GYAN VIGYAN SARITA:शिक्षा

A Non-organizational, Non-remunerative, Non-commercial and Non-political Initiative To Mentor Unprivileged Children Monthly e-Bulletin GgyanVigyanSarita:शिक्षा dt 1st November'19 (50th Issue)





Deserving Incumbents With a Sense of Personal Social Responsibility (PSR) थिक्षा ऐसा एक दिया जो, दे टूटी हिम्मत को विश्वास। दूर करे अंधकार और भय, भर दे उम्मीदों की आस।।

CONTENTS: (Against Each of the Contents Page Number is Indicated for Convenience)

IOMS Graphical perspective (3)

IT Infrastructure (4)

Editorial – प्रकाशपर्व का संदेश : समस्त प्राणी एक समान हैं (5)

Coordinator's View - Nature and Technology (6)

Regular Columns

- > गमछे की लपेट में -समीर लाल 'समीर'(11)
- Ayurveda Health Care: Prevention From Eye Infection- Dr Sangeeta Pahuja (13)

Poems

- > वैश्णव जन तो तेने कहिये जे (10)
- दीप पर्व मृणालिनी घुळे (20)
- सतत है प्रकृति डॉ. संगीता पाहुजा (20)
- बाहर निकल मुकेश आनंद (21)

Students' Section

- How Properly To Use Petroleum D. Naga Divya (25)
- Success G. Kavitha (26)
- Indian Or Indian Origin Nobel Laureates *M.Bala Ramya Sri* (27)
- Rivers of India Deepika (28)
- Swatcha Bharath Abhiyan J. Ganesh (29)
- Agriculture Is The Backbone A. Karthika (30)
- It's Not Just A CLOWN... (Episode 5)– Chyanis Tiwari (31)
- **Crerative Work** *Paarth Karve* (32)
- I Am A Little Tree Dishita Joshi (33)

An Appeal (9) Our Five Year's Journey (33) Evolution of IOMS (14) IOMS का दर्शन (Philosophy) (19)

Articles

- > **Opposite is Complimentary** *Prakash Kale* (15)
- बूंद-बूंद से घट भरे कुंसुम लता गुप्ता (18)
- यादें......एडिस अबाँबा (इथियोपिया) भावना मिश्रा (22)
- रामू कुम्हार- हर हाल में खुश- भावना मिश्रा (22)
- Skills Kumud Bala (23)

Growing With Concepts (53)

- Mathematics: Let's Do Some Problems in Mathematics-XIII – Prof. SB Dhar (34)
- Physics: Waves and Motions: SHM Part II (41) Typical Problems with Illustrations (42)
- Chemistry: General Characteristics of Compounds of Alkali and Alkaline Earth Metals – Kumud Bala (54)

Quizzes

- Crossword Puzzle: SIKHISM Prof. SB Dhar (40)
- Science Quiz: November'19– Kumud Bala (60)

From Previous e-Bulletin

Answers to Science Quiz: October'19- Kumud Bala (24)

Answer: Crossword Puzzle October'19 –Prof. SB Dhar (24)

Invitation for Contribution of Articles (12)

Theme Song (63)

Editor: Gyan Vigyan Sarita – शिक्षा,e-Bulletin:Dr SB Dhar; Coordinator-Gyan Vigyan Sarita,: Dr Subhash Joshi

Cover Page Graphics – Gyan Vigyan Sarita, Courtsey – Google.com

Disclaimer: Views expressed in this bulletin are author's view and Gyan Vigyan Sarita – शिक्षा, Publishers of this bulletin, are not responsible for its correctness or validity

Rights of Publication: Core Committee of ज्ञान विज्ञान सरिता reserves right of moderation or publication of a content of this e-Bulletin

Address: #2487, Betina, Mahagun Moderne, Sector-78, NOIDA, Uttar Pradesh, PIN: 201309,, (INDIA). GyanvigyanSarita.Gvs; e-Mail ID: <u>subhashjoshi2107@gmail.com</u>; (M): 9711061199

__00__

Aim at the Best, but...



Equipments at Mentoring Center 1.Desk-/Lap-top (Linking platform : cloud based with as low bandwidth as 2. WebCam

3. Headset with Microphone 4. Digital Pen AND Broadband-Internet Connection

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

Cloud Internet

possible for seamless connectivity of audio-video

whiteboard across nodes where internt connectivity is

poor- Presently A-VIEW is in use)



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 modern 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



Mentoring

the of the sais have the



Learning

Centre - 3

Learning

Centre

Learning Centre - n



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.i n/contact/



earning

Centre - 2

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

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

Learning Centre (if asked for by M	entor)	r) Mentoring Centre (if asked for by Mentor)				
Est	timated Cap	ital Cost (One Time)				
Particulars	Cost (in Re	s) Particulars	Cost (in Rs)			
Desktop (without monitor)	20,000	Laptop	25,000			
Projector	9,000	Projector	-			
Web camera	2,000	Web camera	-			
Mixer cum amplifier with Speaker and Wireless microphones	14,000	Headset with Microphone	3,000			
Total	45,000	Total	28,000			
Wireless Surface Writing Device (WSWD). It shall be required when Learning Centre is ready for collaborative use of Whiteboard.	15,000	Wireless Surface Writing device	15,000			
Total with WSWD	60,000	Total with WSWD	43,000			
Estimated Recurring Cost	ated Interne	t charges based on estimated monthly	, data transfer which			
monthly data transfer which depends u choice of cloud platform, and tariffs of Ib. Cloud Platform Charges, to be sha across Learning Centres	pon depen SP ured	ids upon choice of cloud platform, and tar	iffs of ISP			
Cloud platform :						
A-VIEW indigenously developed by Am University. It is found to be best among avail options for use in IOMS. It has been developed use in imparting Interactive Online Educat with bilateral audio-visual access, in interactive manner. Cloud platform.	arita able l for ion, an an Gyan V collectiv for arriv	s since an initiative driven with Persona operating n Zero-Fund-&-Zero-Asset (ZF n has to provided by Learning Centers for de Yigyan Sarita will be pleased to connect vely complementing the cost of Cloud Platfor ying at a mutual agreement for cost sharing.	l Social Responsibility ZA) basis, the Cloud eriving benefit of IOMS. Learning Centres for orm, whenever payable,			
 a. The IOMS envisages session upto Learning Centres. Charges for the platf whenever payable may be shared acros mutual agreement between Learn Centres. b. Benefit of sharing of charges of cl platform can be optimized with afford 	Five orm So also s in But, at centres, basis.	So also IT Infrastructure with the Mentors has been in use and is working. But, at any stage if upgradation becomes essential, support of learning centres, beneficiaries of the initiative, is gratefully welcomed on ZFZA basis.				
schedule among multiple sessions of IO to the extent Mentor can deliver.	MS, Centres.	Operating cost of Mentor, if required, shall be supported by Learning Centres.				

Specification: These are 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 centres and mentoring centres. These specifications have been updated based on experience of operation of IOMS with available options. MS WhiteBorad a free App of MS office has been tried out in IOMS and is found satisfactory, until a better option is available.

Web Camera: iBall 20.0 HD with a wall mounting

Projector: Portronics POR 624 LED Projector Beam 100 Lumen, Screen Size 130 Inch , 800x480px resolution

Sound System: Ahuja Make PA Mixer Amplifier Model DPA-370, 30 W Max/37W Max, with PA wall speakers PS-300T 10W, and a wireless unit AWM-490V2 Dual Cordless Microphones. This sound input/out when decoupled with USB sound adopter to connect to the computer required echoless environment is achieved in the Classroom and networked mentor and Learning Centres.

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 model Intuos with wireless device makes it suitable for communication with base computer in class in an interactive online environment.

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

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

-00-

<u> संपादकीय</u>

प्रकाशपर्व का संदेश : समस्त प्राणी एक समान हैं



मनुष्य एक कर्मशील प्राणी है। उसका स्वभाव है, अपने नजदीक अच्छे लोगों को रखना, अच्छे लोगों से अच्छी बातें सीखना और समाज में अच्छी बातों का प्रचार करना। अच्छाई से जीवन बढ़ता है। अच्छाई से व्यक्ति विकास करता है। अच्छाई एक प्रकाशमान ऊर्जा है। इस ऊर्जा को फैलाना एक कठिन काम है। जो व्यक्ति अथवा समुदाय यह काम करता है, समाज उसे महापुरूष अथवा महान कहता है, उसकी इज्जत करता है, और उसके बताये रास्तों पर, बिना कोई तर्क किये, चलने में गर्व अनुभव करता है।

भारत की धरती ऐसे अनेक महापुरूषों से भरी पड़ी है जिन्होंने समाज को नयी दिशा दी है। ऐसे ही एक महापुरूष हैं – श्री गुरूनानक देव जी। कार्तिक मास की पूर्णिमा के दिन उनका जन्म हुआ था। उनके जन्म से जुड़ने के कारण यह तिथि और अधिक प्रकाशमान हो गयी तथा युग-युगांतर तक अच्छाई फैलाने वाले के नाम हो गयी।

हिंदू पंचांग के अनुसार कार्तिक महीना, वर्ष का सर्वोत्तम महीना माना जाता है। सनातन धर्म में हर महीने की पूर्णिमा का भी बड़ा महत्व माना गया है। एक वर्ष में 12 पूर्णिमा होती हैं, परंतु अधिक मास या मलमास की स्थिति में इनकी संख्या 13 हो जाती है।

कार्तिक पूर्णिमा को त्रिपुरी पूर्णिमा भी कहते हैं, क्योंकि इसी दिन भगवान शंकर ने त्रिपुरासुर नामक भयंकर राक्षस का वध किया था। यह भी मान्यता है कि कार्तिक पूर्णिमा के दिन भगवान विष्णु ने प्रलयकाल में वेदों की रक्षा के लिये तथा सृष्टि को बचाने के लिये मत्स्य अवतार धारण किया था। मत्स्य अवतार विष्णु का पहला अवतार माना जाता है। एक अन्य कथा के अनुसार, कार्तिक पूर्णिमा के दिन श्रीहरि के बैकुण्ठधाम में देवी तुलसी का प्राकट्य हुआ था।

कार्तिक पूर्णिमा, देव दीपावली का दिन है, यानि देवतागण इस दिन दीपावली का प्रकाशोत्सव मनाते हैं। इस वर्ष की कार्तिक पूर्णिमा का एक विशेष महत्व है। यह कार्तिक पूर्णिमा गुरूनानक देव जी के जन्म का 550वां वर्ष है। गुरूनानक जी का जन्म कार्तिक पूर्णिमा के दिन 1469 में लाहौर से करीब 40 मील दूर तलवंडी नामक गांव में हुआ था। उनके पिता का नाम कल्याणराय मेहता तथा माता का नाम तृप्ताजी था।

गुरूनानक देव जी एक अच्छे विचारक माने जाते हैं। इनको मानव धर्म का उत्थापक माना जाता है। इन्होंने सिख धर्म की स्थापना की थी। इनको ही सिख धर्म में प्रथम गुरू माना गया है। इनका जन्म

-00-

हर वर्ष गुरूपर्व अथवा गुरूपरब अथवा प्रकाशपर्व के रूप में मनाया जाता है।

गुरू नानक देव का मानना था कि सभी मनुष्य एक हैं और हर तरह से समान हैं। हर प्राणी को वही वाणी बोलनी चाहिये जो उसे सम्मान दिलाये। हमें हर तरह के अहंकार से अपने को दूर रखना चाहिये क्योंकि अहंकार एक ऐसा दुर्गुण है जो समूची मानवता का अंत कर देता है।

संसार पर विजय वही पाता है, जो अपने विकारों पर विजय पा लेता है, अर्थात् अपने अहंकार पर विजय पा लेता है। हमें नहीं भूलना चाहिये कि जो भी बीज हम आज बोते हैं, वह किसी न किसी दिन एक पौधा अवश्य बनता है, फिर हम अच्छे पौधों के बीजों को ही क्यों न रोपें जो समय आने पर अच्छे फूल दें और अच्छा फल दें?

आइये, हम प्रतिज्ञा लें कि अपने चारों ओर के वातावरण को अच्छा बनाने का प्रयास करेंगे ताकि वहां अपनापन पनपे और एक दूसरे के बीच की कटुता की दूरी खत्म हो। जब हर मनुष्य अपने को देवों का अंश मानता है, तब क्यों न हम सभी लोग एक दूसरे के उत्थान में सहयोग करें, एक दूसरे के कष्ट में खड़े मिलें और एक दूसरे को अपने परिवार का सदस्य मानें? अगर हम ऐसा कर पाये तो निश्चित तौर पर हमारा स्वभाव देवतुल्य हो जायेगा।

प्रकाशपर्व मनाने में सिख धर्म की एक प्रथा है। इस दिन गुरूग्रंथ साहिब को पालकी में सजाकर गुरूद्वारे से निकालकर, पूरे नगर में घुमाया जाता है। उनके आगे-आगे पंज प्यारे चलते हैं। कीर्तन होता रहता है। मान्यता है कि जहां-जहां गुरू जाते हैं, वहां-वहां की भूमि पवित्र हो जाती है। समस्त नगर को पवित्र बनाने की यह सोच अत्यंत सराहनीय और वंदनीय है।

ज्ञान विज्ञान सरिता परिवार अपने सीमित संसाधनों के बावजूद समाज के पिछड़े और सुविधाओं से वंचित लोगों के उत्थान की दिशा में शिक्षा के माध्यम से जो प्रकाश फैला रहा है, वह एक न एक दिन पूरे समाज को आपस में जोड़ने का काम करेगा और नये लोग जो संसाधनों से युक्त हैं, अवश्य सहायता में खड़े होंगे।

ज्ञान विज्ञान सरिता परिवार का कार्य हमें एक सबक सिखाता है कि अगर हम दृढ़ निश्चय कर लें कि समाज को कुछ नया देना है, तो हम हर हाल में सफल अवश्य होंगे।

आइये, इस प्रकाश पर्व पर हम सब मिलकर अपने चारों ओर सहायता और सहयोग का दिव्य प्रकाश फैलाएं।

Coordinator's View



Nature and Technology

Age of the earth is estimated to be about 4.5 billion years during which it has evolved itself from a fireball to a habitat of more than 11 million species of flora and fauna. Among the huge biodiversity on this planet, The Mother Earth, human species that have evolved are in their most developed form.

The process of evolution is extrinsically a perpetual positive change but intrinsically it is cyclic in nature. Simplest and shortest cycle is breathing, which has extended into daily cycles, seasonal variations and so on with increased periodicity. It is pertinent to note that greater is the periodicity larger is the quantum of change. This change has been visible in natural topology, characteristics of living species and non-living objects created by men or nature. Basic reason behind the change in organism is adaptability of living organism to its cyclic needs of energy. Changes in non-loving objects are regulated by their resistance to natural process and occur due to either erosion or reformation. Changes in both of living and non-living things are inevitable. These changes in cyclic manner are essential mechanism for mutual correction and adjustment to overdoing in any part of the process. These conditions of changes are effects of many parameters some of them are beyond control. Uncertainty of role of any of the parameter has been causing randomness in the cyclic processes. Best example of randomness in yearly variation in weather both intra and inter the seasons.

Survival instinct of all living species has been prompting them to thrive upon flora or fauna around their habitat and thus evolved the rule of survival of the fittest. In this process animal species and human were first to use their arms, nail and teeth. These were primitive tools and weapons. These were used as tools to satisfy energy needs manifested in the form of hunger or as weapon for protection. While botanical species thrived on the energy sources to the extent they were available. In the process only those species grew which had ability to adapt the change, and rest perished. Thus understanding of mechanism grew at the pace of experiences gained by human and were used for greater applications. Yet, any variation in needs, adaption, generation and/or consumption of energy sources on this planet got manifested in random cyclic processes. These variations led to greater curiosity among human. This curiosity is attributed to their ability to observe, think and replicate.

It was only in the renaissance period i.e. during 14th to 17th century when many scientists prominently Kepler, Galileo, Newton questioned human observations to find a reason and just not accept them as natural or super-natural phenomenon. These answers could satisfy human quest with reproducibility of observations and were regarded as discoveries. These discoveries of natural phenomenon started leading to applications in the form of invention, creation of architecture. This was followed with an accelerated growth of both the human civilization and science. Thus science gained recognition as an inevitable discipline of knowledge and thought process. Aim of science was and continues to be to discover variables and their influences on any process. Randomness, if any, in observations in scientific age is recognized as inability to

identify either the variables involved in the process, or interrelationship among variables along with boundary conditions for each variable. These uncertainties and randomness are generally observed in weather predictions, storms, earth quakes most of the natural experiences.

Here it is relevant to recall Euler's Identity: $0 = 1 + e^{j\pi}$. In this each of the mathematical symbols was discovered independently in different context by different persons in different era. Yet, each of the symbols has very specific meaning. If meaning and value of any of the symbol is to be changed then not only the scientific concepts and discoveries but understanding of the whole universe will have to change. This is an excellent example of integration of everything that exists in nature, each of them have a complementary role to play. Absence or predominance of any of them would completely change the characteristic of the nature. Doping of semiconductor materials is an excellent example of natural balance.

Another interesting example of boundary conditions is in difference between classical and relativistic mechanics. It was Lorentz and Einstein who around the same period, transition from 19th to 20th century, independently recognized that velocity of light as an absolute value and thus emerged Special Theory of Relativity to correlate inter-convertibility of mass and matter. In classical mechanics mass and matter were considered independent and non-convertible. Yet, it is noteworthy that this convertibility is valid only when matter approaches the velocity of light; until then classical mechanics remains valid. This establishes need of scientific quest to discover boundary conditions for validity of relationships among associated variables; without this it will not be possible to fix any kinds of randomness or any undefined natural phenomenon. Before evolution of scientific thought process all mysteries were regarded as influence of super natural powers and formed basis of all the ancient cultures. A great price of ignorance of masses in general and rulers in particular has been paid by human civilization in the form of precious lives of great thinkers and scientists like Socrates, Galileo and many more.

Ever since wedge, lever, wheel and other tools of minimizing human efforts were evolved, these tool in various combinations and formation were regarded initially as machines and later as engines. One who was able to use these engines was regarded as engineer. Thus did evolve the word engineering. It is an art of designing building and use of engines, machines, and structures. Thousands of years before Christ use of bricks, ceramics and glass were invented. They became readily acceptable construction material. These materials were manufactured as per requirement of structures and this formalized engineering as a branch of applied science. This specialized knowledge and ability to create civic amenities and structures was called civil engineering. Later, with popularization of mobile facilities making working and transportation easier mechanical engineering evolved. Until Faraday electricity was confined to almost laboratory. In 1931 with the invention of dynamo Faraday, the inventor, was asked utility of dynamo which he

replied in a naïve yet optimistic manner "*it has the same utility as that of a new born child*". Use of electricity led to evolution of electrical engineering. All the inventions, in their primitive form, were crude models to demonstrate application of scientific concepts for human welfare and convenience. It was the engineering which made it possible to make the inventions economical and reliable reality. With growing specialization and diversification in human knowledge and skills evolution of numerous braches of engineering took place.

Dependence of human race on engineered inventions created a forward path to industries. Commercial survival of industries created a demand upon engineering in terms of economy, ease of production and minimum possible impact on environment. These considerations could not be met with binary approach; it involved interdisciplinary approach which was a step beyond science and engineering and thus in 20th century a new buzzword was coined. Technology is considered more as a technique of integration of human knowledge to meet the requirement of human civilization in a manner which is economical, feasible, and sustainable for coexistence. The last expectation of technology is based on the basic fact that it is the technology that has to serve the human race to coexist with the nature, and not the vice-versa. Unfortunately, trade and commerce are too short-sighted. They aim at immediate gain in the prevalent scenario with a hope to search out new pastures when potential of contemporary opportunities exhaust.

