GYAN VIGYAN SARITA:शिक्षा

A non-remunerative, non-commercial and non-political initiative to Democratize Education as a Personal Social Responsibility (PSR)

3rd Monthly e-Bulletin dt 1st January'19, Fourth Year of the Publication

HAPPY NEW YEAR 2019

WORK FOR BETTER FUTURE

Happy 69th Republic Day

CONTENTS: (Against Each Content Page Number is Indicated for Convenience)

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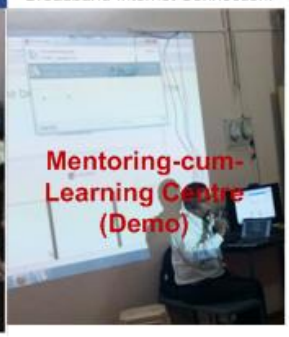
Aim at the Best, but...

Conceptual Representation
of
Online Mentoring
An Initiative To Bridge Gap between
Passionate Teachers
and
Desperate Students
Selfless Endeavour
to
Democratize Education
with a sense of
Personal Social Responsibility (PSR)

Equipments at Mentoring Center
1.Desk-/Lap-top
2. WebCam
3. Headset with Microphone
4. Digital Pen
AND
Broadband-Internet Connection

Cloud Internet
(Linking platform : cloud based with as low bandwidth as possible for seamless connectivity of audio-video-whiteboard across nodes where internt connectivity is poor- Presently A-VIEW is in use)

Equipments at Learning Center
1.Desk-/Lap-top
2. WebCam
3. A Mixer-cum-amplifier with Speakers
and Wireless Microphone
5. Overhead Projector.
6. UPS (For Continuous Power Supply to computer, internet modem and L&F)
AND
Broadband-Internet Connection:



Important Links
1. Good Internet Connectivity (Wired Broadband Connection)
2. Subject-wise Coordinator for Each Session to Bridge Learning Gaps between Mentor & Students

Special Features
1. Free and Open to all to adopt. Modify, change, correct
2. Welcomes participation, promotion and facilitation on Zero-Fund-Zero-Asset (ZFZA) basis
3. More details on Technological and Operational – please write on http://www.gyanvigyansarita.in/contact/

... start, without loosing time, with whatever is available.

Infrastructural requirement for Centers in Interactive Online Mentoring Sessions (IOMS)

Learning Center (if asked for by Mentor)		Mentoring Center (if asked for by Mentor)	
Estimated Capital Cost (One Time)			
Particulars	**Cost (in Rs)**	**Particulars**	**Cost (in Rs)**
Desktop (without monitor)	20,000	Laptop	25,000
Projector	15,000	Projector	-
Web camera	10,000	Web camera	-
Mixer cum amplifier with Speaker and Wireless microphones	15,000	Headset with Microphone	3,000
Wireless Surface Writing device	15,000	Wireless Surface Writing device	15,000
Total	75,000		43,000
Estimated Recurring Cost			
Internet charges, based on estimated monthly data transfer which depends upon choice of cloud platform, and tariffs of ISP		Internet charges, based on estimated monthly data transfer which depends upon choice of cloud platform, and tariffs of ISP	
Cloud platform : a. Subscription whether it annual as in WebEx or One time with AMC like in as in UTP+. b. Cloud platform is a shared resource across Learning Centers benefitting from IOMS. c. The IOMS envisages session for more than one centre together, these charges may be shared across, or one centre bears total cost sequentially. It is purely in mutual agreement between Learning Centers. d. Benefit of sharing of charges of cloud platform can be optimized with offset of schedule of sessions of IOMS.		IOMS is since an initiative driven with Personal Social Responsibility (PSR) operating n Zero-Fund-&-Zero-Asset (ZFZA) basis, the Cloud Platform has to provided by Learning Centers benefitting from IOMS. Gyan Vigyan Sarita will be pleased to connect Learning Centers for collectively complementing the cost of Cloud Platform for arriving at a mutual agreement on financial sharing. So also IT Infrastructure with Dr Joshi has been in use and is working. But, at any stage if upgradation becomes essential, extended hand by learning centers is gratefully welcomed on ZFZA basis. The same is true for any other mentor joining IOMS	

Specification: These were practiced independently, based on ground level operating experience and need of optimizing the cost on the initiative. This is essential to utilize financial resources, considered scarce, for benefitting more number of students at more number of centers and mentoring centers.

These specifications have been updated by deriving motivation from **VIVEKDISHA, Belur Math**, which has been engaged in Online Teaching to about 22 Centers, since last 10 years. The only difference that IOMS has is in extensive use of Whiteboard.

Web Camera: Logitech HD 1080p, with a tripod or wall mounting

Projector: Portronics LED Projector Beam 100", 100 Lumen, 130" Screen size, 800x480px resolution

Mixer-cum-Amplifier: Ahuja Make PA Mixer Amplifier Model DPA-370, 30 W Max/37W Max, with Two Cordless Mikes and Speakers. This device offers echoless input/output communication with base computer and Mikes and Speakers in the Class.

Cloud Platform: A-VIEW (Amrita Virtual E-Learning World) developed by Amrita University in association with IIT Bombay, an MHRD, GOI sponsored project.. Problems with Whiteboard functionality of A-VIEW are being circumvented with OneNote app of MS Office for IOMS. This has many features of minimizing bandwidth requirements.

Surface Writing Device: HUION make Model WH1409, or Wacom Intuos with wireless device makes it suitable for communication with base computer in class like environment.

UPS: An additional accessory, for uninterrupted continuity of session, based on power availability to be decided by Learning Center, **not included in above cost estimates.**

Furniture and Lighting: At Learning Center, as deemed fit by local administration of Learning Center, **not included in above cost estimates.**

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संपादकीय

नववर्ष की शुभकामना

मंगलमय शुरूआत हो
हों शुभकारी कर्म
नित उन्नति होती रहे
बढ़े कर्म का धर्म

सेवामय हर भाव हो
करूणामय आधार
अनुभव सबका साथ हो
फंसे न कोई मझधार

सीखें हम बातें नयी
खोज करें नित नूतन
देश बढ़े गौरव बढ़े
हो ऐसा परिवर्तन

शिक्षा से संस्कृति बढ़े
संस्कृति से आचार
सदाचारमय देश हो
फिर सबका सिरमौर

नये वर्ष में बढें हम
नये लक्ष्य की ओर
जो छूटा रह गया
उसे जोड़ लें और

कर्म बिना सब व्यर्थ है
धर्म बिना सब सून
जबतक बची सामर्थ्य है
सबको मिले प्रसून

संबंध बढ़े संपर्क बढ़े
बढ़े ज्ञान भंडार
खुशहाली चहुंओर हो
बढ़े मधुर व्यवहार

बच्चे सीखें पाठ सब
शिक्षक सीखें और
हम भी सीखें सीख कर
खींचे नयी लकीर

नये वर्ष में नयी सोच से
सबको लेकर साथ
सरिता ज्ञान विज्ञान की
बहे थाम हर हाथ

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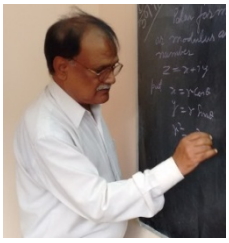
"I have been impressed with the urgency of doing. Knowing is not enough; we must apply. Being willing is not enough; we must do."

-Leonardo da Vinci

हमारा पंचवर्षीय प्रवास

Start: June-2012



April-2015

June-2016.....

पारम्परिक शैक्षणिक मार्दर्शन से प्रारम्भ कर आज हम तकनीकी-विकास के सहारे मूलभूत प्रासंगिकता को आगे बढ़ने में संलग्न हैं..

यह प्रयास अपने सामाजिक कर्त्तव्य के प्रति सहजविनीत आग्रह है; कृपया इस पर विचार करें.

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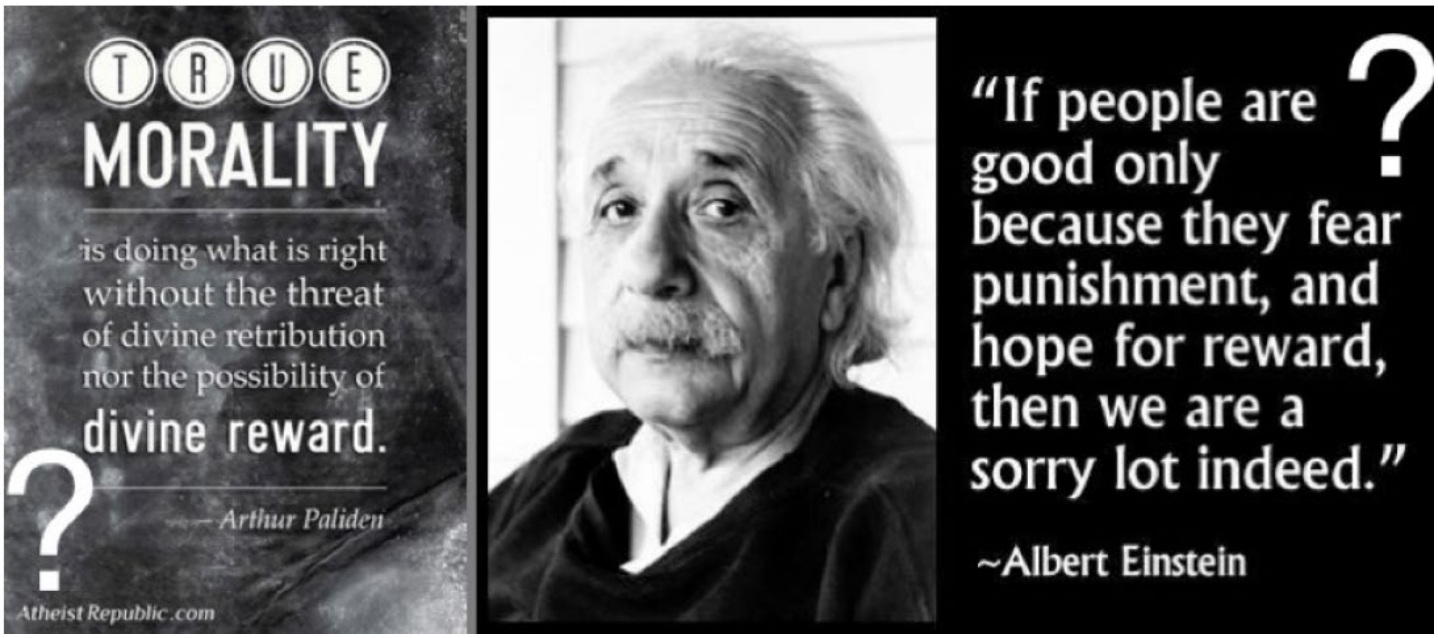

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*"**Imagination** is more important than **knowledge**.*
*For **knowledge is limited**, whereas **imagination** embraces the entire world, stimulating progress, giving birth to evolution."*

- **Albert Einstein**

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Coordinator's View

Naturalizing Learning of Mathematics and Science

This article is outcome of brain storming over a wide cross-section of society and their concern towards impact of science and technology on natural environment and human values. The subject matter being so intrinsic that impact of evolution of nature, social ethics, human sensitivity, law, science and education cannot be seen discretely independent and requires to be dealt with separately. However, this article draws inferences on each topic to concludes with the need of deployment of collective wisdom by elite section of society which is best placed to make a difference.

Evolution of Nature: General notion about science and technology is to make living more effective, powerful and comfortable, in the environment that we are in. But, the nature is about the environment surrounding everyone, living with or without science and technology. Nature, unlike mother, does not give birth, but it is the cause of birth to all. It creates necessary conditions for the origin of life. This is the reason that the nature, and for that matter earth, is respectfully addressed as the mother nature or the mother earth. Our earth is an integral part of universe. Its evolution is a mystery and there are multiple theories, some of them are theological. But, in the scientific world big-bang theory is most acceptable. This theory has estimated life of various celestial bodies based its temperature and environment prevailing on it.

Nature on earth has been changing and would continue to change based on energy dissipation by the sun. This has led to estimates on remaining life of sun, in its present form, which in turn would regulate life on the earth. It, therefore, corroborates the theory that death is certain for everything that is born, be it organic or inorganic. *But, matter and energy cannot suddenly disappear; it only changes its form. This fact goes in line with the theory of rebirth.*

Evolution of Social Ethics: When nature and earth are addressed as they are, a notion of mother, who cares her child both pre- and post-birth, is obvious. Mother symbolizes care, concern, kindness, mercy. Literature is full of praise and gratitude towards mother to an extent that "*mother is considered to be first and natural teacher of her child*". It is the mother with whom child learns relationship and human sensitivity, called values. There is a famous quote in Hindi "पुत्र कुपुत्र हो सकता है, पर माता कुमाता नहीं हो सकती"; this makes mother a character universally above all. Despite, there are stray occurrence of a mother abandoning child or indulging into crime, greed, prejudices and discrimination. *Human mind has a great potential to evolve apparent justifications for every act, be it right or wrong.*

Let us, analyze nature, mother of all naturally occurring things living or non-living. This nature itself while allowing life to grow, it also manifests in calamities like drought, floods, storms, quakes, volcanoes, continental shifts etc. All these natural vagaries have changed environment on this earth from a fire balls to dense forests, deserts, plains, hill rivers and oceans.

This has lead to a premise that kindness and values are not universally natural. This gives rise to a question – *are the social ethics and values of a person inspired by nature, mother or through the process of education?*

Human values are highly contentious and its understanding in a society takes us into anthropology. Values have evolved right from nomad stage and have transformed the human life as it grew in numbers and generations. Nevertheless, no society can exist without individual differences, priorities and needs. These are the causes of strain within a society. Yet, societies have continued to exist, grown into civilizations, states and nations. *The only binding force, among the diverging individuals, is the need to coexist and it is regulated through conventions, traditions, rules and laws.*

Evolution of Social Regulations: Evolution of societies, its values and laws regulating the social behavior is a matter of philosophy and a process and addressed as jurisprudence; it is the foundation of judicial system, a necessity for a stable society. Volumes have been written on jurisprudence, a highly complex and integrated subject matter. *It encompasses everything that has transformed human life into a civilization, in its present form*. This would continue to influence all the changes that the society would experience. Inspite of this, its relevance in social behavior is a driving point of this thought process. Aberrations in social behavior and their corrections has created a need of natural justice in a civilized society. It demands that every weak person is protected from the excesses of organized power. In simple words it denounces the practice of *'might is right'* in nomadic era. Natural justice demands that justice is brought to the parties naturally and is more a matter of common sense. Preamble of Indian constitution and has promulgated it in its section - Fundamental Rights.

Evolution of Mathematics and Science: Here it is pertinent review definition of motion, a basic observation, conceived by a men right from its beginning. This has made it possible for one to reach to its pray, moving independently. It is natural and intuitive. Even, a new born child sucks the milk from mother's breast, without being taught as to how

pressure difference created by the child during sucking would cause flow of milk into his mouth, and when to stop sucking for swallowing milk in the mouth. Archeological evidences of the oldest Chinese, Indian and Egyptian civilization reveal that a lot of mathematics and science was discovered thousands of years BC.

Motion, the primitive observation, has changed meaning with discoveries by scientists at different point of time. Aristotle about 300 BC, was the first to define free fall motion of a body and related it to its mass. It was during 14th to 17th century Tycho Brahe, Copernicus, Kepler, Galileo and Newton in succession analyzed motion of celestial bodies leading to equations of motion defined by Galileo, it is in contradiction to Aristotle's proposition. Soon after Newton discovered laws of motion that could precisely explain Kepler's Laws of motion of celestial bodies and whole mechanics which is used largely in engineering and technology. But, human mind did not stop at that. Michelson and Morley, more than three centuries after Newton, failed to measure velocity of rotation of earth's surface. This prompted Lorentz to relate distance, velocity and time taking velocity of light to be invariant. He suggested Lorentz Transformation. In a quick succession, Einstein in early 20th century through his thought experiment proposed Special Theory of Relativity with convertibility of mass into energy and vice-versa, a purely mathematical proposition. It was only later that his theory was proved. This created a boom in physics with emergence of Quantum Mechanics. Race is on to discover origin of universe with newer concepts like string theory.

Human Sensitivity, and Science and Technology: Engineering and technology, using discoveries of mathematics and science, have a potential of moderating nature to human advantage; it is akin to the role of law in regulating a society. Here, a word of caution is needed that technology is also prone to abuse as much as law, example are nuclear weapons, racial laws etc. *Jurisprudence in law, and education in science and technology both infuse essence of good and bad.* They have transformed human life from nomadic to sustainable co-existence. Mathematics and science are untainted expression of nature as it exists. Taking an example from physics a larger force prevail upon a weaker force to cause action, and it is nomadic in nature. While, in curative sense alkali is required to neutralize acids. *This creates a contradiction as to how can naturalizing the learning of science, which is so indiscriminate, can be upheld?*

Indiscrimination causes abrupt and brutal objectivity whereas discrimination leads to subjectivity. But, when concepts of *mathematics and science are realized in human and social behavior, and related to their interaction in day to day life, it facilitates realization, visualization and integration of cause and effect.* In human experience, it adds to better understanding of pleasure and pain of actions and its related cause and effect. This is where consequence of science becomes a subject matter of humanities and literature. Such a literature is able to touch hearts of the readers, but in its absence literature becomes either fictitious or irrelevant. Thus discrimination promotes spirit of coexistence with nature, a sense of good and bad, desirable and undesirable; it has become a necessity of coexistence on the pedestal of sustenance, tolerance and patience. However, indiscriminate use of discrimination leads to bias, favoritism and has undesirable consequences. *Therefore, mere accumulation of information, without morality, leads to literacy and not education.*

Threshold of Discrimination: This necessity of discrimination across societies and states is the reason as to why there is no universal law. Likewise, there cannot be a universal technological solution for people spread across the globe. Diversities in their resilience to economical, geographical and sociological conditions across people decide suitability of any solution. But, the only difference between law and technology is that effect of law is local, while effect of technology is global. This difference has caused global organizations addressing different aspects of environment, human right, trade, commerce, crime, fiscal violations, information beach, human rights etc.

As long as discrimination aims at giving additional care and a rational opportunity to enable to join the main stream it is fine, but not contrary to it. This has prompted democracies across countries to take care of this aspect through its various schemes and if necessary through suitable laws. At global plane formation of United Nations Organization (UNO) is a result of some highly thoughtful persons.

Integration in Nature and Humanities: At this point it is essential to cite a Euler's Identity $0 = 1 + e^{j\pi}$ published in 1748, while each of the number appearing in this equation was discovered independently at different point of time, yet having a closed linkage among them. Meaning of each of the term in the expression is eternal and was given some name by its discoverer. If meaning of any of these is changed whole mathematics and laws of physics, for that matter science, would have a different meaning and lead to a different universe, an unimaginable turmoil. But, the universe has remained the same and all the changes manifested by nature are governed by the laws that make both mathematics and science eternal. All that is being done by mankind is to define and name them based on their observation, correlation, inference and context. These are being only discovered and not invented. This process of discoveries would continue based on ability of an individual to observe, imagine, correlate, analyze and infer.

Oppenheimer, is credited to be father of Atom Bombs that were detonated over Japan on 6th Aug 1945. He, later became an influential lobbyist for control of nuclear power, and thereby invited irk of many politicians. *At this point, shouldn't one learn from the catastrophic effects of nuclear explosions? Are the politicians, talking of their nuclear might, worth mega TNT, aware of scale of damage to the human race that they can cause?* This is in context of the 15 kilo TNT nuclear bombs that were detonated on Hiroshima and Nagasaki. *Are they aware that hardly anybody would be left to detonate second bomb?* In such a scenario, *how is it relevant for anyone to talk of nuclear deterrence and defense, while being a part of nuclear threats?*

Apparently, all those who talk of nuclear armory in whatever sense are victims of ill-education; they may have treasure of knowledge and power, but seem to lack wisdom.

