states such as Andhra Pradesh, Maharashtra, Tamil Nadu, Karnataka and to some extent Kerala account for the bulk of the professional institutions in India. For example, in 2007, out of total 977 Engineering and Technology institutions the above mentioned five states accounted for 635 institutions i.e. roughly 66 per cent of total institutions in five states alone. Private sector in these five states account for over more than half of the total Engineering and Technology institutions in India. Similar north-south divide exists in the other branches of professional education in India. This has an important implication for the northern states. Since most of the students from the poor northern states take admissions in the private professional institutions, higher the fee structure higher is the drain of money from the north to the south. This fact has very important implication in terms of policy and planning design of professional institutions.
3. **Quality**: There is no published index of quality, either in terms of input, process or output indicators in higher education that could, to a certain extent, assess quality objectively. There are, however, some different views that have been expressed. Balance

of opinion gives the verdict that except for *islands of excellence* overall quality is far from satisfactory. Quality is a major concern for surviving in a knowledge economy. In the triangle, with its vertices as access, equity and quality, it is argued that quality has suffered due to the trade off with quantity. As resources are limited so they are exhausted in expansion and diversification with little left for quality intervention.

4. **Globalisation:** can be most commonly defined as the process of international integration arising from the interchange of world views, products, ideas, and other aspects of culture, which promises dramatic and rewarding change to the higher education systems of the developed as well as developing countries. Role of WTO and GATS has changed the landscape of higher education in developing and developed countries. This has also introduced different forms of higher education like translocation and transnational education, on-line learning, distance education etc.
   Translocation is the act, process or an instance of changing locations or position. Transnational education (TNE) includes "all types of higher education study programmes or sets of courses of study, or educational services (including those of distance education) where learners are located in a country different from the one where the warding institution is based". Some common forms of TNE are Franchising, Twinning programmes, Branch campus, Off campus etc.
5. **Curriculum upgrading, updating and diversification** so as to meet the needs of the knowledge economy. The major emphasis should be on learning skills rather than imparting knowledge.
6. **Continuous Professional Development** of higher education teachers is a must for any higher educational system.
7. **Need for higher and further education while in gainful employment, is still a rare phenomenon:** Although open learning comes here for rescue. Open learning is primarily a goal or an educational policy. An essential characteristic of 'open learning' is the removal of barriers to learning. This means
   - no prior qualifications to study
   - meant for students with disabilities
   - nobody should be denied access
   - must be scalable as well as flexible

Recently, technology has redefined the meaning of open learning especially OERs. OERs include openly licensed course materials, lesson plans, textbooks, games, softwares and other materials that support teaching-learning process. They make teaching-learning more accessible, especially where money for learning materials is scarce. They also nourish the kind of participatory culture of learning, creating, sharing and cooperation that rapidly changing knowledge societies needs.

8. **Plagiarism:** If you use another person's work and do not attribute that work to the author, including copying text verbatim, paraphrasing a phrase or summarizing an idea, you are essentially committing *Plagiarism*.
   Plagiarism usually occurs when a writer fails to
   - cite quotes or ideas written by another author
   - enclose direct text in quotes; or
   - put summaries and/or paraphrases in the his/her own words

Let us first try to understand the concept of 'authorship'. Authorship refers to the production and ownership of ideas and intellectual material, such as books, articles, images etc. If an individual

is the owner and producer of some learning material then it is considered as individual property rather than communal property. Therefore, improper or incomplete acknowledgement of a source of information is treated as intellectual theft or Plagiarism.
The following need referencing:

- ideas and quotations taken from journal articles, books etc.
- information taken from the web
- images from the web and elsewhere
- newspaper articles

Urban Landscape Horticulture

Dr. Jaswinder Singh Bilga
Indian Instiute of Scinence Education and Research
Govt of India, MOHALI-140306, Punjab.
Email: bilgalandacpes@yahoo.com

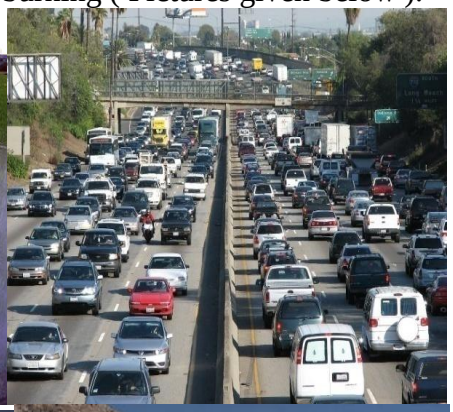
ABSTRACT

Urban Landscape Horticulture through Extensive planning, plantation and maintenance (95% survival) in Ludhiana during 1999-2002 brought down its pollution level from the second highest number in India to twenty second position (2006). Similar exercise in Jalandhar during 2006 and 2007 brought this city out of top ten highly polluted cities in 2010 but Ludhiana again fell in the list of top ten polluted cities due to non continuity of plantation drives. Amritsar, Bathinda, Chandigarh, Patiala and SAS Nagar were never so highlighted among top polluted cities due to continuous efforts for the development of Urban Landscape Horticulture.