Taking a look in retrospect bricks, the most ancient construction materials made out of clay is destructive conversion of cultivable soil. Their conversion into soil, like stones, takes thousands of years. If this can be the lifecycle of bricks considered to be most environment friendly then fate of conversion of ceramics, glass and other forms of construction material produced at higher temperatures would be more pessimistic. The only solace in this type of soil conversion is that these construction materials are used for creating permanent structures and infrastructure for improving life style. These are not consumable material like single use products viz. plastics, packaging materials, transportation, consumables, processes and infrastructure which have become acceptable norm of modern life. When this process of invention, engineering and technology started inertia of ecosystem was quite high to absorb any damage. This can be compared with effect of impact of a bucket full of water taken out of ocean.

Creation of amenities to support race of modern life on this globe has already consumed billions of trees, millions of hectares of cultivable land and produced biodegradable waste on a scale that it over breached resilience of the nature much earlier. This has severely endangered ecological balance of biodiversity on the Mother Earth. The rate of ecological disorder has become alarmingly high as against the adaptability of the biodiversity. This has resulted in extinction of some of the weakest species. Nature took billions of years to create them. First amoeba occurred on earth after about one billion years of its creation. It had to precede formation of oxygen on the earth and biodiversity in its present form. It is a result of complex biological processes for about 3.5 billion years. Yet, there is optimism. Now that all kinds of gases, organic substances and energy sources are present on the earth in abundance, reevolution of the biodiversity with human race might take much lesser time. This optimism is fraught with a risky proposition as to what form and capabilities would human race reemerge. These thoughts make the future of our beloved descendents dreadful.

At this point of time every responsible person need to ponder upon five basic questions : (1) Can the prevalent technological progress be slowed if not halted or reversed? (2) Can technology produce new strains of organisms to accelerate biodegradable processes? (3) Can technology restore oxygen in environment consumed in generation of energy? (4) Can technology restore ozone layer to undo the green house effects? (5) Can technology become accessible to poorest of the poor person and weakest of the weak species to guarantee their right to live on?

There could be more questions coming to thoughtful minds. If answers to these questions cannot be evolved and demonstrated in reality then certainly we are heading towards doomsday. In its present form it may not take too long to turn this beautiful planet into a place having water, air and lot of organic material necessary for recreation of life, unlike all other planets, without any signs of life on it.

Answers to each of the above questions are being explored to make the concerns explicit.

Resolution of Question 1: The democratic order that has emerged in 20th century all over the world is such that wish of the polity is capable of changing the government. Yet orienting masses to walk an extra mile for coexistence requires a leadership which has grown against all odds. This task is like moving against gravity, while the natural human tendency is to take position of least potential and least effort. The advent of science, engineering and technology has enhanced human comfort to an extent that it is a nightmare to think people resorting to options involving greater human effort. This is vouched from responses of pleading to people in a highly elite society to carry cotton bags for shopping, a simplest proposition. It antagonized many highly qualified persons and things did not change. It was only on the 73rd Independence Day when Prime Minister (forget about the party-politics) spent nearly few minutes from rampart to request all citizens India to stop single use plastics, their mindset made a reluctant drift. Ultimately what has emerged is that small proportion of people using cotton bags, while right from shopkeepers to users they resorted to use of thicker plastic bags which be used more than once and are unprepared to make a determined effort to avoid use of plastic. This is the way how responsible people circumvent compulsions based on the logic of their convenience. Is it not professional, intellectual and moral dishonesty? While financial dishonesty is visible like tip of the iceberg, other forms of dishonesties are latent and worst and they have eroded the whole socio-economic system. These elite people who influence system, policies and capable of shrouding masses with their preferences - can they be so insensitive to dire need of change? Do they need to be pushed with a rule-of-stick? Do they need another rebuke? are they not worst than cattle? At least cattle while living for them self they serve their master. Therefore, elite section of society, without losing any time, must pro-act on war footings for conservation of nature if not for technological reversal.

Resolution of Question 2: Science and technology has advanced in every field right from domestic needs to medical science, biotechnology, metrology etc. Even clones have become reality. Bacteria have been produced to decompose certain non-biodegradable materials. All that is required a concerned and concerted approach towards making solution to every problem first possible and then feasible. Plastics are some of the wonderful inventions as long as they are used judiciously, and not indiscriminately. So is the case on every other technology including the most debated nuclear technology; problems starts only when technology is exploited without responsibility for sustainable coexistence. This has happened on every field be it construction of roads, new transport systems, energy sector including agriculture. New strains of genetically modified crops are being used for increasing yield of more profitable crops; but their aftermaths are new biological disorder caused by eco-imbalance. Use of plastics waste as an alternative to construction material has started receiving attention. Yet, use of plastic must be made judiciously only on merit and not on convenience. This is one of the example and such possibilities must be explored and imposed on each and every application of technology.

Resolution of Question 3: On every onset of rainy season media is flooded with news, pics of sorts on plantation of trees in every state in millions. But, here point of relevance is how many of these saplings see next rainy season. If even 50% of the saplings could survive one year certainly green cover of the earth would have been replenished. On the one hand survival of saplings if not significant, rather it is just notional, while on the other side carbon-oxides and toxic gas production is increasing to an extent that whole atmosphere is getting highly vitiated and metros are worst affected. It has, therefore, become more important to ensure maintenance of the saplings as an integral part Personal Social Responsibility (PSR) of every individual. Degree of this responsibility must increase with the order of increasing affluence. This is based on philosophy that dependence of a person on technology increase with his order of affluence.

Resolution of Question 4: Technology has been in use to make various processes more energy efficient, yet thermodynamically efficiency at the level of hundred percent cannot be achieved. Therefore, there will be always some heat energy that is not available for work. This continuously pumps heat energy on the planet and thus increases its entropy. Greater is the use of technology more rapid would be increase of entropy. On the other hand emission of carbon in the process of meeting the growing energy demand is a matter of serious concern. All these complex factors are supplementing the global warming. It is the basic cause of the accelerated depletion of ice and rise of sea level endangering life on earth. It is possible to restore oxygen balance by plantations and reducing the use of accelerators of ozone hole. This will help to arrest further damage by way of natural corrective mechanism. *The intensity of these corrective*

efforts with resilience of nature can help to reverse the damage already done.

Resolution of Question 5: Sustenance and growth of technology is possible only when it reaches to a level of economics of scale. This is the reason that all the developed countries look upon most populous countries viz. India and China as potential markets. Microscopically, it has purely a commercial orientation where focus is on immediate gains and to sustain the market. In this pursuit technology is a means to meet their ends. This makes sustainable coexistence still is matter of global debate rather than a consensus for concerted collective efforts. Global trends of environmental changes are deeply frustrating; Contributions of developed nations towards conservation of nature that they proclaim is not enough. On the other hand developing nations and underdeveloped nations cannot escape their responsibility on the pretext of their per capita contribution to environmental degradation is lesser than others. Developed countries have affordability with technology to survive longer if worst becomes true; but developing and underdeveloped countries would perish faster in absence of technology and resources at their command. On a global scale developed countries are synonymous to elite persons on a social plane. Thus each one of us has to pro-act without watching or waiting for role of others.

We at Gyan Vigyan Sarita are making a conscious, consistent and concerted efforts to mentor students from deprived section of society and groom in them competence to compete. This is being done through Interactive Online Mentoring Sessions (IOMS) in a totally selfless manner which is nonorganizational, non-remunerative, non-commercial and non*political*. In this endeavour available technology is being used in most economical and energy efficient manner by a small group of co-passionate persons. It is contextual to mention that lack of education for a sustainable coexistence among masses is the root cause of all socio-economic and environmental evils. Yet this effort is like a drop in the ocean. Need of such efforts is mammoth to bring in a positive and sustainable change for societal coexistence. Sense of the Personal Social Responsibility (PSR) among elites can catalyze necessary inspiration for the change.

Conclusion: The above discussions lead to a conclusion that reversal of technological cycle is impossible. Any thought in that direction would be a great disregard to human quest over three millions of years. This gives rise to a new question to we all thoughtful elite persons – are we waiting for life on our mother to become miserable and finally perish? Are we waiting to watch this scene of total destruction from heaven? These frightful propositions have compelled to initiate brainstorming, at every platform, on various options of survival. It is with a hope that some genius would emerge to guide us with solution(s) and many more of would take a lead to implement these solutions for the life to continue to coexist this MOTHER EARTH peacefully.

--00---

Humanity is acquiring all the right technology for all the wrong reasons.

R. Buckminster Fuller

<u>An Appeal</u>: 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-organizational, 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:** <u>Interactive Online Mentoring Sessions (IOMS)</u> since July'16, which has been recently switched over to A-VIEW, 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 a 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 non-teacher by profession, soon after submission of Ph.D. Thesis in 2012, at one of the IITs, under taken after retirement got inspired to mentor unprivileged students.

The endeavour started with Chalk-N-Talk mode of mentoring unprivileged students starting from class 9th upto 12th: Since then it has gone through many ground level experiences and in July'16 it was upgraded to IOMS, a philosophy in action to reachout to more number of deprived students. Currently regular sessions of IOMS are held regularly for students of class 9th and above at few Learning Centeres. Efforts are being made to integerate more learning centers and mentors to diversify its scope and utilize our full capacity.

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 <u>website</u> and operational aspects of can be online accessed at <u>IOMS</u>.

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 above at **Involvement**, to make the mission more purposeful and reachable to target children.

Contact: Dr. Subhash Kumar Joshi, Coordinator –Gyan Vigyan Sarita.

Address: #2487, Mahagun Moderne, Sector-78, NOIDA, UP-201309, (R): 0120-4969970;

(M):+91-9711061199,

e-Mail ID: subhashjoshi2107@gmail.com, Website: http://www.gyanvigyansarita.in

-00-

वैश्णव जन तो तेने कहिये जे

Original Lyrics in Gujrati-

વૈષ્ણવ જન તો તેને કહિયે જે પીડ પરાઇ જાણે રે

પર દુ:ખે ઉપકાર કરે તો યે મન અભિમાન ન આણે

વૈષ્ણવ જન તો તેને કહિયે જે . . .

સકળ લોકમાં સહુને વંદે निंधा न કरे डेनी रे

મન નિર્મળ રાખે ધન ધન જનની તેની રે

વૈષ્ણવ જન તો તેને કહિયે જે...

સમદૃષ્ટિ ને તૃષ્ણા ત્યાગી પરસ્ત્રી જેને માત રે

જિહ્વા થકી અસત્ય ન બોલે પરધન નવ ઝાલે હાથ રે

વૈષ્ણવ જન તો તેને કહિયે જે ...

મોહ માયા વ્યાપે નહિ જેને દૃઢ વૈરાગ્ય જેના મનમાં રે

રામ નામ શુ તાળી રે લાગી સકળ તીરથ તેના તનમાં રે

વૈષ્ણવ જન તો તેને કહિયે જે . . .

વણ લોભી ને કપટ રહિત છે કામ ક્રોધ નિવાર્યાં રે

ભણે નરસૈયો તેનું દર્શન કરતાં કુળ એકોતેર તાર્યાં રે

વૈષ્ણવ જન તો તેને કહિયે જે . . .

Lyrics

वैष्णव ज पीड पर

पर दुख मन अभि

वैष्णव ज

सकळ नींदा न

वाच का धन धन

वैष्णव ज

सम दृष्टी पर स्त्री

जिह्वा थ पर धन

वैष्णव ज

मोह मार द्रिढ वैर

राम नाम सकळ (

वैष्णव ज

वण लोभ काम क्रे

भणे नर कुळ एव

वैष्णव जन तो तेने कहिये जे ...

नज्मी गेटना

in Hindi	Lyrics in English
जन तो तेने कहिये जे 1यी जाणे रे	Vaishnav Jan To Tene Kahiye Je, Peed Parae Jane Re,
खे उपकार करे तोये भेमान ना आणे रे	Par Dukhe Upkar Kare Toye, Man Abhiman Na Aane Re.
जन तो तेने कहिये जे	Vaishnav Jan To Tene Kahiye Je,
लोक मान सहुने वंदे करे केनी रे	Sakal Lok Maa Sahune Vande, Ninda Naa Kare Keni Re,
छ मन निश्चळ राखे जननी तेनी रे	Vach Kachh Mann Nishchal Rakhe, Dhan-Dhan Janani Teni Re.
जन तो तेने कहिये जे	Vaishnav Jan To Tene Kahiye Je ,
ो ने तृष्णा त्यागी जेने मात रे	Sam Drishti Neh Trishna Tyagi, Par-Stri Jene Maat Reh,
की असत्य ना बोले नव झाली हाथ रे	Jivha Thaki Ashatha Na Bole, Par- Dhan Naav Jhali Hath Re.
जन तो तेने कहिये जे	Vaishnav Jan To Tene Kahiye Je ,
या व्यापे नही जेने ाग्य जेना मन मान रे	MohMaya Vyape Nahi Jene, Dridh Vairagua Jona Mann Maan Pa
न सुन ताळी लागी तिरथ तेना तन मान रे	Ram Naam Shun Tali Lagi, Sakal Tirth Tena Tan Mann Re
जन तो तेने कहिये जे	Vaishnav Jan To Tene Kahiye Je ,
भी ने कपट- रहित छे ोध निवार्या रे	Van Lobhi Ne Kapat Rahit Chhe, Kaam Krodh Nivarya Re
सैय्यो तेनुन दर्शन कर्ता क्रोतेर तारया रे	Bhane Narsaiyyo Tenun Darshan Kartan, Kul Ekotar Tarya Re
जन तो तेने कहिये जे	Vaishnav Jan To Tene Kahiye Je,

अंदाज ए बयां

गमछे की लपेट में

जिस दिन से कनाडा वापस आया हूँ, न जाने आँखे हर तरफ बस एक ही चीज खोज रही हैं-गमछा. बड़ा मिस कर रहा हूँ गमछे को.

गमछा मिस कर रहा हूँ इसलिये नहीं कि मैं पूरबिया भईया गमछा लपेटे नहाता होऊँगा या कंधे पर गमछा डाले खैनी दबाये गली गली डोलता होऊँगा बल्कि इसलिये कि इतने दिन भारत में रहे- जहाँ देखो वहीं गमछा. सफेद और दूसरी वाली का उससे भी सफेद. क्योंकि शायद सर्फ से धुला होगा. अगर सर्फ का वो वाला विज्ञापन आज बने तो पंच लाईन होगी- भला उसका गमछा मेरे गमछे से ज्यादा सफेद कैसे.

जबलपुर में हर लड़की/ महिला जो भी सड़क पर दिख जाये वो ही चेहरे पर गमछा लपेटे, हाथों में कोहनी तक ढ़के दस्ताने पहने, सर पर टोपी, आँख पर काला चश्मा और एक डॉक्टरनुमा एप्रन पहने मिलेगी.

मैं तो गाने ही लगा-"हवा में उड़ता जाये, ये उजला गमछा मैडम का!!!

सुना था महिलाओं में एक दूसरे से ज्यादा खूबसूरत दिखने की एक इनबिल्ट होड़ की प्रवृति होती है. सुना ही क्या , महसूस भी किया है. मगर इस वेशभूषा में तो सभी एक सी दिखती हैं. रोड रोमियोज यानि सड़क छाप मनचलों की तो मानो दुकान ही बन्द हो गई. जेबकटी शाहर में एकाएक बढ़ गई. कारण पता किये तो मालूम चला कि छुट्टन भाई लोगों के पास कोई काम बचा नहीं तो जेबें काटा करतें हैं. बेचारों पर बड़ी दया सी आती है. अब वे कैसे छेड़ें, किसको छेड़े?

पता चले कि किसी को छेड़ दिया तो गमछा हटने पर अन्दर से ५५ वर्षीय माता जी नुमा महिला अवतरीत हो गईं या खुद ही की कोई परिचिता निकल आईं. बीबी निकल आये तब तो राम नाम सत्य ही समझो. कौन रिस्क लेगा भला ऐसे में.

छेड़ो भी , पिटो भी और अन्दर से निकली खब्बड़ दांत वाली. कितनी तो जग हँसाई हो जाये.

एक दिन तो गज़ब ही हो गया. बैंक के बाहर खड़ा था. एक सुडोल (इसके अलावा तो कुछ भी दृष्टीगत नहीं था) कन्या ने आकर स्कूटी रोकी तो हावभाव देख बरबस ही नजर ठहर गई. फिर उसने अपना गमछा उतारा तो अन्दर से लड़का निकला. अब सोचिये, अगर कोई उसे छेड़ लेता तो कितना पंगा खड़ा हो जाता.

आजकल तो अगर कोई छेड़ाछाड़ी कर्म में लिप्त मिले तो जान लिजिये पक्का जुआड़ी है और ब्लाईन्ड खेलने का शौकिन. मैं अपने आपसे प्रश्न करता रहा कि आखिर ऐसा क्या है जो एकाएक सब महिला वर्ग इतना लैस होकर सड़क पर निकलने लगा है. सुना था कि अब तो शहर की स्थितियाँ पहले से बहुत समीर लाल 'समीर'

बेहतर हैं. पुलिस मुस्तैद हो गई है और अपराध भी कम हो गये हैं. प्रश्न अनुत्तरित ही बना रहा तब हार कर मैने एक महिला मित्र की शरण ली. मैने उन्हें अपनी जिज्ञासा से अवगत कराया तो वह खूब हँसीं.

कहती हैं कि आजकल भारतीय महिलाऐं अपनी ब्यूटी के प्रति बहुत जागरुक हो गई हैं. स्किन डेमेज न हो और सॉफ्ट एण्ड ग्लोई बनी रहे, इसलिये सब इसे ढंक कर निकलती हैं. मैने कहा , "और ये कैप?"

"इससे बालों की चमक बनी रहती है!" उन्होंने मेरी जिज्ञासा शांत करते हुए बताया.

मैं उनको धन्यवाद कर चला तो आया मगर सोचता रहा कि लाख ग्लोई तव्चा बनी रहे , बाल चमकते रहें-फायदा क्या ?? जब कोई उन्हें देख ही नहीं रहा. घर वाले देखें भी तो क्या ? घर वालों को तो घर वाले जैसे भी हों यूँ भी प्यारे रहते हैं. हम खुद अपने कई घर वालों के रोल मॉडल हैं. उनके लिये सुन्दरता के मापदण्ड आपकी स्किन की सॉफ्टनेस , ग्लो और बालों की चमक का कोई मायने नहीं. यह सब तो बाहर वालों के लिये हैं और उस समय आप नख से शिख तक पूरा नकाबमयी हो लेती हैं तो सब बेकार गया. फिर कहते हैं हम वेस्टनाईज हो रहे हैं. इस वेस्टन वर्ड में तो मैने किसी को गमछा लपेटते नहीं देखा. बल्कि हमारे यहाँ से उल्टा-जैसे जैसे गरमी बढ़ती है , वैसे वैसे कपड़े छोटे और कम. सरदी का अंतिम पड़ाव में तो जिम लड़कियों से भर जाते हैं. सब गरमी की तैयारी में वापस शेप में आ जाती हैं. सरदी में तो मोटे मोटे कपड़े के अन्दर कौन मोटा कौन पतला-पता ही नहीं लगता.

२४-२५ डिग्री पर तो शार्टस/ स्लिवलेस बनियान में आने लगते हैं सड़को पर. कपड़ो की साईज और संख्या गरमी के तापमान के वक्रानुपाती.

जिसकी जैसी स्किन, ग्लो या नो ग्लो, जैसे बाल, जितनी सुन्दर, कम सुन्दर-सब सामने. कुछ भी गमछे में लिपटा नहीं. कभी सोचता हूँ कि यहाँ सड़कें कैसी दिखेंगी अगर तापमान दिल्ली वाला पहुँच जाये यहाँ ४५ डिग्री. सड़कें समुद्री बीच बन जायेंगी शायद और हमारा घर बीच फेसिंग.