Wisdom with Education – A Natural Way: Wisdom is culmination of human values during education. High education is not a pre-requisite to be wise. Centuries ago Saint Kabeer Das, Sant Raheem, Sant Gyaneshwar and many more, who were born in poverty and grown in starvation. Yet, the text and thoughts they left behind are highly revered by the wisest persons of the day. These men had no formal education but whatever they wrote was a gist of their learning in school of real life.

Taking these examples, and those of the scientists cited above, they were phenomenon in themselves, and not a result of formal education. At this point it is essential to understand *what the education is all about?* Taking forward the thought churning, it can be said that education is a process of transforming a raw student tending to be wise and competent person. Such a person is one who has – **(a)** capability to observe, **(b)** correlate observations, **(c)** discriminate inconsistencies across observation, **(d)** analyze causes of inconsistencies, **(e)** select most potential cause of inconsistency, **(f)** evolve remedies to correct inconsistencies, **(g)** select a remedy which is effective, economical, and sustainable for coexistence, and **(h)** last but not the least an ability to implement the selected remedy for the larger good. This approach is towards naturalized learning and is beyond 5e (Engage, Explore, Explain, Elaborate, and Evaluate) instructional model based on the constructivist approach to learning.

The capability to reach a kind of such an end-to-end-solution cannot be infused. But, it has to be cultivated in a normal person through a process where sufferings of deprivation and pleasure of achieving are inseparable. This can happen only when facts of nature are experienced and visualized while living in real world. Bare facts of nature are mathematics and science. *Education is about experiencing and visualizing these natural truths with human sensitivity. This kind of learning environment is the point of relevance called naturalizing learning of mathematics and science.* A person having undergone through such a process is unlikely to advertently use his knowledge, power, position and belonging in an unwise manner; he would rethink to act to his advantage, which might be detrimental to the innocents. Such wisely thought actions are in the interest of the larger good. *Use of mathematics and science in such a sensible manner is more an art and is the essence of engineering and technology*; it is just not using mathematics and science to make the things possible senselessly and indiscriminately.

Conclusion: Naturalizing the learning of mathematics and science is like evolving natural instinct among students who are deprived of educational opportunities to democratize education. Here, disposition is not the objective. *Wisdom and capabilities are there in plenty, but the girth is of willingness to implement it and bear the brunt of executing it passionately and beyond self. Requirement of such efforts is gigantic, much beyond capability of an omniscient, omnipotent and omnipresent person or an institution to do it independently.*

If there is any effort to naturalize learning of mathematics and science interactively among all, and specially deprived children it is directed toward democratization of education, with human sensitivity. This article is an effort to reach out to elite persons, and especially senior citizens, who can make a difference in this endeavour through a sense of Personal Social Responsibility (PSR), and make their presence purposeful. This will render our descendents a feeling pride in the legacy that they posses. All that is needed is – **(a)** to come out of complacence, **(b)** to take a first step to collectively complement corrective wisdom with sincere efforts, and **(c)** a last word to motivate upcoming generation -

उठो ! बढ़ो ! उड़ो ! इतना कि क्षितिज दिखे करीब से,
हो सके तो ध्यान रखना तार न टूटे जमीं से |
शकून मिलेगा इतना जब हम कह सके गर्व से ,
इस धरा से बढ़ते हैं लोग आसमां तक जमीं से | |

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An Appeal: for Interactive Online Mentoring Session (IOMS) at your establishment By Gyan Vigyan Sarita – A non-organizational educational initiative

Philosophy: Socio-economic reform through education with **Personal Social Responsibility** (PSR) in a non-remunerative, non-commercial and non-political manner.

Objective: Groom competence to Compete among un-/under-privileged children from 9th-12th in Maths, Physics and Chemistry, leading to IIT-JEE.

Financial Model:*Zero-&-Fund-Zero-Asset (ZFZA).* It calls for promoters and facilitators to provide infrastructure for use to the extent they feel it is neither abused nor there is a breach of trust. And, reimbursement of operational expenses, as and when they arise, to the initiative

Operation:

a. **Mode:** Interactive Online Mentoring Sessions (IOMS) since July'16, which has been recently switched over to A-VIEW, a free web-conferencing S/w, with connectivity upto 5 Learning Centers, with One Mentoring Center.
b. **Participation:** Voluntary and Non-remunerative, Non-Commercial and Non-Political

Involvement:

a. **Promoter** –
i. Initiate a Learning Center,
ii. Sponsor a Mentor who is willing to join on certain terms,
iii. Sponsor cost of operation and up-gradation of infrastructure to voluntary mentors,
b. **Facilitator** –
i. Provide space and infrastructure for **Interactive Online Mentoring Sessions (IOMS).** Most of it is generally available, and may need marginal add-on,
ii. Garner support of elite persons to act as coordinators at the Learning Centre.
c. **Participator** –
i. As a Mentor,
ii. As Coordinator,
iii. Operational support
iv. E-Bulletin and Website promotion for increasing its depth and width across target students

Background: *The initiative had its offing in May'12, when its coordinator, a power engineer by profession, soon after submission of Ph.D. Thesis in April'12, at IIT Roorkee, at the age of 61 years, decided to mentor unprivileged students.*

The endeavour started with Chalk-N-Talk mode of mentoring unprivileged students starting from class 9th upto 12thI. n last more than Six years it has gone through many turbulences and is now settled with its IOMS model and looking forward to reach needy students. IOMS has been in operation since July'16. Currently regular sessions of IOMS are held regularly for class 9th and 10th, at Ramkrishna Mission School, Sithanagram, A.P. This is second year of mentoring at the school. We want to add more learning centers

*It is a small group of Four persons including **Prof. SB Dhar**, Alumnus-IIT Kanpur, **Shri Shailendra Parolkar**, Alumnus-IIT Kharagpur, settled at Texas, US and **Smt. Kumud Bala**, Retd. Principal, Govt. School Haryana. More details of the initiative are available on our website and operational aspects of IOMS online.*

***Actions Requested:** May please like to ponder upon this initiative. **Queries** ,if any, are heartily welcome. We would welcome your collective complementing in any of the areas listed at **Involvement**, above, to make the mission more purposeful and reachable to target children.*

Contact: Dr. Subhash Kumar Joshi, **Coordinator** –Gyan Vigyan Sarita.
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e-Mail ID: subhashjoshi2107@gmail.com, **Website: http://www.gyanvigyansarita.in**

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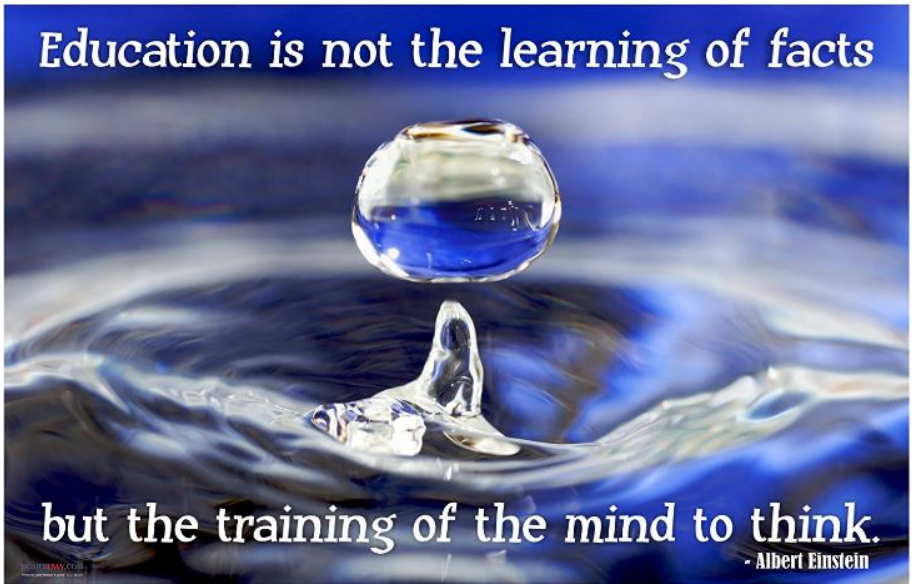

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Modern cynics and skeptics... see no harm in paying those
to whom they entrust the minds of their children
a smaller wage than is paid to those to whom
they entrust the care of their plumbing.
- John F. Kennedy

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INVITATION FOR CONTRIBUTION OF ARTICLES

Your contribution in the form of an article, story poem or a narration of real life experience is of immense value to our students, the target audience, and elite readers of this Quarterly monthly e-Bulletin ***Gyan-Vigyan Sarita: शिक्षा,*** *and thus create a visibility of the concerns of this initiative. It gives target students a feel that you care for them, and they are anxiously awaiting to get benefitted by your contributions. We request you to please feel free to send your creation, by* ***20th of each month*** *to enable us to incorporate your contribution in next bulletin, subhashjoshi2107@gmail.com.*

We will be pleased have your association in taking forward path our plans as under-

- ***With the the release of 1st Monthly e-Bulletin in its consecutive Fourth Year, we are gearing up for its 2nd Monthly e-Bulletin Gyan-Vigyan Sarita: शिक्षा .***
- ***This cycle of monthly supplement e-Bulletin Gyan-Vigyan Sarita: शिक्षा is aimed to continue endlessly, till we get your तन and मन support in this sefless educational initiatice to groom competence to compete among deprived children.***

We believe that this e-Bulletins shall make it possible for our esteemed contributors to make its contents rich in value, diversity and based on their ground level work and/or experiences.

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अंदाज ए बयां

लबड़हत्था....

समीर लाल 'समीर'

बचपन से ही मैं बाँये हाथ से लिखता था. लिखने से पहले ही खाना खाना सीख गया था, और खाता भी बांये हाथ से ही था. ऐसा भी नहीं था कि मुझे खाना और लिखना सिखाया ही बाँये हाथ से गया हो लेकिन बस जाने क्यूँ मैं यह दोनों काम ही बांये हाथ से करता.

पहले पहल सब हँसते. फिर डाँट पड़ने का सिलसिला शुरु हुआ.

अम्मा हुड़कती कि लबड़हत्थे से कौन अपनी लड़की ब्याहेगा? (उत्तर प्रदेश में बाँये हाथ से काम करने वालों को लबड़हत्था कहते हैं)

आदत छुड़ाने के लिए खाना खाते वक्त मेरा बाँया हाथ कुर्सी से बाँध दिया जाता. मैं बहुत रोता. कोशिश करता दाँये हाथ से खाने की लेकिन जैसे ही बाँया हाथ खुलवा पाता, उसी से खाता. मुझे उसी से आराम मिलता.

एक मास्टर साहब रखे गये थे, नाम था पं.दीनानाथ शर्मा. रोज शाम को आते मुझे पढ़ाने और खासकर दाँये हाथ से लिखना सिखाने. जगमग सफेद धोती, कुर्ता पहनते और जर्दे वाला पान खाते. ऐसा नहीं कि बाद में और किसी मास्टर साहब ने मुझे नहीं पढ़ाया लेकिन उनका चेहरा आज भी दिमाग में अंकित है.

बहुत गुस्से वाले थे, तब मैं शायद दर्जा तीन में पढ़ता था. जैसे ही स्कूल से लौटता, वो घर पर मिलते इन्तजार करते हुए. पहला प्रश्न ही ये होता कि आज कौन से हाथ से लिखा? स्कूल में दाँये हाथ से लिख रहे थे या नहीं. मैं झूठ बोल देता, 'हाँ'. तब वो मुझसे हाथ दिखाने को कहते और बाँये हाथ की उँगलियों में स्याहि लगी देख रुलर से हथेली पर मारते. उनकी मुख्य बाजार में कपड़े की दुकान थी. पारिवारिक व्यवसाय था. उन्हीं में से थान के भीतर से निकला रुलर लेकर आते रहे होंगे क्यूँकि जिन दो साल उन्होंने मुझे पढ़ाया, एक सा ही रुलर हमेशा लाते.

फिर मैं जान गया कि वो स्याहि देखकर समझ जाते हैं. तब स्कूल से निकलते समय वहीं पानी की टंकी पर बैठ कर मिट्टी लगा धो धोकर स्याहि छुड़ाता और फिर घर आता.

मगर दीनानाथ मास्टर साहब फिर दाँये हाथ पर स्याहि का निशान न पाकर समझ जाते कि कुछ बदमाशी की है. मैं फिर मार खाता.

इसी दौर में मैने यह भी सीख लिया कि सिर्फ स्याहि धोने से काम नहीं चलेगा तो दाँये हाथ की उँगलियों में जानबूझ कर स्याहि लगा कर लौटता. ऐसा करके काफी हद तक मास्टर साहब को चकमा देता रहा और मार खाने से बचता रहा.

फिर जाने कैसे उनकी पहचान मेरे क्लास टीचर से हो गई. फिर तो वो उनसे पूछ कर घर पर इन्तजार करते मिलते. गनीमत यह रही कि परीक्षा में नम्बर बहुत अच्छे आ जाते तो बाँये हाथ से लिखना धीरे धीरे घर में स्वीकार्य होता चला गया और दीनानाथ मास्टर साहब को विदा दे दी गई. हाँ खाने के लिए फिर भी बहुत बाद तक टोका गया.

उसी बीच जाने कहाँ की शोध किसी अखबार में छपी कि बाँये हाथ से काम करने वाले विलक्षण प्रतिभा के धनी होते हैं और किसी सहृदय देवतुल्य व्यक्ति ने पिता जी को भी वो पढ़वा दिया. पिता जी ने पढ़ा तो माता जी को ज्ञात हुआ. एकाएक मैं लबड़हत्थे से प्रमोट हो कर विलक्षण प्रतिभाशाली व्यक्तियों की जमात में आ गया.

तब मैं चाहता था कि वो मेरे बड़े भाई को अब डांटे और मास्टर साहब को लगवा कर उसे रुलर से मार पड़वाये कि बाँये हाथ से लिखो. मगर न जाने क्यूँ ऐसा हुआ नहीं. बालमन था मैं इसका कारण नहीं जान पाया या शायद मेरी विलक्षणता अलग से दिखने लगे इसलिये उसे ऐसे ही छोड़ दिया होगा. ऊँचा पहाड़ तो तभी ऊँचा दिख सकता है, जब नापने के लिए कोई नीचा पहाड़ भी रहे. वरना तो कौन जाने कि ऊँचा है कि नीचा.

लबड़हत्थों की जमात में अमिताभ बच्चन, बराक ओबामा जैसे अनेक लोगों का साथ मिला तो आत्मविश्वास में और बढ़ोतरी हुई और मेरी उस शोध परिणाम में घोर आस्था जाग उठी. काश , उस पेपर की कटिंग मेरे पास होती तो फ्रेम करा कर नित दो अगरबत्ती लगाता और ताजे फूल की माला चढ़ाता.

शोध परिणाम तो खैर समय , जरुरत, बाजार और स्पान्सरर्स/ प्रायोजकों के हिसाब से बदलते रहते हैं मगर अपने मतलब का शोध फ्रेम करा कर अपना काम तो निकल ही जाता. फिर नये परिणाम कोई से भी आते रहते उससे मुझे क्या?

किन्तु सोचता हूँ क्या इससे वाकई कोई फरक पड़ता है कि आप बाँये हाथ से काम करते हैं या दाँये? फिर क्यूँ न जो सहज लगे, सरल लगे और जो स्वभाविक हो, उसे उसके स्वतंत्र विकास की लिए जगह दे दी जाये..प्रतिभा दाँया, बाँया देखकर नहीं आती. प्रतिभा तो मेहनत और लगन का परिणाम होती है ,मेहनत किस हाथ/तरह से की गई उसका नहीं.

लोकप्रिय चिट्ठाकार समीर लाल व्यवसाय से चार्टर्ड एकाउंटैंट हैं। आजकल वे कैनेडा में रहते हैं। उन्होंने कहानी लिखना पाँचवीं कक्षा में ही शुरु कर दिया था। आप कविता , गज़ल, व्यंग्य, कहानी, लघु कथा आदि अनेकों विधाओं में दखल रखते हैं| भारत के अलावा कनाडा और अमेरिका में मंच से कई बार अपनी प्रस्तुति कर चुके हैं। आपका ब्लॉग "उड़नतश्तरी" हिन्दी ब्लॉगजगत में एक लोकप्रिय नाम है।

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Ayurveda- Health Care

Prevention From Skin Diseases in Winter Season

Dr Sangeeta Pahuja

Dryness increases in the winter season.Cold weather leas to Vata accumulation in the body resulting in dry skin, cracked lips and heels etc.There are many different types of skin diseases.Some of most common in winter are Psoriasis,Eczema, Pruritis,Rashes,Acne, Bacterial and Fungal infections etc.

Ayurvedic treatment for Skin is based on the Dosha type of an individual and is formulated to meet the specific requirement of each.Following are the skin care treatment for each of the Dosha type.

Skin care of Vata Type: Gentle cleansing. Do oil massage on your body before bathing.It will keep your skin smooth and healthy. You can use coconut oil, sesame oil, almond oil,olive oil.

Keep yourself hydrate and moisturize to prevent dryness. Juicy fruits and vegetables like carrot, cucumber, lemon etc.which had high water content should be consumed.
Aloe herb fascial cleansing treatment offers the skin a refreshed feel.
You can apply paste of raw milk and raw honey for 5 minutes and rinse thoroughly after that to have soft skin.
Special masks and anti-aging creams with soothing massage offers a delightful Ayurvedic skincare.

Skin care of Pitta Type : Keep yourself hydrate.Drink 3-4 liter water per day. Plant and fruit based products of highest quality and purity levels rejuvenate and refresh the skin infinitely.
You can apply paste of raw milk and banana for 5 minutes to have soft and smooth skin.

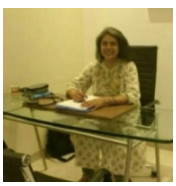
Skin care of Kapha Type : Kapha skin is characterized by smoothness, moisture and least wrinkles.
But the skin type is prone to pores and oily surface.
Skin colour remain pale and dull.
You can apply mixture of honey and lemon juice to refresh skin.
Revive your senses with the blissful therapeutic experience of skin enhancement and beautifying techniques.
Favourable diet and lifestyle to prevent skin diseases : Consume food sweet,sour and salty(Madhur-amal-lavan) in nature, Vegetables like pumpkin, cabbage,snakegourd, cauliflower, Fenugreek leaves,mint, amaranth etc.,Pulses like Green gram,red gram, Pickles likelemon pickle,orange pickle,ginger pickle.
Fruits like grapes,apple, orange, Raisins are good to consume.
Use of jaggery in diet helps to balance vata .
Herbs like Amla,Shunthi,Manjishta, Aloe etc. have detoxifying properties, should be consumed in winter to balance Tridoshas.

Favourable Lifestyle : Have proper sleep at night atleast for 7-8 hours. Drink 3-4 litres water per day. d
People suffering from constipation, should take Triphla churna daily for better evacuation.
Go for morning walk atleast for 30 minutes in fresh air.
Keep good hygiene.
Do yoga,Meditation and pranayam.

Unfavourable Diet and Lifestyle : Avoid Oily,spicy and junk food. Chocolate, painkillers, sweets,Non-vegetarian,cold water,Arreated drinks,canned and preserved food items,excess intake of tea ,coffee and Alcohol, Tamarind, jackfruit,potato Brinjal,Non-vegetarian etc. Sugar,jaggary,honey and sweets should be avoided by Diabetics.

Unfavorable lifestyle : Avoid excess of hot water for bathing, instead use lukewarm water.
Avoid harsh soaps.Use soaps with high content of natural oils and glycerine which are soft to your skin.
Avoid irregular eating habits
Avoid Anxiety and Stress
Avoid Day Sleeping
Avoid night Awakening
Avoid suppression of natural urges.
Avoid humid and damp places.
Avoid seddantary lifestyle.

Know Ayurveda, Follow Ayurveda and Stay Healthy.