All over the world there is fast growth of Population, Urbanization, Industrialization, Deforestation, Vehicular population, Agricultural activities, Desertification, And Fossil fuel burning that causes large scale imbalance in atmosphere resulting to pollution that is harmful for health. Urban Landscape Horticulture is an important tool to keep the natural balance intact and provide pleasant living surrounding. Horticulture, Landscape Horticulture ,Urban Horticulture ,City Landscape, Landscape Architecture, Urban Landscape, Urban Landscape Architecture, Peri-Horticulture, Urban Forestry, are the different subjects but somehow related directly or indirectly with urban beautification and greening. International Society for Horticultural Science (ISHS) describes this as Landscape and Urban Horticulture. Under Indian Council Agricultural Research its Masters in Landscaping and Floriculture. Ohio State University Columbus USA, where from Punjab Agricultural University Ludhiana introduced the subject in India for the first time (1972) is Landscape Horticulture. This could not be followed in our Agricultural universities in true spirit, needs Landscape to be separated from Floriculture because both the disciplines are different though equally important. In some other nations In some of the countries, Landscape Architecture is attached with Universities of Forestry or with Fine Arts department.

For pleasant human living 33 % of our surrounding be green It works even if comes around 13-15 % ,But majority of the cities vary from 3-5 %, Chandigarh " The City Beautiful " is covered with 28 % but Nanjing (China) sixty times bigger then Chandigarh is 42 % green. Three decades back when 80% of the population was rural and 20% in urbans. At present city population is increased to 30% while rural is 70% but Mohali have 48%.Industries are blamed to be the major polluters, infect 70% of urban pollution is from vehicles while industry is causing 30%. Number of vehicles per head ,that is 800 per thousand in US where as only twelve per thousand in India. When we study the pollution extent in our cities then the top ten polluted cities in India are as 1st. is Ankles war 2nd Vapi - Gujarat, 3rd Ghaziabad 4th Singrauli in Uttar Pradesh, 5th Korba in Chhattisgarh, 6th is Chanderpur in Maharashtra, 7th is Ludhiana in Punjab, 8th is Vellore of Tamil Naidu, 9th Bhiwandi in Rajasthan and the 10th is Angul Telcher in Orissa while the top ten beautiful cities of the world include Vienna - Austria, Zurich, Geneva - Switzerland, Vancouver - Canada, Auckland - New Zealand, Dusseldorf, Munich and

Frankfurt in Germany, Bern – Switzerland and Sydney – Australia. Carbon emissions are claimed to be coming from the industries but in fact its 70 % from vehicles while 30 % from Industries. The major human activities responsible for pollution and global warming are excessive use of agrochemicals, over population of vehicles, industrialization, desertification and deforestation along with fossil fuel burning (Pictures given below).

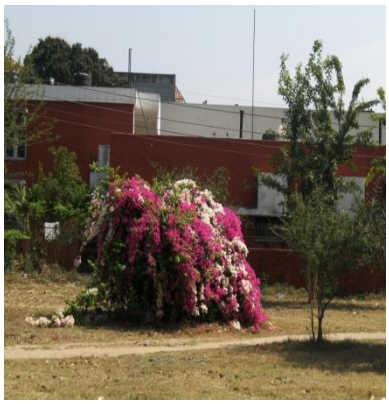
The scope for the development of Urban Landscape Horticulture includes parks, green belts, road sides, islands, round abouts and central verges. Educational / Health Institutes / Showrooms, Malls. Govt. Office, Railway Tracks, Canals, Sports complexes, Cremation Ground, Ponds etc. Satellite / peripheral a forestations through indigenous species. Local Bodies i.e. Municipal Corporations , Municipal Councils, Improvement Trusts and Urban Development authorities of the state. The Maximum number of parks in Punjab lies under the municipalities (2669), then urban development authorities(949) and the remaining (668)under the management of city trusts. Similarly more green belts (98),round abouts(120) and big gardens (52) also are being maintained by Municipal Corporations and Councils as compared to Urban Development authorities and Improvement Trusts .Approximately half of these greens are being maintained through Public Private Partnerships.