चलो, अभी तो शौकिया खुद की इच्छा से यह महिलायें पर्दा किये हैं मगर शायद यही अगर मजबूरी में करना होता तो कितनी ही आवाजें उठ खड़ी होती कि महिलाओं को प्रताड़ित किया जा रहा है. पर्दा प्रथा नहीं चलेगी और यह सब आवाजें आती भीमहिला खेमे से ही. वैसे , अगर मजबूरी होती तो आना भी चाहिये. :)

खैर, अब स्किन और हेयर का तो जो हो सो हो मगर नव युवाओं को यह खुले आम सड़क के किनारे, थियेटर या रेस्टॉरेन्ट में मिलने जुलने के बहुत अवसर उपलब्ध करा रहा है. पहले एक डर रहा करता था कि कहीं कोई पहचान का न देख ले. अब गमछा अपने अन्दर वो डर भी समेट ले गया. लोग गमछा लपेटे खुले आम मिल रहे हैं. बेहूदी हरकतें सड़क के किनारे खुले आम दिखना एक आम सी बात हो गई है. गमछा बड़ा विशाल है- कभी सुन्दरता अपने अन्दर लपेट लेता है तो कभी डर और कभी हया !!! धन्य है गमछा महिमा!!



लोकप्रिय चिट्ठाकार समीर लाल व्यवसाय से चार्टर्ड एकाउंटेंट हैं। आजकल वे कैनैडा 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।

ई-मेल: <u>sameer.lal@gmail.com</u>

-00-

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: **RT&TT**, 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 20^{th} of each month to enable us to incorporate your contribution in next bulletin, subhashjoshi2107@gmail.com.

We will be pleased to 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 next Monthly e-Bulletin <u>Gyan-Vigyan Sarita</u>: **RI&I** due on 1st of ensuing month.
- > This cycle of monthly supplement e-Bulletin <u>Gyan-Vigyan Sarita</u>: 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.

Formatting Guidelines: (a) Paper Size A4, (b) Fonts: Times Roman (English), Nirmala UI (Hindi), (c) Font Size Title/Author Name/Text: 14pt/12pt/10 pt (d) Margins: top/bottom/left/right – 1"/1"/0.4"/0.4", (e) Photoprofile of author – In 4-5 lines with mail ID and Photo. We will be pleased to provide softcopy of template of an article, in MS Word to the author on advise.

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.

__00__

Ayurveda- Health Care

Prevention From Eye Infection

- Dr Sangeeta Pahuja

Eye infections are caused by bacterial, viral or fungal agents. In Ayurveda our eyes are governed by Aalochak-Pitta (sub-dosha of Pitta dosha). When aalochak-pitta is in balance, our eyes remain healthy. But, if the pitta gets aggravated, we experience excess heat, anger, frustration. Impaired vision and eye problems are often related to Pitta aggravation. Tarpak Pitta (Sub-dosha of pitta) is responsible to keep the eyes lubricated, moist and cool. Prana-vata is responsible for the movement of eyes, blinking and sensory perception.

Symptoms. They can include irritation, redness, discharge and reduced vision, persistent itching, flaking of eyelids, Discomfort, blurred vision, watery eyes, discharge from the eyes, swollen eyelids. Treatment depends on the cause.

Common Eye Infections: They are

- **a.** Pink eye (conjunctivitis)
- **b.** Stye
- **c.** Blepharitis
- d. Cellulitis
- e. Keratitis
- f. Corneal ulcers
- g. Trachoma
- h. Herpes simplex virus
- i. Herpes Zoster(shingles)

Favourable die, lifestyle and some simple techniques are helpful for improving vision, reducing eyestrain and healing of eye conditions.

Favourable diet: Maintaining a well balanced, healthy diet is a key to keeping your eyes healthy. By following the Healthy diet and lifestyle, you may be able to prevent eye problems like cataract, age related macular degeneration, glaucoma, dry eyes, poor night vision.

Consuming Antioxidants like leutin, zeaxanthin, vitamin A,C,E, beta-carotene,omega3 fatty acids, zinc etc. can help to prevent eye problems.

Fish, eggs, almonds, dairy products, carrots, kale oranges, deep orange and yellow colour fruits and vegetables, winter squash, sweet potato, pumpkin, apricot, peach, cantaloupe, mango, dark leafy vegetables like spinach, black mustard and broccoli are good to consume. Amla is rich in vitamin C and antioxidants and pittashamak. Amlaberry is known as chakshushaya in Ayurveda. Which means that strengthen the eyes.

Favourable lifestyle: Prevention of eye infection can be done with –

- **a.** Wash your hands often with soap and warm water.
- **b.** Avoid touching and rubbing your eyes.
- **c.** Wash any discharge around your eyes with fresh cotton ball.
- **d.** Do not use the same eyedrop dispenser for your infected and non infected eye.Wash pillowcases, bedsheets, towel often in hot water and detergent.
- e. Wash your hands after handling such items.
- **f.** Stop wearing contact lenses while you have eye infection
- **g.** Do not share personal items such as pillows, towels, eye drops, eye or face make-up, eyeglasses with others .
- **h.** Vaccines can prevent some infections associated with conjunctivitis, rubella, measles, chickenpox, shingles, pneumococcal, heamphillus influenza type B(HIB).

Helpful Techniques: Some of the simple yet helpful gtechniques to prevent eye infections are-

GAZING: According to Ayurveda, Sun rules the eyes. Gentle sun gazing can improve eyesight. Stand barefeet with feet directly touching the earth. Solar gazing is only recommended at early sunrise or the late sunset. When harmful UV rays cannot harm the eyes.

Solar gazing improve vision and it also activates the pineal gland (called third eye)and helps to get rid of depression and anxiety,

Gazing technique should not be done by the patient suffering from acute eye infection and glaucoma.

TRATAKA: It's a beneficial eye exercise to meditate upon a ghee lamp flame without blinking.Gaze at the flame from 2-3 minutes until tears come from eyes.

The ghee made out of cow's milk actually draws in satwik frequencies to calm our mind. Thus type of meditation allow us to reflect on our inner radiance.

WASHING: Start the day with washing your eyes with cold water.Retain some cool water in the mouth while washing your eyes.This helps to keep Pitta in balance. An ayurvedic eyewash made out of well strained Triphala tea can helpful in treating eye disorders. Triphala is well

known eye tonic and anti inflammatory. This eyewash help in the prevention and treatment of glaucoma, cataract, conjunctivitis, poor eyesight etc.

OLEATING: In Ayurveda Netra basti is given to clean and nourish the dry eyes. The person lies down with melted ghee covering their eyes from 5-10 minutes. Eyes are kept open, allowing the ghee to cool Pitta and lubricate vata Dosha. Netra basti is recommended for pain and overexertion due to computer use, allergies, squinting, diminished vision,optic nerve injury etc.

One drop of Castor oil at bed time in the eyes helps to lubricate the cornea, reduce the eyestrain and irritation. A black eyeliner called kajal made up of castor oil and burnt camphor is applied under the eyes to keep them cool.

RESTING: Take adequate sleep. Lack of sleeping is one of the Main causes of eye problems. Wihout proper rest eyes get tired, itchy, red, puffy. Late night awakening

leads to aggravated Pitta and Vata and causes eye problems.

PALMING: Palming is an excellent technique to give soothing effect to tired eyes after working on laptops, computers and reading books for long hours.Keep your palms together for few seconds and place them over the eyes.It gives very soothing effect to eyes.

EYEPADS: Place cool cotton pads dipped in rosewater over the eyes. Cotton pads can also be dipped in aloevera, cilantro, cucumber juices. One can also apply paste of sandalwood powder and water on the forehead to soothe the eyestrain which leads to headache.

By following the Ayurvedic diet and lifestyle and techniques, we can prevent ourselves from many diseases.

Know Ayurveda, Follow Ayurveda and Stay Healthy.



Author is an Ayurvedic Medical Practitioner. She did B.A.M.S. from M.D. University, Rohtak. She has consultation centres at Delhi and Noida. She is keenly interested in spiritual, women and social developmental activities. Contact No.: 9953967901,

e-Mail - sangeeta.pahuja3@gmail.com

EVOLUTION OF IOMS

-00-

- Philosophy of IOMS had its inception in Sarthak Prayash an NGO, in May'2012 in Chalk-N-Talk Mode with stray students.
- > Its manifestation in the form of e-Bulletin started in 2016, on 2^{nd} October with its First Issue **Subodh**
- In May' 2017 the initiative was upgraded to IOMS, in its primitive form, with the efforts of its Shri Shailendra Parolkar
- This initiative was reorganized as Gyan Vigyan Sarita in 2017 with its e-Bulletin in the name of Gyan Vigyan Sarita शिक्षा
- With this e-Bulletin as Fourth Annual issue, we are stepping in Fifth year of broadening communication to invoke participation of those who can make a difference, for the larger good.
 - > Presently it is a satisfactory working model on 'Minimum Need' basis.
- > Currently about 200 students in Two rural schools, one in A.P. and other in M.P., are being mentored.

> We continue to look forward.....

Opposite is Complementary

Though universe at highest level is un-manifested, invisible and indescribable yet all is one. Its manifested i.e. visible or felt part does exhibit diversity. For simplicity we can say, manifested universe have two different traits and we label them opposite of each other. In physical sciences, it is automatic and instantaneous. Thus when we pass on a current in an iron ring, South and North Pole of magnetism is created. Stable atoms also do have equal positive and negative charge. In social sciences too, such opposite is imminent though for some reason, may not be equal all the In management we do SWOT analysis, with time. presumption that, with Strength there must be some Weakness and with available Opportunity there must be some Threat behind. It must be again emphasized that Divine is beyond positives and negatives, and they are merely a play and display of the relative creation of our mind.

Question is; are different phenomenon opposite or complementary to each other? Does photon theory and wave theory of light are opposing each of other or complement each other to explain all properties of light? Red and Violet colour are opposite or complement to make complete colour white? Einstein proved Newton (laws of motion) wrong or extended it for specific situation? Now Einstein, who said nothing can travel faster than light speed, also seems to be wrong after NASA's Hubble telescope have spotted thousands of objects travelling over five times this speed in a distant galaxy. In life science, we (animal) inhale oxygen and plants inhale carbon dioxide, so, are we opposite of each other, or complement to each other? In the summer season we wish rain, and in rainy season we wait for sun to shine. Thus we need both seasons to make vegetative growth possible. Conclusions are manifestation of one's experiences and are of complementary nature. It is nature's diversity that gives us large number of different flora and fauna and makes life beautiful and enriched.

In above examples we easily accepted that opposites are actually complementary as they are from nature and science that does not involve false superiority of one over the other in mankind's eye. But when our own (of individual, nation) pride and passion involved in two different concept, theories, culture, political system etc, we label them as opposite instead of complements. Ours is correct, other's is wrong. To be more precise, human mind (in such situations) does highlight contrast and overlook similarity. It also creates opposition or enemy while there is none. Similarly, a single situation may more than two perceptions to different persons. Take adverse situation in life, one way is to perceive it as glorifying our qualities and helping our qualities to come up, other way is to perceive them as though they put obstacles in our way. In Ramayan, Ravana and all those characters, which appear to be negative (opposing Ram) on one side, are in fact there to glorify the positive (Ram). Take City lights on the eve of the new moon. They cannot vanish the night, but the night is giving a chance to all these millions of lights to shine. *Thus in one way night is glorifying the lights and the other way to look at it is that the lights are fighting the night. It is just how we see things.*

Before we go further, let us discuss Man and Woman relationship (familiar to all of us) to have more clarity. Are they opposite or complement of each other? Because we have different productive organs, many of us feel that men and women are opposites. But, singulalrly neither man nor woman can create a new life.. Further their talents, gifts, and strength are joined to produce a mutual power (greater than one plus one) for growth and development. This harmony can only occur between two complementary beings, not opposites. If we are truly opposite genders, then we could never love one another, agree, procreate, and perhaps never be truly compatible. So, try to think about your spouse as your complement and not your opposite. I am certain it will revolutionize your married life. My friend told me for the first ten years of his married life he was cursing GOD that his wife is not like him. But now for last thirty years he is thanking GOD that wife is not like him. This experience can be of our friend, neighbor or anyone.

Having discussed in general, now I, based on dictionary, would define opposite as "the inability to agree or relate in any fashion," and complementary as "born to interact, relate, and empower each other". Thus, the word "Complementary" is used to describe separate elements that together equal perfection, make a whole; likewise are supplementary or reciprocal. This adjective can be used to refer to people, other animals, objects, or concepts. Now, reality is that all (manmade) arrangements, brings with them some positives and some negatives and so no single social (it includes, political and any other group) arrangement or law is so comprehensive or exhaustive that it covers all mankind, and fulfill their needs and desire at at all the times. To do so it needs interaction with other arrangement. Also any arrangement continues as long as its followers are in majority or powerful in some way. as discussed below under Maslow, a Further, psychologist, law the followers (of the arrangement) themselves, (having fulfilled some need with the present arrangement seek something new which existing system is not able to fulfill) discard it. Thus every new order right

Prakash Kale

from its inception it also brings in seeds of its own destruction. Examples of above points are- status of woman started falling and child marriage started in our golden period of History i.e. Gupta dynasty period. Further, though, British rule snatched our independence, it gave relief from inertia of late Mughal period. We entered in it (British rule) as small-small princely states and came out as Big one (except Pakistan part) India. History is filled with example how alternate Viceroy adopted liberalhard, and neutral-expansionist agenda under British rule over India. Our first five year plan- agriculture oriented, gave way to industry oriented, second five year plan and so on. That is why Tennyson wrote-The old order changeth, yielding place to new. And God fulfills Himself in many ways. Lest one good Custom should corrupt the world.

Now let us see how these interaction affect the whole decision making process. For example, if I alone purchase a T shirt, I will purchase plain white T shirt, but wife says, white will soon lose shine and you should purchase some dark shed. Is she opposing me or complementing my idea to enhance total value of my purchase? Further, if son joins us, his view will be still different. Though their advices seem to obstructing and delaying my decision of purchasing a T shirt, in reality by giving due weights to each one's advice, I will be adding value to my purchase. This idea can be extended to social group, political parties, village, state and nation. It must be remembered that the final things (decisions) are created (reached) through the interaction (mere presence is not sufficient) of those processes, which are complements to one another in some way.

In spite of above benefits of interaction, we are stuck with old Aristotelian Law, which states every proposition must be either true or false (support/oppose), which has been inappropriately extended to complex systems (as above) in a form which could be called the "Exclusivity of Opposites". According to this principle, complex systems are classified into opposing groups on the basis of only one (and generally not even the most important) of their characteristics. Thus there can be opposing groups, based on relatively trivial differences, consisting of men and women, blacks and whites, disabled and able bodied, etc. From here it is only a small step to racism, apartheid, ethnic cleansing, and dictatorship of the proletariat, fundamentalism, feminism, affirmative action, aggressive trade unionism and scores of further such problems plaguing mankind.

However, the commonality between the interacting entities is obviously much more important than their differences. For example, men and women share millions of bodily processes of which only a handful are different. And creativity occurs only through the interaction between all the (different) processes. The differences simply catalyze the process of creation; remember similarities do not add any value to the product. Thus Synergy of Complements is the creative collaboration between two complex systems or processes which have many common, but also some opposing characteristics. *These two systems should not be regarded as opposites, as it is generally the case, but rather as complements to one another.*

Above Complex system can be best understood with Fuzzy logic which is a sort of computer logic that is different from Boolean algebra which allows like Aristotle logic, true or false or on and off values. Fuzzy logic allows all things in between (of true and false) and has lead to many of the technological developments that we enjoy today. Hector Sabelli who formulated a Process Theory (PT) recognizes that the essence of life is action and acceptance of, change and uncertainty being part of the world around us. He said having two opposing elements help to maintain and, at the same time, to vary processes. Newton also stated that [in the process of keeping something in equilibrium] "for every action, there must be a reaction" and "a body will remain at rest or in motion in a straight line at a constant speed until unbalanced external forces act upon it." These are in fact process laws and make sense only when one is talking of processes which demonstrate some change.

Having discussed in general and theory behind it, let us analyze the positive and negatives of an observed trait "being decisive" in public life/ policy making (hence forth policy maker for any level). Decisiveness is a condition that is produced primarily by policy maker who have great certitude. This refers to those people who operate primarily on the basis of passions, belief and faith rather than the intellect. They feel strongly about something at a deep level and find it difficult to see the other point of Now every policy maker is faced with a choice view. among available options, without certainty of an outcome and have limited capacity (due to own bias and inclination etc) to evaluate probabilities of outcome. Policy maker should also try to see how his action will affect others and how they will in-turn react. This is more complex and, particularly on issues like war and the economy. The dictionary tells us that decisiveness is a quality "showing the ability to take decisions quickly and firmly". Firmly, in this case, means overruling the objections or concerns of those whose counsel is caution? Next question that occurs - who is decisive and strong policy maker? It is the ability to make choice (when outcome is unclear) that others in the same position hesitate to do. Our understanding of why something is decided by the decisive policy maker must have considered as to why it was left undecided or decided differently by someone else. Thus cautious person and

person having different view will not serve under such policy maker. Lack of appreciation or hostility and criticism towards different/ opposite view (which is in fact is complementary and can enrich his own view) reflects great insecurity, can lead to mistakes in policymaking and may hamper realization of desired goals. He will then live in a pleasant make-believe environment, until the harsh truth can no longer be denied. Point of concern in policy is that differences should be accepted and be utilized to stimulate creativity generally ignored in the common processes. Unattended, large scale conflict (opposition) can have detrimental consequences and should be avoided at all costs. From this point of view, being "decisive" is not all positive quality. Initially it appears to be strength and determination but as problems start cropping up latent value of softness and indecisiveness starts surfacing.

Further policy maker should take in to account Abraham Maslow's "hierarchy of needs" that demonstrates the human needs in the shape of a pyramid. The base of the motivational order begins with the life-sustaining physiological needs like, food, water shelter and sex (for survival of species), which must be met to survive. The next level comprises of needs for security and safety, to live without stress and worry. The third level is social needs that include the need for sense of belonging and love. Further up the pyramid is a person's need for self-esteem and social recognition and accomplishment. The need for self-actualization is at the very top of the pyramid.

Maslow believed that needs played a major role in motivating behavior (for a political policy maker it means voting for him), and higher needs don't seem as urgent and aren't persuaded when lower needs are not met. He classified the first four levels of the pyramid, as deficiency needs (also called D-needs) as these needs are caused due to deprivation. Likewise, highest level of the pyramid is growth needs (also called B-needs). Growth needs do not arise because of deprivation, but rather from a desire to grow. The specific form that these needs will take will of course vary greatly from person to person and are dynamic for a person from time to time. In one individual it may take the form of the desire to be an ideal mother, in another it may be expressed athletically, and in still another it may be expressed in painting pictures or in inventions. Similarly a single person may feel different need at different times, in office good boss and at home good parent/ spouse.

Based on two points discussed- First, no human being, no social system is complete. Second, whatever and however great its achievement, participant / beneficiary will always feel lack of something and strive for change (Maslow). Conclusion is *if any system or social order wishes to extend its shelf life for policy making,(having explained complementary nature of opposite), it is always better to co-opt opposite view rather than crush it.*

But, alas!, the concept of opposites (and crushing it) is deeply engrained in our society. Right from the beginning of our life, we classify things into opposite pairs. We start conscious life by realizing the difference between me and not-me. Instead of teaching our children about opposites, we should teach them about complements and synergy. We should teach that men and women, day and night, black and white, people speaking our language and those who do not, etc. are complements and not opposites.