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शिक्षा प्रणाली और शिक्षक की व्यथा

डॉ. विभु मिश्र

विद्यालय सीखने और सिखाने के केंद्र होते हैं। सीखना और सिखाना मिलकर शिक्षा बनती है। शिक्षा से मेधा का विकास होता है। विद्यालय में किताबों को शिक्षा का सहायक तथा शिक्षकों को जिम्मेदार सहायक माना जाता है। छात्रों की हर प्रकार की असफलता का ठीकरा शिक्षकों और विद्यालय के सिर पर मढ़ा जाता है। अब प्रश्न उठना स्वाभाविक है कि क्या विद्यालय, शिक्षक और किताबों को ही पूर्णरूपेण जिम्मेदार मानना उचित है अथवा बच्चों के पालक, परिवार एवं समाज का भी इसमें कोई योगदान है?

यह देखा गया है कि एक ही विद्यालय में, एक ही शिक्षक और एक ही पाठयक्रम के अंतर्गत शिक्षा ग्रहण करने वाले सब बच्चे एक सा विकास नहीं दिखाते हैं। एक समय और एक ही परिस्थिति में एक विषय में अधिक चपल, सक्रिय व व्यावहारिक नजर आने वाला बच्चा, किसी अन्य विषय में उस स्तर का व्यवहार नहीं दिखा पाता है।

प्रचलित शिक्षा का तरीका यह है कि आजकल स्कूल में छात्र के दिमाग को खाली घड़ा समझकर उसे विभिन्न विषयों की सूचनाओं से ठूंस ठूंस कर भर दिया जाता है। विद्यार्थी का कितना विकास हुआ, यह जानने के लिये परीक्षाओं का निर्धारण है जिसमें शिक्षक के अनुसार बताए गए तरीके से छात्र व्यवहार करते हैं और अंकों के रूप में सफलता दिखाते हैं।

सोचने की बात यह है कि क्या यह सफलता मौलिक चिंतन व व्यवहारिकता के कारण है अथवा चंद पाठ्य अंशों के रटे रटाए हिस्सों को ज्यों का त्यों परीक्षा की कापी में लिखने के कारण है? देखा तो यह भी गया है कि स्वयं शिक्षक भी स्वतंत्र रूप से सोचने और और अपने को अभिव्यक्त करने वाले छात्रों को उचित अंक नहीं देते हैं।

आज की शिक्षा प्रणाली और परीक्षा प्रणाली का दुष्परिणाम रटंत विद्या को बढ़ावा देना हो गया है, न कि स्वतंत्र व मौलिक चिंतन और कार्यव्यवहार को आगे बढ़ाना है। स्कूली शिक्षा में शासकीय नीतियों की रूढ़िवादिता ने त्वरित परिणाम की आशा करना शुरू कर दिया है जिससे बच्चों में सीखने और समझने की क्षमता प्रभावित हो रही है।

आज की आवश्यकता यह है कि बच्चों में हर हाल में सही उत्तर तक पहुंचने की क्षमता विकसित की जाये, उनमें आदर्श व्यवहार सीखने और उसे अपनाने की जिज्ञासा उत्पन्न की जाये न कि उसका दिखावा करने की प्रवृत्ति को बढ़ावा दिया जाये। यदि हम ऐसा कर पाये तो हमारी शिक्षा प्रणाली, शिक्षा के वास्तविक लक्ष्य तक पहुंच पायेगी।

शिक्षक का कार्य छात्रों को विषय सिखाना है, समझ को स्पष्ट करना है और उनको व्यावहारिक बनाना है। शिक्षक को चाहिये कि वह अपने छात्र की समझ को जांचे, उसमें अधिक समझ का विस्तार करे और परीक्षा में अर्जित अंकों को ही योग्यता अथवा विषयगत दक्षता का एकमात्र परिचायक नहीं बनाये। इस बात को अकाट्य सत्य के रूप में लेना चाहिये कि केवल अनुकूल परिस्थितियां होने से ही स्वतंत्र चिंतन क्षमता और कार्यदक्षता का विकास होता है। शिक्षक को यह हमेशा ध्यान में रखना चाहिये कि कक्षा में शिक्षण के दौरान सिखायी गयी बातों में से कुछ भी निरर्थक और हानिकारक नहीं हो ।

वास्तविकता यह है कि शिक्षा के क्षेत्र में वास्तविक क्रियान्वयन और अनुभवों का संयोग, प्रशासन-तंत्र को नहीं भाता है। प्रशासन तंत्र का मुख्य उद्देश्य शिक्षा जगत की त्रुटियां निकालने और शिक्षकों को पढ़ा लिखा कर्मचारी मानने तक हीं सीमित रहता है। पढ़ा- लिखा कर्मचारी मानने से सरकार का एक फायदा यह होता है कि किसी भी विभाग के किसी भी कार्य को शिक्षक से संपन्न कराने के लिये उनका उपयोग कर लिया जाता है, परंतु जब ऐसा करने से हो रहे शिक्षण कार्य के नुकसान के बारे में विचार का प्रश्न आता है तो उस तरफ विल्कुल ही ध्यान नहीं किया जाता है। यह मान लिया गया है कि शिक्षा अथवा उससे संबधित समस्याओं अथवा कमियों को शिक्षक अथवा छात्र खुद ब खुद हल कर लेंगे। वास्तव में शिक्षण संबंधी समस्याएं केवल संसाधन एकत्र करना, उनका सम्यक उपयोग करना, कक्षा - व्यवस्था करना, अथवा कक्षा का नियंत्रण करने से ही नहीं जुड़ी हैं।

हर पढ़ाई के बाद विद्यार्थिओं की परीक्षाएं लेना, उनको उनके उत्तर के आधार पर अंक देना, शिक्षकों के साथ साथ, समाज को भी एक बड़े छलावे में रखती हैं। सच्चाई यह है कि विद्यालय में सीखी गई बातों का एक बहुत छोटा अंश ही वास्तविक जिंदगी में काम आता है।

छात्र वास्तविक जिंदगी में काम आने वाली चीजें, विद्यालय के बजाय, बाहरी समाज से ज्यादा सीखते हैं। सवालों-जवाबों के अभ्यास, स्पष्टीकरण और परीक्षाओं के सिलसिलों ने वास्तव में सामान्य और सहज बुध्दि के विकास का रोकने के अलावा कुछ नहीं किया है।

विंस्टन चर्चिल का मानना था कि शिक्षकों के प्रश्नों का संबंध क्या जानने की बजाए क्या नहीं जानने से अधिक संबंधित होने चाहिये। हमें नहीं भूलना चाहिए कि परीक्षा-परिणामों से ज्ञान की उपलब्धता और उपादेयता को पूर्णरूप से नहीं मापा जा सकता है।

शिक्षा का अर्जन एक लंबी और मंद प्रक्रिया है। आजकल की भागदौड़ की दुनिया में रहनेवाले, आनन फानन परिणाम चाहने वाले समाज और प्रशासनतंत्र को इस प्रक्रिया की जानकारी नहीं है। इस जानकारी के अभाव में उन्होंने शिक्षक-समुदाय को एक अनुत्पादक की श्रेणी में रख दिया है और उसकी उपेक्षा करना शुरू कर दिया है।

विडंबना यह है कि शिक्षा के कारण ही उच्च उपलब्धियां हासिल करने वाले लोग एक तरफ तो शिक्षण समुदाय की उपेक्षा करते हैं और दूसरी तरफ अपने नौनिहालों को शिक्षकों को सौंप कर उसे कम से कम समय व संसाधनों में पूर्ण सक्षम बनाना चाहते हैं।

इन विषम परिस्थियों में घिरा शिक्षक स्वयं को असहाय मानकर शिक्षणकर्म की चुनौतियों के आगे हार मान लेता है और मशीनी युग के यंत्र मानव की भांति बिना भावनाओं के यंत्रवत कार्यदक्षता का प्रदर्शन कर रहा है, जो भावी पीढ़ी के लिए घातक है। शायद यही कारण है किसी समय भगवान से भी पहले सम्मान पाने वाले शिक्षक के रूप में काम करने के लिये अच्छे शिक्षक बड़ी मुश्किल से मिलते हैं।

नवीन राष्ट्रीय पाठ्यक्रम की रूपरेखा के अनुसार, शिक्षा का उचित माहौल बनाने के लिए छात्र की स्वतंत्रता जितनी जरूरी मानी गयी है, उतनी ही स्वतंत्रता की हिमायत शिक्षक के लिये भी की गयी है। सीखने वालों की विविध आवश्यकताओं को समझकर शिक्षणकर्म को

चुनौतीपूर्ण तरीके से संपन्न कराया जा सकता है, परंतु इसके लिये जरूरी बात यह है कि अध्यापक की शिक्षण क्षमता का बेहतर इस्तेमाल किया जाये। यह बेहतर इस्तेमाल तभी संभव हो पायेगा, जब अध्यापक को पाठयक्रम के अलावा अन्य शासकीय कार्यों से मुक्त रखा जायेगा।

आज शिक्षक शासकीय कार्यों के बोझ से इतना दब गया है कि वह अपनी सृजनात्मक क्षमता व कौशल को भूल गया है और सिर्फ छात्र को पास कराने और अपने को सफल दिखाने की चकरघिन्नी में घूम रहा है।

शिक्षा को बहुमुखी बनाने के लिये जरूरी है कि देश का हर चिंतक, प्रशासक, समाज सुधारक इस बात को समझे कि शिक्षण-कार्य एक निम्न दर्जे की अनुत्पादक प्रक्रिया नहीं है, बल्कि यह एक सृजनात्मक श्रृंखला की उच्च कोटि की कार्यप्रणाली है जो एक बच्चे को उसकी क्षमता व प्रतिभा का ज्ञान कराती है जिससे वह आगे चलकर समाज हित के लिए उपयोगी नागरिक बनता है। डॉ. ए.पी.जे. कलाम ने सच ही कहा था कि अध्यापन ही एकमात्र ऐसा पेशा है जिस पर आप गर्व कर सकते हैं।

आइये , विचार करें कि क्या सबको उन्नति के पथ पर ले जाने वाली शिक्षा के क्षेत्र में कभी रामराज्य आ पायेगा, क्या चमकती-दमकती शहरी शिक्षा और दुबकी-सिमटी ग्रामीण शिक्षा को मिलाकर एक ऐसा रूप दिया जा सकेगा कि सीखने वाले अपने प्रति उत्तरदायी बनें, क्या इंजीनियरिंग, डाक्टरी और व्यावसायिक शिक्षा की ओर अधिक ध्यान दे रही सरकार सामान्य शिक्षा क्षेत्र की मूलभूत जरूरतों को पूरा करने और व्याप्त समस्याओं को दूर करने की ओर नजर घुमायेगी, क्या कभी ऐसा समय आयेगा जब शिक्षण पेशे में आने वाले लोग आर्थिक पक्ष पर ज्यादा ध्यान न देकर शिक्षण कार्य को ही सम्मानजनक स्वरूप दे पायेंगे? क्या यह आवश्यक नहीं है कि शिक्षण कार्य को समाज और सरकार दोनों मिलकर ऐसा प्रभावी और अर्थसंपन्न बना दें कि ज्ञान देने वाले स्वयं इस ओर खिंचे चले आयें और उन्हें कभी अर्थ की चिंता न रह जाये?

लेखक का जन्म सन 1967, जबलपुर में हुआ . आप एम् फिल, पी एच डी (भौतिकी), एम् एड . वर्तमान में जनजातीय कार्य विभाग के शा0 उ0 मा0 वि0 सुन्दरदादर, जिला उमरिया में प्राचार्य हैं . पर्यावरण और विज्ञान जागरूकता हेतु Futuristic Force और Scifun जैसे स्व समूहों के द्वारा शिक्षा में स्वतंत्र चिंतन और स्वयं सीखने हेतु कबाड़ से जुगाड़/ सस्ते गतिविधियों के द्वारा निरंतर गतिविधियां करते रहते हैं. अच्छे प्रशिक्षक व स्वयं कल्पित अनुप्रयोगों/ नवाचारों हेतु मध्य प्रदेश राज्य शिक्षक सम्मान 2006, राज्य स्तरीय नवाचारी शिक्षक पुरुस्कार 2004, मध्य प्रदेश विज्ञान प्रतिभा सम्मान 2009, वे बोल्ट अवार्ड प्राप्त NTSC 2006 में देश के बेस्ट 31 शिक्षक और NCIEP 2006 हेतु देश के बेस्ट 10 नवाचारो में स्थान प्राप्त कर चुके हैं और राज्य स्तरीय विज्ञान संगोष्ठी और विज्ञान मेला, INSPIRE Award अवार्ड आदि प्रतियोगिताओ हेतु कई बार प्रशंसित किये गये हैं.

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Nothing is more important than education,
because nowhere are our stakes higher;
our future depends on the quality of education of our children today.

- Arnold Schwarzenegger

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Education is not job training;
the function of education is to instill an appreciation
of our place in the flow of time and space,
to expand our intellectual and empathetic understanding
of nature and people.

- Jonathan Lockwood Huie

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COMMUNICATION

Prakash Kale

Every communication does have/must have purpose. It need not be, while most of the time it is not true. Communication is always made, taking in to account the target group-may be audience, viewer or reader based on form of communication.

Fame of communication depends on its effectiveness on target group rather than its intrinsic truthfullness. In this sense "Geeta" had (has) a objective to prepare Arjuna (common man) for War(life).What is said in Geeta may or may not be true, but its greatness rest on the fact that it changed the mind of Arjuna and effectively changes mind of many -many of modern Arjuna. The same can be said about advice of parent to children, scolding of superior to junior and astrologer's predictions. Stated word need not be true as long as they aimed at create a desired effect.

If we wish to observe as to how the communication is based on targeted group, just read the Mumbai News papers in Marathi, Hindi and English, there comments on Marathi/ non-Marathi issue is meant for their own readers and obviously different. In Mumbai no one dares to say that how is that a Mumbikar going to USA can help to strengthen built economy at homeland. But, it portrays that population migrating to Mumbai is destroying it. Such communications are driven on the premise that most of audience are Mumbaikars and can be excited with the news of migrating population.

Likewise, comments of celebrities on their own target group. Marathi celebrities, whose popularity is not dependent on Marathi population speak in favour of Mumbai for all. These are Sachin Tendulakar, Asha Bhosle etc. In sixties and seventies, our leaders while addressing Indian population used to advised population control for accomplishing their vision of development. Later those leaders pleaded for development assistance at international forum for control of population. A different position taken by experts (coming from urban-middle class and addressing their own group) in TV talks on LPG subsidy as against fertilizer subsidy is worth watching.

In case of disputes, posturing of a group or country to resolve an issue reflects their own position as compared to its opponent. On international plane India, getting stronger, its stand is that all issues with its neighbours should be resolved with bilateral talks only. But, in earlier times when India, as a weak nation, sought international support to resolve issues. With India's position improving in international arena; the it talks of direct and bilateral talk with other strong countries. Same applies to domestic issues. [

Another form of communication is awards and honours; basically these are felicitation of a person's qualities and contributions. Every individual or group judges others and makes comment based on its own expectations, profit and loss etc. After India opened market for foreigners in 1991 onwards, I observed sudden increase in number of Indian girls winning miss world/ miss universe awards and so on, in short span of 5-6 years, prior to this probably in 40 years there was only one winner. To say correctly, Miss A Roy became second miss world after a gap of 28 years, and thereafter in seven years we saw four winners. One reason may be world cosmetic industry's eagerness to enter Indian market and promote their own product by focusing health and beauty. Similarly, without undermining the qualities of Dr. Manmohan Singh, the honour praise etc. received by him is mostly coming from the advocates of free enterprise. These advocates may be capitalist countries or our own chamber of commerce etc, who were benefited by his policies.

There are many dangerous communication is in the form of what is good and what is bad. These are used to modify behaviour of person for the so called good of society. It is in the form of, glorifying the acts that are, against human nature, and what human being will generally hesitate to act upon. In old days worshiping "Sati" came under this category. Dying for nation is called "Martyrdom". Taking oath of celibacy "Diksha or Nun ship" at early age is similarly glorified in every religion. Saving the "Girl Child" is good. Same is true with honouring the highest tax payer. Examples can be cited in hundreds. What is not noticed by common man is that these good things are not followed by the preachers of these good things. Thus no one from rich/leader family goes for martyrdom or accepting celibacy. All these are reserved for poor and uneducated persons.

There are communication for which there is no proof while, there is no opposition either for these communication in the group. It is believed that human life is most valuable and higher form of life; among Hindus it is believed that this life is due to pious deeds (Punya karma) and it is very rare. But, the way humans are easily replicating and making

other species rare we may have to revise our opinion. It has side effect of looking down other forms of life leading to atrocities destruction of these. If we could say that all forms of life are equal and are integral part of nature, we may have different attitude. There is an apprehension that China's growth can endanger India, based on some statistics but without independent opinion poll. Similarly, all Indians unanimously claim that Indian Culture and Tradition are great, despite its many short comings. These topics form subject matter for a separate article.

One more form of communication causing fallacy of logic. It is like saying "Sun rises in the sky" and almost every child grows with this perception. Later, he learns that sun is in its position with earth revolving around it. Now-a -ays most common slogan is "Save the Earth". The fact is that earth is not in any way affected by 1-2 degree rise and fall of temperature, It has survived more severe variation in temperatures. What is realy affected by temperature rise is flora and fauna on it, and in turn human life. Therefore the slogan should be "Save ourselves". Similarly many a times philosopher and writer propagate new theories to advance there own cause. For example, when Samarth Ramdas started preaching and writing in Prakrit Marathi, he said "Knowledge is Knowledge ", it should be accepted in any language.

Last but not the least, who speak truth and who communicate lie is a matter of perception. It is generally believed or said that common people speak lie, and higher authority speak truth. But this is not always true. The fact is that higher the desire to have intended communication, higher is the chance of communication camouflaging, i.e deviation from truth. All advertisements come in to this category and therefore matured persons do not take them on face value. But, what about state's communications. While preparing for War against Iraq, USA propagated possession of "Wapons of Mass Destruction" with Iraq. It turned out to an utter and deliberate lie. Hitler proclaimed Aryana to be pure human being.

History is littered with such false and controversial communications, that have changed the its narration.

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"A hundred times every day I remind myself that my inner and outer life are based on the labors of other men, living and dead, and that I must exert myself in order to give in the same measure as I have received and am still receiving."

Albert Einstein

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शिक्षा में हिन्दी का महत्व

सीमा फाटक

मनुष्य के विचारों की अभिव्यक्ति का सर्वश्रेष्ठ माध्यम है भाषा है। यही भाषा ज्ञान मनुष्य को श्रेष्ठता प्रदान करती है। हर राष्ट्र की अपनी मातृभाषा होती है जिसमें उसके सभी शासकीय व अशासकीय कार्य किए जाते हैं। शिक्षा के क्षेत्र में भी यदि राष्ट्रभाषा को महत्व दिया जाए तो राष्ट्र व राष्ट्रवासियों की उन्नति तय होती है। वर्तमान परिपेरक्ष्य में यदि देखा जाए तो आज जितने भी विकासशील राष्ट्र हैं वे अपनी भाषा के कारण ही उन्नति कर रहे है। उन्होंने अपने कार्य क्षेत्र में राष्ट्रभाषा को सर्वोच्च स्थान दिया है। विभिन्न विद्वानों ने भाषा के संबंध में अपने विचार प्रस्तुत किए है : "राष्ट्रभाषा के बिना देश गूँगा है - "गाँधीजी", "विद्या वहीं है जो मुक्ति प्रदान करे -"शंकराचार्य'.