Planting Strategies for the development of urban greens include LONG TERM (> 20 YRS) needs trees as *Alstonia scholaris, Azadirachta indica, Chukrasia tabularis, Ficus sps, Mimusops elengi, Mangifera indica, Putranjiva roxburghii, Schzium communi, Sterculia alata, Terminalia* sps, while SHORT TERM (5-20 YRS) : Trees : Bambusa, Populas indica, Melia azadirach, Morus sps, Shrubs : Murraya paniculata, Lawsonia, Cassia sps, Taberna, Hamelia patens, Tecoma sps. And IMMEDIATE (1-5 YRS) include Seasonal flowers as: Winter, Summer, Monsoons and Pot plants with Ficus sps. Palm sps. and many more.

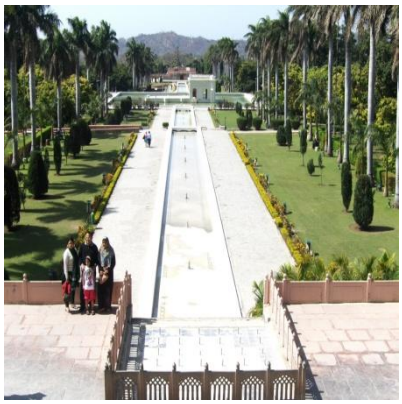
To get the best results qualified staff , selection of suitable plant material, proper pits, filling of pits with water then refilling of pits with proper soil mixture , again watering of pits , planting the grown up

tree(8-10 ft), thereafter weekly watering and immediate replacement of dead plant in 3/ 4 days. Timely fertilization, plant protection and pruning and training of plants give excellent results .

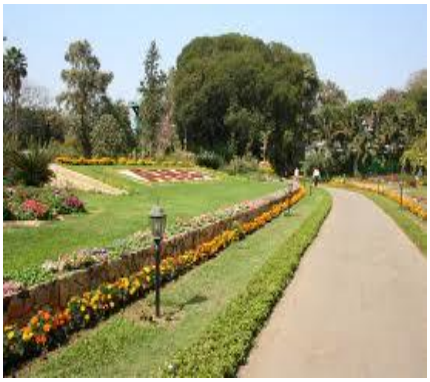
Important trees for environment, fragrance and flowering are *Alstonia scholaris, Bauhinia sps-5, Azadirachta indica, Cassia sps-5, Bischofia javanica , Choresia speciosa, Cederilla toona, Delonix regia, Chukrasia tabularis, Erythrina indica, Ficus sps, Grevillia robusta , ,Hardwichia sps, , Jacaranda acutifolia , Kigellia pinnta, Lagerstroemia speciosa , Mangifera indica, Michelia champaca, Mimusops elengi, Millingtonia hortensis, Polyalthia longifolia, Pterospermum acerifolium, Schlerichera oleosa , Taebubia rosea, Sterculia alata, Tecoma urgentia, Schziun communi , and Terminalia sps-4 and* beautiful shrubs for Landscaping include *Bougainvillea in no. of colours, Cestrum nocturnum, Gardenia jasminoides, Hamelia patens,Hibiscus species, Hiptage benghalensis , Jatropha pendurifolia, Lagerstroemia indica , Lawsonia alba, Nerium indicum, Nyctanthus arbotristus, Murraya paniculata, Plumeria species , Tabernamonium species, Tecoma species and Thevetia species.*



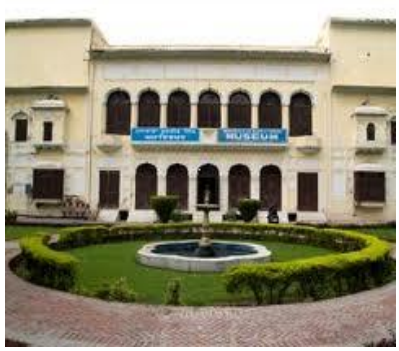
Colour in Landscape Horticulture.



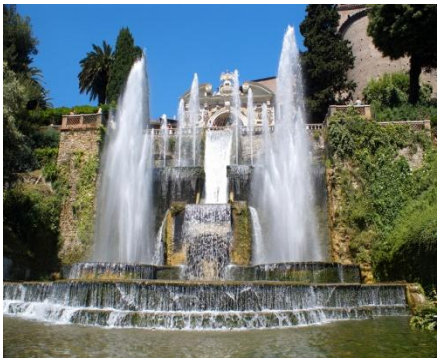
Yadwindera Garden ,Pinjore



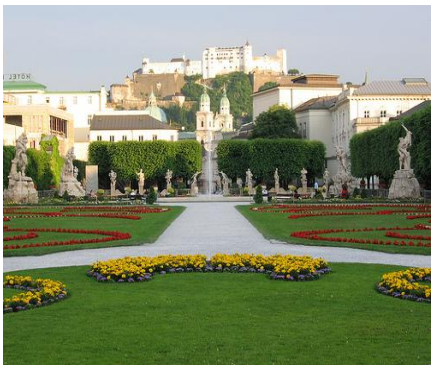
Howrah Botanical Garden Kolkata.