Conclusion: Can we approach issues this way? Such an approach will be an antidote to the hopeless strife we have been experiencing and continue to experience in our world. Through it we might appreciate that the world cannot be divided into two camps, one of which is right and the other wrong. We shall be able to understand and appreciate those who might look and think different from us, but share the great majority of our own concerns for love, peace, justice and beauty. As a final word we must add that the Synergy of Complements is an inclusive principle: it does accept opposition, turning it to own advantage.



Author is M.Sc.(Physics) and a retired Banker, settled at Dewas, M.P.During his career he was also a faculty, at CBD Staff College o-f Indian Bank, Mumbai. Currently he associated with IFBI, a joint venture of ICICI Bank and NIIT) for skill development of newly recruited bank officers, and NIBM, Pune RBI's Apex College for Executive Training. He is passionate about sharing his thought through blogs and newsletters and guiding college students for competitive exams in a non-commercial manner.E-mail: kaleprakash23@gmail.com

-00-

The value of a college education is not the learning of many facts but the training of mind to think.

Albert Einstein

बूंद-बूंद से घट भरे

कुसुम लता गुप्ता

- a. इस पानी से हम बाल धो सकते हैं, इससे हार्ड वाटर से होने वाली समस्याओं से छुटकारा मिल सकता है इसके अलावा
- b. नहाने के काम में
- c. कपड़े धोने में
- d. पौधों में भी यह पानी बहुत लाभदायक होगा आदि

अक्सर देखने में आता है कि ऐसी डिस्चार्ज वाटर के कारण भवनों की बाहरी दीवारें काई आदि लगने से भद्दी लगती है

हम इस समस्या से भी निजात पा सकते हैं।

 रसोई में हम दाल चावल एवं सब्जियां धोते हैं उस पानी को हम पौधों में डाले तो पौधों को बहुत से पोषक

> पोषक तत्व मिल सकते हैं। जैसा कि फिगर

नंबर 3 में दिखाया गया है 4 घर में आग मेहमानों के ज्वापत

4. घर में आए मेहमानों के स्वागत में हम सर्वप्रथम पानी अवश्य पेश करते हैं, क्यों ना हम पानी एक

बोतल में भर कर कुछ खाली गिलास टेबल पर रख दें जिसे जितनी प्यास लगे उतना पानी आवश्यकतानुसार लें जैसे फिगर नंबर 4

5. विशेष: क्यों ना हमारी बिल्डिंग में कुछ ऐसी व्यवस्था की जाए कि आरो डिस्चार्ज वाटर और एसी कंडेंसर वाटर को हम बोरवेल से जोड़ दें ताकि पानी भी व्यर्थ ना जाए एवं भूमिगत जल (अंडर ग्राउंड वाटर) का स्तर भी बढ़ जाए तो हम इस प्रकृति के अनमोल स्त्रोत को सब तक पहुंचा सकते हैं। अक्सर देखने में आता है कि ऐसी डिस्चार्ज वाटर के कारण भवनों की बाहरी दीवारें काई आदि लगने से भद्दी लगती है हम इस समस्या से भी निजात पा सकते हैं।

इस प्रकार हम इन छोटे-छोटे प्रयासों से थोड़ा-थोड़ा पानी बचाकर अपने बिजली एवं पानी के बिल में भी भारी कमी

आज प्रयोग योग्य पानी की घटती उपलब्धता एक गंभीर चिंता का विषय बना हुआ है। जल्दी ही हमारी पृथ्वी पर पीने योग्य पानी की भारी कमी होने वाली है। सोचो आस्ट्रेलिया जैसा देश जो चारों ओर से पानी से घिरा है, पर वहां प्रयोग करने योग्य पानी की इतनी कमी है कि जब वहां क्रिकेट मैच था तब पर्थ में हर खिलाड़ी को बाथरूम यूज़ करने के लिए सिर्फ 2 मिनट का समय दिया गया था क्योंकि वहां पीने योग्य पानी लगभग समाप्ति की ओर है। हमारे देश में भी बहुत जगह है पानी की भारी कमी है। आए दिन हम सुनते हैं कि मुंबई, चेन्नई, राजस्थान,छत्तीसगढ़, मध्य प्रदेश ,आंध्र प्रदेश आदि प्रांतों में पानी बहुत कम है वहां पानी को लेकर अक्सर झगड़े होते रहते हैं। बहुत शीघ्र यह सब हमारे साथ भी होने वाला है । इस कमी को हम अपने छोटे-छोटे प्रयासों से काफी हद तक हल कर सकते हैं जैसे कि निम्न –

1. आर ओ (RO) : आरो के प्रयोग से बहुत अधिक मात्रा में डिस्चार्ज वाटर नाली में बह जाता है यदि डिस्चार्ज वाटर किसी तरह से हम कलेक्ट कर लें फिगर नंबर वन जैसा कि

मैं एवं बहुत सारे लोग करते हैं इस पानी का प्रयोग अनेक प्रकार से कर सकते हैं जैसे कि -

- a. कपड़े धोने में
- b. पौधों में
- c. टॉयलेट्स में
- d. घर की साफ सफाई में एवं
- e. बर्तन धोने आदि में

2. ए सी (AC): एसी से निकलने वाले पानी (कंडेंसड



वाटर) को भी हम इकठ्ठा कर सकते हैं जैसा कि फिगर नंबर 2 में दिखाया गया है । तटीय क्षेत्रों एवं जहां आद्रता पूरे साल रहती है वहां तो घर की पानी से होने वाली सारी जरूरतें पूरी हो सकती हैं जैसे चेन्नई मुंबई आदि । इस पानी को भी हम निम्न प्रकार प्रयोग में ला सकते हैं -



उपरोक्त सुझाव हम कुछ बहनों के प्रयासों के अनुभव पर आधारित है और हम आशा करते हैं कि इन सुझावों को सुधारने अथवा आगे बढ़ाने में आप अगला कदम अवश्य उठाएंगे। हम आपके अनुभवों का बेसब्री से इंतज़ार करेंगे।

ला सकते हैं और पानी को हम आने वाली पीढ़ियों के लिए भी सुरक्षित रख सकते हैं।

> लेखिका एक शिक्षक की पुत्री एवं एक प्रतिष्ठित इंजीनियर , शोधकर्ता एवं शिक्षाविद की सहचारिणी हैं। सामाजिक विषयों पर चिंतन एवं उस पर कार्यान्वन उनकी अभिरुचि है ।

ई-मेल: <u>kusumlatagupta15@gmail.com</u>

--00---

IOMS का दर्शन (Philosophy)

> ग्रामीण अंचल के एवं वंचित परिवारों के बच्चों को उठाना, उनकी गलती बताकर संभव नहीं है ।

> परन्तु उनके स्तर से नीचे उतर कर स्तानीय शिक्षकों तथाव्यवस्था के परिपूरक बनकर यह संभव है।



नीचे से उठाने पर गमला और पौधा दोनों ऊपर उठेंगे



ऐसे में गमला टूट सकता है



ऐसे नहीं, पौधा जड़ से उखड़ जायेगा!



ऐसे नहीं, पत्ता टूट जायेगा!

सुदूर स्थित मार्गदर्शक (मेंटर) द्वारा
 स्थानीय शिक्षकों एवं सुविधाओं को
 स्थानीय स्तर पर विकसित कर
 विद्यार्थियों के वातावरण से विषय को प्रासंगिक बनाकर
 उनका मार्गदर्शन एवं शैक्षणिक उत्थान

Active

-00-

"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





दीप पर्व

दीपावली पर्व है प्रकाशित दीप का अंधता के लोप का।

दीपावली पर्व है श्री आगमन का दारिद्य गमन का ।

दीपावली पर्व है आशा के प्रकाश का निराशा के नाश का ।

दीपावली पर्व है शुभ का लाभ का समृद्धि सुभाग का।

दीपावली पर्व है सुशोभन कामना का लावण्य मय भावना का।

दीपावली पर्व है प्रीत की जीत का एकता के गीत का।

दीपावली पर्व है निर्धन की उत्थापना का समभाव की स्थापना का।

सतत है प्रकृति

तरूपल्लव की छटा देखकर,कणकण मुसकाया है। उदय होती कलियों ने जीवन का आभास कराया है।

खिलते फूलों ने वृद्धि का आभास कराया है। महकते फूलो की सुगंध ने हर सांस को महकाया है।

कांटों में खिलते फूलों ने, कीचड़ में खिलते कमलों ने, हर परिस्थिति में रहना सिखाया है। ओस की हर बूंद ने, फूलों का संग करके ओजोमय वातावरण बनाया है।

परिपक्व होकर, झड़ते फूलों ने, उभरती नई कपोलों ने, आवागमन के चक्र को समझाया है।

मृत्यु और जन्म दोनों समय श्रद्धासुमन अर्पित कर फूलों ने नम्रता व प्रत्येक परिस्थिति में सम भाव से रहना सिखाया है। सतत है प्रकृति,सतत ही रहेगी, ऐसा भाव जगाया है।

डॉ. संगीता पाहुजा



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।

ई-मेल: mrinalinighule46@gmail.com



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, ई-मेल : sangeeta.pahuja3@gmail.com

-00—

मृणालिनी घुळे

If you can find a path with no obstacles, it probably doesn't lead anywhere

- Frank A. Clark





तुझे सचमुच का नेता बनना हो तो जात से बाहर निकल। कुछ करना है ज़माने में तो फ़िज़ूल बात से बाहर निकल।

मिलती नहीं है खुशियां कभी किसी को, कमियां निकाल कर, अगर पाना है सच्चाई को तो झूठे जज्बात से बाहर निकल।

खूबियां तुझमे हैं बहुत सारी, तुझे बतायेगा नहीं कोई कभी, खुद पता चल जायेगा, तू मामूली करामात से बाहर निकल।

छूना है आसमा तो सर उठा, टिका नजरें हिमालय पर, मंजिलें गर पानी हो मुकम्मल, तो छोटी औकात से बाहर निकल,

जला दीपक, कर उजाला, फाड़ दे सीना स्याह अँधेरों का 'आनंद', बन कर इंसान, तोड़ बन्धन, अंधों की जमात से बाहर निकल।



कवि एक अधिवक्ता एवं सामाजिक कार्यकर्ता हैं| सामाजिक विषयों पर पाठन, चिंतन –मनन, लेखन एवं उन पर कार्यान्वन उनकी अभिरुचि है |

E-mail ID: <u>lawexcel@gmail.com</u>

-00-

We have learnt that LIFE is neither fast nor sudden leaps; It grows gradually and sreadily through pits and rises. We have learnt on every fall, more was needed from us; Irrespective of how others were.

We have learnt that when tide is against, swim hardest to keep moving ahead; When in favour swim fastest to create a reserve in case of contingencies.

We have also learnt that reasons are in abundance to justify losses, But there is only ONE reason to do good beyond self. LIFE is MUST for sustainable coexistence.

यादेंएडिस अबाबा (इथियोपिया)

भावना मिश्रा

एडिस अबाबा (इथौपिया) कि कुछ यादे आप लोगों के साथ साझा कर रही हूँ। यह मेरी पसंदीदा रचना हैं। इथियोपिया मुझे बहुत अच्छा लगा। वहाँ की स्त्री बहुत मेहनती होती है। सभी काम में बढ-चढ के हिस्सा लेती है।

वहाँ की एक महिला से बहुत प्रभावित हुई। मैं उनके प्यार और ममता को कभी नहीं भूल सकती। उन्होंने जो मेरे पुत्र मनन्न के लिए की, वो एक माँ ही कर सकती हैं। ऐसे ममतामयी माँ को शत्-शत् प्रणाम।

मैं, मेरे पति और मनन्न , वहां के इदना मॉल (Edna Mall, Addis) मे गये। मनन्न को बाथरूम (शु -शु) लगी। किसी कारण से वहाँ का शौचालय बंद था। मनन्न छोटा था, उसके लिए बाथरूम को रोकना मुश्किल हो रहा था। हम लोग बाथरूम ढूंढ रहे थे, मनन्न रोए जा रहा था - हम सब परेशान थे। मनन्न बहुत ही रोने लगा.... अब वह शू शू नहीं रोक सकता। यह सब वहाँ खाना खाते एक महिला देखी। वो इंनजीरा (Injera) इथियोपिया ब्रेड (ETHIOPIAN BREAD) खा रही थी। उन्होंने हमें बुलाया और कहा कि आप मनन्न को मेरे थाली (जिस में वो खाना खा रही थी) बाथरूम (शु-शु) करवा दीजिए। हम लोग हक्के-बक्के रह गये। तब तक मनन्न रो रो के बुरा हाल कर लिया था। मनन्न ने उनके खाना की थाली में शु-शु (बाथरूम) किया।

मनन्न खुश था, और हमारे आँखों में आँसूमैं उस इन्सानीयत की देवी के गले लगकर बहुत अच्छा लग रहा था (proud feel) कर कह रही थीधन्यवाद दीदी .. इथियोपियन (Thank you my Ethiopian sister!

मेरे दिल को ये बात छू लिया, इसलिए आप सब के साथ इन हृदयस्पर्शी यादों को साझा किया, शायद आप सब को भी अच्छा लगे, और हम सब भी दूसरों के लिए ऐसा करे.....

—00— रामू कुम्हार- हर हाल में खुश

भावना मिश्रा

रामू कुम्हार आज बहुत खुश हैं ,क्योकि उसकी बेटी गीता को बेटा हुआ हैं । रामू और उसकी पत्नी नीना जल्दी- जल्दी काम निपटा कर ट्रेन से गीता के बेटे से मिलने ,गीता के ससुराल जाने वाले हैं ।

रामू - सारे रूपये रख लिये ना ?

नीना - मिट्टी के इन सामान से हम कितने कम रूपये जमा कर पाते हैं, एक हजार रुपये तो ही हैं ,इस में क्या सब होगा, आना -जाना,मिठाई, बेटी को दूँगी,नाती को दूँगी । पहली बार मैं बेटी की ससुराल जा रहीं हूँ ।

रामू- अरे सब हो जायेगा ।

दोनों भीड़ के कारण जेनरल डब्बे में नहीं घुस पाये,किसी तरह से स्लीपर डब्बे में चढ़ गए । बाथरूम के पास दोनों अपने बक्से के साथ



टी टी बोला दो सौ का रसीद नहीं होता । "रामू- साब हम गरीब हैं, माफ़ कर दो ।" किसी तरह से चार सौ लेकर टी टी चला गया ।

नीना रोते हुए बोली छः सौ में क्या-क्या होगा ।

रामू हँसते हुए बोला- हम अपने नाती का मुँह देख लेगें , यह कम है क्या । दोनों की हर हाल में आँखे ख़ुशी ख़ुशी से भर गयीं



लेखिका कला संकाय से स्नातक तथा एक गृहणी हैं। वे अपने पुत्र मनन्न और पुत्री नव्या के साथ अपने परिवार तथा बुजर्गों की सेवा का आनंद लेती हैं। संगीत (गायन) ,नृत्य एवं भ्रमण इनके शौक हैं।

ई -मेल : <u>bhawna.ragini@gmail.com</u>

-00-

Education is not filling of a pail, but lighting of a fire.

- William Buttler Yates

SKILLS

A skill is the ability to carry out a task with determined results often within a given amount of time, energy or both. Skills can often be divided into domain-general and domain-specific skills. For example, in the domain of work, some general skills would include time management, team work, leadership, self-motivation and others, where as domain- specific skills would be used only for a certain job.

Different types of skills:

Hard skills: Hard skills are teachable abilities or skill sets that are easy to quantify. Typically, we will learn hard skills in the classroom, through books or other training materials, or on the job. For example, proficiency in a foreign language, a degree or certificate, typing speed, machine operation and computer programming.

Soft skills: soft skills are subjective skills that are much harder to quantify. Also known as people skills or interpersonal skills, soft skills relate to the way you relate to and interact with other people. For example: communication, flexibility, leadership, team work, motivation, problem solving abilities and time management.

Life skills: The term 'life skills' refers to the skills we need to make the most out of life. Any skill that is useful in our life can be considered a life skill. Broadly speaking, the term 'life skills' is usually used for any of the skills needed to deal well and effectively with the challenges of life. Life skills education is important in everyday life because the development of life skills helps students to find new ways of thinking and problem-solving. Basic life skills are communication, interpersonal skills, decisionmaking and problem-solving, creative thinking and critical thinking, self-awareness and empathy, which are two key parts of emotional intelligence. Life skills are associated with managing and living a better quality of life. I believe that all schools should teach life skills. Often times, high school prepares students for college but not for the basics of life. The simple skills such as sewing, ironing, washing laundry, cleanliness, traffic rules, cooking, money management skills and first aid skills are often overlooked as they are not state tested topics. All schools should teach students real life skills. Without learning how to do basic tasks such as cooking, sewing and other things, young adults are left with a consumer way of thinking. If schools teach life skills to students, they would be able to carry those skills into adulthood. They would be able to cook a healthy meal for themselves or their families or make simple repairs on clothing. It would make the transition to adulthood slightly easier on today's generations. Skills

like cooking basic meals, basic sewing techniques and banking tasks are necessary for success in life. I feel adding basic life skills to schools will help students to prepare for the real world. The needs for social and life skills are rising in society. Life skills based education is designed to address a balance of three areas; knowledge, attitude and skills to live and work effectively.

Social skills: Social skills are the ways people talk, play and work together that help us understand each other and get along better. There are lots of different social skills we use every day, often without even thinking about them. Some examples of *good social skills*, the students should use are:

- 1. Waiting for their turn
- 2. Asking before taking or using something that belongs to someone else
- 3. Using 'please and thank you' words.
- 4. Waiting in line.
- 5. Noticing how someone is feeling.
- 6. Not interrupting others discussions.
- 7. Leaving some personal space between you and someone else .
- 8. Show kindness when someone is having a bad day.
- 9. Being excited with someone when they are having a good day
- 10. Eating with polite manners.
- 11. Helping your friend clean up the toys you used.
- 12. Using words instead of hitting and pushing.
- 13. Telling the truth.
- 14. Respect elders and females.
- 15. Considering how your actions impact other people.

Some examples of *bad social skills* are :

- 1. Someone grabs your toy without asking.
- 2. Someone pushes you out of the way.
- 3. Someone interrupts other's conversations.
- 4. Someone has a tantrum when they don't get their way.
- 5. Someone leaves a mess or throws thrash on the ground.
- 6. Someone speaks too loudly in places that should be quiet .
- 7. Someone lies to get what they want.

Kumud Bala

- 8. Someone says mean things to others.
- 9. Someone doesn't care how their action impact the other people .

Social skills are really important for everybody so we can treat each other with courtesy, respect, honesty and kindness.

--00---

Answers: Science Quiz- October'19

Kumud Bala

1. (D)	2. (B)	3. (A)	4. (D)	5. (A)	6. (A)	7. (C)	8. (A)	9. (B)	10. (B)
11. (B)	12. (B)	13. (D)	14. (C)	15. (C)	16. (D)	17. (A)	18. (C)	19. (C)	20. (D)
21. (C)	22. (B)	23. (D)	24. (D)	25. (C)	26. (C)	27. (A)	28. (A)	29. (C)	30. (C)

-00-

ANSWER: CROSSWORD PUZZLE October'19 (e-Bulletin Authors)

Prof. S.B. Dhar

							1M	Α	D	н	U	2R	I	К	R	1	S	н	Ν	Α				
												Α												
												В												
												1												
									3J	0	н	Ν	Α	D	Α	М	Α	S						
							4P					D												
							0				5P	R	Α	К	Α	S	н	К	Α	L	Ε		6S	
							0					Α											Α	
							R					N					7K						Ν	
				8P	R	Α	Ν	Ε	Е	Т	н	Α					Е						G	
							I					т					м						Е	
					9R	Α	м	Е	S	н	С	н	Α	Ν	D	R	Α						Е	
				10F			Α					т					L						т	
				T			R					Α				11S	Α	м	Е	Е	R	L	Α	L
12M	Α	D	н	v	T	L	Α	т	Н	Α		G					т							
				Е			0					0					Α							
												R					т							
																	U							
																	R							
																	К							
																								<u> </u>

-00-

How Properly To Use Petroleum

D. Naga Divya

Petroleum became a major industry following the oil discovery at Oil Creek Pennsylvania in 1859. For much of the 19th and 20th centuries, the US was the largest oil producing country in the world. Discovery of petroleum lead to the major inventions in the world. We petroleum for various purposes use in the world. Petroleum is considered as nonrenewable because they cannot be replenished in a short period of time. These are called fossil fuels. For every motor vehicle we use petrol as the fuel.