शिक्षा शब्द शिक्ष धातु से निकला है जिसका अर्थ है सिखाना अथवा शिक्षा देना। संविधान में हिन्दी को सर्वोच्च स्थान प्रदान किया गया। 14 सितम्बर 1989 को हिन्दी को संघ की राजभाषा घोषित किया गया। वर्तमान संदर्भ में यदि देखा जाए तो भारत की उन्नति हेतु हिन्दी भाषा शिक्षा में अनिवार्य की जानी चाहिए। राष्ट्रभाषा के माध्यम से ही हम उन्नति के पथ पर अग्रसर हो सकते है। राष्ट्रभाषा ही शिक्षा का माध्यम भी मातृभाषा होना चाहिए।

संसार के कई देश जैसे - सोवियतसंघ, जापान, पौलेण्ड, चेकौसलोवाकिया, रूमानिया, फ्रांस ने अपनी राष्ट्रभाषा के माध्यम से विश्व में अपना एक स्थान बनाया। फिर भी हमारी विडम्बना है कि आजादी के 70 वर्ष होने पर भी हम हिन्दी को शिक्षा में एक महत्वपूर्ण स्थान दिलाने में असमर्थ महसूस कर रहे है।

भाषा मानव समाज की उन्नति और सफलता का मूलभूत आधार है। भाषा के बिना एक दूसरे के विचारों को समझना एक असंभव प्रयास है, संपूर्ण जीवनमण्डल में केवल मनुष्य को ही भाषा का अमूल्य वरदान ईश्वर से मिला है। भाषा के कारण ही मनुष्य, मनुष्य है और सभी जीवधारियों में श्रेष्ठ है। भाषा मनुष्य के भावों व विचारों की अभिव्यक्ति का मध्यम है। "भाषा एक मानवीय कलाकृति है।" वेद में भाषा को अनेक नामों से जाना जाता है, "वाग्, वाच्, गिर, लोक व्यवहारे प्रचलित वामेव भाषा शब्देन व्यवहता", अर्थात् लोक व्यवहार में प्रचलित 'वाग्' शब्द ही भाषा शब्द के रूप में प्रयोग में लाया जाता है।

ऋगवेद् में कुत्स में कहा है कि - "सर्वप्रथम मानवाय स्तुत्यर्थ वाचमिन्दः प्रदायः", इन्द्र ने मनुष्य को ईश्वर स्तुति के लिए भाषा प्रदान की। भाषा एक ध्वनि संकेत है जिसके द्वारा मानव अपने सामाजिक तथा सांस्कृतिक भावों एवं विचारों का आदान-प्रदान करता है ।प्लेटो के अनुसार विचार आत्मा की मूक या ध्वनात्मक बातचीत है पर वहीं जब ध्वनात्मक होकर होठों पर प्रकट होती है तो उसे भाषा की संज्ञा देते हैं। इनसाइक्लोपीडिया ब्रिटेनिका के अनुसार "भाषा यादृच्छिक मौखिक प्रतीकों की व्यवस्था है जिसके द्वारा मनुष्य समाज एवं संस्कृति के सदस्य होने के नाते परस्पर विचारों एवं कार्यों का आदान प्रदान करते हैं। रामचन्द्र वर्मा के अनुसार – "मुख से उच्चारित होने वाले शब्दों और वाक्यों आदि का वह समूह जिसके द्वारा मन की बात बतायी जाती है। भाषा कहलाती है"।

भाषा का महत्व एक प्रकार से असंदिग्ध है । मानवीय समाज की उन्नति ज्ञान विज्ञान के नूतन प्रक्षेणों का उद्य और जीवन के विभिन्न प्रखण्डों में तालमेल के बिना भाषा असंभव है। भाषा अभिव्यक्ति का महत्वपूर्ण साधन है। भाषा ज्ञानार्जन का सर्वसुलभ साधन है। भाषा साहित्य कला एवं संस्कृति की जननी, संरक्षिका एवं संवाहिका है। भाषा आंतरिक आनंद का स्त्रोत है। भाषा अन्तर्राष्ट्रिय एवं राष्ट्रीय सद्भावना जागृत एवं सुदृढ़ बनाने में समर्थ है।

हिन्दी का इतिहास : प्राचीन भारतीय आर्यभाषा काल 1500 ई. पू. से 500 ई. पू. तक माना गया हैं। इस अवधि में संस्कृत बोल-चाल की भाषा थी। संस्कृत भाषा के दो रूप है - वैदिक संस्कृत और लौकिक संस्कृत। हिन्दी का वास्तविक आरंभ 1000 ई. से माना जाता है। अर्द्धमागधी अपभ्रंश से पूर्वी हिन्दी का उद्भव हुआ है। हिन्दी की पाँच उपभाषाएँ है - पश्चिमी हिन्दी, पूर्वी हिन्दी, राजस्थानी, पहाड़ी और बिहारी। हिन्दी भाषा देवनागरी लिपी में लिखी जाती है। ध्वनि के अनुरूप संकेतों की दृष्टि से देवनागरी सर्वश्रेष्ठ लिपी है। जिस भाषा में शासन का काम-काज संपादित होता है उसे 'राजभाषा' कहते है। अशोक के समय में 'पालि राज्यभाषा थी।

हिन्दी के विकास में सर्वप्रथम कोई विलियम कॉलेज कोलकाता का योगदान रहा है। संविधान के अनुच्छेद 343 के अनुसार संघ की राजभाषा हिन्दी और लिपि देवनागरी है। अमीर खुसरों (1253 - 1325 ई.) ने सबसे पहले भाषा या भोखा के स्थान पर हिन्दी या हिन्दवी शब्द का प्रयोग किया। मानव के मानसिक विकास के लिए मातृभाषा उतनी ही आवश्यक है जैसे कि बच्चे के शारीरिक विकास के लिए माता का दूध आवश्यक है उतना ही बच्चे के शारीरिक विका के लिए सर्वांगिण विकास भी आवश्यक है। रविन्द्रनाथ टेगौर तथा महात्मा गाँधी, गिजुभाई भी मातृभाषा के माध्यम द्वारा शिक्षा प्रदान करने के पक्ष में थे। केवल एक ही भाषा में हजारों भवों की स्पष्ट व्यंजना हो सकती है। केवल एक ही भाषा में शब्दों के सूक्ष्म संकेतों को हम अपनी माता के साथ ही सीखते हैं तथा जिसमें हम अपनी प्रारंभिक प्रार्थनाओं हर्ष तथा शोक के उद्गारों को व्यक्त करते है। दूसरी किसी भाषा को शिक्षा का माध्यम बनाना विद्यार्थीयों के श्रम को अनावश्यक रूप से बढ़ाना ही नहीं, वरन् उसके मस्तिष्क की स्वतंत्रगति को पंगु बना देता है।

शिक्ष के क्षेत्र में विविध विषयों के ज्ञान के लिए एक भाषा का माध्यम होना अनिवार्य होता है। भाषा शक्ति जितनी परिपक्व एवं गहन होगी उतनी ही सरलता और सहजता से हम अन्य विषयों का ज्ञान प्राप्त कर सकते हैं। माध्यिमिक शिक्षा आयोग (1952) ने भी शिक्षा का माध्यम मातृभाषा में होना चाहिए। देश का अधिकांश भाग हिन्दी को किसी न किसी रूप में समझ लेता है। अंग्रेजी एक विदेशी

भाषा होने के कारण भारतीय जनता की समझ से एकदम दूर है। देश की सर्वसाधारण जनता या तो हिन्दी समझती है या क्षेत्रिय भाषा। हिन्दी को शिक्षा का माध्यम बनाया जाना चाहिए।

प्रत्येक भाषा के चार लक्ष्य होते हैं, जैसे लिखना, पढ़ना, बोलना, सुनना। हिन्दी भषा के द्वारा हम दूसरों की कहाँ और लिखी हुई बाते ठीक - ठाक समझ और पढ़ सकते है तथा शुद्ध प्रभावोत्पादक और रमणीय ढंग से बोल और लिख सकते हैं।

उद्देष्य : हिन्दी षिक्षण को हम उद्देष्यों के अनुसार दो भागों में बाँट सकते हैं। सामान्य उद्देष्य से विद्यालय के विभिन्न स्तरों पर मातृभाषा छात्रों में लेखन शक्ति स्वाध्याय की शक्ति, सृजनात्मक शक्ति, मौखिक और लिखित भाषाओं को समझने की योग्यता ज्ञान को शब्दों द्वारा अभिव्यक्त करने की क्षमता उत्पन्न की जा सकती है।

विद्यालय के विभिन्न स्तरों पर मातृभाषा के उद्देष्य

1) प्राथमिक स्तर- बोध-षक्ति को विकसित करना, अभिव्यक्ति शक्ति को विकसित करना, विचारों और भावों को अभिव्यकत करना।
2) माध्यमिक स्तर- स्वाध्याय की प्रवृत्ति, भाषा की शुद्धता, सौन्दर्य भावना विकसित करना।
3) उच्चतर माध्यिमिक स्तर- उच्च स्तर की आत्माभिव्यक्ति तथा सृजनात्मक शक्ति को विकसित करने के लिए वाद विवाद कहानी तथा निबंध प्रतियोगिता में भाग लेने लेखन शैली, मानसिक विकास भाषा ही शुद्धता तथा अषुद्धता का ज्ञान करवाना।

चूंकि भारत एक विकासषील देश होने के कारण आर्थिक गतिविधियों के लिए अन्य देषों पर निर्भर रहता है। इसके लिए हमें अन्य देशों से संपर्क स्थापित करना पड़ता है। इसके लिए अन्य भाषा आना भी आवष्यक है। जिसके परिणाम स्वरूप धीरे-धीरे हमारी राष्ट्रभाषा अपना अस्तित्व खोती जा रही है। आज व्यक्ति हिन्दी बोलने में शर्म महसूस करता है। वह विदेशी भाषा को बोलने में गौरान्वित महसूस करता है। विदेशी भाषा को बोलना कोई बुरी बात नहीं है। आज के युग में देखे तो वर्तमान समय वैष्वीकरण का है, लेकिन इसके लिए हम हिन्दी के महत्व को नज़र अंदाज नहीं कर सकते है।

प्रत्येक देश अपनी राष्ट्रभाषा में काम-काज करना पसंद करता है। फिर हम क्यों नहीं।

स्वामी विवेकानंद जी ने अमेरिका शिकागो में होने वाली धर्मसभा में तथा अटलबिहारी वाजपेयी ने ;संयुक्त राष्ट्रसभा में हिन्दी में भाषण देकर हिन्दी भाषा को गौरान्वित किया।

भातर में अधिकांष लोग हिन्दी भाषाई है। अगर हिन्दी के माध्यम से शिक्षा प्रदान की जाएगी तो व्यक्ति अपनी विचारों की अभिव्यक्ति सरलता व सहजता से कर पायेगा तथा उसे एक मजबूत आधार मिलने के बाद वह अवष्य दूसरी विदेषी भाषा को सीख सकता है।

हिन्दी भाषा विद्यार्थीयों को शुद्ध सरल स्पष्ट व मधुर एवं प्रभावोत्पादक भावाभिव्यक्ति में सफल बना सके चाहे यह अभिव्यक्ति मौखिक हो अथवा लिखित, बात को समझने की क्षमता प्रदान कर सकना महत्त्वपूर्ण है ।

रोजगार के अवसर : हिन्दी की अंतर्राष्ट्रीय स्थिति का अनुमान इस बात से भी लगाया जा सकता है। कि संसार के मुख्य रेडियों और दूरदर्षन संस्थान, वॉइस ऑफ़ अमेरिका, रेडियो मॉस्को, रेडियों पीकिंग, रेडियों श्रीलंका ब्रॉडकास्टिंग सर्विस आदि हिन्दी में नियमित रूप से कार्यक्रम प्रसारित करते हैं। फिजी, त्रिनिदाद, गुयाना आदि देश हिन्दी से भावनात्मक रूप से जुड़े हैं और इन देशों में हिन्दी का व्यापक प्रयोग हो रहा है।

सोवियत संघ, अमेरिका, जापान, इंग्लैण्ड, पौलैण्ड, चोकोस्लोवाकिया, रूमानिया, फ्रांस, अफ्रीका इत्यादि देषों में अन्य भाषा के रूप में हिन्दी अध्यापन के प्रतिरूचि बढ़ रही है। आज दुनिया के तीस देशों में फैले सौ से अधिक विष्वविद्यालयों, भाषा संस्थानों, अध्ययन केन्द्रों में हिन्दी का अध्ययन और अध्यापन हो रहा है।

फिजी, मारिषस, सूरीनाम त्रिनिदाद, आदि देशों में हिन्दी के अनेक पत्रिकाएँ प्रकाषित होती है। म्यांमार में 'ब्रह्मदेव' नामक पत्रिका विगत कई वर्षों से प्रकाषित हो रही है। किसी सरकार का सूचना विभाग 'शंख ' नामक पत्रिका का प्रकाषन कर रहा है। ये सब तथ्यों से ही हम अंदाज लगा सकते है। कि विश्व के पटलपर हिन्दी रोजगार अवसरों की क्षमता पढ़ रही है। हिन्दी विश्व की महान भाषाओं में से एक है। यह भी एक तथ्य है।

कार्यक्षमता में वद्धि : आज शिक्षा तकनीकी तथा कम्प्यूटर के कारण अंग्रेजी भाषा को अधिक बढ़ावा मिल रहा है। इसका प्रभाव विश्व व्यापी है। यहाँ तक कि हम अपनी मातृभाषा को भूलते जा रहे है, भारत में अंग्रेजी माध्यम विद्यालय को बढ़ावा मिलने से हिन्दी माध्यम के लिए कार्य करने वालों की कार्यक्षमता पर एक प्रश्न चिह्न है। हर देश अंतर्राष्ट्रीय पर अपने गुणवत्ता शैली व कार्यक्षमता के कारण ही जाना जाता है। कार्यक्षमता में वृद्धि हमेशा भावों की अभिव्यक्ति के माध्यम से ही होती है, उसमें भी मातृभाषा हो तो और भी सरल हो जाता है। शिक्षा का माध्यम यदि मातृभाषा में हो ताकि इसके माध्यम से हम व्यक्ति की सामाजिक, राजनैतिक आर्थिक, पारिवारिक एतिहासिक, वैज्ञानिक सांस्कृतिक, साहित्यक आदि विषयों की जानकारी और रूचि बढ़ा सकते हैं।

हिन्दी मातृभाषा जीवन का अनिवार्य पक्ष है जीवन पर्यन्त सम्प्रेषण में मातृभाषा का ही प्रयोग किया जाता है। मातृभाषा के माध्यम से ही अच्छे नागरिक गुणों का विकास होता है। मातृभाषा से ही चिंतन सूझबूझ की क्षमताओं का विकास होता है। विद्यालयों पाठ्यक्रम में मातृभाषा को समुचित स्थान न देने से बालकों का विकास अधूरा ही रहता है उनके भावों एवं विचारों की अभिव्यक्ति स्वाभाविक रूप से नहीं हो पाती है।

सांस्कृतिक मूल्य, सामाजिक, पारिवारिक मूल्य राष्ट्रियता का भाव, देश-भक्ति की भावना का विकास संभव नहीं है। मातृभाषा के

माध्यम से जो ज्ञान दिया जाता है उससे बालकों की अंतर्वृत्तियाँ जागृत हो उठती है, और अनुभवों, विचारों के विकास और चरित्र के विकास में सहायता मिलती है।

हिन्दी से शिक्षा शिक्ष देना अनिवार्य होना ही हमारे देश के विकास के हित में है। शिक्षण, अनुदेषन, प्रशिक्षण तथा परीक्षा का माध्यम हिन्दी में हो अपेक्षित है। इससे अन्य विषयों का मिश्रण तथा उनका बोध कराना सुगम होता है। बालक के स्वाभाविक और मनोवैज्ञानिक विकास तथा सामाजिक और राष्ट्रीय आवष्यकताओं की दृष्टि से मातृभाषा का प्रमुख स्थान है।

अन्तर्राष्ट्रीय या विदेशी भाषा को वैकल्पिक रूप में सम्मिलित किया जाए जिससे बालक पर अनावष्यक रूप में भार न पड़े। परंतु आवश्यकतानुसार बालक किसी भी विदेशी भाषा का अध्ययन कर सकता है।

हीनता व असुरक्षा का : प्रायः देखा गया है कि अंग्रेजी का प्रभाव छोटे शहरों व गावों में पल रहे मातृभाषी लोगों में हीनता व असुरक्षा का भाव दिनों दिन बढ़ता जा रहा है। वह समाज में अंग्रेजी रूपी दानव से अपने आपको असहाय महसूस पा रहे हैं । यह हमारे बालकों में भी असुरक्षा का भाव बढ़ा रहा है। अतः हमें विदेशी भाषा की अपने कार्य शैली पर हानि न होवे इसके लिए हमें मातृभाषा व राष्ट्रभाषा को इतना सुदृढ़ बनाना है जिससे वह विष्व के पटल पर हिन्दी के स्तम्भ खड़े कर सके।

निष्कर्ष : पूरे तथ्यों से हम निष्कर्ष यही निकालते हैं कि आज शिक्षा-तकनीकि, इलेक्ट्रॉनिक -माध्यम तथा कम्प्यूटर के कारण अंग्रेजी भाषा को अधिक बढ़ावा मिल रहा है इसका प्रभाव विष्वव्यापी है। यहाँ तक कि हम अपनी मातृभाषा को भूलने जा रहे है। भारत में अंग्रेजी माध्यम के विद्यालय की अधिकता और राष्ट्रीय भाषा को गौण स्थान दिया जा रहा है। इसलिए शिक्षा में भारत की राष्ट्रभाषा, राजभाषा या कम से कम संपर्क भाषा हिन्दी का अध्ययन अनिवार्य होना चाहिए यह जनतंत्र की आवष्यकता व जरूरत भी है।

अंत में महात्मा गाँधी के शब्दों में कहा जा सकता है -"राष्ट्रीय व्यवहार में हिन्दी को काम में लाना देश की शीघ्र उन्नति के लिए आवष्यक हैं, क्योंकि प्रांतीय भाषाओं के स्थान पर नहीं बल्कि उसके सिवा अंन्तप्रांतिय विनिमय के लिए राष्ट्रभाषा समस्त भारत के लिए आवष्यक हैं, यह भाषा हिन्दी ही होनी चाहिए।"

लेखिका एक स्वतंत्र चिंतक हैं | पिछले कई वर्षों से शिक्षक के रूप में कार्यरत हैं. प्रकृति, कला एवं शिल्पकारी उनकी रूचि है

E-mail: seemaphatak68@gmail.com

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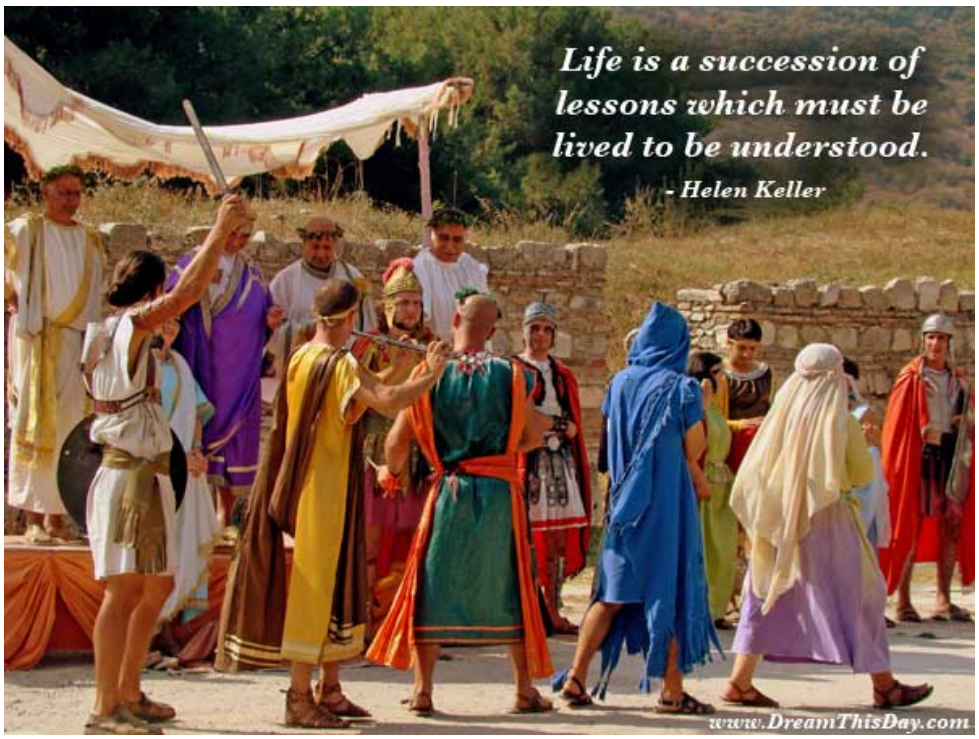

NATIONAL TALENT SEARCH EXAMINATION

Prof. SB Dhar

The National Council of Educational Research and Training (NCERT) was established by the Government of India in the year 1961 with a view to bringing about qualitative improvement in school education in the country.