Ram Bagh ,Amritsar



View of Landscape Horticulture

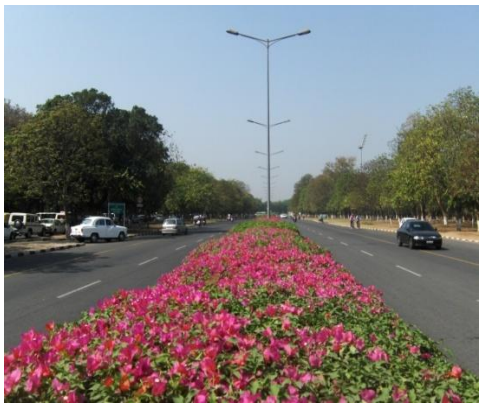


Beauty in Landscape Horticulture

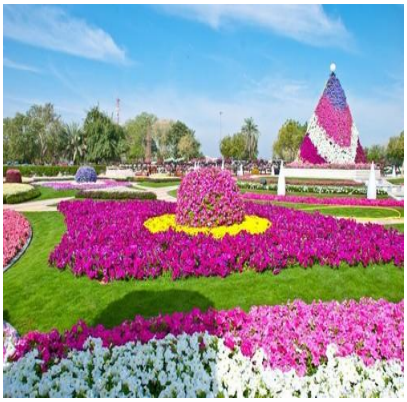
Belt Designed Round About

Beautiful Garden Shelter

Bamboos in Landscape Horticulture



City Road Landscape



Color in Landscape

Understand Corrosion, Protecting Industry

Prof. (Mrs.) S. Manocha
University School of Basic and Applied Science, Guru Gobind Singh Indraprastha University, Dwarka, New Delhi
E.Mail: sm_manocha@rediffmail.com

In everyday life we experience certain unwanted events or happenings with the tools we use. The metallic or plastic chair we use daily to sit on suddenly crumbles. The body of our scooter or car cracks and break. The large and sturdy bridges suddenly fall in couple of years. It happens fast with boats and ships or chemical plant machinery. All this happens due to a phenomenon known as Corrosion.

What is Corrosion:
Destruction or deterioration of Metals / alloys. plastics or any material due to Electrochemical / chemical reaction on metal surface with aggressive environment.

Factors Affecting Corrosion
Corrosion is mainly caused by following factors:

Environmental Factors:
1. Aggressiveness & Type of Environment.
2. Variation in Concentration of Environment.
3. Temperature, Pressure and Velocity Conditions.
4. Hydrogen & Oxygen potentials.
5. Acidity & Basicity (pH).
6. Noble metal ion concentrations.

Metallurgical & Process Factors:
1. Voids, Vacancies and Dislocations in metal structure.
2. Precipitation and Grain boundary thickening.
3. Micro-cracks on the surface and substrate.
4. Embrittlement due to Cold working & other processes.
5. Formation of Phases of different Electrochemical properties.

Nature of Corrosion
1. Uniform fully or partial removal of surface layer of Metals and alloys.
2. Formation of adherent corrosion product on the surface.
3. Formation of Pits, Crevices, Stress Corrosion cracks etc., on metal surface.
4. Selective removal of active phases or direct combination different metals.
5. Grains fall attack due to grain boundary precipitation.

Classification of Corrosion

Based on Types of Environments:

WET & DRY CORROSION

Based on Nature of Reactions:

CHEMICAL & ELECTROCHEMICAL CORROSION

Based on Failure Pattern & Observations

UNIFORM / GENERAL CORROSION
GALVANIC / TWO METAL CORROSION
DEZINCIFICATION
PITTING CORROSION
CREVICE CORROSION
INTERGRANUAL CORROSION
EROSION CORROSION
STRESS CORROSION CRACKING

Galvanic Corrosion

Galvanic corrosion is frequently referred to as dissimilar metal corrosion.
Galvanic corrosion can occur when two dissimilar materials are coupled in a corrosive electrolyte.
An illustration of galvanic corrosion would be joining two dissimilar metals in electrical contact in seawater.
In a galvanic couple, one of the metals in the couple becomes the anode and the other metal becomes the cathode. The less noble material becomes the anode. The anodic metal corrodes faster than it would all by itself.
The cathodic metal corrodes slower than it would all by itself.

Pitting Corrosion

Pitting is a localized form of corrosive attack.
Pitting corrosion is typified by the formation of holes or pits on the metal surface. Pitting can cause failure due to perforation while the total corrosion, as measured by weight loss, might be rather minimal.
The rate of penetration may be 10 to 100 times that by general corrosion.
Pits may be rather small and difficult to detect. In some cases pits may be masked due to general corrosion.
Pitting may take some time to initiate and develop to an easily viewable size.
Pitting occurs more readily in a stagnant environment. The aggressiveness of the corrodent will affect the rate of pitting.