Petroleum as an Energy Source: Petroleum, or crude oil, is neither as cumbersome as coal nor as volatile as natural gas. It can be **used** to heat buildings, power internal combustion engines, and produce electricity, and it also has numerous non-fuel applications. Our ancestors gave us a lot of fuels. Even they knew how to utilize them but their future sight stopped them to do so. But we are using them as they are our own wealth. Even wealth is passed over the generations with an increase. But these fuels

cannot be increased. We should share them with our future generations. I also agree that technology is very important for a marvelous future. But it should not harm this beautiful environment. Everything must be limited. We should not waste the fuels that we have. So we should utilize them in a proper manner.

These are some of the ways to reduce pollution and usage of fossil fuels:-

1. Using non renewable energy instead of renewable energy.

2. Proper education that leads to awareness about the earth and its resources.

3. Using public transport.

4. Forego fossil fuels.

5. Stop chopping down the forests.

6.Use solar panels to produce electricity.



Author is a student of class 8th, at Ramakrishna Mission High School, Sitanagram, Andhra Pradesh.





SUCCESS

G.Bavitha

Success is the one which none can define. It is the feeling of happiness one gets from leading a particular way of life or carrying a particular activity. Success is much more than riches, power or fame.

Success in any field or aspect of life can be achieved through serious hard work and a little bit of opportunity. One of the most important recipes of success id determination and it might as well be the most important secret of success. To become successful, it is necessary to never give up until the aim of happiness and satisfaction in life is fully met. The real secret ingredient to get success is to believe that we are already successful.

With this strong affirmative thought, success can be achieved if we follow these three success factors.

1. We should follow our passion because that is where our heart and soul is. When we follow our passion, we need not put extra effort. 2. The path to success is always challenging. We should build confidence to face any challenging situations.

3. The third and most important factor is discipline.

	See your goal
	Understand the obstacles
	Create a positive vision
SUCCESS	Clear your doubts
	Embrace the challenge
	Stay on track
	Show others that you can do it.

I wish all to succeed in their respective fields.



Author is a student of class 9th at Ramakrishna Mission Hugh School, Sitanagram, Andhra Pradesh. She is attending IOMS sessions for Mathematics and Physics being conducted at the school for class 9th and 10th.

-00---



Never regard study as a duty, but as the enviable opportunity to learn to know the liberating influence of beauty in the realm of the spirit for your own personal joy and to the profit of the community to which your later work belongs.

(Albert Einstein)

izquotes.com

INDIAN OR INDIAN ORIGIN NOBEL LAUREATES

M.Bala Ramya Sri

I feel that India is moving slowly into the stream of winning Nobel prizes. This idea I got when I heard the news about the winning of Nobel Prize in Economics by Abhijit Banerjee.

Banerjee joins the list of Indians and people of Indian origin who have received the prestigious Nobel prize in fields like Physics, Chemistry, Peace, Economic Sciences and Medicine.

Let me share a list of Nobel laureates from India or Indian of Origins -

Before Independence:

1. In 1913, Rabindranath Tagore was awarded the Nobel Prize for literature because of his fresh and beautiful verse, by which, he expressed in his own English words, a part of the literature of the west. The creation of his was 'Gitanjali'.

2. In 1930, Chandrasekhara Venkata Raman received in phuysics for his outstanding work on the scattering of light and for the discovery of 'Raman Effect', - the effect named after him.

After Independence:

3. In the year 1968, Indian-American H.G,Khorana, was the winner of this prize in Physiology, along with Robert Holley and Marshal Nirenberg for their interpretation of the genetic code.

4. In 1979, Mother Teressa was conferred the Nobel Prize for her tremendous social work among the homeless, orphans and deserted people. She founded a new sisterhood, Missionaries of Charity.

5. In 1983, another Indian - American, Subrahmanyan Chandrasekhar won this in Physics for his theoretical studies of the physical processes of importance to the structure and evolution of the stars.

6. In 1998, Amartya Sen received the Nobel Prize for his contributions to welfare Economics. He is from the state of West Bengal.

7. In the year 2001, V.S Naipal, who was born Trinidad in 1932, bagged the Nobel Prize in literature. He was the descendant of indentured labourersshipped from India.

8. In 2009, Venkatraman Ramakrishnan of Tamilnadu was awarded this in Chemistry for his extensive study of the structure and function of the ribosome.

9. In 2014, The Nobel Prize was awarde to Kailash Satyardhi for his struggle against suppression of children and young people and for the right of all children to education. He shared his Prize with Malala Yousafzai of Pakisthan.

10. The latest winner of this prestigious prize was won by Abhijit Banerjee who shared with his wife - Esther Dufflo and Michael Kremer for their "experimental approach to alleviating global poverty.

Between 1901 and 2018, the award has been given 590 times to 935 laureates and organisations. The prize includes 9 million-kronor (\$918,000) cash, a gold medal and a diploma.



Author is a student of Class 9th at Ramakrishna Mission High School at Sitanagaram, Andhra Pradesh. She is attending IOMS session being held at the school for Mathematics and Physics for students of class 9th and 10th.

-00-

Compunication (Computer with Communication capability i.e. internet) has forged the world, which is otherwise fragmented into narrow boundaries, into a global village. All that we need to do is to connect the most deprived persons through strings of education. Compunication provides the much needed solution in the form of Virtual Class Rooms.

-00-

RIVERS OF INDIA

Deepika

Some of the famous rivers of India are as under -

GANGA: The origin of Ganga is Gangotri. Its length is upto2,525 km depth is 17 m. It is the third largest river in the world. It is the most sacred river in the Hindu relugion. Major cities on its journey: Kashi, Prayaraj, kolkata, Badrinath, Haridwar, Kanpur, Patna, Farrukhabad, Fatehgarh, Kannauj, Chakeri. It also creates worlds largest delta in West Bengal: Sundarbans. It merges into Bay of Bengal.

YAMUNA: The name Yamuna derives from sanskrit word 'Yama', meaning twin probably because it runs parallel to the Ganges. Origin of Yamuna is Yamunotri. 70 per cent of water to Delhi comes from the yamuna. Taj Mahal is situated on the banks of this river. Major tributaries: Hanuman Ganga, Sharda, Chambal. Merges into :Ganga.

INDUS: Origin of Indus is Tibetan Plateau. Flows through Ladakh. Its length is about 3,180 km. Major cities on its journey are Leh, Sukur, Hyderbad. Major tributaries are Balram river, Beas, Chenab, Dras, Gilgit, Jhelum, Ravi, Sutlej. Merges into Arabian sea. It is also known as Sindhu.

BRAHMAPUTRA: Brahmaputra literally means, 'the son of Brahma', Vishnu, Shiva trinity. Brahma is also known as Tango. Origin of this river is Angsi Glacier. It journey from Arunachal Pradesh spanning a length of merges into : Padma river, Bangladesh.

GODAVARI: It is the second largest river in India. Origin of this is Tryambakeshwar, Maharashtra. Its is about 1,465 km. long. Districts covered by this river are Rajahmundry, Nashik, Nandad, Nizamabad. Dams on this river are Gangapur dam, Sriram Sagar dam. It merges into Bay of Bengal.



Author is a student of Class 9th at Ramakrishna Mission High School at Sitanagaram, Andhra Pradesh. She is attending IOMS session being held at the school for Mathematics and Physics for students of class 9th and 10th ,

--00---

Nature is a beautiful integration of different entities. Mathematics and science only discover them.

Euler's Identity $0=1+e^{j\pi}$ is an excellent example of integration. Each of the constituent was discovered independently, by different mathematicians, at different point of time.

Yet they all complement each other.

Lest it not be there whole nature shall have to rediscovered

--00---

The value of a college education is not the learning of many facts but the training of mind to think.

- Albert Einstein

-00-

SWACHA BHARATH ABHIYAN

J. Ganesh

The Prime Minister Narendra Modi started the Swachh Bharat Abhiyan or Clean India Mission to address the challenges of water, sanitation, and hygiene on October 2^{nd} , 2014 at Rajghat in New Delhi. This flagship programme of the Union government aims to realize the dream of a Clean India by October 02, 2019, the 150th birth anniversary of Mahatma Gandhi.

Sanitation has emerged as a key issue since the 2011 Census highlighted the glaring data on lack of toilets in the country by stating that over 26 million people in India defecate in the open. Launched with an estimated cost of around Rs 62,000 crore, Swachh Bharat Mission aims to achieve the elimination of open defecation in the country. Among its other objectives are conversion of insanitary toilets to pour flush toilets, putting an end to the inhuman practice of manual scavenging and carrying out Municipal Solid Waste Management (MSWM).

Launching the mission, Prime Minster nominated nine famous personalities for the campaign. They joined the campaign and nominated nine more people. Thus, the momentum had been built with people from all walks of life joining it. Eminent personalities such as Aamir Khan, Amitabh Bachchan, Kailash Kher, Priyanka Chopra and leading sportspersons like Sachin Tendulkar, Sania Mirza, Saina Nehwal and Mary Kom were part of the SBM initiative.

As per the government data, till November 2018, around 25 states and more than 5 lakhs villages have been declared Open Defecation Free (ODF) and 96.55% rural household have now access to toilets. There have been around 89 million toilets built since 02nd October, 2014 and the work is still in progress.

Though the government is putting forward its best efforts, but what matters the most is the behavioural change of its citizen which is very important to keep our country clean. There is a need of an attitudinal change on the part of all citizens to fulfill the mission of a clean India in its true spirit.



Author is a student of Class 9th at Ramakrishna Mission High School at Sitanagaram, Andhra Pradesh. She is attending IOMS session being held at the school for Mathematics and Physics for students of class 9th and 10th

--00---

"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

--00---

Who cares what am I, as long as I am not either useful or dreadful.

Can I take first step to befriend other by complementing my usefulness,

For the larger good.

AGRICULTURE IS THE BACKBONE

A. Kruthika

More than 90% of the rural area families highly depend upon agriculture as a source of their earning. Everyone one and other village in our nation with very little variations as according to the area.

Not to forget, this is where the agricultural sector works, runs and operates. Farming is where most of the workforce is engaged in while working in the agriculture sector. It is the backbone of the nation because not only it employs more than half of the workforce, not only more than half of the total population is dependent upon it for living but also because the future of the nation, the kids, are connected to this sector. It is the backbone of the nation because these kids have the potential to learn technical farming, and further employ people of their own kind, efficiently and effectively use the resources. Although India is a developing country, almost around 50- 60 percent of India's population still practises agriculture and that is one of the reasons why agriculture is the backbone of India. But if you see industrial sector & information technology sector it roughly employs 15 to 20 percent of our population but contributes to more than 50 percent of GDP.

When it comes to employment major chunk of our population still depends on agriculture for their livelihood, and that's y they still call agriculture as the backbone of India. India is regarded as one of the fastest developing economy, but still India is an agricultural economy rather than an industrial economy like Britain.

Agriculture is the backbone of India because present and future of more than 700 million Indians depend upon this sector.



Author is a student of class, IXth, Ramakrishna Missionm High School, Sitanagaram, A.P.He is attends IOMS held at school for Mathematics and Physics for students of class 9th and 10th



- John Dewey

www.DreamThisDay.com

It's Not Just A CLOWN (Episode 5)

Chyanis Tiwari

"Um... Okay. I guess I have to run now", Uma murmured a bit before running. Lucky for her that she watched lots of horror movies. So, she knows exactly what to do. First, she ran to the big street that has many people. She turned back and found out that the clown has gone. She was relieved and worried at the same time. What if that creepy clown kills other people? There's no way she's going to let this happen. Uma immediately took the taxi to the police station.

"Hello, May I help you?", the front desk police asked her.

"No, I spent 10 bucks for the taxi just to come here and say hi", Uma said.

"Huh?", That guy spoke.

"Okay I'm sorry for saying something like that. I would like to report about this strange, creepy, whimsical, bizarre, faddish clown", Uma portrayed.

"A clown?", that guy asked.

"Yes, A clown", Uma said. "What happen is that clo---"

"Ok, I mean like, are you serious? I know sometime clowns are creepy but like, I don't understand why do you have to report something about the clown?", the police said.

"Excuse me? Why? It's a clown so what? Are you freaking kidding me? This is not funny at all alright." Uma said with anger.

"What's the problem, Mark?" The girl from the back asked.

"No, it's just that this ma'am is reporting something about a clown." Mark said.

"So what? Why are you not taking her report?" She said.

"I just wanna say that it's—" Mark was trying to say something but that girlinterrupted him.

"Then, let me take the report if you have problem." The girl walked to the front.

"Yeah so what happen is..." Uma was saying something but she suddenly saw the batch 'Nina Payton' She looked at that girl face and the face was exactly like what she saw in her dream.

"Yes, miss. What happend?" Nina asked.

"Uh... I was walking and that clown followed me and..." Uma described the situation with all the confusion. "Okay miss, I guess we got the case, Andy!" Nina shouted out to this guy named 'Andy'

"Oh god, finally", Andy walked out from his office while drinking coffee and playing his phone. He turned his head up from his phone and was stunt when he saw Uma.

"Oh my god, Andy, Please don't tell me that you are stunt by those 'beauty' thing again." Nina said like she knew well what's going to happen next.

"What a... beauty" Andy spoke while walking to Uma. "Can I have your number ma'am?"

"Um... Excuse me?" Uma spoke. "You're creepy."

"Am I?" Andy asked.

"Yes, you are." Uma said before looking with a 'I need help' gain at Nina.

"Hey you, Andy, Is this a time to act like this?" Nina said with a little anger voice.

"I'm sorry. So, what happened?" Andy asked normally.

"There's a creepy clown that has intention to kill or hurt someone." Nina said.

"Are you sure that guy wasn't just joking or kidding around." Andy said "I mean like, clown loves joking around. They are made to do these things."

"I don't know. But to be honest, that joke wasn't funny at all." Uma said.

"Okay Uma. Here's my number. And if there's anything wrong or creepy happens, call me." Nina said before giving her number to Uma. "Be careful."

"..." Uma was quiet. But then she asked something "Nina, do you feel strange when you see me?"

"Excuse me? Why would I?" Nina asked. "Are you ok?"

"erm... yes, I guess I am." Uma said. "I'm leaving. Bye."

Uma walked to her apartment, laid down on her comfy bed and was absent-minded.

"What's wrong with me? Why did I dream about that erm... Nina Payton?"

"Could they really find that fat, creepy clown?"

"Or they're just speaking like they will find him but in reality, they don't."

"Nah. They are not that bad."

"Ok. You know what. I should stop thinking about this and work on my project." Uma quickly woke up and walked to her desk. She worked on the project for few hours and finally! It was a coffee break. This time, Uma didn't go outside but instead, she made her own coffee. She was drinking coffee happily when suddenly, she looked outside and saw that clown standing and looking at her. She was in silent and her heart started to beat fast. She quickly dialed Nina's number and called her.

"Hello, Nina Payton speaking." Nina said.

"Hello, Nina. It's me, Uma. I really need your help now. I saw exactly the same clown I saw today." Uma said.

"Are you sure?" Nina asked.

"Why would I lie! Quick Nina. I'm in a small apartment at the Karen street. Please be fast." Uma said rapidly before the line was cut so it shows that Nina was coming as soon as possible.

Uma ran to the window again but this time, the clown was showing a big sign 'Be ready to die. Not tonight but one night.' Uma was 60% scared. She sat down below the window. Waiting for the siren sound to come.



Author is a student of grade 9 at Thailand. She likes writing stories. Most of her stories are usually about social problems because she wants that the new generation teenagers should understand the social world. She hopes that the guys will learn about the new society from this story.

E-mail: prgd2000@yahoo.com





-00-

I Am A Little Tree

Dishita Joshi

I am a little tree, As tender as I cilud be, I am happy to be sown By a little girls like me.

I used to watch and wait, While she played with her school mate, Their laughter seemed like sound of church bells, I thought, this is where my happiness dwells.

> We grew up together, with lots of fun, But the day came down When the deal of the plot was done. They came to uproot me, Setting me out if their sight But she stood there for me To stop them with all her might.

She convinced them to uproot me never Then I relaized I had got a true friend forever I played with her, and now I play with her children And enyoy their joy wuth my fruits and oxygen.



Poet is a student of Class 8th, The Khaitan School, Sec-40,NOIDA, Apart from music her hobbies are drawing and painting, swimming and palying Tennis. She is a member of Student's Management Committee at School.

E-mail ID: joshipn@gmail.com

--00---

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

Growing With Concepts - Mathematics

LET'S DO SOME PROBLEMS IN MATHEMATICS-XIII

Prof. SB Dhar

This article contains some problems that are typical and require attentive approach to solve. Let us enjoy the problems and their solutions.

1. This problem was asked in the recent PSLE test in Singapore meant for 12 years old students. The problem is as under:

The 5 semicircles in the figure below are identical. What is the diameter of one semicircle?



Solution:

Let us assume that each will have the same distance *y* overlapping with the central semicircle, as both have the same distance 12 + x for the remaining part of their diameters. The diagram becomes as below:



Now set the diameter of the leftmost semicircle equal to that of either bottom semicircle. This gives the equation:

22	+ x = x +		12	+ y
⇒12	+	У	=	22
⇒y =10				

Now consider the middle semicircle which has a diameter of y + 16 + y. We then substitute y = 10 to get the answer of 10 + 16 + 10 = 36.

2. This problem was asked in China from 11 years Old students in a test. The problem is:

A circle is inscribed in a square with a side length of 10 cm. What is the area between the circle and the quarter-circles, as shown in the diagram below?



Solution:

Let us First, recall the area for a circular sector, and the area for a triangle in terms of two sides and the angle between the sides.



Area of the sector is given by $\frac{1}{2}r^2\theta$. The area of the triangle $=\frac{1}{2}ab\sin C$

Now imagine the triangle sides are radii of the circle, and the triangle's angle is the same as that of the circular sector.

If we subtract the area of the triangle from the circular sector we get the area of a circular segment.



The area in yellow colour $=\frac{1}{2}r^2(\theta - \sin\theta)$

Let us recall Al-Kashi's law of cosines in order to find a triangle's angle from its three sides.

$$c^{2} = a^{2} + b^{2} - 2ab \cos C$$
$$C = \cos^{-1} \left(\frac{a^{2} + b^{2} - c^{2}}{2ab} \right)$$

Since the square has a side of 10, its diagonal will be $10\sqrt{2}$. Half of the diagonal is then $5\sqrt{2}$, which is the distance from the corner of the square to the center of the inscribed circle.

The inscribed circle has a diameter equal to 10, so its radius is 5. The quarter circle in the square has a radius equal to 10. So we can construct the following diagram

by drawing two radii of the inscribed circle, two radii of the quarter circle, and a chord belonging to both circles.



We then solve for angles *A* and *B* in the following diagram:



Using Al-Kashi's law of cosines, we have:

$$A = \cos^{-1}[(5^2 - 10^2 - (5\sqrt{2})^2)/(-2 \times 10 \times 5\sqrt{2})]$$

$$A = \cos^{-1}[5/(4\sqrt{2})]$$

$$B = \cos^{-1}[(10^2 - 5^2 - (5\sqrt{2})^2)/(-2 \times 5 \times 5\sqrt{2})]$$

$$B = \cos^{-1}[-1/(2\sqrt{2})]$$

By symmetry we can draw another angle *B*, and then the central angle of the inscribed circle is $C = 2\pi - 2B$.