NCERT started a programme to shape the education in the name of National Science Talent Search Scheme (NSTSS) in the year 1963 which is now-a-days called NTSE.

National Council of Educational Research and Training conducts NTSE each year. It is open to all the students of recognized schools in India.

NTSE is a very prestigious scholarship program of **NCERT**. It is a **national-level examination.** It is for the students who study in **Class 10**. Every year around **10 lakh students** appear for this scholarship program.

Reservations:
For the students who appear in the examination, at the National Level of Stage-II, 15% seats are reserved for Scheduled Castes, 7.5% are reserved for Scheduled Tribes and 27% are reserved for Other Backward Castes as per Central List available on www.ncbe.nic.in/user panel/centralliststateview.aspx and 4% seats are reserved for Physically Challenged Students.

It is a two stage examination. The type of Questions in the examination is Multiple Choice (MCQ). There are two sections in the Question Paper.

Stage 1

Stage 1 is a **State-Level Examination**. It has two sections – **Mental Aptitude Test (MAT)** and **Scholastic Aptitude Test (SAT)**. The SAT has **three subjects** – Science, Social Science & Mathematics. Each question carries one mark.

In SAT paper there are 100 Questions 40 from Science, 40 from Social Science and 20 from Mathematics. Each question carries 1 mark. No negative marking is there in Stage 1 examination.

Stage 2

Students shortlisted from Stage 1 of NTSE will be eligible to appear for Stage 2 of NTSE. The pattern and marking scheme is same as in Stage 1. No negative marking is there in Stage 2 also.

Interview: Students who qualify in the Stage 2 of NTSE are called for an interview. The best 1000 students are selected for the scholarship.

History

National Talent Search Scheme is a flagship activity of the NCERT which was started in the year 1963. The purpose of the scheme was to identify talented students and nurture their talent. Talent refers to the potentiality that manifests itself in a high level of performance in one or more specialized areas. It honours and helps talented students by providing financial assistance in the form of a monthly scholarship. This scholarship is for the courses in Basic Sciences, Social Sciences and Commerce. This assistance is provided up to Ph.D. level. For professional courses like Engineering, Medicine, Management and Law this assistance is given only up to Post Graduation Level.

Note: (a) For details of NTSE, the aspirants should visit www.ncert.nic.in

(b) Close to one thousand scholarships are awarded for each stage of education. These stages are as follows:

1. For Class - XI to XII, a scholarship of Rs. 1250/- per month is provided.
2. For Undergraduates and Postgraduates, a scholarship of Rs. 2000/- per month is provided.
3. For Ph.D, the scholarship amount is fixed in accordance with the UGC norms.
4. No fee is charged by NCERT.
5. **Indian students studying abroad in class X can appear directly for Stage II NTSE.**

NTSE Syllabus 2019

MAT (Mental Ability Test) contains questions from analogies, series, problem solving, reasoning, classification, figures, coding words, etc. The MAT test checks the candidate's ability to think, reasoning capability of problem solving.

SAT (Scholastic Aptitude Test) contains questions from Science, Mathematics, History, Geography, Political Science and Economics.

Stage 1 Level Exam For Standard X

SAT:

1. The syllabus for Mathematics, Science and Social Science will be broadly based on the prescribed respective State Board Syllabus from Std 9th - 10th class

2. Few states like Kerala refer both state board and NCERT books while few states like Maharashtra, Andhra Pradesh ask questions primarily from their state board books

Stage 2 Level Exam For Standard X

1. The **State Level Talent Search Exam** is conducted by **29 States/07 UTs** for all students studying in **Class 10th**.

2. The students **qualifying in State Level Talent Search Examination** are eligible to appear in **NTSE Stage II Examination** to be conducted by **NCERT**.

The Aim Of NTSE Scheme:

1. To award talented students pursuing education in Science and Social Studies stream with scholarships to help continue their education.

2. State level examination of Stage 1 is conducted by respective states or UTs and the National Level i.e. Stage 2 is conducted by NCERT.

Scholarship

The scholarship amount for Class 11 and 12 is Rs 1250 per month, for UG and PG levels it is Rs 2000 per month and for Research Level it is decided as per UGC norms.

Examination Mode

Off line i.e., Pen and Paper.

Exam Papers

Mental Aptitude MAT
Scholastic Aptitude Test SAT

Duration

120 minutes for each paper at each level. Total 240 minutes each for STSE and NTSE.

Stage 1

It is held in all 29 states and 7 UTs.

Stage 2

It is held in 35 Cities.

Registration for 2018-2019 began in August 2018.

Examination Dates

For NTSE stage 1 were November 03, 04, 18 for different states.
For NTSE Stage 2 is May 12, 2019 for all states and UTs.

Examination Helpline for NTSE Stage 2 only

Phone number - 011-26560464
e-mail - ntsexam.ncert@gov.in
Official Website: http://www.ncert.nic.in

From 2018 Negative marking has been discontinued.

30 minutes extra time for Visually Challenged (VC) candidates are allotted.

The examination timing

For MAT: 0930- 1130 (1230 for VC)

For SAT: 1330-1530 (1600 for VC)

LAT is removed. MAT paper carries 100 Questions.

Minimum Qualifying Marks

For General Candidates: 40%

For SC/ST/PH candidates: 32%

Author is editor of this e-Bulletin and an acclaimed teacher of mathematics

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नन्हे शिशु सा ...

मृणालिनी घुळे

नन्हे शिशु सा
आया है नया साल
अपने भोले भाले मुख पर
लिए हुए मासूम मुस्कान
जैसे सारी सृष्टि में लाया है

नया उजियारा
यह करो जतन
कि यह मुस्कान रहे कायम
न मिले किसी को ग़म
कभी खुशियां न हों कम।

रहे सदा उमंग भरा मौसम
हर सको अगर दु:ख दर्द किसी का
इस नये साल का हर दिन
सुनाएगा खुशी की सरगम।

कवियत्री एक सामाजिक चिंतक एवं विचारक हैं | आपकी कविताएँ वर्तमान पर्यवेक्ष्य में बुद्धि-जीवियों को उनके सामाजिक उत्तरदायित्व के प्रति उन्हें चिंतन के लिए प्रेरित करती हैं | आपकी लेखनी प्रादेशिक एवं राष्ट्रीय स्तर पर प्रकाशित है।
E-mail: mrinalinighule46@gmail.com

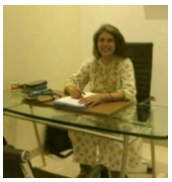
नववर्ष हो कुछ इस तरह -

डॉ. संगीता पाहुजा

हर सुबह की पहली किरण जगाए
मन में नया उमंग और उत्साह ।
नए सपने,नई आशाएं ,
जगाएं जीवन में उल्लास ।

नव तरूपल्लव की हरी छटा देखकर
जागे मन में नया उत्साह।
मन झंकृत हो जाए सूर्योदय के साथ ही,
कुछ कर गुजरने का नया उन्माद ।

जो प्रकाश बिखेरे सूर्य की उजली किरणों की तरह।
व्यवहार में झलके, चांद तारों सी शीतलता
सूर्य बिखेरे उजली किरणों को,नई उम्मीद की तरह।
कर्मों से परिणाम झलके,सूर्य के उजाले कि तरह।
शुरुआत हो नूतन वर्ष की,खिल जाएं सभी पुष्पों की तरह।



कवियत्री आयुर्वेदिक चिकित्सक हैं | आपने B.A.M.S. की उपाधि M.D. University, रोहतक से प्राप्त की | आपके दिल्ली एवं नॉएडा में परामर्श केंद्र है | धार्मिक, नारी एवं समाज उत्थान कार्यों में आपकी विशेष रूचि है |
संपर्क: मो. क्र.- 9953967901,
E-mail: sangeeta.pahuja3@gmail.com

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Students' Section

MIRA BAI

G. Gayatri

Mirabai was a staunch devotee of Lord Sri Ktishna. She was born in the year 1498. Her father was Ratan Sinha. As he was always engaged in wars with Mughuls, she lived with her grandfather. Along with her general education she learnt music. Her voice was melodeous. Oneday a sadhu came to their house. He had an idol of Lord Krishna. He gave the idol to her when Mira insisted upon it. She saw a wedding of a king. He was loke an idol. Mira wanted such an idol. Grandfather tld her that the Krishna's idol was her husband. From that day, she treated Krishna as her husband. She was married to Rana. He loved her so much that he had built Krishna's temple for her. She used to sing bhajans of Krishna in the temple. Once king Akbar came in disguise and presented a necklace to Lord Krishna. It was misunderstood and there arose a suspicion in the mind of her mother-in-law. She wanted tokill Mira. She sent to Mira basket of flower with a snake inside it. When Mira touched the flowers, the snake turned into flowers. Mira merged herself in Lord Krishna in 1547. Her body was not found, except her clothes.

Author is a student of class IXth in Ramkrishna Mission School, Sithanagram, A.P., She is a regular students of Interactive Online Mentoring Sessions (IOMS), held at the school.

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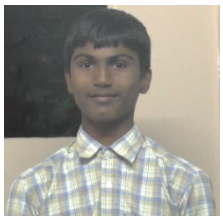
FIVE POINTS FOR SUCCESS IN STUDENT LIFE

Madhu Kiran Reddy

Old Religion says he who does not believe in God is atheist but new religion says he who does not believe in himself is an atheist. To become a successful student in life we need to develop these qualities.

1. **Self-confidence:** Faith in ourselves; Faith in God; Faith in goodness and its powers; We have to believe that we have great power.
2. **Goal in life:** We should have proper goal and strive for it.
3. **Concentration:** Swami Vivekananda says "the difference between a normal person and a great person is degree of concentration''There are two components of concentration : **(a)** ability to focus, and **(b)** hold the focus. Meditation helps in improving concentration.
4. **Time Management:** We spend most of our time in seeing mobiles and waste our time. We should utilize time properly by cultivating good habits. We have to categorize our works in the following ways and plan them accordingly. (a) Urgent and important – it is that for which we must spend time, **(b)** Urgent but not important – it is that for we should not spend more time, **(c)** Not urgent but important – it is that for which we should do hard work and spend most of our time. For example thinking about 10^{th} class public examinations from 8^{th}& 9^{th} class onwards is not urgent but important, and **(d)** Not urgent and not important – it is that for which we should not waste our time. For example mobile games.
5. **Unselfishness:** We have to do unselfish work for others. If we can develop these qualities not only we but the society at large gets benefitted.



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WINGS OF FIRE

P. Rajyalakshmi

"Wings of Fire" is an autobiography of Avul Pakir Jainulabdeen Abdul Kalam covering his early life and his work in Indian Space Research and Missile Programme (ISRMP) . It is the story of a paperboy with a humble background who went on to become a key person in ISRMP. Later he became the President of India.. The bool is very popular in India. It is translated in multiple languages. The initial chapters of the book give a clear picture of our country during 1930-50s. They also provide an intresting glipse of religious harmony which existed before India's partition. Kalam in his youth wanted to be an officer in the airforce. However, he could not clear the interview. He met Swami Sivananda after this failure. He was advised by Swamiji - "Accept yor destiny and go ahead with your life".

In the inspiring book, we learn how Kalam started his career in Aerounatical Development Establishment (ADE) and his involvement in the design of a hovercraft. Later, he moved to Indian Space Research Organization which was the brain child of Vikram Sarabhai. In 1963, Kalam wentto NASA facility in Maryland (USA) as partbof a training programme on rocket launching techniques. There he came across a painting which depicted Tipu Sultan's rocket warfare against theBritish.

"Wigs of Fire" covers Kalam's Personal life only briefly which is strange for an autobiography. For insance, we do not know why he decided to remain single or his activities outside space research (even though we conclude in the end that Kalam was married t Science and Technology). Kalam was a poet and a huge fan and poetry. The book contains many of his poems and his favourite poem of other. Here is an example of his poem-

Do not look at Agni
As an entity directed upwards
To deter the ominous
For exhibit your migh
It is fire
Inthe heart of an Indian
Do not give in
The form of a missile
As it cings to the
Brning pride of this nation
And thus is bright.

Through "Wings of Fire", we come across some brilliant people who worked behind ISRO such as Vikram Sarabhai, Dr Btamh Prakash. The book also contains about 24 photos and I found the ones from his early days of Indian Space programme very interesting. This alone is worth the price of the book!

One of the things that stands out throughout the book is Kalam's positivethinking. I am impressed with the attitude of the Kalam. It is the book which throws light in how to attain success. "Wings of Fire" is aptly called a unique book.

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DISCIPLINE

Dishita Joshi

Discipline is all about controlling your actions and obeying rules controlling your actions, means doing the right thing irrespective of how you feel o who is watching. For example at times, people get irritated and act inappropriately in anger.; at times, people feel like junk food frequently. Such actions need to be controlled on a day-to-day basis by everyone.

Obeying the rules is another critical part of leading a disciplined life. We have rules for behaving in school, on the road, with the family, and all aspects of life. It is important to follow the rules as our action impact others as well.

Following a disciplined life ensures happiness and success. On the contrary, breaking the rules

irresponsibly can lead to spoilt relationship and even failure.

It is important to know that acting irrationally even once can spoil one's social profile, so it is important toconsistently lead a disciplined life without any exception.

Discipline is a key to a successful life. Leaders from all fields in all parts of the world lead a highly disciplined life and we should follow this aspect whoever leaders we like.

She is a student of class VII in The Khiatan School, Noida, Her hobiies are vocal music, drawing and painting and playing lawn tennis

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ENVIRONMENT POLLUTION

S Niteesh Kumar

Environment gives us everything . The air we breathe ,the water we drink are given by environment . Without environment the existence of life on earth becomes doubtful . It protects us from the harmful rays of the sun . It gives us wood to construct houses and make furniture .

But today that great environment is being spoiled . The greedy humans are breaking the laws of nature . They are cutting down trees . Due to that many animals lost their habitat . Once upon a time there were many forests . Many animals existed .

But today most of the animals are in the list of endangered animals . Humans had developed industries . They release pollutants and several types of pollutions like land,air and water pollution are taking place .

Air pollution is depleting ozone layer . Water pollution is leading to the death of marine animals . Global warming is taking place because of air pollution . Ecological balance is being disturbed by pollution .

Ocean levels are rising due to global warming . Even micro organisms are being affected . In olden days human beings thought that nothing happens to nature in whatever way we deal with it . But that idea is wrong .

"So reduce exploitation of natural resources - give them to future generations"

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If a poor child cannot come to the education then education must go to him .

- Sachin Joshi,
At World Forum of Democracy'2016

GROWING WITH CONCEPTS

Concepts of an expert are not like a static foundation of a huge structure; rather it is like blood flowing in a vibrant mind.

During growing into an expert, each one must have used best of the books available on subject and received guidance of best of the teachers. Authors might have had limitations to take every concept thread bare from first principle and so also must be the constraint of teacher while mentoring a class with a diversity of inquisitiveness and focus. As a result, there are instances when on a certain concept a discomfort remains. The only remedy is to live with the conceptual problem and continue to visualize it thread bare till it goes to bottom of heart and that is an ***ingenious illustration****.*

In this column an effort is being made to take one topic on Mathematics, Physics and Chemistry in each e-Bulletin and provide its illustration from First Principle. We invite all experts in these subjects to please mail us their ingenious illustrations and it would be our pleasure to include it in the column.

We hope this repository of ingenious illustrations, built over a period of time, would be helpful to ignite minds of children, particularly to aspiring unprivileged students, that we target in this initiative, and in general to all, as a free educational web resource.

This e-Bulletin covers – a) Mathematics, b) Physics , and c) Chemistry. This is just a beginning in this direction. These articles are not replacement of text books and reference books. These books provide a large number of solved examples, problems and objective questions, necessary to make the concepts intuitive, a journey of educational enlightenment.

Looking forward, these articles are being integrated into Mentors' Manual. After completion of series of such articles on Physics it is contemplated to come up representative problems from contemporary text books and Question papers from various competitive examinationsand a guide to theirsolutions in a structured manner, as a dynamic exercise to catalyse the conceptual thought process.

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I don't think anybody anywhere can talk about the future...
without talking about education.Whoever controls the education of our children,
controls our future.

- Wilma Mankiller

There are two educations.
One should teach us how to make a living,
and the other how to live.

- John Adams

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Answers: Science Quiz- December'18

Kumud Bala

1. (b)	2. (a)	3. (b)	4. (c)	5. (a)	6. (b)	7. (c)	8. (b)	9. (c)	10. (a)
11. (d)	12. (c)	13. (a)	14. (c)	15. (c)	16. (b)	17. (c)	18. (d)	19. (c)	20. (a)

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ANSWER: CROSSWORD PUZZLE December'18:
International Maths Olymiad

Prof. S.B. Dhar

													1T			2Z	
				3N		4S	I	X			5S	E	V	E	N	H	
				O		O			6R					R		O	
				R		V			O			7U		E		U	
				T		I			M			S		N		Q	
				H		E			A		8C	A	L	C	U	L	U	S
				K		T			N					E			E	
				O		U			I					T			N	
9B				10R	I	N	A	P	A	N	I	G	R	A	H	Y		
B				E		I								O				
11C	H	I	N	A		O												
						N												

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Science in general and Physics in particular is not a subject to learn, but an area of observation and exploration by correlation, integration and analysis of repetitive nature, and then conclusion.

It is a real thrill, full of fun.
But, it can't be done in dicrete manner, it has to be done patiently, like climbing stair far a faster and purposeful journey.
This is where role of education come in; it is to streamline the process.

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Growing With Concepts - Mathematics

LET'S DO SOME PROBLEMS IN MATHEMATICS-V

Prof. SB Dhar

This article relates to the type of problems that are asked in the NTS/STS Examinations. The problems of these examinations' are categorized under MAT and SAT sections. A good knowledge of concepts to Mathematics helps the aspirants to do the problems by using common sense.

It has been observed that some of the competitions' problems consist of various concepts and tricks too. There is no short-cut for them. The only possible way to do such problems is to practice well by writing them on paper with pen, a number of times.

Some typical problems are hereby selected for the readers. The solution or answer of any problem is not being written in this article. The solutions will be written in the next e-bulletin because it is being expected from the readers to solve these problems according to their understanding.

If some of the readers is/are anxious to know about the solution or answer, to match his/her solution, he/she may contact through the coordinator's email.

Best of Luck !

MAT QUESTIONS

1. If P + Q means P is husband of Q, P/Q means P is sister of Q, P*Q means P is the son of Q, then D is related to A in D*B+C/A as -
   (a)Son (b)Nephew
   (c)Sister (d)Couple

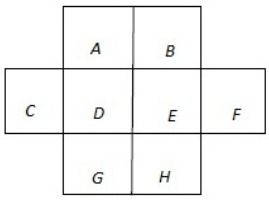
2. If in a certain code language 23 x 26= 42 and 11 x 15= 19 then 32 x 16 is equal to
   (a)40 (b)41 (c)44 (d)48

3. If in a certain code language TOME is written as @$*? And ARE is written as !&?, then REMOTE can be written in that code as -
   (a)&?!@? (b)&?*$@?
   (c)@?*$@? (d)*@$*?!