Species in the Industrial Environments which accelerate the corrosion:

In Gaseous Atmosphere containing: O2, H2S, Poly sulphide, Carbon Dioxide and Humidity with Cl_ ions.
In Aqueous Solutions: Strong Acids, Brines and Alkalis.
Equipment & Media which give corrosion failure are;

Plant Environment.....Acids, Hydroxides & NH3.
Start-up & Shutdown conditions....Replacement & substitution of Materials
Seasonal temperature changes...Heat Affected Zone (HAZ)
Aeration.....To the Process.
Cooling Water.....Varied Cl_ ions and Other salts
Steam.....High Temperature and Pressure
Variable Process flow Rates..... Erosion
Impurity..... Organics in Acids
Water..... Acidity / Alkanity

The Historic Example of Failure due to Corrosion

Though in history there are many examples of failures due to corrosion and we experience many and fresh events in everyday life, The one which had great impact in history is the Failure of TITANIC

The Titanic began its maiden voyage to New York just before noon on April 10, 1912, from Southampton, England. Two days later at 11:40 p.m., Greenland time, it struck an iceberg that was three to six times larger than its own mass, damaging the hull so that the six forward compartments were ruptured. The flooding of these compartments was sufficient to cause the ship to sink within two hours and 40 minutes, with a loss of more than 1,500 lives.

TITANIC was 269.1 meters long, 28.2 meters maximum wide, and 18 meters tall from the water line to the boat deck (or 53 meters from the keel to the top of the funnels), with a gross weight of 46,000 tons.
Initial studies of the sinking proposed that a continuous crack in the hull 100 m in length was created by the impact with the iceberg.

More recent studies indicate that discontinuous damage occurred along the 100 m length of the hull.
After the sinking, Edward Wilding, design engineer for Harland and Wolff, estimated that the collision had created openings in the hull totaling 1.115 m2, based on the reports of the rate of flooding given by the survivors.This damage to the hull was sufficient to cause the ship to sink.
The failure of the hull steel resulted from brittle fractures caused by the high sulphur content of the steel, the low temperature water on the night of the disaster, and the high impact loading of the collision with the iceberg
On impact, the rivets were either sheared off or the heads popped off because of excessive loading, which opened up riveted seams. Also, the rivets around the perimeter of the plates elongated due to the stresses applied by the water, which broke the caulking and provided another inlet for the water

Tests for Knowing Corrosion

Salt Spray (Neutral / Fog), ASTM B117
This is the most commonly used salt spray for testing of inorganic and organic coatings, especially where such tests are used for material or product specifications. Salt Spray testing is a tool for evaluation the Uniform corrosion with reduction in thickness of the Metals/ alloys or change in uniformity of thickness and degree of porosity and formation of localized attacks and pits of metallic and nonmetallic protective coatings. A number of samples can be tested at once depending upon their size.

Remedies to Control/Protect from Corrosion

Selection of Metals and Alloys

Precipitation of Chromium Carbides at grain boundaries, due to the high temperature (450 - 850 degree Centigrade) called as Sensitization. This will lead to IGC in aggressive environment.

The low carbon version of the Austenitic Stainless Steel, for example 316L or 304L, are used to avoid corrosion problem caused by welding. The "L" means that the carbon content of the Stainless Steel is below 0.03%, this will reduce the sensitization effect, precipitation of Chromium Carbides at grain boundaries, due to the high temperature produced by welding operation.

How to Green the mind and save the self from present day pollution

R. K. Kohli,(*FNA,FNASc, FASc, FNAAS, FBS, FNESA, JC Bose Fellow)*
Vice-chancellor, DAV University, Jalandhar
e.mail : rkkohli45@yahoo.com rkkohli45@gmail.com

Man by nature wants to lead a comfortable, healthy, long life. This is possible through development. If we do not develop or develop very slow, the environmental issues like sanitation, hygiene, pollution and discomfort will engulf us. On the contrary if we develop very fast, we will have to face problems like air-, water and noise pollution, social disparities, congestion, resource depletion and unrest. So we have to look for sustainable way of development/growth.

We tend to accuse industry and vehicles for environmental problems and the government machinery for inaction. We have hardly realized our own contribution inviting problems for the self. In stead of becoming a part of the solution we end-up becoming a part of the problem for the self. I propose to share as to how we can save ourselves from the self inflicted pollution.

About 80 % of our lives are spent indoors – homes, workplaces etc. So, what-so-ever we do in our houses or workplaces is bound to affect us more than the pollution on the road or the Industrial area.