By symmetry we can draw another angle *A*, and then the central angle of the quarter circle is 2*A*.

We now solve for the circular segment in the inscribed circle, which works out to be $0.5(5^2)(C - \sin C)$.

$$C = 2\pi - 2\cos^{-1}\left(-\frac{1}{2\sqrt{2}}\right)$$
$$2A = 2\cos^{-1}\left(\frac{5}{4\sqrt{2}}\right)$$

The area of sector $=\frac{1}{2}5^2(C-sinC)$

We do the same for the circular segment in the larger circle, which works out to be $0.5(10^2)(2A - \sin 2A)$.

The area of a single blue shape is the area of the circular segment from the inscribed circle minus the area of the circular segment from the larger circle. This area is then:

$$0.5(5^2)(C - \sin C) - 0.5(10^2)(2A - \sin 2A)$$

We want the area of 2 such shapes, so we can double the formula to get:

$$(5^{2})(C - \sin C) - (10^{2})(2A - \sin 2A)$$

$$C = 2\pi - 2B$$

$$B = \cos^{-1}[(10^{2} - 5^{2} - (5\sqrt{2})^{2})/(-2\times5\times5\sqrt{2})]$$

$$B = \cos^{-1}[-1/(2\sqrt{2})]$$

$$A = \cos^{-1}[(5^{2} - 10^{2} - (5\sqrt{2})^{2})/(-2\times10\times5\sqrt{2})]$$

$$A = \cos^{-1}[5/(4\sqrt{2})]$$

We could simplify the formula using some trigonometric identities like double angle formulas (it's shown in the video but omitted in this blog post). This works out to be:

 $50\pi - 50^{*}\cos^{-1}(-1/(2\sqrt{2})) + 25\sqrt{7} - 200^{*}\cos^{-1}(5/(4\sqrt{2}))$ \$\approx 29.276\$

3. This problem is adapted from Argentina's TESBA examination. The problems is as under:

Every school day Pedro leaves his home at 7:00 am to go to school.

On Monday, Pedro walked to school at 95 meters per minute and was 1 minute late to school.

On Tuesday, Pedro walked to school at 105 meters per minute and was 1 minute early to school.

Finally on Wednesday, Pedro walked to school and was just on time.

- (a) What time did he get to school?
- (b) At what speed did Pedro walk on Wednesday?

Solution:

We'll use the famous formula:

distance = (rate)(time) d = rt

Let *d* be the distance to the school and *t* be the number of minutes to be on time to school.

On Monday Pedro walks at 95 m/min and arrives 1 minute late, which translates into the equation

$$d = 95(t+1)$$

 $d = 95t + 95$

On Tuesday Pedro walks at 105 m/min and arrives 1 minute early, which translates into the equation

d = 105(t - 1)d = 105t - 105

As both equations are equal to d, we can set the two equations to be equation to each other.

$$d = 95t + 95 = 105t - 105$$

Then we can solve for *t*.

95t + 95 = 105t - 10510t = 200t = 20

Thus it takes Pedro 20 minutes to reach school, so he would arrive at 7:20 am on Wednesday.

Part 2

Let's solve for the distance using the equation for Monday and t = 20.

d = 95(t + 1)d = 95(21)d = 1995

Then we want to solve for Wednesday's rate using the equation of being just on time *t*:

d = rt1995 = r(20)r = 99.75

The above method is simple enough. But for fun, here's a "clever" way to solve the problem too.

On Wednesday Pedro arrives exactly on time, which is the average of 1 minute late and 1 minute early. If we want to average time, then we must use the harmonic means of the speeds for the average speed. Thus the speed on Wednesday is the harmonic mean of the previous two days, which gives:

r = 2/(1/95 + 1/105) r = 2(95)(105)/(105 + 95) r = 19950/200r = 99.75

It's a fun little problem!

4. If angles A, B, C of a triangle are in arithmetic progression, then find the value of $\frac{a}{c} \sin 2C + \frac{c}{a} \sin 2A$.

Solution:

First, let's use the double angle identity:

 $\sin 2\theta = 2 \sin \theta \cos \theta$

We substitute into both terms to get:

 $(a/c) \sin 2C + (c/a) \sin 2A$ = $(a/c) 2 \sin C \cos C + (c/a) 2 \sin A \cos A$

Now recall Al-Tusi's law of sines:

 $(\sin A)/a = (\sin B)/c = (\sin C)/c$

We substitute $(\sin C)/c = (\sin A)/a$ in the first term and $(\sin A)/a = (\sin C)/c$ in the second term to get:

 $(a/c) 2 \sin C \cos C + (c/a) 2 \sin A \cos A$ $= (a/a) 2 \sin A \cos C + (c/c) 2 \sin C \cos A$

 $= 2 \sin A \cos C + 2 \sin C \cos A$ $= 2 (\sin A \cos C + \sin C \cos A)$

Now we use the sine angle sum formula sin(x + y) = sin x cos y + sin y cos x to get:

 $2 (\sin A \cos C + \sin C \cos A)$ = 2 sin(A + C) = 2 sin(180° - B)

Now recall the angles are in an arithmetic progression, so the angles *A*, *B*, *C* are equal to *A*, A + d, A + 2d for some constant *d*. Because the angles in a triangle sum to 180°, we have:

 $A + B + C = 180^{\circ}$ $A + (A + r) + (A + 2r) = 180^{\circ}$ $3A + 3r = 180^{\circ}$ $A + r = 60^{\circ}$ $B = 60^{\circ}$

We can evaluate the desired formula:

 $2 \sin(180^{\circ} - B) = 2 \sin(120^{\circ}) = 2(\sqrt{3}/2) = \sqrt{3}$

5. Find the area of the square with the given conditions in the below figure:



Solution:

Let's rotate the entire square 90° counter-clockwise from its lower left corner.



In the left square, the angle in purple is equal to the one marked in purple in the right square by symmetry of the rotation. Then notice the angle marked a and the purple angle in the right square form a corner of a square. Hence the two angles sum to 90°.

This means the purple angle in the left square and the angle marked a in the right square also sum to 90°. Consequently, we can construct a right triangle as follows.



As the triangle's two legs are equal to 2, it is an isosceles right trangle with angles $45^{\circ}-45^{\circ}-90^{\circ}$. And its hypotenuse will be $2\sqrt{2}$.

Now consider the other triangle formed with sides $2\sqrt{2}$, $\sqrt{17}$, and 5.

We can see the sum of the squares of two of its sides will equal the square of the longer side because:

$$(2\sqrt{2})^2 + (\sqrt{17})^2 = 5^2$$

8 + 17 = 25

Thus this triangle is a right angle, so the angle between the sides $2\sqrt{2}$ and $\sqrt{17}$ is 90°.



In the right square, we can then see the angle between the line segments of 2 and $2\sqrt{17}$ will be $45^\circ + 90^\circ =$ 135° . Focusing just on the right squares gives the following figure:



For the side length *x* of the square, we can use Al-Kashi's law of cosines:

$$x^{2} = (\sqrt{17})^{2} + 2^{2} - 2(\sqrt{17})(2)\cos 135^{\circ}$$

$$x^{2} = 17 + 4 - 4(\sqrt{17})(2)(-1/\sqrt{2})$$

$$x^{2} = 21 + 2(\sqrt{34})$$

Now recall we want the area of the square, which is its side length squared, or x^2 . And this is exactly what we have solved for—no more work needed!

The area of the square is $21 + 2\sqrt{34}$.

6. How old is the father if the father's age is the son's digits reversed and the sum of both the ages is 55 years?

Solution:

Suppose the son's age is the two digit number xy, which can be represented as 10x + y. Then the father's age is the two digit number yx, which is algebraically 10y + x.

The sum of the ages is 55, so we have:

$$(10x + y) + (10y + x) = 55$$

 $11x + 11y = 55$
 $x + y = 5$

We also have x < y for the father to be older than the son. This leaves 3 possibilities:

$$0 + 5 = 5$$

 $1 + 4 = 5$
 $2 + 3 = 5$

For 0 + 5 = 5, the father is 50 years old, and the son is 05 years. But we typically don't write ages with leading 0s. And if someone is 5 years old, the reverse of the number 5 is 5. So this case is not the solution.

For 2 + 3 = 5, the father is 32 years old, and the son is 23 years. But an age gap of 9 years is unrealistic for a father and son, so this case is also not the solution.

This leaves 1 + 4 = 5. The father is 41 and the son is 14. This is reasonable, and it is the answer. The father is 41 years old.

7. This problem was asked in Oxford Admissions.

The value of log_23 is:

(a) Between
$$1\frac{1}{3}$$
 and $1\frac{1}{2}$
(b) Between $1\frac{2}{3}$ and 2
(c) Between $1\frac{1}{2}$ and $1\frac{2}{3}$
(d) Between 2 and 3

Solution:

Suppose $x = \log_2 3$. Then notice:

$$2^{x} = 3$$

 $(2^{x})^{3} = 3^{3}$
 $2^{3x} = 27$
 $2^{3x} = 27 < 32 = 2^{5}$

From here we can conclude 3x < 5, so then x < 5/3.

We can do a similar calculation to find a lower bound.

$$2^{x} = 3$$

$$(2^{x})^{2} = 3^{2}$$

$$2^{2x} = 3^{2} = 9$$

$$2^{2x} = 9 > 8 = 2^{3}$$

From here we can conclude 2x > 3, so then x > 3/2.

Combining the two results we find choice (b) is the correct answer.

(b) between 3/2 and 5/3

It's pretty neat we could estimate the result without a calculator!

8. Find the side of the square in the figure below:



Solution:

First, recall that a 3-4-5 triangle is a special right triangle, so the angle between the 3 and 4 sides is a 90 degree right angle.

Now ignore the side of 5, and we have two triangles whose hypotenuses are 4 and 3. We will show they are similar triangles. Suppose one angle in the triangle of hypotenuse 4 has an angle a, so its other acute angle is 90 - a degrees.



In the triangle of hypotenuse 3, we can calculate the lower left angle as follows. The side of the square is a straight line with measure 180 degrees, so the angle in

the triangle has to be 180 - 90 - (90 - a) = a. This means the other angle in the triangle is 90 - a degrees.



As corresponding angles in these triangles are equal, they are similar triangles.

Now suppose the short leg of the triangle with hypotenuse 4 has a length of *y*. As the square side length is *x*, the remaining distance has to be x - y.



Since the triangles are similar, we can equate the ratio of the long leg to the hypotenuse, giving:

$$(x - y)/3 = x/4$$

$$4(x - y) = 3x$$

$$x = 4y$$

$$x/4 = y$$

We substitute this value into the diagram for *y*.



Finally we can use the distance formula to get:

$$x^{2} + (x/4)^{2} = 4^{2}$$
$$(17/16)x^{2} = 16$$

Since we want a positive value of x, we get the solution:

 $x = 16/\sqrt{17}$

9. O is the centre of the circle and the perimeter of triangle AOB is 6 units then the circumference of the circle in the following circle:

_<u>∕6</u>0°

Solution:

Obviously, if side OB=OA= radius of the circle

 $\Rightarrow \angle B = \angle A = 60^{\circ}$

Given perimeter of side=6

 $\Rightarrow a=2$

 $\Rightarrow \angle B = \angle A$ (angles of equal sides)

 \Rightarrow triangle OAB is an equilateral triangle.

⇒3a=6

10. If $x=a^5$ and $y=a^6$, $a\neq 0$, then which of the following is equivalent to a^{13} ?

(a) xy (b) x^2y (c) $\frac{x^3}{y}$ (d) $\frac{y^3}{x}$ (e) $\frac{x^4}{v}$

Solution:

Clearly, $\frac{y^3}{r} = \frac{a^{18}}{a^5} = a^{13}$

 \Rightarrow circumference= $2\pi a=4\pi$

11. The probabilities that each of two independent experiments will have a successful outcome are 8/15 and 2/3 respectively. What is the probability that both experiments will have successful outcomes?

(a) 4/5 (b) 6/5 (c) 2/15 (d) 16/45(e)64/225

Solution:

Both experiments are independent, hence the both experiments will have successful outcomes= $P(success \ of \ first) \times$ $P(success of the second) = \frac{8}{15} \times \frac{2}{3} = \frac{16}{45}$



The author, is Editor of this Ouartrerly e-Bulletin. He is an eminent mentor, analyst and connoisseur of Mathematics from IIT for preparing aspirants of Competitive Examinations for Services & Admissions to different streams of study at Undergraduate and Graduate levels using formal methods of teaching shared with technological aids to keep learning at par with escalating standards of scholars and learners. He has authored numerous books of excellence.

e-Mail ID: maths.iitk@gmail.com



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

CROSSWORD PUZZLE November'19 : SIKHISM

Prof. SB Dhar



Across

- 1. Adherents of Sikhism are known as
- 5. Turban of Sikhs is known as
- 6. Famous temples of Sikhs in Amritsar
- 8. Sikh Temple is known as
- 9. Holy book of Sikhism
- 10. Most important festival of Sikhs

Below

- 2. Most important symbol of Sikhism
- 3. Tenth Guru of Sikhism
- 4. Meal in Gurdwara is known as
- 6. First Guru of Sikhism
- 7. Guru Granth Sahib's script





Growing with Concepts : Physics

Waves and Motions : Simple Harmonic Motion- Part II

Simple Harmonic Motion (SHM) is climax of mechanics and as one ascends in complexity of problems and attempts to solve them it becomes integral part of not only other branches of physics but every observation of life. Philosophically also life is a cycle having two nodes birth and death.

Such a realization of universality of SHM occurs only when one attempts to answer questions beyond mere application of formulae. One would reveal oscillation is inherent to every system and SHM os the most fundamental to it.

Solving typical problems on a gradual degree of complexity helps to build power of visualization of concepts that are essential in understanding a problem/n observation and evolving solution/answer. At this stage simpler calculations are being skipped in elaboration, with a hope that reader would be able to decipher intermediate steps..

Mentors' Manual is one of the dimensions of the Gyan Vigyan Sarita through which efforts are being made to reach out to remote teachers through our experience of mentoring unprivileged children who are disconnected from us by virtue of multiple barriers. Direct interaction has been possible through Interactive Online Mentoring Sessions (IOMS) a working model of connecting unprivileged children in a selfless manner. This experience is being disseminated to the teachers spread out by writing of chapters of an open source Mentors' Manual. Simple Harmonic Motion is First of the Three parts of chapter Three covering Sound and Optics..

Science is a subject not to learn but a matter of realization through experiments and its visualization in surrounding. Every student is not equipped either to conduct experiment or an environment for visualization of science in his surroundings. This is where simulation is a technique to verify the concepts and study effect of variation in parameters related to the concept. There are various simulalition tools leading to virtual laboratories.

India, growing digital, provides optimism to every student to be able to have an access to virtual laboratory, where without any physical laboratory, involving consumption of equipment and material, it is possible to carry out experiments in an e-environment. There are some excellent videos available on the web either free or on price which provide an experiences of kind in simulation of the concepts, The only problem with this is of sequencing and scaling of concepts and selection of an appropriate video out of a big list of search results. But, it is neither possible nor affordable for a student to first make a survey to select most suitable video and then view it for gaining proficiency in the concepts.

It creates a question, can one wait for suitable virtual labs to become available to each student to gain proficiency in concepts? Definitely not! then the only way to get going on acquiring proficiency in concepts and their applications, Competitive examinations and more particularly in real life rarely expose to problems solved. Yet ability to solve such problems one groomed, it enhances competence to handle unknown problems speedily and correctly with a greater degree of clarity and confidence, an essential attribute of thought process needed for success in life.

soon after learning them, is solving problems of variety. This is a key, have patience and perseverance, to acquire proficiency without consumption of any other resource except time which is available with students. All that they miss is the direction in which they can deploy their efforts. Problem solving in mathematics and physics is inevitable to gain necessary proficiency.

Here, Question Banks include problems from various sources and they are being supported with illustrations. These are not just solutions but an attempt to bring home use of basics involved in solving a problem. In an effort to compile problem there some good text books including those authored by Prof. H.C. Verma and a team of authors Robert Resnick, David Halliday and Kenneth S. Krane and many more. Questions in these books are graded and authors have attempted to incorporate all concepts covered in the book. Thus it necessitates a student to read each chapter carefully before taking up questions.

In the illustrations to the problems, supported with each question bank, some student may find them to be a bit lengthy and dwelling into basics more than what one requires. Since it targets students, who are in abundance, not directly connected to us, patience of well versed students is requested. Few question with their illustrations are drawn from the set-1, on Waves and Motion : Simple Harmonic Motion, covering and appended here. The complete set of 50 questions is being uploaded as a free web-resource.

This initiative is aimed at to mentor unprivileged children is of a small group of passionate persons is driven with a sense of Personal Social Responsibility (PSR) in a nonorganizational, non-remunerative, non-commercial and non-political manner. You are welcome to add value to this initiative by way of suggestion, advising correction or new type of questions. Or any other form that suits to your competence and convenience.

TYPICAL QUESTIONS WITH ILLUSTRATION

Question-01: The block of mass m_1 shown in figure is fastened to the spring and the block of mass m_2 is placed against it.

- (a) Find the compression of the spring in the equilibrium position.
- (b) The blocks are pushed a further distance $\left(\frac{2}{k}\right)\left(m_1 + m_2\right)g\sin\theta$ against the spring

and released. Find the position where the two blocks separate.

(c) What is the common speed of blocks at the time of separation?

Illustration-02: The problem is solved progressively case-by-case:

Step (a): Gravitational force of the masses along the plane is m_1g and m_2g . Both the forces are along the same orientation and hence net force along the inclined surface is $F_s = m_1g\sin\theta + m_1g\sin\theta = (m_1 + m_2)g\sin\theta$. Therefore, compression of the arrive would be

Therefore, compression of the spring would be $l = \frac{F_s}{k} = \frac{(m_1 + m_2)g\sin\theta}{k}$. Thus answer of part (a) is $\frac{(m_1 + m_2)g\sin\theta}{k}$.

Case (b): It is stated that system is further pushed through $\left(\frac{2}{k}\right)(m_1 + m_2)g\sin\theta = 2l$.

Thus in this new state if equilibrium total compression of the spring is $l+2l = 3l = \left(\frac{3}{k}\right)(m_1 + m_2)g\sin\theta$.

Further, the mass m_2 is resting against mass m_1 which is fastened to the oscillating end of the spring. Therefore, during oscillation of the combined mass velocity of both the masses remain same. But, they would start separating only when relative acceleration $_2a_1(=a_2-a_1)$ of mass m_2 w.r.t. the mass m_1 is (+)ve i.e. up the slope; when $_1a_2$ is (-) ve i.e. down the slope the mass m_2 shall continue to remain in contact with mass m_1 since other end of the spring is fixed. All directions up the slope are marked (+)ve and down the slope are marked (-)ve and accordingly signed values of the accelerations are shown in the figure.

Thus when mass m_2 is at (-)x from position of equilibrium ${}_2a_1 = (-)a_{s2} - a_{1x-} < 0$. But, when the m_2 is at (+)x from position of equilibrium ${}_2a_1 = (-)a_{s2} - (-a_{1x+})$; during this part of motion as long as x < l When, spring stretches to its natural length i.e. x = l determined in case (a) the ${}_2a_1 = a_{1x+} - a_{s2} = 0$, and as soon as x > l then ${}_2a_1 = a_{1x+} - a_{s2} > 0$ and mass m_2 starts separating from mass m_1 , this is answer of case (b).