4. What will be the number of digits used in numbering the pages of a book having 199 pages?
   (a)398 (b)489 (c)495 (d)532

5. In a farmhouse there are 50 hens, 40 goats and 8 camels which are maintained by a few supervisors. If the total number of feet be 224 more than the number of heads in the farmhouse then the total number of supervisors is
   (a) 5 (b)8 (c)10 (d)15

6. In the following figure



   A, B, C, D, E, F, G, H are each to be assigned a different number from 1 to 8. What should be values of B, D, E, F and G so that no consecutive numbers are in adjacent (even diagonally) squares. Given A=5, C=2, H=4
   (a)(6,8,1,7,3) (b)(3,8,7,1,6)
   (c)(8,6,3,7,1) (d)(3,8,1,7,6)

7. If Q means Addition sign, J means multiplication sign, T means subtraction sign and K means division sign, then 30 K2 Q3 J 6 T 5 is -
   (a)18 (b)28 (c)31 (d)103

8. If ÷ is +, x is -, - is x, then what is the value of 20 ÷4 x 12 – 6 + 11 is -
(a)2 (b)5 (c)56 (d)65

9. A watch goes half minute fast at dusk, but at down it loses one third minute. On 1st March morning, the watch showed right time, then on which of the following dates the watch was minutes fast?
(a)28th March (b)29thMarch
(c)30th March (d)31st March

10. A group of students is sitting in such a way that each occupied a corner of a hexagonal table. N is sitting opposite to Y, R is sitting next to S, P is sitting opposite to S, but not next of N, one person is sitting between T and Y, then who is sitting opposite to R?
(a)Y (b)S
(c)T (d)P

11. In a code language STAR=50 and CIRUS=65 then PLANET will be
(a)68 (b)78 (c)84 (d)94

12. The missing number in the sequence 64, 57, 66, 55, ?, 52 at the place of ? is
(a)68 (b)69 (c)70 (d)71

13. The missing term in the sequence ACC, ..., CEO, DFX is
(a)BDD (b)BDE
(c)BDH (d)BED

14. Look at the series: J14, L16, ..., P20, R22. Which of the following will fit into the blank?
(a)N18 (b)S24 (c)M18 (d)T24

15. If MENTAL : SMXFOB then ABILITY : .....
(a)GJSXWJQ (b)GSXWJJQ
(c)SGXWJJQ (d)SJXQJWG

SAT QUESTIONS

16. At 298K and 1 atm pressure, a gas mixture contains equal masses of He, H2, O2 and NH3. Which of the following is correct for their average molecular velocities?
(a)He>H2>NH3>O2
(b)He<H2<O2<NH3
(c)H2<He<NH3<O2
(d)O2<NH3<He<H2

17. In the balanced chemical equation: (a Lead Nitrate + b Aluminium Chloride) → (c Aluminium Nitrate + d Lead Chloride). Which of the following is correct?
(a)a=1,b=2,c=2,d=1
(b)a=4,b=3,c=3,d=4
(c)a=2,b=3,c=2,d=3
(d)a=3,b=2,c=2,d=3

18. Two nichrome wires A and B, each of length 5cm and of radius 1cm and 3 cm respectively are connected to each other in series. If a current of 5a flows through the combination of wires, the ratio of potential difference across wire A to that across wire B will be
(a)1:3 (b)3:1 (c)9:1 (d)1:9

19. A cart of mass M moves at a speed u on a frictionless surface. At regular intervals of length L, block of mass m=M/2 drop vertically into the cart. How much time is taken to cover a distance of 9/2L?
(a)9L/2u (b)5L/2u
(c)19L/2u (d)17L/2u

20. A ray of light of pure single colour is incident on the face of a prism having angle of the prism 30 degrees. The refracted ray does not change its direction a it croe the othe face and emerges out of the prism. The refractive index of the material of the prism is
(a) $\frac{2}{\sqrt{3}}$ (b) 2 (c) $\sqrt{2}$ (d) $\sqrt{3}$

21. Given that $\frac{1}{7} = 0.\overline{142857}$, which is a repeating decimal having six different digits. If x is the sum of such first three positive integers n such that $\frac{1}{n} = 0.\overline{abcdef}$, where a,b,c,d,e and f are different digits, then the value of x is -
(a)20 (b)21 (c)41 (d)42

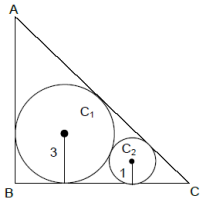
22. The rational roots of the cubic equation $x^3+14kx^2+56kx- 64k^3=0$ are in the ratio 1:2:4. The possible values of k are -
(a) 0 only (b) 1 only
(c) 2,0 (d) -2, -1

23. The values of $\cos x^o - \sin x^o$ $(0 \le x < 45)$ is -
(a) 0
(b) positive
(c) negative
(d) sometimes negative and sometimes positive

24. How many grams of oxygen gs will be meeded for complete combustion of 2 moles of 3rd member of alkyne series?
(a) 186g (b) 256g
(c) 352g (d)372g

25. There is a right circular cone of height h and vertical angle 60^o. A sphere when placed inside th cone, it touché the curved surface and the bae of the cone. The volume of the sphere is
(a) $\frac{4}{3}\pi h^3$ (b) $\frac{4}{9}\pi h^3$
(c) $\frac{4}{27}\pi h^3$ (d) $\frac{4}{81}\pi h^3$

26. In the figure below:



ABC is a triangle in which $\angle B=90^o$ and its incircle C_1 has radius 3. A circle C_2 of radius 1 touches side AC, BC and the circle C_1. Then the length AB is equal to -
(a) $3+6\sqrt{3}$ (b) $10+3\sqrt{2}$
(c) $10+2\sqrt{3}$ (d) $9+3\sqrt{3}$

27. The Swaraj Flag designed by Mahatma Gandhi had the spinning wheel in it. What did it symbolize?
(a) Ideal of Self-help
(b) Symbol of defiance to the British Rule
(c) Greatness of India in pre-colonial time
(d) Ahimsa (non-violence) in contemporary world

28. In a particular year, the prices of wheat in a market is R 15 per Kg and a farmer produces 100 Kg of wheat. In the next year the prie of wheat has fallen to Rs 10 per Kg and the farmer produce 120 Kg. if the government wishes to stabilize the income of the farmer, then what will be the minimum support price?
(a) Rs. 12 per kg (b) Rs.12.5 per kg
(c) Rs. 13 per kg (d) Rs. 13.5 per kg

29. In a village, 200 families are living. Eighty five families work on their own piece of land, 60 families work on the field of other farmers, 5 families run their own shops and 50 families work in a nearby factory ot earn livelihood. What percentage of the village depends on the secondary sector?
(a) 20 (b) 25 (c) 35 (d) 55

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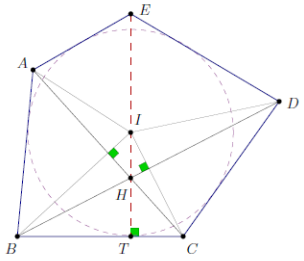
Solutions to the Problems –IV : December Issue

S.B. Dhar

1. *Let ABCDE be a convex pentagon such that AB=BC=CD, ∠EAB=∠BCD, and ∠EDC=∠CBA. Show that the perpendicular line from E to BC and the line segments AC and BD are concurrent.*

Solution:



Let the perpendicular bisector of AC and that of BD that pass respectively through B and C meet at I.

BD ⊥CI, AC ⊥BI. Hence AC and BD meet at the orthocenter H of the triangle BIC , and IH⊥ BC. It means, we have to prove that e lie on the line IH or equivalently EI ⊥BC.

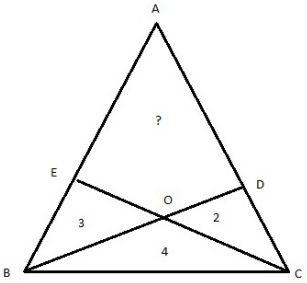
Lines IB and IC bisect B and C respectively. Also IA=IC, IB=ID, and AB=BC=CD, hence IAB, ICB and ICD are congruent. so, angle IAB= ICB=C/2=A/2. So, the line IA biect angle A. similarly ID biects D. and IE bisects angle E because I lies on all the other four bisectors of the angles of pentagon.

The sum of the internal angles in a pentagon= 540 degree so $E=540^0-2A+2B$

In quadrilateral ABIE, $\angle BIE=360^0-\angle EAB-\angle ABI-\angle AEI=360^0-\angle A-\angle B/2-\angle E/2=360^0-\angle A-\angle B/2-(270^0-\angle A-\angle B)=90^0-\angle B/2=90^0+\angle IBC$

i.e. EI is perpendicular to BC.

2. *Refer the triangle ABC in the figure. BD and CE are the line segments to sides AC and AB respectively meeting at O. The areas of ΔOBE=3 units, ΔOCD=2 units, and Δ OBC=4 units. Find the area of the quadrilateral AEOD.* **(Ans: 7.8 units)**



3. *Let $a_1, a_2, a_3, \ldots, a_n$, k and M be positive integers such that $\frac{1}{a_1}+\frac{1}{a_2}+\cdots.+\frac{1}{a_n}=k$ and $a_1a_2a_3\ldots a_n = M$. If M > 1, then show that $P(x) = M(x+1)^k-(x+a_1)(x+a_2)\ldots(x+a_n)$ has no positive roots.*

Solution:

For x>0, $a_i(x+1)^{\frac{1}{a_i}} \le x+a_i$

Obviously, equality holds good if and only if

$a_i = 1$

If $a_i > 1$, by the use of AM-GM inequality,

$$\frac{(x+1)+1++1+\cdots(a_i-1)times\ 1}{a_i} \ge \sqrt[a_i]{(x+1).1^{a_i-1}}$$

$$\Rightarrow a_i(x+1)^{\frac{1}{a_i}} \le x+a_i$$

Since x+1>1, the inequality is trict for $a_i > 1$.

If we multiply this inequality for i=1,2,3,….n then

$\prod_{i=1}^n a_i(x+1)^{\frac{1}{a_i}} \le \prod_{i=1}^n(x+a_i)$ ⇔

$M(x+1)\sum_{i=1}^n \frac{1}{a_i} - \prod_{i=1}^n(x+a_i) \le 0 \Leftrightarrow P(x) \le 0$

But this inequality implies that M=1 which is not possible hence P has no positive roots.

4. *Find all functions f:R→R such that $f\big(f(x)f(y)\big)+f(x+y)=f(xy)$ for all $x, y \in R$.* **(Ans: x→0, x→(x - 1) , x→(1 - x))**

Solution:

Obviously, the three solutions are x→0, x→ x-1 and x→ (1-x)

We have to show that these are the only solutions.

Let us assume that if f(x) is a solution then –f(x) is also a solution.

Let us assume that f(0)≤ 0. We have to show that either f is identically zero or f(x)=x-1 for all x ∈R.

For some x ≠1, let us assume that there exists a y ∈R such that x+y=xy or $= \frac{x}{x-1}$.

$$f\left(f(x).f\left(\frac{x}{x-1}\right)\right)=0.$$

And $f(f(0)^2)=0$.

Using induction we can show that f(x+n)=f(x)+n for all x belonging to R and n belonging to Integers.

5. *Find all pairs (x,y) of prime numbers with x>y for which the number* $\frac{(x+y)^{x+y}(x-y)^{x-y}-1}{(x+y)^{x-y}(x-y)^{x+y}-1}$ *is an integer.* (**Ans: The only pair is (3,2)**)

Solution:

Let $M=(p+q)^{p-q}(p-q)^{p+q}-1$ which is relatively prime with both p+q and p-q.

Denote $(p-q)^{-1}$ multiplicative inverse of (p-q) modulo M.

Let us eliminate the term -1.

$M=(p+q)^{p-q}(p-q)^{p+q}-1\equiv(p+q)^{p-q}(p-q)^{p+q}-1 \pmod M$

$(p+q)^{2q}\equiv(p-q)^{2q} \pmod M$ …(i)

$((p+q).(p-q)^{-1})^{2q}\equiv1 \pmod M$ …(ii)

Case I: q≥ 5

Let us assume an arbitrary prime divisor r of M. Note that M is odd so r ≥3. By (ii), the multiplicative order of $((p+q).(p-q)^{-1})$ modulo r is a divisor of the exponent 2q in (ii), so it can be 1,2,q, or 2q.

The Fermat's theorem says that the order divides r-1.

So,

$M=(p+q)^{p-q}(p-q)^{p+q}-1\equiv(q)^{p-q}(-q)^{p+q}-1=(q^2)^p-1\equiv q^2-1=(q-1)(q+1) \pmod p$

The factors q-1 and q+1 are less than p.

M is the product of two consecutive positive odd numbers, both should be congruent to 0 or 1 modulo q. but this impossible by the assumption that q ≥5. So there is no solution.

Case II:

Let q=2, then by (i)

$M \mid (p+q)^{2q}-(p-q)^{2q}=(p+2)^4-(p-2)^4$

So, $(p+2)^{p-2}(p-2)^{p+2}-1=M\le(p+2)^4-(p-2)^4\le(p+2)^4-1$

So, $(p+2)^{p-6}(p-2)^{p+2}\le1$

If p ≥7 then the left hand side is obviously greater than 1.

For p=5 we have $(p+2)^{p-6}(p-2)^{p+2}=7^{-1}.3^7$ which is also too large.

So, p=3.

Case III:

If q=3,

$64(p+3)^{p-9}(p-3)^{p+3}\le1$

If p is greater than 11 then the left hand side is greater than 1. If p=7 then the LHS >1. If p=5 the the LHS>1. Therefore there exists no solution.

6. *If a>b>c>0; the distance between (1,1) and the point of intersection of the lines ax+by+c=0 and bx+ay+c=0 is less than* $2\sqrt{2}$*, then show that a+b-c>0.*

Solution:

The given equations are

ax+by+c=0

bx+ay+c=0

hence, $\frac{x}{bc-ac}=\frac{y}{bc-ac}=\frac{1}{a^2-b^2}$

$x=\frac{-c}{a+b}$ and $y=\frac{-c}{a+b}$

Also,

$$\sqrt{\left(1+\frac{c}{a+b}\right)^2+\left(1+\frac{c}{a+b}\right)^2}<2\sqrt{2}$$

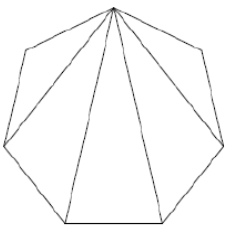
Hence, a+b-c>0

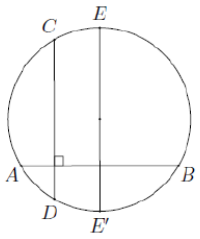
7. *A teacher writes the equation (x-1)(x-2)….(x-2019)=(x-1)(x-2)…(x-2019) on the board. He asks his students to erase some linear factors from both the sides so that each side still has at least one factor and the resulting equation has no real roots. Can you find the least number of linear factors one needs to erase to achieve this?* (**Ans:2019**)

8. *Let n ≥ 3 be a positive integer. Find the maximum number of diagonals of a regular n-gon one can select, so that any two of them do not intersect in the interior or they are perpendicular to each other.* (**Ans: n-2 if n is even and n-3 if n is odd**)

Solution:

Let us consider firstly, n is odd.

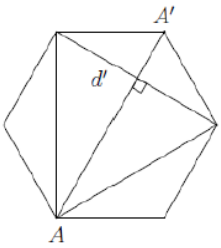




Let us assume tht no pair of diagonals is perpendicular. Suppose A,B,C,D are vertices of where AB and CD are perpendicular, and E be the vertex lying on the perpendicular bisector of AB. Let E' be the opposite point of E on the circumcircle of the regular polygon.

Since EC=E'D and C,D,E are vertices of the regular polygon, E' should also belong to the polygon. This contradicts the fact that a regular with odd number of vertices does not contain opposite points on the circle.

Case II: assume that n is even.



If there is no intersection, then the proof in the odd case works.

If we select all diagonals emanated from A together with the diagonals d' joining the two neighboring vertices of A', then the only pair of diagnonal that meet each other is AA' and d', which are perpendicular to each other. In total we can take n-2 diagonals.

9. *Let ω be a complex cube root of unity with $\omega \neq 1$ and $P = (p_{ij})$ be a n x n matrix with $p_{ij} = \omega^{i+j}$, then $P^2 \neq 0$ when n = 55,56,58*

Solution:

Given ω be the complex cube root of unity ω≠1 and P=(p_{ij}) be a matrix of order nxn with $p_{ij}=\omega^{i+j}$

$$P^2\begin{pmatrix}\omega^2 & 1 & \omega\\ 1 & \omega & \omega^2\\ \omega & \omega^2 & 1\end{pmatrix}\begin{pmatrix}\omega^2 & 1 & \omega\\ 1 & \omega & \omega^2\\ \omega & \omega^2 & 1\end{pmatrix}$$

$$=\begin{pmatrix}0 & 0 & 0\\ 0 & 0 & 0\\ 0 & 0 & 0\end{pmatrix}$$

P^2 is zero only when n is a multiple of 3 otherwise when n=55, 56, 58 it is not zero.

10. *Show that the value of* $cot(\sum_{n=1}^{23} cot^{-1}(1+\sum_{k=1}^{n} 2k))$ *is* $\frac{25}{23}$

Solution:

$$\cot\left(\sum_{n=1}^{23}\cot^{-1}\left(1+\sum_{k=1}^{n}2k\right)\right)$$

$$=\cot\left(\sum_{n=1}^{23}\cot^{-1}\left(1+2n\frac{(n+1)}{2}\right)\right)$$

$$=\cot\left(\sum_{n=1}^{23}\cot^{-1}\left(n^2+n+1\right)\right)$$

$$=\cot\left(\sum_{n=1}^{23}\tan^{-1}\frac{1}{1+n(n+1)}\right)$$

$$=\cot\left(\sum_{n=1}^{23}\left(\tan^{-1}(n+1)=\tan^{-1}n\right)\right)$$

$$=\cot\left(\cot^{-1}\frac{25}{23}\right)=\frac{25}{23}$$

11. *Find all the pairs (f, g) of functions from the set of real numbers to itself that satisfy* $g(f(x+y)) = f(x) + (2x+y)g(y)$ *for all real numbers x and y. (***Ans: Either both f and g vanish identically, or there exists a real number C such that f(x)=x^2+C and g(x)=x for all real numbers x***)*

Solution:

Clearly all these pairs of functions satisfy the functional equation in question, so it suffices to veritfy that there cannot be any further ones. Substitute -2x for y in the given equation.

g(f(-x))=f(x)

using this equation for –x-y in place of x we obtain

f(-x-y)=g(f(x+y))=f(x)+(2x+y)g(y)

for any two real numbers a and b, setting x=-b and y=a+b we get

f(-a)=f(-b)+(a-b)g(a+b)

if c denotes another arbitrary real number we have similarly

f(-b)=f(-c)+(b-c)g(b+c)

as well as

f(-c)=f(-a)+(c-a)g(c+a)

adding all these equations

((a+c)-(b+c))g(a+b)+((a+b)-(a+c))g(b+c)+((b+c)-(a+b))g(a+c)=0

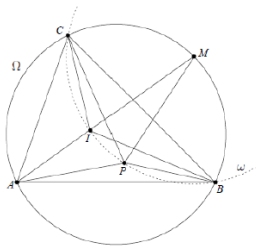
Now given any three real numbers x,y and z one may determine three reals a,b and c such that x=b+c and y=c+a and z=a+b so that we get

(y-x)g(z)+(z-y)g(x)+(x-z)g(y)=0

It means (d,g(x)), (y,g(y)), and (z,g(z)) from the graph of g are collinear. Hene that graph is a line. so, g is either a constant or a linear function.

12. *Let ABC be a triangle with in-centre I. A point P in the interior of the triangle satisfies ∠PBA+∠PCA=∠PBC+∠PCB. Show that AP≥ AI and that equality holds if and only if P coincides with I.*

Solution



From triangle APM, AP+PM ≥AM=AI+IM=AI+PM

Therefore, AP ≥AI. Equality holds if and only if P lies on the line segment AI, which occurs if and only if P=I.

13. *Let N be the set of all positive integers. Find all functions f : N→ N such that for all positive integers m and n, the integer f(m)+f(n)-mn is non-zero and divides mf(m)+nf(n).* **(Ans: f(n)=n^2 for any n ∈N)**

Solution:

Given that

f(m)+f(n)-mn | m f(m)+nf(n) ..(i)

taking m=n=1 in (i) we get

2f(1)-1| 2f(1) then 2f(1)-1| 2f(1)-(2f(1)-1)=1

And hence f(1)=1

Let p ≥7 be a prime. Take m=p and n=1 in (i)

f(p)-p+1| pf(p)+1 and hence

f(p)-p+1| pf(p)+1-p(f(p)-p+1)=p^2-p+1

if f(p)-p+1=p^2-p+1, then f(p)=p^2.