Today, we are in the age of chemicals. We can't think of anything (food, cosmetics, wearable, medicines etc) that is devoid of chemicals. Daily new products/brands are added to the market. Due to vigorous advertising, we get temped to the new product. At the same time, we remain worried about the diseases like cancer, heart failure, birth-defects and nervous disorders. It all depends on ones attitude as to which type of life one wants to lead. The risks of our actions and likings depend on (a) Probability, (b) genetic makeup and (c) product of dose and exposure of the body to the toxic substance we use. It is up to us to measure the risk to benefit ratio of our action. Some risks like dying the hair, smoking are under our control, while others like depletion of ozone in the stratosphere or global warming or pesticide buildup in the food products are not in our individual hands. The resistance or susceptibility of the body depends on the genetic make-up that our parents have given to us, our body weight, stage and dose of the toxic material we get exposed to and of course our lifestyle.
In this lecture I propose to discuss as to what we normally do at homes

Many of our houses, in strict sense, are more or less places of Pollution. In such houses lay wall-to-wall carpets that keep the rooms humid and serve as a store-house of microbial/fungal spores; thick double curtains covering huge windows that are hardly opened for fresh air or sunlight; desert coolers whose stale water is hardly changed and that serves as a source of microbial spores, pollen grains and trichomes from outside into the room. Many of us do not mind smoking cigarettes inside our homes, polluting indoor air and endangering the lives of passive smokers. Some do not stop tobacco smoking and chewing, in spite of vigorous campaigning against it by the Government. Perhaps even educated people do not know that tobacco contains 43 carcinogens of class A (known to cause cancer in Human-beings) as per EPA (Environment Protection agency of USA)

In order to keep slim many of us prefer to avoid intake of sugar, instead opt for artificial sweeteners containing aspartyl phenylalanine or saccharine. The safety of use of such artificial sweeteners is very controversial. Likewise, we do not mind talking very long on cellphones fixing it directly on to the ears or keeping in our chest pocket, little realizing the bad effect of electromagnetic frequency radiations like those of microwave. We eat sweets with silver-foil adhered on its surface, little knowing that it is less of silver, more of lead and aluminium – excess of which leads to avoidable toxicity. Similarly we are fond of tinned food including juices and soups. The seam of the tin-

container is impregnated with lead to check the leackage. The lead in acidic medium gets dissolved in the food. In take of such food leads to lead toxicity.

Food shiners, polishing dyes are nothing but the waxes and synthetic food colours (*gulabi, hari, jamuni burf*i etc) that attract us are the azo dyes known to cause cancer and genetic disorders. The face-paints, our youth is fond exhibiting especially during cricket matches are dissolved in organic solvents like benzene, (known for Leukemia – a type of blood cancer), xylene (dries out skin causing blisters), toluene (causes skin irritation). These also contain lot of lead that is known for lowering intelligence. Other sources of lead are gasoline, lead adulterated tin-platting, soldering, batteries, joints of water pipes etc.

To ward off crawling insects like cockroaches we prefer to Permethyrine containing products which though work like natural plant product Pyrethrin but is regarded as carcinogen of group C (EPA). Most of us do not fail to apply hair dye on to our heads, for deceiving others of our age. Most of the hair colors / dyes contain Ammonia, Hydrogen peroxide (for initial bleaching of hair), Sodium Lauryl Sulphate (Protein Precipitant) and lead that causes lead toxicity.
Most of the cosmetic creams contain ethylene glycol (which is break oil) as anti-freezing agent and hydroquinone that causes allergy, blurred vision and slows reflective movements apart from causing fatigue. Some of the sun-screen lotions and beauty cream for making fairer have such elements that disturb hormonal balance and consequential health problems.

During Holi festivals the coloured powders we use are a source of heavy metal toxicity

Color	**Composition**	**Health effects**
Gulal	Mica, glass sand,	Corneal abrasion, loss of memory, eye-sight corneal ulcer
Black	Lead Oxide	Renal failure, learning disability
Green	Copper Sulphate	Temporary blindness, Eye Allergy
Purple	Chromium Iodide	Bronchial Asthma, high BP, kidney damage
Silver	Aluminium Bromide	Alzheimer's and cancer

Whom do we paint? Our friends and relatives and get painted. Why not to prepare our own Holi Colors? Some possible hints include, *Arrow root, Talcum powder, wheat flour, 'multani mitti', turmeric powder, sandal wood, extracts of marigold, amaltas petals, indigo-blue, beet-roots, mint, coriander, rose petals*

Some tips for healthy living:

Safe Remedies: Instead of using the organic/synthetic pesticides at homes, we should follow the following tips:

- Ants: Squeeze lemon juice at pt. of entry &, leave the peel there ; use chalk powder, damp coffee, charcoal dust, haldi or pepper
- Cockroach : Plug cracks etc, put boric acid in cracks/ holes switch boards; Trap by greasing inner side of wide mouth bottle with potato or stale wine; hung naphthalene ball in the kitchen and bathroom-drains
- House fly : hang yellow paper, Paste honey on it
- Silver fish : use borax in book racks, wardrobes
- Stored food pests: dry food and store in air tight container or add boric acid powder or mix

- Mosquito: Terminator with UV-A lamp, mosquito net, bath before retiring

<u>Let's recapitulate</u>: We should avoid:

- Drinking or bathing in chlorinated water & first flush of tap water
- Fluoridated tooth paste *(better change brands every month)*
- Excessive use of cell phone direct on the ear (*use ear-phone*)
- Agenomoto, synthetic colored foods
- Misuse of paper, if we love environment
- Highly spicy food
- Food refried in same cooking oil
- Smoking
- Storing food in polythene and plastic container
- Eating salad in Restaurants
- Using cheap cosmetics (better make your own)
- Laying carpets esp. in summers and rainy seasons
- Letting congress grass grow near houses/ work places
- Tinned food
- Using cheap holi gulal (better make your own)

<u>Some substitutes of beauty products</u>

- Besan : Good Cleanser
- Haldi : Disinfectant
- Milk Cream : Replenishes body oil
- Honey : Strong cleanser, nourisher and healer
- Glycerin : good moisturizer
- Rose water : good soft fragrant medium
- Multani mitti (Fullers earth) : removes dead cells
- Sandal wood : improves skin texture
- Oil : nourishes body skin
- Un-boiled milk : strong cleansing power
- Neem datun : saves infection in buckle cavity
- Hair cleansing with Reetha and Amla
- Fruits and vegetables good source of vitamins,minerals and medium of removing wastes from body
- Clean water best for getting rid of toxins of the body

Carbon Material and their Application

Prof. L.M. Manocha
Department of Materials Science Sardar Patel University,Vallabh Vidyanagar–388120,Gujarat
E-Mail: manocha52@rediffmail.com; lalitmanocha@gmail.com

Materials & Materials Science - Materials and Materials Science is an important Interdisciplinary subject covering Basic science subjects of Physical sciences including Physics, Chemistry, Mathematics, Biosciences etc. as well as Engineering subjects and Technological aspects. Materials may be defined as substance of which something is composed or made.We obtain materials from earth crust and atmosphere. Everyday we start our daily life with use of a material may it be tooth paste or tooth brush to the end of the day using mobile phone or watching television.

Materials science deals with basic knowledge about the internal structure, properties and processing of materiaengineering deals with the application of knowledge gained by materials science to convert materials to products.

All these involve different types of materials and their scientific aspects.
Why the Study of Materials is Important?
Every subject and its study is aimed at certain aspects. Concernin Materials, some of these are:
*Production and processing of materials constitute a large part of our economy.
*Engineers choose materials to suite design.
*New materials might be needed for some new applications
*Modification of properties might be needed for some applications

Materials are classified in many ways, depending on their origin, structure, chemical nature, physical form or properties and applications. Some of these groups are:

Metals
Non Metals
- Polymers
- Ceramics

Composites Materials
Bio-Materials
Electrical and Electronics Materials
-Semi conducting Materials
-Super conducting Materials

According to physical form, these are:

Bulk Materials
Signal crystal
Whiskers
Fibrous
Nano Materials

Though each material is important from scientific, technological as well as application point of view, rest of the part is devoted to Carbon materials.

Carbon as Materials

Carbon has been considered an important material during all civilizations and has played key role as element and as materials during all scientific and technological revolutions, starting from prehistoric era for writing and painting, metallurgy, to incandescent bulb, telephone, polymers and high performance composites to nanotechnology and still posses the scientific and technological curiosity, mainly because of big scope in playing with its structure and attaining exotic properties. It is well established that carbon, in a variety of structural forms, basically consisting of graphene, one to several layers, layers stacked over each other in many different ways ordered to disordered as known in Fig.1. These materials possesses following properties which render it suitable for applications in advanced fields requiring varying properties in terms of strength, stiffness, thermal stability, electrical properties to biocompatibility.

Charcteristics of Graphite

Low density
· Chemically inert
· High Thermal & Electrical Conductivity
· Low Coefficient of Thermal Expansion (CTE)
· Optically opaque even in extremely thin section
· Low Coefficient of friction
· Self Lubricating (Greasy Feel)
. Bio-Compatible
· Retain Strength at high temperature

Physical Properties of Graphite

At. Number	-	6
At. Mass	-	12.011
Melting Point:	-	3823 K (3550°C)
Boiling Point	-	4098 K (3825°C)
Density	-	2.267g/cC.
Crystalline Form	-	Hexagonal

Some of these applications are shown in Fig.2. Maximum of carbon products are used in Metallurgy such as electrodes for manufacturing of steel, Aluminium and extraction of other metals. Here, strength as well as electrical properties are important.