Case (c): It is stated that after compression stipulated in case (b), identified in the figure by point C, the masses are released and it is required to determine common speed of the two block at time of separation; this position has been derived in case (b) and is identified by point A in the figure. Point B in the figure is the position of the spring under natural compression of the spring caused by the two masses as derived in case (a).

Thus this case (c) is extension of case (a) and (b) from perspective of conservation of energy. Accordingly, $PE_C = TE_A...(1)$, here $PE_C = \frac{9}{2}kl^2...(2)$, because at this state total compression of the spring is



$$\Delta l_c = l + 2l = 3l. \text{ At position } TE_A = \Delta PE + \frac{1}{2}Mv^2 \dots (3), \text{ here the combined mass is } M = m_1 + m_2. \text{ And}$$

$$\Delta PE = Mgh = Mg(3l\sin\theta) = 3Mgl\sin\theta \dots (4), \text{ since in reaching point A from point the change of elevation of the combined mass } M \text{ is } h = 3l\sin\theta. \text{ The combining the equations (2), (3) and (4) in equation (1)}$$

$$\frac{9}{2}kl^2 = 3Mgl\sin\theta + \frac{1}{2}Mv^2. \text{ Substituting in this equation value of } l \text{ derived in case (a),}$$

$$\frac{9}{2}k\left(\frac{Mg\sin\theta}{k}\right)^2 = 3Mg\left(\frac{Mg\sin\theta}{k}\right)\sin\theta + \frac{1}{2}Mv^2. \text{ This equation solves into}$$

$$Mv^2 = \frac{9}{k}(Mg\sin\theta)^2 - \frac{6}{k}(Mg\sin\theta)^2 \Rightarrow v^2 = \frac{3M}{k}(g\sin\theta)^2 \Rightarrow v = \sqrt{\frac{3M}{k}}g\sin\theta. \text{ Substituting the value of } M,$$

the velocity of the combined mass is $v = \sqrt{\frac{3(m_1 + m_2)}{k}}g\sin\theta.$ Thus answer of part (c) is $\sqrt{\frac{1}{k}(1-1)}$

$$v = \sqrt{\frac{3(m_1 + m_2)}{k}}g\sin\theta.$$

N.B.: In this elaboration concept of SHM is applicable only in deriving answer of Part (b), rest is all based on the concept of mechanics.

Question-02: The spring shown in the figure is un-stretched when a man starts pulling on the cord. The mass of the block is m. If the man exerts a constant force F, find –

- (a) the amplitude and time period of the motion of the block
- (b) the energy stored in the spring when the block passes through the equilibrium position and
- (c) The kinetic energy of the block at this position.

Illustration-02: Taking each case sequentially -

Case (a): When the man applies force F as shown in the figure. The spring shall experience elongation until its restraining force is in equilibrium such that $F = kA \Rightarrow A = \frac{F}{k}$. Once it reaches state of equilibrium it will continue to be there unless an external force causes disturbance. But, if the man releases the force the spring-mass system would start oscillating with amplitude about its

mean position O. Thus amplitude of the oscillation is $\frac{F}{k}$. The maximum force on the mass *m* during

oscillation is displacement F from the mean position O and is $F = f_{max} = m \times a_{max} \Rightarrow a_{max} = \frac{F}{m}$. During

SHM
$$a_{\max} = A\omega^2 \Rightarrow \frac{F}{m} = A\omega^2 \Rightarrow \omega = \sqrt{\frac{F}{mA}}$$
. It leads to $\frac{2\pi}{T} = \sqrt{\frac{F}{mA}} \Rightarrow T = 2\pi\sqrt{\frac{m}{F} \times \frac{F}{k}}$ and further,
 $T = 2\pi\sqrt{\frac{m}{F} \times \frac{F}{k}} = 2\pi\sqrt{\frac{m}{k}}$. Thus time period of the oscillation is $2\pi\sqrt{\frac{m}{k}}$. Thus combined answer of case
(a) is $\frac{F}{k}$, $2\pi\sqrt{\frac{m}{k}}$



Case (b): The block in equilibrium position is displaced from mean position by A. And hence energy stored in the

spring is
$$PE_s = \frac{1}{2}kA^2 = \frac{1}{2}k\left(\frac{F}{k}\right)^2 = \frac{F^2}{2k}$$
. Hence answer of case (b) is $\frac{F^2}{2k}$

Case (c): When block reaches mean position, when spring is unstretched, it's potential energy becomes zero and the whole energy is transferred to the block and hence mass as its kinetic energy, as per principle of conservation

of energy would be
$$(PE_s + KE_m)_{\text{stretched}} = (PE_s + KE_m)_{\text{unstretched}}$$
. It leads to $\frac{F^2}{2K} + 0 = 0 + KE_m$, which leads
to $KE_m = \frac{F^2}{2K}$. Thus answer 0f part (c) is $\frac{F^2}{2k}$

N.B.: The spring shall experience extension until it reaches equilibrium with external force F applied by the man, but the spring-mass system will start oscillating only when the man releases the force

Question-03: A particle of mass m is attached to three springs A, B, and C of equal force constants k as shown in the figure. If the particle is pushed slightly against the spring C and released, find the time period of the oscillation.

Illustration-06: When the block of mass m, represented by a point mass at o, is slightly pushed against spring C such that it's displacement to position is by an amount Δx . The restraining force developed by the spring is $F_C = k\Delta x$. Since the is tied to the system of three springs, it will cause stretching of springs A and B, this stretching of springs A and B by length n-p and m-p.

Since displacement $\Delta x \ll$ is small hence the angular displacement of spring A by angle $\theta \ll$ and \angle bom $\rightarrow 90^{\circ}$ and likewise for spring B the \angle bon $\rightarrow 90^{\circ}$. Thus stretching of springs A and B, placed symmetrical to spring C, is by lengths n-p and

such that
$$mp = np = \Delta x \sin 45^\circ = \frac{\Delta x}{\sqrt{2}}$$



into oscillation its amplitude shall remain $A = \Delta x$. Further, in case of SHM $a_{\Delta x} = A\omega^2$, accordingly using the value of

$$a_{\Delta x}$$
 determined above, $a_{\Delta x} = \frac{2k\Delta x}{m} = \Delta x \omega^2 \Rightarrow \omega = \sqrt{\frac{2k}{m}} = \frac{2\pi}{T} \Rightarrow T = 2\pi \sqrt{\frac{m}{2k}}$. Thus answer is $2\pi \sqrt{\frac{m}{2k}}$.

N.B.: This problem involves careful use of geometry to get to correct answer

Question 4: The string, the spring and the pulley shown in the figure are light. If pulley has a moment of inertia I about its axis and the string does not slip over it. Find the time period of the mass m.



Illustration 4: The force on the mass *m* due to gravitation would be *mg* and it would create an elongation *l* in the spring such that $mg = kl \Rightarrow l = \frac{mg}{k}$. In this state of equilibrium a small perturbation of the mass is produced in the vertical position of elongated equilibrium. This will set in a SHM assuming that potential energy of the mass remains constant at its mean position. Let at an instant of displacement $x < l \Rightarrow l + x \rightarrow l$ from equilibrium position velocity of the mass is *v*, then as the energy equation of the system would be $\frac{1}{2}mv^2 + \frac{1}{2}I\omega^2 + \frac{1}{2}kx^2 + mgl = K$, here *K* is a constant. Differentiating the equation w.r.t. *t* it gives $mv\frac{dv}{dt} + I\omega\frac{d\omega}{dt} + kx\frac{dx}{dt} + mg\frac{dx}{dt} = 0$. Here $\omega = \frac{v}{r} \Rightarrow \frac{d\omega}{dt} = \frac{1}{r}\frac{dv}{dt}$ and $\frac{dx}{dt} = v$. It simplifies into $mv\frac{dv}{dt} + \frac{1}{r^2}v\frac{dv}{dt} + kxv = 0 \Rightarrow \left(m + \frac{1}{r^2}\right)a = -kx$, where the acceleration is $a = -\left(\frac{k}{m + \frac{1}{r^2}}\right)x$. The characteristic equation of SHM is $a = -\omega^2 x$. Thus equating the two equation of SHM $\omega^2 x = \left(\frac{k}{m + \frac{1}{r^2}}\right)x$. It leads to $\omega = \frac{2\pi}{T} = \sqrt{\left(\frac{k}{m + \frac{1}{r^2}}\right)} \Rightarrow T = 2\pi\sqrt{\left(\frac{m + \frac{1}{r^2}}{k}\right)}$ Hence answer is $2\pi\sqrt{\left(\frac{m + \frac{1}{r^2}}{k}\right)}$.

N.B. The assumption of potential energy of the oscillating mass remains constant at its mean position. This problem can also be solved with consideration of torque and forces.

Question-5: Consider the situation shown in the figure. Show that of the blocks are displayed slightly in opposite directions and released, they will execute simple harmonic motion. Calculate the time period.

 $\begin{array}{c} & & \\$

masses are equal, the relative displacement any of the two masses w.r.t to the other is x accordingly restraining force in the spring is F = -kx and in turn acceleration of the mass will be $ma = -kx \Rightarrow a = \frac{kx}{m}$...(1) Each mass is oscillating about C.G of the mass system with an amplitude $\frac{x}{2}$. Characteristic equation of spring-mass system is zz

Illustration-5: The force produced by perturbation x in length of spring. Since both the

$$a = -\omega^2 \frac{x}{2}...(2)$$
. Combining the two equations $\omega^2 \frac{x}{2} = \frac{kx}{m}$. This leads to $\omega = \sqrt{\frac{2k}{m}} \Rightarrow \frac{2\pi}{T} = \sqrt{\frac{2k}{m}}$. Accordingly the time period is $T = 2\pi \sqrt{\frac{m}{2k}}$. Hence answer is. $2\pi \sqrt{\frac{m}{2k}}$

N.B.: Here it is to be noted that in this case of independent oscillation of the spring-mass system the amplitude of oscillation is w.r.t. CG of the mass system. If this is ignored it will lead to wrong answer. This problem can also be solved with energy considerations.

Question 6: A rectangular plate of side a and b is suspended from a ceiling by the parallel strings if length L each as shown in the figure. The separation between the strings is d. The plate is



displaced slightly in its plane keeping the strings tight. Show that it will execute simple harmonic motion. Find the time period.

Illustration-6: The rectangular plate is a rigid mass and has been suspended in a horizontal position with Two parallel strings of length l, separated by a distance d. The plate is slightly displaced along its plane as shown in the figure, the supporting strings are displaced through a small angle θ about their fixed points as shown in the figure. Assuming the two strings carry equal tension $T_0 = \frac{mg}{2}$. On displacement through the tension in the rwo strings shall be equal such that their vertical components would balance the wight of the plate. Accordingly, $T_V = T_{\theta} \cos \theta = \frac{mg}{2}$, the restraining force shall be caused by horizontal component such that

 $T_H = -T_\theta \sin \theta \approx -T_\theta \theta$, since for $\theta \ll \sin \theta \rightarrow \theta$. This leads to $T_H = -T_\theta \frac{x_\theta}{L}$. Thus proportionate mass $\frac{m}{2}$

supported by each string is accelerated to its mean position would be $a_H = -\frac{2T_{\theta}x_{\theta}}{mL}$. In this formulation $\theta \ll$ it leads

 $\cos\theta \to 1 \Rightarrow T_{\theta} = \frac{mg}{2}$. Accordingly, $a_{H} = -\left(\frac{mg}{2}\right)\frac{2x_{\theta}}{mL} = -\frac{g}{L}x_{\theta}$...(1). Further, as per characteristic equation of

SHM $a_H = -\omega^2 x_{\theta} \dots (2)$. Equating (1) and (2), $\omega^2 x_{\theta} = \frac{g}{L} x_{\theta}$. It solves into $\omega = \sqrt{\frac{g}{L}} \Rightarrow \frac{2\pi}{T} = \sqrt{\frac{g}{L}} \Rightarrow T = 2\pi \sqrt{\frac{L}{g}}$. Thus answer is $2\pi \sqrt{\frac{L}{g}}$.

N.B.: Actual tension in each string and the corresponding mass shared by each would depend upon point of suspension of the plate and this can be determined with the principle of moments. However, in the final result assumption that tension in the both the strings are equal.

Question-7: The left block in the figure moves at a speed v towards the right block placed in equilibrium. All collisions to rake place are elastic and the surfaces are frictionless. Show that the motions of the two blocks are periodic. Find the time period of these periodic motions. Neglect the widths of the blocks.



Illustration-7: Momentum of the moving block A is p = mv. At the instance of collision the block B in equilibrium has zero velocity. Since collision is in equilibrium, velocity of the two masses shall be

 $2mv' = mv + m \times 0 \Longrightarrow v' = \frac{v}{2}$. Mass of both the blocks is *m*. On collision the

kinetic energy of the block A shall get converted in elastic potential energy of the spring at amplitude A of the oscillation of the spring-mass system such that

 $\frac{1}{2}mv^2 = \frac{1}{2}k(A)^2 \Longrightarrow A = \sqrt{\frac{m}{k}}v$. This is in accordance with Law of Conservation

of Energy. It is to be noted that once oscillation of the system will involve two parts -



(a) One-half of cycle is compression from mean position to reversal back to mean position and it shall take time $\frac{T_s}{2}$, here

 T_s is time period of spring mass system when two masses are attached. As per characteristic of SHM velocity at

v

equilibrium position is
$$v' = A \omega \Longrightarrow \omega = \frac{2\pi}{T_s} = \frac{v'}{A} \Longrightarrow T_s = 2\pi \frac{\frac{v}{2}}{\sqrt{\frac{m}{k}}} = \pi \sqrt{\frac{k}{m}}$$

(b) On reaching the state of initial collision, since the masses A and B are not attached, mass attached to the spring B would come to rest while mass A would regain its velocity v in opposite direction, as per Law of Conservation of Momentum and as such separation of two masses shall take place at this instant. Since system is frictionless, the mass A on reaching the barrier will experience an elastic collision with it to experience second collision with mass B, and thus complete one cycle. Thus time taken by mass A to seprate from mass B and return back to it will be $T_A = \frac{2L}{v}$ initial velocity will start moving with the velocity of separation, since the system is frictionless. This mass on reaching the stopper will again undergo elastic collision to return to collide with the mass attached to the spring.

The time period of the periodic motion comprises of half cycle of SHM as elaborated at (a) i.e. $\frac{T_s}{2}$ and motion of mass A with uniform speed T_A . Accordingly, time period of one this periodic motion would be $T = \frac{T_s}{2} + T_A = \frac{\pi}{2} \sqrt{\frac{k}{m}} + \frac{2L}{v}$.

Thus answer is
$$\frac{\pi}{2}\sqrt{\frac{k}{m}} + \frac{2L}{v}$$

N.B: While determining time period T_s of spring mass system velocity of velocity at inception of oscillation i.e. $v' = \frac{v}{2}$ has to be considered and not v.

Question-8: Find the time period of the motion of the particle shown in the figure. Neglect the small effect of the bend near the bottom.

Illustration-8: Motion in each part is being analyzed separately-



Part (a): Along the slope at 45° -Initial velocity along the slope is $u_{45} = 0$ and distance covered by it is

 $s_{45} = \frac{0.1}{\sin 45} = 0.1\sqrt{2}$ Therefore, time taken to reach bottom of the slope as per second equation of motion is

$$s_{45} = u_{45}t_1 + \frac{1}{2}(g\cos 45)t_1^2 \Rightarrow 0.1 \times \sqrt{2} = \frac{1}{2} \times \frac{10}{\sqrt{2}} \times t_1^2 \Rightarrow t_1 = \sqrt{\frac{4}{100}} = 0.2 \text{ sec.}$$
 Here, acceleration due to gravity is taken to be $g = 10 \text{ m/s}^2$ and accordingly acceleration along the slope shall be $a_{45} = g\cos 45$.

gravity is taken to be $g = 10 \text{ m/s}^2$ and accordingly acceleration along the slope shall be $a_{45} = g \cos 45$. Velocity of the particle at the bottom of the slope, as First Equation of Motion would be $v_{45} = u_{45} + a_{45}t_1 \Rightarrow v_{45} = \frac{10}{\sqrt{2}} \times 0.2 = \sqrt{2} \text{ m/s}$

Part (b): Along the slope at 60^{0} - Since nothing is stated about friction and it is stated that there is no effect of bending near the bottom and therefore the particle will rise to the same height, as per law of Conservation of Energy. But velocities along the slopes shall be $v_{45} = u_{60}$. Time taken to rise to maximum height along the slope would

be when its velocity becomes zero. Here, a acceleration up the slope would be $a_{60} = g \cos 30 = 10 \times \frac{\sqrt{3}}{2} = 5\sqrt{3}$

m/s. Accordingly, time to rise up the slope would be $0 = u_{60} - 5\sqrt{3}t_2 \Rightarrow t_2 = \frac{\sqrt{2}}{5\sqrt{3}} = 0.163$ s.

Time period is the total time taken for the particle to return to the position of start, thus time period is $T = 2(t_1 + t_2) = 2(0.2 + 0.163) = 2(0.363) = 0.726 = 0.73$ s.

N.B.: The value of *T* would depend on selection of value of *g*.

Question-9: A pendulum clock giving correct time at a place where $g = 9.800 \text{ m.s}^{-2}$ is taken to another place where it loses 24 seconds during 24 hours. Find the value of g at new place.

Illustration-9: Given that time period of a standard pendulum is $T_1 = 2$ s at $g_1 = 9.8 \text{ m.s}^{-2}$. At another place the pendulum loses i.e. get slower by 24 sec in 24 hours or $\delta = \frac{24}{24 \times 60 \times 60} = \frac{1}{3600}$ s/s. Time period of pendulum is $\sqrt{1}$

expressed as
$$T = 2\pi \sqrt{\frac{l}{g}}$$
. Therefore, in case of change of acceleration due to gravity

$$\frac{T_1}{T_2} = \frac{2\pi \sqrt{\frac{l}{g_1}}}{2\pi \sqrt{\frac{l}{g_2}}} \Rightarrow \left(\frac{T_1}{T_2}\right)^2 = \frac{g_2}{g_1} \Rightarrow g_2 = g_1 \left(\frac{T_1}{T_2}\right)^2$$
. With $\delta = \frac{1}{3600}$ s/s, the time period $T_2 = T_1 (1 + \delta)$. Accordingly,
 $g_2 = g_1 \left(\frac{T_1}{T_1(1+\delta)}\right)^2 \Rightarrow g_2 = g_1 \left(\frac{1}{1+\delta}\right)^2$. Further, $1 + \delta = 1 + \frac{1}{3600} = \frac{3601}{3600}$, therefore,
 $g_2 = 9.8 \times \left(\frac{3600}{3601}\right)^2 = 9.7945 = 9.745$ m.s⁻². Hence answer is 9.745 m.s⁻².

N.B.:(a) Using formula for time period of simple pendulum taking ratio of time periods, effect of length which is same in two cases, can be eliminated.

(b) Since value of g_1 is given in Four significant digits, and hence value of g_2 will also have to be given if Four SDs for which calculation result of calculation shall have to be taken in five SDs and then rounded to 4tyh LSD.

Question-10: A spherical ball of mass *m* and radius *r* rolls without slipping on a rough concave surface of large radius *R*. It makes small oscillations about the lowest point. Find the time period.