If f(p)-p+1 ≠p^2-p+1, as p^2-p+1 is an positive odd integer. We have p^2-p+1 ≥3(f(p)-p+1)

Or f(p)≤ (1/3)(p^2+2p-2)

If we take m=n=p in (i) then –p^2<-p

Since p ≥7, this contradicts the fact. Hence f(p)=p^2

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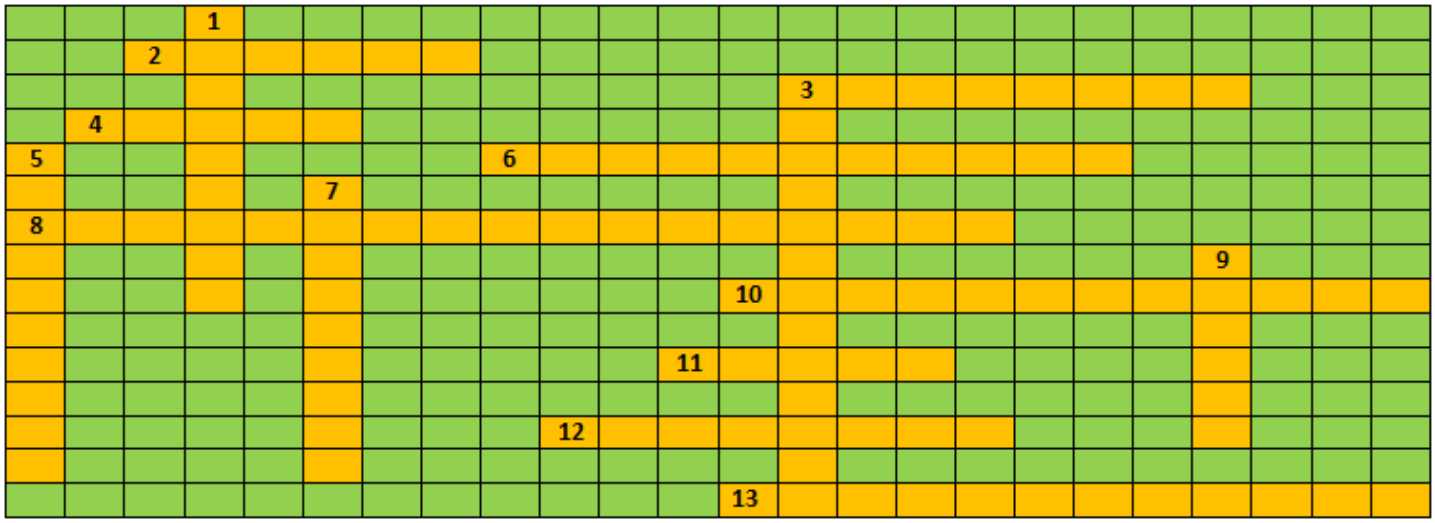
Euler's Equation: $0 = 1 + e^{i\pi}$

Mathematics is the language of natural consequence.

—00—

CROSSWORD PUZZLE January'19 : NEW YEAR OF INDIA

Prof. SB Dhar



Across

2 New year of Parsis

3 New Year of Tamil Naddu

4 New year of Karnataka

7 New Year of Odisha

8 New Year of Manipur

10 New Year of Jews

Down

1 New Year o Assam

3 New Year of Bengal

5 New Year of Gujarat

7 New Year of Maharashtra

9 New Year of Kashmir

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Take care of your thoughts,
For they are formed and moulded by our thoughts.
Those whose minds are shaped by selfless thoughts,
Give jot when they speak or act.
Joy follows them like a shad,
that never leaves them.

\- ***Gautama Buddha***

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Growing with Concepts : Physics

Prologue : Basic Mathematics

Mathematics without Physics is abstract, and Physics without Mathematics is science fiction. Moreover these two branches of knowledge are eternal. Human endeavour is just about discovering it and correlating with the physical world that we live in, and is cause of our being able to experience it. In light of this while writing Mentors' Manual upto standard of Class XIIth on Physics, Mathemathecics and Chemitry it was considered essential to revisit concepts of basic mathematics, which are used as a tool to understand not only higher mathematics but physics in particular, and in general other branches of science and social sciences. A chapter on Basic Mathematics written about Three Years ago, has been reviewed for any kind of error that might have crept in, being a totally unassisted and unsupported endeavour. Moreover, experience of mentoring through Interactive Online Mentoring Sessions (IOMS) over three years, has added to wisdom in respect of difficulties experienced by remotely placed target students. This endeavour is all about to reach to deprived children. These target children are unable to have access to main-stream of learning due multiple constraints viz. geographical, econoonical, social etc.

Basics of mathematics in arithmetic, algebra and geometry, that are studied upto class Xth, form building blocks of whole world of mathematics, science, and engineering. Understanding of mathematics started with a feel of quantity smaller or bigger, taller or shorter, give or take, response to rhythm of sound; all of them grow naturally, without any training. This has not remained confined to natural responses, but gave rise to number system which later evolved into arithmetic as an independent branch of mathematics. Every problem in arithmetic handles a definite set of numbers unique to it, and tries to quantify every physical reality. But, algebra is all about translating any specific problem into a set of variables and thus evolve a general statement. This general statement with specific set of numbers, called values of variables, provides specific solution to the problem. Thus algebra is all about generalization of a problem. Whereas, geometry handles shapes which are attributes of every physical entity. All higher branches of mathematics are derived from addition, subtraction, multiplication and division of the three basic mathematical entities. A deeper insight into mathematics reduces at elemental level to **(a)** ratio-proportion, **(b)** theory of indices and **(c)** Pythagoras theorem. The journey into mathematics in this chapter is made to deal this in a hybrid manner rather than dealing with each branch discretely.Accordingly, it will be observed that sequence of various concepts is based on need of how and why to understand the concepts that follows. An important massage in this journey is that mathematics is just not about knowing and using formulae, with necessary calculations. It is rather about using them in a manner which smartly simplifies calculations with a logical thought process.

Illustrations in this chapter will help to believe that mathematics is all about our observations of real world which can be quantified, correlated and analysed to draw useful inferences. In this chapter endeavour has been made to build the basics, as they come up, to be of natural consequence. Assimilation of these concepts, to enable one to use them adroitly, and swiftly, requires practising them through mental revision (which authors calls as meditation) and solving of problems. This we call making concepts intuitive. Accordingly, text books and reference books, listed below or any other, that are readily available should be advised by mentors to the students for practicing concepts. These books are time invariant and can become available as second hand book, an economical proposition to target students, as well as it is environment friendly. In real life nothing is encountered in a simplistic manner. Even best of the books and teachers cannot provide a readymade solution to all the problems or the ones that one would encounter in real life. Even it be so, it not possible for anyone to carry complete set of books. But, clarity of concepts is the only thing that helps in correlating observations, in correct mathematical form, and to get a right answer or solution.

Mentors can also promote group learning among students, by way complementing their colleagues in the group, in solving their problems. This will help each student, while gaining proficiency at leraning, to become a good team player. This attribute of personality is a necessity. It it is not developed in school days, it costs heavily to every individual when it is required to put in place.

Here, importance of understanding of problem in a language in which it is encountered, defined or narrated also becomes crucial tool in its resolution. Every successful person has a good command over language and, therefore, every student of mathematics, science and engineering whom society and profession looks upon as problem solver, must not ignore proficiency in language, and general reading as a means to maintain and build it, else all this learning would remain confined to books with no utility in real life.

This chapter (G-02) is a part of common section, followed by Foundation Mathematics, that will go in understanding contents of separate sections on Mathematics, Physics and Chemistry upto class XIIth. There after separate section have been developed on Mathematics, by Prof S.B. Dhar, Physics by Dr Subhash Joshi and Dr Vibhu Mishra and on chemistry by Mrs Kumud Bala. All these resources are being selflessly made available as free web resource. Mentors and students are welcome to make their observations andor suggestion to make value addition and make it more purposeful, for the larger good.

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Growing with Concepts: Chemistry

KINETIC MOLECULAR THEORY OF GASES

Kumud Bala

Graham's law of diffusion or effusion: When we enter into kitchen, we get smell of food. Similarly, if a student in a class-room has used perfume, everybody in the room gets the fragrance of the perfume. This is because the molecules of the aroma of the food or the perfume mix with the air. The spreading of the molecules of a gas throughout the available space is called diffusion. It differs from the term effusion which is a process in which a gas under pressure escapes out of a fine hole or orifice in a vessel, e.g., leaking out of a gas from a cylinder or air from a punctured tyre or escaping out of perfume molecules through the atomizer etc. However, the process of effusion is always followed by the process of diffusion. Thomas Graham studied the rates of diffusion of different gases. He observed that the lighter gases diffuse faster than the denser gases. In 1831, he put forward the following law: 'under similar condition of temperature and pressure, the rates of diffusion/effusion of different gases are inversely proportional to the square root of their densities'. For two gases have densities d_1 and d_2 and rates of diffusion r_1 and r_2 under similar conditions of temperature and pressure. $\frac{r_1}{r_2} = \sqrt{\frac{d_2}{d_1}}$. Here, the rate of effusion or diffusion implies as: Rate of effusion or diffusion = $\frac{volume\ of\ the\ gas\ effused\ or\ diffused}{time\ taken}$. The law may be modified for different types of calculations as follows:

Calculation of molecular masses- As density is mass per ml of the gas and vapour density is mass of 11200 ml of the gas at S.T.P, therefore ratio of densities of two gases is equal to their vapour densities. As molecular mass = 2 × vapour density, we can write $\frac{r_1}{r_2} = \sqrt{\frac{M_2}{M_1}}$ where M_1 and M_2 are the molecular masses of the two gases thus, knowing the relatives rates of effusion of two gases and knowing the molecular mass of one of them that of the other can be calculated. If two gases are taken at different pressure, then as greater the pressure, greater is the number of molecules hitting per unit area, greater is the rate of diffusion. In such cases, Graham's law of diffusion can be written as: $\frac{r_1}{r_2} = \frac{P_1}{P_2}\sqrt{\frac{d_2}{d_1}} = \frac{P_1}{P_2}\sqrt{\frac{M_2}{M_1}}$ Similarly, for two gases undergoing diffusion at the same pressure but at two different temperatures, $\frac{r_1}{r_2} = \sqrt{\frac{T_1}{T_2}\frac{d_2}{d_1}} = \sqrt{\frac{T_1}{T_2}\frac{M_2}{M_1}}$

Comparison of volumes of two different gases effused or diffused in the same times: Suppose v_1 is the volume of gas 1 diffused in time t and v_2 is the volume of gas 2 diffused in the same time t under the same condition of temperature and pressure and through the same orifice. Then, rate of diffusion of gas1 (r_1)= $\frac{v_1}{t}$, rate of diffusion of gas2 (r_2)=$\frac{v_2}{t}$. If d_1 and d_2 are their respective densities or M_1 and M_2 are their respective molecular masses, then $\frac{r_1}{r_2} = \frac{\frac{v_1}{t}}{\frac{v_2}{t}} = \frac{v_1}{v_2} = \sqrt{\frac{d_2}{d_1}} = \sqrt{\frac{M_2}{M_1}}$. Thus, volumes of two gases effused or diffused in the same time (through the same orifice) under similar condition of temperature and pressure are inversely proportional to the square roots of their densities.

Comparison of times taken for effusion or diffusion of the same volume of two different gases: Suppose t_1 is the time taken for the gas1 for diffusion of volume v and t_2 is the time taken for gas2 for diffusion of the same volume v under same conditions of temperature and pressure and through the same orifice, then , $\frac{r_1}{r_2} = \frac{\frac{v}{t_1}}{\frac{v}{t_2}} = \frac{t_2}{t_1} = \sqrt{\frac{d_2}{d_1}} = \sqrt{\frac{M_2}{M_1}}$. Thus, times taken for effusion or diffusion of same volume of two different gases under the same condition of temperature and pressure (through the same orifice) are directly proportional to the square roots of their densities.

Importance of Graham's law of diffusion or effusion: Graham's law is useful in a number of ways as follows- (i) It helps in the separation of gases having different densities. (ii) It helps in the separation of isotopes of certain elements, e.g., those of uranium taking $^{235}UF_6$ and $^{238}UF_6$. (iii) It helps to determine the density or molecular mass of an unknown gas by comparing its rate of diffusion with a known gas.

Numericals :

1. Which will diffuse faster, ammonia or carbon dioxide? What are their relative rates of diffusion?

   Solution: M_{NH3} =17, M_{CO2} = 44 as rate $\alpha \sqrt{\frac{1}{M}}$, hence NH_3 will diffuse faster. $\frac{r_{NH3}}{r_{CO2}} = \sqrt{\frac{M_{CO2}}{M_{NH3}}} = \sqrt{\frac{44}{17}} =$ 1.609.
2. Equal volumes of two gases A and B diffuse through a porous pot in 20 and 10 seconds respectively. If

the molar mass of A is 80, calculate the molar mass of B.

Solution: Suppose the volume of each gas diffused = v cc, then by Graham's law of diffusion, $\frac{r_A}{r_B} = \frac{\frac{v}{20}}{\frac{v}{10}} = \sqrt{\frac{M_B}{M_A}}$ or $\frac{1}{2} = \sqrt{\frac{M_B}{80}}$ or $(\frac{1}{2})^2 = (\sqrt{\frac{M_B}{80}})^2$ or $\frac{1}{4} = \frac{M_B}{80}$ or $M_B = \frac{80}{4} = 20 g\ mol^{-1}$.

Kinetic molecular theory of gases: The various gas laws such as Boyle's law, Charles' law etc. have been obtained on the basis of experimental studies. There was no theoretical background to explain them. The various scientists, from time to time have tried to give a theoretical model of the gas. The first such model was put forward by Bernoulli in 1738 and later improved upon by various scientists. Finally in the complete form, it was put forward by Clausius in 1857 and is known as kinetic-molecular theory of gases. It was so called because it assumes the gas to be made up of a number of molecules which were in ceaseless motion. For the same reason, it is also called a 'Dynamic particle model' of the gas. The name Microscopic model is also used because the model assumes the gas to be made up of molecules which cannot be seen. The main postulates of this theory are given below:

1. Every gas is made up of a large number of extremely small particles called molecules. All the molecules of a particular gas are identical in mass and size and differ in these from gas to gas.
2. The molecules of a gas are separated from each other by large distance so that the actual volume of the molecule is negligible as compared to the total volume of the gas.
3. The distances of separation between the molecules are so large that the forces of attraction or repulsion between them are negligible.
4. The force of gravitation on the molecules is also supposed to be negligible.
5. The molecules are supposed to be moving continuously in different directions with different velocities. Hence, they keep on colliding with one another as well as on the walls of the containing vessel.
6. The pressure exerted by the gas is due to the collision of its molecules on the walls of the container per unit area.
7. Molecular collisions are perfectly elastic, e.g., no loss of energy occurs when the molecules collide with one another or with the walls of the container. However, there may be redistribution of energy during the collisions.
8. Since, the molecules are moving with different velocities, they possess different kinetic energies. However, the average kinetic energy of the molecules of a gas is directly proportional to the absolute temperature of the gas.

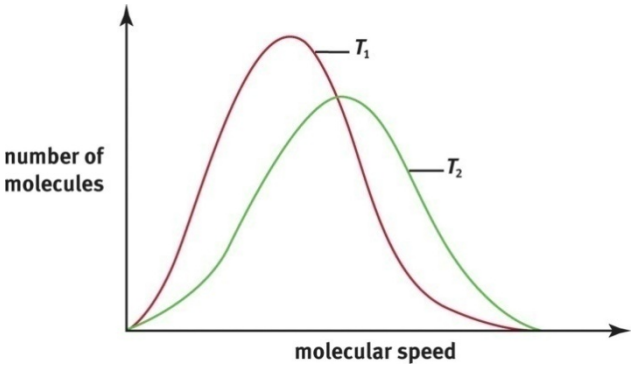
Justification for the above postulates:

1. The first postulate is in accordance with the general particle or molecular nature of matter.
2. The second postulate is justified on the basis of the fact that gases are highly compressible showing the existence of empty spaces among the molecules. For example, it has been experimentally observed that the molecules of gases like H_2 or N_2 or O_2 have volume less than 0.1% of the total volume of the gas.
3. The third postulate is supported by the fact that gases expand and occupy the whole space available to them, showing the existence of weak intermolecular force of attraction.
4. Postulate fourth is true because if there were strong force of gravitation on the molecules, they would have settled down in the container which, in fact, never happens.
5. It is a common observation that smoke or dust particles in the air are in constant zigzag motion. Smoke and dust represents solid particles suspended in air which is a mixture of different gases. These particles are colliding with the molecules of the gases and their zigzag motion clearly shows that the gas molecules, too, have identical motion. If the particles were at rest and occupied fixed positions, then the gas would have had a fixed shape. However, this is not observed.
6. When the gas is enclosed in a vessel, its molecules being in rapid motion constantly go on striking the walls. As a result, the walls experience some outward force and this force per unit area is termed as gas pressure. This is supported by the inflation of a rubber balloon or a cycle tube when more and more air is pumped in to it.
7. The molecules are constantly moving in all directions. During the course of their motion, they collide with one another and also with the walls of the container. During each collision, the speed and

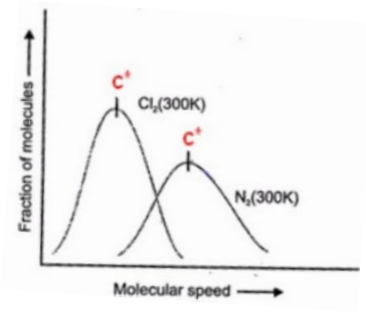
the direction of motion of molecules undergo a change. However, the molecular collisions are perfectly elastic, i.e., the total kinetic energy remains constant. In these collisions, energy may be transferred from one molecule to another but the total kinetic energy remains the same. If these collisions are not elastic, there should have been continuous loss of energy and ultimately the molecules would stop. But this does not happen.

8. Postulate eight has emerged as a result of the fact that when the temperature of the gas is raised, the molecules start moving faster (as observed by increase in pressure). Thus, their individual kinetic energy increases and hence the average kinetic energy increases. The reverse happens if the gas cooled. The liquefaction of a gas supports this view.

Maxwell's distribution of molecular speed/ energies: At a particular temperature, the different molecules of a gas possess different speeds. Further, due to continuous collisions of the molecules among themselves as well as against the walls of the container, their speeds keep on changing. Maxwell and Boltzmann, however, showed that as a result of collisions, though some molecules are speeded up, some others are showed down and hence the fractions of molecules possessing particular speed remains constant at constant temperature. This is called Maxwell- Boltzmann distribution and is shown by the curves in figure for two different temperatures.



The peak of the curve corresponds to a speed possessed by the maximum fraction of the molecules and is called the most probable speed. We observed that with rise in temperature, the most probable speed increases. This is expected because with rise in temperature, the average speed of the gas molecules increases. However, it may be noted that the fraction of molecules possessing most probable speed decreases with increase in temperature. It may be noted that the speed distribution at a particular temperature also depends upon mass of molecules. At the same temperature gas molecules with heavier mass have slower speed than lighter gas molecules. For example, lighter nitrogen molecules move faster than the heavier chlorine molecules. Therefore, nitrogen molecules have higher value of most probable speed than chlorine molecules at any given temperature.

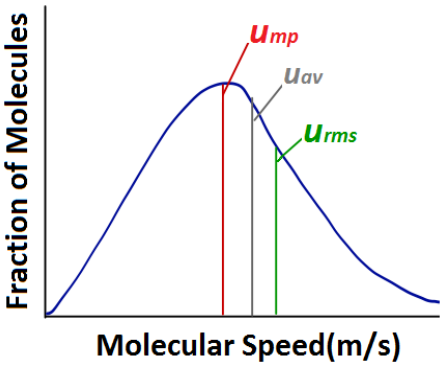


Types of speeds:- There are three types of speeds of gaseous molecules which are commonly used.