One form of Carbon, glassy carbon in three point bending has a fracture strength of 225 MN/m', strain energy to fracture of 10 MN/m2 and total strain to fracture of 0.01. These values of strain to fracture and strain energy are particularly low and reflect the extreme brittleness of these materials. One solution to this problem is to use carbon as a coating on tougher and more ductile substrates. In structural application domain, the era started with development of Carbon fibers

and carbon-carbon composites. These variations in reinforcements affect the microstructure of the carbon matrix which results in enhancement of properties of the carbon/carbon composites especially the thermal properties, oxidation resistance and fracture toughness.

Carbon/Carbon composites (Carbon fibers reinforced in Carbon matrix), though are now nearly four decade old materials and have been successfully used as structural material in many advanced applications, still posses the scientific and technological curiosity, mainly because of big scope in playing with its structure and hence attaining exotic properties. Carbon/Carbon composites have been developed in India for aerospace vehicles and re-entry vehicles through controlled microstructure using liquid infilteration technique. The recent development of nanomaterials, the so-called carbon nanostructures like carbon nanofibers, carbon nanotubes and carbon nanoparticles and the recent much talked grapheme have renewed interest in composites. Amongst these, study of carbon nanotubes as such or as hybrid reinforcing material is one of the main areas of focus due to their combined mechanical and thermal characteristics which can improve the properties, especially thermal properties of the end composites. This has been achieved through synthesis of multiwall carbon nanotubes (MWCNTs) as such as well as on the surface of different substrates, which themselves are used as reinforcements.

Recent development of nanomaterials, the so-called carbon nanostructures like carbon nanofibers, carbon nanotubes and carbon nanoparticles and the much talked graphene have given new dimension to interest in carbon based composites. Amongst these, study of carbon nanotubes as such or as hybrid reinforcing material is one of the main areas of focus due to their combine mechanical and thermal characteristics. This involves synthesis of multiwall carbon nanotubes (MWCNTs) as such as well as growing these on the surface of different substrates in desired directions and use these as reinforcements

The R&D in last few decades has been concentrating on exploiting surface, mechanical as well as thermal properties of carbons in aerospace, environment and energy applications. This is due to the flexibility in achieving different microstructures in carbons resulting in different properties which in turn can be controlled to for desired end product and application.
.
Carbon fibres exhibit an exceptional biocompatibility which, in combination with their high strength and flexibility, makes them very suitable for ligament replacement. Elemental carbon bio-compatibility has been recognized for many centuries, particularly by less advanced societies, where tattooing with burnt bamboo splinters has been a significant element of the hereditary cultural patterns.The biomedical applications of carbon range from prosthetic heart valves to percutaneous access devices and dental implants. For these applications the requirements for biocompatibility are so severe that carbon is one of only a few materials that can offer any hope of long term success.. While carbon of many varieties has been used, better results have been obtained with one or more of the forms which lack a high degree of crystallinity. Such materials have been called glassy, vitreous, or Pyrolite Carbons.

Carbon nanotubes with their excellent mechanical properties, have the potential to strengthen and toughen Hydroxyapatite without offsetting its bioactivity, thus opening up a wider range of possible clinical uses of this material. Various carbon nanostructured materials have been synthesized in the Department using simple chemical routes. Carbon nanomaterials have been

prepared as free standing states or on desired substrates as webs or mixed with other matrices in the form of composites.

The unique properties of these advanced carbon materials are also vital in the development of components for energy devices etc. may it be solid and porous carbons for new generation electrochemical cells and batteries, the new generation environment friendly energy systems. For each application, there is specific requirement with respect to density, thermal conductivity, porosity and electrical behavior which are dictated by the microstructure of the carbons. Different aspect of the development of these materials and their application in various fields will be presented.

References for further Reading

H. Marsh, E.A. Heintz, F. Rodriguez–Reinoso., (Eds), Introduction to Carbon Technologies, Spain: University of Alicante, 1997.
2. T. Ishikawa, T. Nagaoki, (Eds) (Lewis IC, English editor), Recent Carbon Technologies, Japan, JEC Press, 1983.
3. E. Fitzer., L. M. Manocha.Carbon Reinforcements and Carbon /Carbon Composites, 1998, Springer, ISBN 3-540- 62933-5.
4. M. Inagaki, New carbons: control of structures and functions,.Elsevier; 2000.
5. D. Timothy Burchell "Carbon Materials for Advanced Technologies", 1999, Pergamon, ISBN 0-08-042683-2

Fig. 1 Disordered and Ordered Carbons

Fig.2. Different types and Applications of Carbon Materials and products