Most probable speed (u_{mp})- It is the speed possessed by maximum fraction of molecules of a gas at a particular temperature.

Average speed:- It is the average of the different speeds of all the molecules present in a given sample of gas. If there are N number of molecules in a sample and their individual speeds are u_1, u_2, u_3 …. Then average speed (u_{av}) = $\frac{u_1+u_2+u_3+\cdots}{N}$. Alternatively, if u_1 is the speed of N_1 molecules, u_2 is the speed of N_2 molecules, u_3 is the speed of N_3 molecules, and so on, then average speed (u_{av}) = $\frac{N_1u_1+N_2u_2+N_3u_3+\cdots}{N_1+N_2+N_3+\cdots}$

Root mean square speed- It is the square root of the mean of the squares of different speeds of the molecules of a gas. It is represented as $u_{r.m.s}$. If u_1, u_2, u_3 …… are the individual speeds of N molecules, then $u_{r.m.s}$ = $\sqrt{\frac{u_1^2+u_2^2+u_3^2+\cdots}{N}}$. Alternatively, $u_{r.m.s}$ = $\sqrt{\frac{N_1u_1^2+N_2u_2^2+N_3u_3^2+\cdots}{N_1+N_2+N_3+\cdots}}$. The root mean square velocity is the direct measure of the average kinetic energy of gas molecules. These three types of speed are shown in figure.



Relationship between different types of speeds:

Most probable speed (u_{mp}) = $\sqrt{\frac{2RT}{M}}$. Average speed (u_{av}) = $\sqrt{\frac{8RT}{\pi M}}$. Root mean square speed ($u_{r.m.s}$) = $\sqrt{\frac{3RT}{M}}$

The three speeds are related as: Average speed = 0.9213 X root mean square speed.

Most probable speed = 0.816 X root mean square speed or

$u_{mp} : u_{av} : u_{r.m.s} = 1 : 1.128 : 1.224$. The root mean square speed is commonly used and can be calculated from the following relation: $u_{r.m.s} = \sqrt{\frac{3RT}{M}}$ or $\sqrt{\frac{3PV}{M}}$ or $\sqrt{\frac{3P}{d \text{ or } \rho}}$. d or ρ=density.

Kinetic Gas Eequation: On the basis of the various assumptions made in the kinetic theory of gases, a mathematical equation has been derived from which all the gas laws can be deduced. This equation is known as kinetic gas equation and is given as: $PV = \frac{1}{3} mnu^2$, where P = Pressure exerted by the gas, V = Volume of the gas, m=mass of each molecule of the gas, n = total number of molecules present in volume V, u= root mean square speed of the gas. For 1 mole, m×n =M, molar mass in gram. Hence, $PV = \frac{1}{3} Mu^2$ or $u = \sqrt{\frac{3PV}{M}} = \sqrt{\frac{3RT}{M}} = \sqrt{\frac{3P}{d \text{ or } \rho}}$ where d or ρ = M/V is density of the gas.

Average kinetic energy of gas molecules: Using the above relationship and gas laws, relationship between average translational kinetic energy of a molecule at a temperature T of the gas can be derived. Average translational kinetic energy of a molecule at a temperature T of the gas = $\frac{1}{2} mu^2$. The total energy of the whole of the gas containing N molecules is, $E_k = \frac{1}{2} mNu^2$. The kinetic gas equation is, $PV = \frac{1}{3} mNu^2$ or $PV = \frac{2}{3} \times \frac{1}{2} mNu^2$ or $PV = \frac{2}{3} E_k$ ($E_k = \frac{1}{2} mNu^2$). Comparing this equation with the general gas equation, PV = RT for one mole of gas, $RT = \frac{2}{3} E_k$ or $E_k = \frac{3}{2} RT$. Similarly, kinetic energy for n moles of the gas $E_k = \frac{3}{2} nRT$. The average kinetic energy per molecule can be obtained by dividing both sides of the above equation by Avogadro number N(6.122×10^{23}) i.e., the number of molecules present in one mole of the gas. Thus, we have $E_k = \frac{3RT}{2N} = \frac{3}{2} k_b T$ where $k_b = \frac{R}{N}$ is called Boltzmann constant. Thus, E_k (kinetic energy) α T. Hence, average kinetic energy of a gas is directly proportional to its absolute temperature irrespective of the nature of the gas. This is also one of the postulates of kinetic molecular theory. Further, as $K.E = \frac{1}{2} mu^2$, i.e., K.E α u^2 and also K.E α T, this means that u^2 α T or $u = \sqrt{T}$. Thus, molecular velocity of any gas is directly proportional to the square root of the absolute temperature. When T = 0 K, u=0, i.e. molecular motion in a gas should become zero at absolute zero. In fact, the gas liquefies before this temperature is attained. The motion of the gas molecules due to temperature is called thermal motion.

Numericals:

1. Calculate the kinetic energy of 2g of oxygen at -23°C.

   Solution: $E_k = \frac{3}{2} nRT$, $n = \frac{2}{32} = \frac{1}{16}$ mol, R = 8.314$JK^{-1}mol^{-1}$, T = 273–23 = 250K ,

   $$E_k = \frac{3 \times 1 \times 8.314 \times 250}{2 \times 16} = 194.86 \text{ J}$$

2. Calculate the root mean square speed of methane molecules at 27°C.

   Solution: $u_{r.m.s} = \sqrt{\frac{3RT}{M}}$, T = 27 + 273 = 300K, M = 16, R = 8.314×10^7 ergs $K^{-1}mol^{-1}$, $u_{r.m.s} = \sqrt{\frac{3 \times 8.314 \times 10^7 \times 300}{16}} = 683.9 \times 10^2$ cm s^{-1} or 683.9 ms^{-1} .

3. The average velocity of gas molecules is 400ms^{-1}. Calculate its r.m.s velocity at the same temperature.

   Solution : $u_{av} = \sqrt{\frac{8RT}{\pi M}}$, $u_{r.m.s} = \sqrt{\frac{3RT}{M}}$, $\frac{u_{r.m.s}}{u_{av}} = \sqrt{\frac{3RT}{M}} / \sqrt{\frac{8RT}{\pi 8}} = \sqrt{\frac{3\pi}{8}} = \sqrt{\frac{3 \times 3.143}{8}} = 1.085$ $u_{r.m.s} = 1.085 \times u_{av} = 1.085 \times 400 = 4.34 ms^{-1}$

Assignment

1. The kinetic energy of 1 mole of a gas is equal to -

   (a) $\frac{3}{2}$RT (b) $\frac{3}{2}$KT (c) $\frac{RT}{2}$ (d) $\frac{2R}{3}$

2. Gas 'A' has molecular weight 4 diffuses thrice as fast as the gas 'B'. The molecular weight of gas 'B' is –

   (a) 36 (b) 12 (c) 18 (d) 24

3. The increasing order of effusion among the gases H_2, O_2, NH_3, and CO2 is –
(a) H_2,CO_2,NH_3,O_2
(b) H_2, NH_3, O_2, CO_2
(c) H_2, O_2, NH_3, CO_2
(d) CO_2, O_2, NH_3, H_2

4. A gas X diffuses three times faster than another gas Y the ratio of their densities i.e., $D_x : D_y$ is –
(a) $\frac{1}{3}$ (b) $\frac{1}{9}$ (c) $\frac{1}{6}$ (d) $\frac{1}{12}$

5. In a closed flask of 5 litres, 1 gm of H_2 is heated from 300 to 600K. Which statement is not correct?
(a) Pressure of gas increases
(b) Rate of collision increase
(c) Number of moles of gas increases
(d) Energy of molecules increases.

6. Which one of the following gases would have the higher r.m.s velocity at 25°C.
(a) O_2 (b) CO_2 (c) SO_2 (d) CO

7. In two vessels of 1 litre each at the same temperature, 1 gm of H_2 and 1gm of CH_4 are taken.For these……..
(a) $u_{r.m.s.}$ value will be same
(b) K.E per mole will be same
(c) Total K.E will be same
(d) Pressure will be same.

8. At S.T.P the order of mean square velocity of molecules H_2, O_2, N_2, and HBr is -
(a) $H_2>N_2>O_2>HBr$ (b) $HBr>O_2>N_2>H_2$
(c) $HBr>H_2>O_2>N_2$ (d) $N_2>O_2>H_2>HBr$

9. As the temperature is raised from 20°C to 40°C, the average kinetic energy of neon atoms changes by a factor of -.
(a) $\frac{313}{293}$ (b) $\sqrt{\frac{313}{293}}$ (c) $\frac{1}{2}$ (d) 2.

10. The ratio of the rate of diffusion of helium and methane under identical condition of pressure and temperature will be:
(a) 4 (b) 2 (c) 1 (d) 0.5

11. Which one of the following statements is not true. On Increasing temperature of a gas….
(a) The most probable speed increases
(b) The fraction of molecules with the most probable speed increases
(c) The distribution becomes broader
(d) The area under the distribution curve remains the same as under the lower temperature.

12. At 100°C and 1 atmosphere if the density of liquid water is 1.0g cm^{-3} and that of water vapour is 0.0006g cm^{-3}, then the volume occupied by water molecules in 1 litre of steam at that temperature is –
(a) 6 cm^3 (b) 60 cm^3
(c) 0.6 cm^3 (d) 0.06 cm^3

13. The temperature at which the root mean square velocity of gas molecules is double than that at 27°C is: (a) 108°C (b) 927°C (c) 327°C
(d) 54°C

14. The root mean square velocity of gas molecules at 100K and 0.5 atmosphere pressure is 106.4 ms^{-1}. If the temperature is raised to 400K and the pressure is raised to 2 atmosphere, the root mean square velocity becomes:
(a) 106.4 ms^{-1} (b) 425.6ms^{-1}
(c) 212.8ms^{-1} (d) 851.2ms^{-1}

15. The root mean square speed of oxygen at 27°C is 760 cm s^{-1}. The root mean square speed of hydrogen at the same temperature will be:
(a) 3040 cm s^{-1} (b) 190 cm s^{-1}
(c) 1520 cm s^{-1} (d) 760 cm s^{-1}

ANSWERS

1 (a)	2 (c)	3 (d)	4 (b)	5 (c)	6 (d)	7 (b)	8 (a)	9 (a)	10 (b)	
11 (b)	12 (c)	13 (b)	14 (c)	15 (a)						

Author is M.Sc. (Chem.), M.Ed. and Advanced Diploma in German Language (Gold Medallist). She retired as a Principal, Govt. School Haryana, has 3-1/2 years' experience in teaching Chemistry and distance teaching through lectures on Radio and Videos. She has volunteered to complement mentoring of students for Chemistry through Online Web-enabled Classes of this initiative

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—00—

SCIENCE QUIZ January-2019

Kumud Bala

1. Which of the statements about the reaction below are incorrect?
   $2PbO(s) + C(s) \rightarrow 2Pb(s) + CO_2(g)$ (i) lead is getting reduced (ii) carbon dioxide is getting oxidized (iii) carbon is getting oxidized (iv) lead oxide is getting reduced
   (a) (i) and (ii) (b) (i) and (iii)
   (c) (i), (ii), and (iii) (d) all are incorrect

2. $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe$ .This reaction is an example of a .....
   (a) Combination reaction
   (b) Double displacement reaction
   (c) Ddecomposition reaction
   (d) Ddisplacement reaction

3. What happens when dilute hydrochloric acid is added to iron fillings?
   (a) hydrogen gas and iron chloride are produced
   (b) chlorine gas and iron hydroxide are produced
   (c) no reaction takes place
   (d) iron salt and water are produced.

4. When we mix quick lime with water, it becomes warm. This is an example of a --------- reaction
   (a) Exothermic (b) Inhibitor
   (c) Reduction (d) Endothermic

5. Equal pieces of zinc granules are dropped in four test tubes. Following substances are poured in all the four test tubes. The reaction will be vigorous with –
   (a) CH_3COOH
   (b) HCl
   (c) Sodium bicarbonate solution
   (d) Lemon juice

6. Hold a highly polished steel spoon curved inwards close to your face and move it slowly away from your face. What will you observe?
   (a) enlarge and erect image of your face
   (b) smaller and inverted image of your face
   (c) smaller and erect image of your face
   (d) enlarged and inverted image of your face

7. Which one of the following materials cannot be used to make a lens?
   (a) water (b) glass (c) plastic (d) clay

8. A spherical mirror and a thin spherical lens have each of a focal length 15 cm. The mirror and lens are likely to be -
   (a) Both concave
   (b) Both convex
   (c) Mirror is concave and lens is convex
   (d) Mirror is convex and lens is concave.

9. Which of the following can make a parallel beam of light when light from a point source is incident on it?
   (a) concave mirror as well as convex lens
   (b) convex mirror as well concave lens
   (c) two plane mirrors placed at 90° to each other
   (d) concave mirror as well as concave lens

10. A student placed a light bulb in midway between the two planes mirrors inclined at an angle of 60°. How many images will be observed by him?
    (a) 4 (b) 6 (c) 5 (d) 8

11. Which of the following lens would you prefer to use while reading small letters found in dictionary?
    (a) a convex lens of focal length 50 cm
    (b) a concave lens of focal length 50 cm
    (c) a convex lens of focal length 5 cm
    (d) a concave lens of focal length 5 cm

12. Cramps caused during sudden activities are due to the formation of -
    (a) Llactic acid
    (b) Acetic acid
    (c) Excess of water
    (d) Ethanol

13. Which of the following plays nose like function in plants?
    (a) Flower (b) Phloem
    (c) Stomata (d) Chlorophyll

14. Which among the following diseases is not sexually transmitted?
(a) Syphilis (b) Hepatitis
(b) HIV- AIDS (d) Gonorrhea

15. Length of pollen tube depends on the distance between --
(a) Pollen grain and upper surface of stigma
(b) Pollen grain on upper surface of stigma and ovule
(c) Pollen grain in anther and upper surface of stigma
(d) Upper surface of stigma and lower part of style.

16. Identify the original source of the energy which flows through a food chain?
(a) Carbon dioxide (b) Glucose
(c) Oxygen (d) Sunlight

17. Which of the following are environment friendly practices?
(a) Carrying cloth- bags to put purchases while shopping
(b) Switching off unnecessary light and fans
(c) Walking to school instead of getting your mother to drop you on her scooter.
(d) All of the above

18. An ecosystem includes –
(a) All living organisms
(b) Non-living objects
(c) Both living organisms and non-living objects
(d) sometimes living organisms and sometimes non-living objects.

19. The pH of water sample collected from a river was found to be acidic in the range of 3.5-4.5. On the banks of the river were several factories that were discharging effluents into the river. The effluents of which one of the following factories is most likely to cause low pH of river water?
(a) soap and detergent factory
(b) lead battery manufacturing factory
(c) plastic cup manufacturing factory
(d) alcohol distillery

20. Varun has read about some national movements associated with conserving environment and its resources. Chipko movement was one tree hugging movement in which the villagers compelled axe man to stop the cutting of trees by embracing encircling trees. Help him in finding out the person who was not related with this movement?
(a) Rajendera Singh
(b) Gaura Devi
(c) Sunder Lal Bahuguna
(d) Chandi Prasad Bhatt

(Answers to this Science Quiz January'19 shall be provided inMonthly e-Bulletin dt. 1st February'19)

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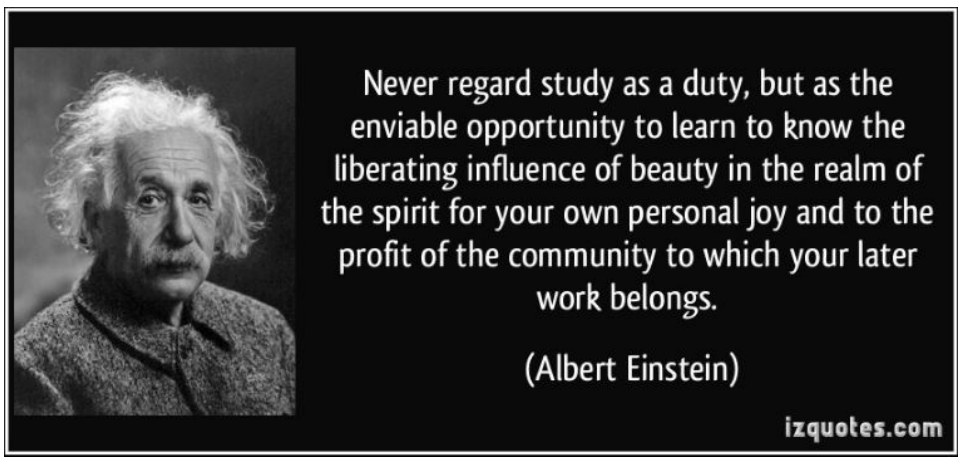

OUR MENTORING PHILOSOPHY: Mentoring is not teaching, neither tuition nor coaching. It is an activity driven by passion, and commerce has no place in it. In this effort is to caution students that -

- This place is not where they will be taught how to score marks and get higher ranks, but to conceptualize and visualize subject matter in their real life so that it becomes intuitive.
- This place is not to aim at solutions but inculcate competence to analyze a problem and evolve solution.
- This place does not extend selective and personalized attention, rather an opportunity to become a part of which is focused on learning and problem solving ability collectively.
- This place provides an opportunity to find students above and below one's own level of learning. Thus students develop not in isolation but learn from better ones and associate in problem solving to those who need help. This group dynamics while create a team spirit, an essential attribute of personality, while one learns more by teaching others.
- This place has strategically chosen Online Mentoring, so that those who are unprivileged can gather at one point and those who can facilitate learning of such students by creating, necessary IT setup. Aseperate **Mentor's Manual**is being developed to support the cause.

We are implementing this philosophy through **Online Mentoring**

—00—

Euler's Equation: $0 = 1 + e^{i\pi}$

Mathematics is the language of natural consequence.

—00—

This life is short, the vanities of the world are transient, but they only live who live for others, the rest are more dead than alive.

-Swami Vivekananda

Theme Song :

PREMISE:*We are pleased to adopt a song*" इतनी शक्ति हमें देना दाता....."*from a old Hindi MovieDo Aankhen Barah Haath दो आँखें बारह हाथ of year 1957, directed by The Late V. Shantaram. The lyrics are by Shri Bharat Vyas, singer Melody Queen Sushri Lata Mangeshkar, and Music Direction by Vasant Desai. It has become a widely accepted inspirational song and/or prayer in many educational institutions and socially inspired initiatives engaged in mentoring of unprivileged children. This newly formed non-organizational initiative, being selflessly operated by a small set ofcompassionate persons, finds its philosophy in tune with the song and conveys its gratitude to all he eminent persons who brought out the song in a manner that it has attained an epitome of popularity. While working its mission and passion, the group invites one and all to collectively complement in grooming competence to compete among unprivileged children. The song/prayer goes as under -*

इतनी शक्ति हमें देना दाता, मन का विश्वास कमजोर होना
हम चले नेक रस्ते पे हम से, भूलकर भी कोई भूल होना ||

दूर अज्ञान के हो अंधेरे, तू हमें ज्ञान की रोशनी दे
हर बुराई से बचते रहें हम, जितनी भी दे भली ज़िन्दगी दे
बैर होना किसी का किसी से, भावना मन में बदले की होना ||

इतनी शक्ति हमें देना दाता, मन का विश्वास कमजोर होना
हम चले नेक रस्ते पे हम से, भूलकर भी कोई भूल होना ||

हमना सोचें हमें क्या मिला है, हम ये सोचे किया क्या है अर्पण
फूल खुशियों के बाँटे सभी को, सबका जीवन ही बन जाए मधुबन
अपनी करुणा का जल तू बहा के, कर दे पावन हर एक मन का कोना ||

इतनी शक्ति हमें देना दाता, मन का विश्वास कमजोर होना
हम चले नेक रस्ते पे हम से, भूलकर भी कोई भूल होना ||

Together Each Achieves More
(**TEAM**)

Every end, so also end of this e-Bulletin, is a pause for a review, before

Resuming of the journey far beyond ...