Illustration-10: Let ball is displaced through an angle θ about it's mean position of oscillation. Taking $\theta \ll$ as given, linear displacement of the COM of the ball, along horizontal direction, would be $x = (R - r)\theta$...(1)

When ball rolls down from point P to A, change of height of COM is $\Delta h = (R - r)\cos\theta$ and therefore change of potential energy of the ball w.r.t. to mean position A is $PE = mg\Delta h = mg(R - r)\cos\theta...(2).$

The ball is stated to be rolling without slipping therefore frictional force shall be balanced by downward force due to gravity such that



0.2m

0.5m

1 m

 $f = mg \sin \theta$ and hence torque responsible for rolling of the ball shall be $\tau = fr = mgr \sin \theta$. Since ball is accelerating on the curved surface and hence applying parallel axis theorem of moment of inertia of the ball at the curved surface shall be $I = mr^2 + I_b$. Moment of inertia of a solid ball is $I_b = \frac{2}{5}mr^2$, therefore, $I = mr^2 + \frac{2}{5}mr^2 = \frac{7}{5}mr^2$... (3).

Accordingly angular acceleration of the ball $\alpha = \frac{\tau}{\frac{7}{-mr^2}} = \frac{5mgr\sin\theta}{7mr^2} = \frac{5g\sin\theta}{7r}$...(4). Translational acceleration of the

rolling ball would be $a = r\alpha = r \times \frac{5g \sin \theta}{7r} = \frac{5g \sin \theta}{7} = \frac{5g}{7} \theta \Big|_{\alpha \in \mathbb{N}}$...(5) Thus, linear shift x of the COM which is moving

along radius (R-r) of the ball shall such that $\theta = \frac{x}{R-r}$..(6).. Combining (5) and (6) $a = -\frac{5g}{7} \times \frac{x}{R-r} = -\frac{5g}{7(R-r)}x$

...(7). Here (-)ve sign indicates the acceleration is on a direction opposite to the displacement. As per characteristic $a = -\omega^2 x \dots (8).$ SHM On equation of combining (7)and it leads to $\omega^2 = \frac{5g}{7(R-r)} \Rightarrow \omega = \sqrt{\frac{5g}{7(R-r)}} = \frac{2\pi}{T} \Rightarrow T = 2\pi \sqrt{\frac{7(R-r)}{5g}}$. Hence answer is $2\pi \sqrt{\frac{7(R-r)}{5g}}$.

N.B.: This problem involves different concepts of geometry and physics and need to be dealt with carefully to get correct and crisp solution.

Question-11: Find the time period of small oscillations of the following systems.

- (a) A meter stick suspended through the 20 cm mark
- (b) A ring of mass *m* and radius *r* suspended through a point on its periphery.
- (c) A uniform square plate of edge *a* suspended through a corner.
- (d) A uniform disc of mass m and radius suspended through a point r/2 from the center.

Illustration-11: This is case of oscillation of physical bodies and can be conceptualized from the figure shown here. Let a body of mass m and moment of inertia (MOI) I is hanging from a point O such that it is above P, the center of gravity (CG), by a length l. When it is hanging in a steady state its centre of gravity (CG) is at point P. When body is set into oscillation and is inclined by an angle θ with the vertical line passing through O, it will experience a torque $\tau = mg \times RQ_{lengt h} = mgl \sin \vartheta ...(1)$. Considering the situation from the point of view of rotational dynamics $\tau = I\alpha$...(2). Combining the (1) and (2) we get $I\alpha = mgl\sin\theta$. Since for small amplitude oscillation when $\sin\theta \rightarrow \theta|_{\theta <<}$. Accordingly, $I\alpha = mgl\theta$, it leads to $\alpha = \frac{mgl}{l}\theta$...(3). Equation (3) is comparable to translational SHM where $a = \omega^2 x \dots (4)$, comparing (3) and (4) $a \to \alpha$ and $x \to \theta$ and therefore $\omega^2 = \frac{mgl}{l} \to \omega =$ $\sqrt{\frac{mgl}{I}} = \frac{2\pi}{T}$. It leads to $= 2\pi \sqrt{\frac{I}{mgl}}$. Accordingly, for a physical body $\alpha = \omega^2 \theta$...(5) and time period of SHM of any physical body is $T = 2\pi \sqrt{\frac{l}{mgl}}$...(6). This concept is applicable all cases in this problem.

Case (a): Moment of inertia a uniform bar of mass m and length L = 1 m about its centre O is $I = \frac{mL^2}{12} = \frac{m}{12}$. Since the bar is hanging from point P, above by l = 0.5 - 0.2 = 0.3m and hence B moment of inertia of the bar about P, by parallel axis theorem is $I_P = I + ml^2$, it simplifies into $I_0 = \frac{m}{12} + \frac{9m}{100} = \frac{52m}{300}$, therefore time period would be $T = 2\pi \sqrt{\frac{52m}{300}}$. It reduces to $T = 2\pi \sqrt{\frac{52m}{300}} = 2\pi \sqrt{\frac{52}{900}} = 1$ 1.51s. Hence answer of part (a) is 1.51 s.

Case (b): Moment of inertia of a circular ring about its centre O os $I = mr^2$ and therefore its MI about point of hanging

P is
$$I_P = I + mr^2 = 2mr^2$$
. Therefore, its time period would be $T = 2\pi \sqrt{\frac{2mr^2}{mgr}} = 2\pi \sqrt{\frac{2r}{g}}$.
P is $I_P = I + mr^2 = 2mr^2$. Therefore, its time period would be $T = 2\pi \sqrt{\frac{2mr^2}{mgr}} = 2\pi \sqrt{\frac{2r}{g}}$.

Case (c): In case of a square plate using perpendicular axis theorem MI about its

center O is
$$I = \frac{ma^2}{12} + \frac{ma^2}{12} = \frac{ma^2}{6}$$
. Accordingly, MA about the point P shall be $I_P = \frac{ma^2}{6} + m\left(\frac{a}{\sqrt{2}}\right)^2 = \frac{2}{3}ma^2$. Therefore,

time period of SHM shall be $T = 2\pi \sqrt{\frac{\frac{2}{3}ma^2}{mg\left(\frac{a}{\sqrt{2}}\right)}}$. Accordingly, $T = 2\pi \sqrt{\frac{\sqrt{8}a}{3g}}$ is the answer of part (c).

Case (d): In this case the disc will swing like a pan across its surface unlike that in case case (b) above. Accordingly, MI about point P is $I_P = \frac{I_0}{2} + m\left(\frac{r}{2}\right)^2 = \frac{mr^2}{2} + \frac{mr^2}{4} = \frac{3mr^2}{4}$. And hence time period

$$T = 2\pi \sqrt{\frac{\frac{3mr^2}{4}}{mg\frac{r}{2}}} = 2\pi \sqrt{\frac{3r}{2g}}.$$
 Thus, $T = 2\pi \sqrt{\frac{3r}{3g}}$ is the answer of part (c).

N.B.: In this problem MI of an object about different points of its plane have been very nicely articulated.

Question-12: Two small balls, each of mass *m*, are connected by a light rigid rod of length *L* as shown in the figure. The system is suspended from its center by a thin wire of torsional constant *k*. The rod is rotated about the wire through an angle θ_0 and released. Find the tension in the rod as the system passes through the mean position.

Illustration-12: Moment of Inertia of two small balls of mass m separated light rigid rod of length about its center O is $I = m \left(\frac{L}{2}\right)^2 + m \left(\frac{L}{2}\right)^2 = \frac{mL^2}{2}...(1)$ Torsional energy stored in the suspension wire $TE = \frac{1}{2}k\theta^2...(2)$ $m\frac{L}{2}\omega^2 \leftarrow$ when the rod passes through its mean position it will be converted into Kinetic Energy $KE = \frac{1}{2}I\omega^2...(3)$ such that $\frac{1}{2}I\omega^2 = \frac{1}{2}k\theta^2 \rightarrow \omega = \sqrt{\frac{k}{I}}\theta...(4)$.







The centripetal force on the rod would be $F_c = m\left(\frac{L}{2}\right)\omega^2 \rightarrow F_c = m\left(\frac{L}{2}\right)\left(\frac{k}{l}\right)\theta^2 = m\left(\frac{L}{2}\right)\left(k \times \frac{2}{mL^2}\right)\theta^2 = \frac{k}{L}\theta^2$. In addition gravitational force of the balls is $F_g = mg$. It is seen from the figure that both F_c and F_g are orthogonal and both the balls are attached to the rod, while being symmetrical to the wire. Hence, resultant force on the rod that supports the balls is $R = \sqrt{F_c^2 + F_g^2} = \sqrt{\left(\frac{k}{L}\theta^2\right)^2 + (mg)^2} = \sqrt{\frac{k^2}{L^2}\theta^4 + m^2g^2}$. Thus answer is $\sqrt{\frac{k^2}{L^2}\theta^4 + m^2g^2}$

N.B.: Since magnitude of resultant motion is always (+) ve hence correct representation in radical form and not in exponential form.

Question-13: Two non-viscous, incompressible and immiscible liquids of densities ρ and 1.5ρ are poured into the two limbs of a circular tube of radius *R* and small cross-section kept fixed in a vertical plane as shown in the figure. Each liquid occupies one fourth of the circumference of the tube.

(a) Find the angle θ that the radius to interface makes with the vertical in equilibrium position.



(b) If the whole liquid column is given a small displacement from its equilibrium position, show that the resulting oscillations are simple harmonic. Find the time period of these oscillations.

Illustration-13: Combining (2) and (3) in (1) we have $\frac{R(\cos \theta - \sin \theta)}{R(\cos \theta + \sin \theta)} = \frac{2}{3} \rightarrow \cos \theta = 5 \sin \theta$. It leads to $\tan \theta = \frac{1}{5} \rightarrow \theta = \tan^{-1} \frac{1}{5}$...(4). **Thus answer of part (a) is** $\tan^{-1} \frac{1}{5}$

Now liquid in equilibrium is displaced by a small angle β i.e. in anticlockwise direction. It

results in fall of height of liquid column in left limb by h such that $h'_1 = h_1 - h$. Since the liquids are

incompressible there will be consequential rise in height of liquid column on right by height by h such that $h'_2 = h_2 + h$. Net pressure difference at level of PQ is $h'_2 - h'_1 = (h_2 + h) - (h_1 - h) = (h_2 - h_1) + 2h$.

Since liquid in the two limbs are of different densities and hence change of pressure on the left due to fall of level is $\Delta p_L = \rho_1 g(-h) = -1.5\rho gh$ and change of pressure on the right limb due to rise of level $\Delta p_R = \rho_2 g\rho(h) = g\rho h$. Therefore, $\Delta p = \Delta p_R - \Delta p_L = g\rho h - (-1.5g\rho h) = 2.5\rho gh$.

Let *A* is the cross-section of the tube, the torque about O is $\vec{\tau} = \vec{R} \times \vec{F}$, it solves into $\vec{\tau} = \vec{R} \times (\overline{\Delta pA}) = -2.5\rho ghAR\hat{k}$. Here, $h = R(\sin\theta - \sin(\theta - \beta))$, as shown in the figure geometrically. Further, $\sin\theta - \sin(\theta - \beta) = \sin\theta - (\sin\theta\cos\beta - \cos\theta\sin\beta)$. Since, β is small hence $\sin\theta - \sin(\theta - \beta) = \sin\theta - (\sin\theta - \beta \cdot \cos\theta) = \beta \cdot \cos\theta$. Thus, $\vec{\tau} = -2.5\rho g(R\beta\cos\theta)AR\hat{k} = -(\frac{5}{2}\rho gAR^2\cos\theta)\beta\hat{k}$. Ot leads to $\tau = -K\beta$...(5).

Here, in the expression of torque angular displacement β is in clockwise direction and unit vector $(-\hat{k})$ indicates torque is in anticlockwise direction and thus it satisfies conditions of SHM. Here, coefficient $K = 2.5\rho g A R^2 \cos \theta \dots (6)$ is a constant including θ determined in part (a) on the answer.

In rotatory motion angular acceleration α is such that $\tau = I\alpha$...(7). In the given system $I = m_1 R^2 + m_2 R^2$ since mass of liquid is distributed about O at a distance R, and $m_1 = \frac{\pi}{4}RA\rho_1 = 1.5 \times \frac{\pi}{4} \times RA$ and $m_2 = \frac{\pi}{4}RA\rho_2 = \frac{\pi}{4}RA$. Thus, moment of inertia $I = \left(1.5RA\rho\left(\frac{\pi}{2} - \theta\right)\right)R^2 + \left(RA\rho\left(\frac{\pi}{2} + \theta\right)\right)R^2 = \frac{5\pi}{4}\rho AR^3$...(8).

Thus combining (5), (6), (7) and (8) we have $\left(\frac{5\pi}{4}\rho AR^3\right)\alpha = -\left(\frac{5}{2}\rho gAR^2\cos\theta\right)\beta$. Here, $\cos\theta = \frac{1}{\sqrt{1+\tan^2\theta}} = \frac{5}{\sqrt{26}}$, using

the value $\tan \theta = \frac{1}{5}$ arrived at (4). Thus, $\alpha = -\frac{\frac{5}{2}\rho gAR^2 \times \sqrt{\frac{25}{26}}}{\frac{5\pi}{4}\rho AR^3}\beta = -0.98 \times \frac{2g}{\pi R}\beta = -0.624\frac{g}{R}\beta$. Thus. As per characteristic equation of SHM $= -\omega^2\beta$, accordingly $\omega^2 = 0.624\frac{g}{R} \rightarrow \omega = \sqrt{0.624\frac{g}{R}} = \frac{2\pi}{T}$ or, $T = \frac{2\pi}{\sqrt{0.624\frac{g}{R}}} = 2\pi\sqrt{\frac{R}{0.624g}}$. Taking

 $g = 10 \text{ m.s}^{-2}$, we have $T = 2\pi \sqrt{\frac{R}{6.24}} = 2.5\sqrt{R}$ s. Hence answer of part (b) is 2.5 \sqrt{R} s.

N.B.: Here $h_1 = R(1 - \sin \theta)$ therefore when θ undergoes a small change say β then $\Delta h_1 = -(R \cos \theta) \beta$. Therefore, change in height of C where $\theta \to \frac{\pi}{2}$, then $\Delta h_C \to -(R \cos \frac{\pi}{2}) \beta = 0$. Accordingly, in the elaborations above, changes in level of C, when liquid in equilibrium displaced by small angle β , have been ignored.







Question: 14: Two identical balls A and B each of mass 0.1 kg are attached to two identical massless springs. The spring-mass system is constrained to move inside a rigid smooth pipe bent in the form of a circle as shown in the form of a circle as shown in the figure. The pipe is fixed in horizontal plane. The centers of the ball can move in a circle of radius 0.06 m. Each spring has a natural length of 0.06π m and spring constant 0.1 N/m. Initially, both the balls are displaced by an angle $\theta = \frac{\pi}{6}$ rad with respect to the diameter PO of the circle (as shown in the figure) and released from rest –

- (a) Calculate the frequency of oscillation of the ball B
- (b) Find the speed of ball A when A and B are two ends of diameter PQ.
- (c) What is the total energy of the system,

Illustration-14: Initial length of both springs $L_0 = 0.6\pi = \pi R$ since radius of the circle on which balls move is R = 0.6 m.. It also implies that the balls are point masses.

When each of the balls is moved towards each other by an angle θ one spring is stretchered by $\Delta l = \alpha R = 2 \times \theta \times R = 2R\theta$ rad, while other spring is also compressed by $\Delta l = \alpha R = 2 \times \theta \times R = 2R\theta$ Thus, restoration force exerted by stretched spring $F_1 = k \times \Delta l = 2kR\theta$ N and likewise the spring getting compressed exerts force $F_2 = k \times \Delta l = 2kR\theta$ N. Both of these forces are unidirectional, hence net force on the balls is $F = F_1 + F_2 = 4kR\theta$. Thus, torque exerted by the force about the center of the path O would be $\vec{\tau} = \vec{R} \times \vec{F} = -4kR\theta \cdot$ $R = -4kR^2\theta$ N.m. ..(1). Here, the angular acceleration is proportional to angular displacement and (-) sign indicates that it is in a direction opposite to the angular displacement and thus it satisfies conditions of SHM of the balls.



Now, moment inertia of the ball about the center O is $I = mR^2$ and in rotatory motion $\tau = I\alpha = mR^2\alpha...(2)$. Thus combining (1) and (2) we have $mR^2\alpha = -4kR^2\theta \rightarrow \alpha = -\frac{4kR^2}{mR^2}\theta \rightarrow \alpha = -\frac{4k}{m}\theta...(3)$ Here, the angular acceleration is proportional to angular displacement and (-) sign indicates that it is in a direction opposite to the angular displacement and thus it satisfies conditions of SHM of the balls.

Characteristic equation if SHM is $\alpha = -\omega^2 \theta \dots (4)$. Combining (3) and (4) $\omega^2 = \frac{4k}{m} \rightarrow \omega = 2\sqrt{\frac{0.1}{0.1}} = 2 \text{ rad.s}^{-1}$. Hence, frequency of oscillation of the spring is $\omega = 2\pi f \rightarrow 2 = 2\pi f \rightarrow f = \frac{1}{\pi}$ Hz. **Thus answer of part (a) is \frac{1}{\pi} Hz.**

When masses are positioned at $\theta = \frac{\pi}{2}$ energy stored in compressed spring $PE_1 = \frac{1}{2}k\left(\left(R\frac{\pi}{6}\right) \times 2\right)^2 = \frac{k\pi^2 R^2}{18}$ and energy stored in stretched spring is $PE_2 = \frac{1}{2}k\left(\left(R\frac{\pi}{6}\right) \times 2\right)^2 = \frac{k\pi^2 R^2}{18}$. Hence, total potential energy in the two springs is $PE_{\frac{\pi}{2}} = PE_1 + PE_2 = 2 \times \frac{k\pi^2 R^2}{18} = \frac{k\pi^2 R^2}{9}$. At this position both the masses are released from state of rest and hence $KE_{\frac{\pi}{2}} = 0$. Thus total energy of the system is $TE = KE_{\frac{\pi}{2}} + KE_{\frac{\pi}{2}} = \frac{k\pi^2 R^2}{9} = \frac{0.1 \times \pi^2 \times 0.06^2}{9} = 3.95 \times 10^{-4}$ J or 4.0×10^{-4} J. Thus answer of part (c) is 4.0×10^{-4} J.

At $\theta = 0$ when the two ball A and B are two ends of diameter PQ, springs are at natural length and hence $PE_0 = 0$ and $KE_0 = TE = 4.0 \times 10^{-4} = 2 \times (\frac{1}{2}mv^2) \rightarrow v = \sqrt{\frac{4.0 \times 10^{-4}}{0.1}} = \sqrt{40} \times 10^{-2} = 6.3 \times 10^{-2} \text{m.s}^{-1}$. Hence, answer of part (b) is $6.3 \times 10^{-2} \text{m.s}^{-1}$.



N.B.: In this velocity of the masses at diametrically opposite positions i.e. $\theta = 0$, when the ball are released from speed cannot be determined from equations of motion since acceleration is changing with change in length of spring. Hence, principle of conservation of energy has been applied.

--00---

Problems are meant to be solved; every solution open doorway to new problems. This is an endless journey to discovery of nature. We are, what we are, because of rigorous efforts of countless persons.

--00---

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.

Growing into an expert, is a process during which 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 examinations and a guide to their solutions in a structured manner, as a dynamic exercise to catalyse the conceptual thought process.

__00__

Growing with Concepts: Chemistry

General Characteristics Of The Compounds Of Alkali and Alkaline Earth Metals

The compounds of alkali metals are mostly ionic in nature. Due to the low ionization enthalpies and large atomic sizes, the atoms of alkali metals form cations readily by losing the valence electrons. Consequently, they form ionic bonds with non-metals of p-block.

General characteristics of some of the compounds of alkali metals are:

 Oxides and hydroxides:- Alkali metals react with oxygen to form three types of oxides, namely oxides, peroxides and super oxides depending upon the metal. Lithium forms only oxide, sodium forms the peroxide (Na₂O₂) while K, Rb and Cs form the super oxides (MO₂). Under appropriate conditions, pure compounds, M₂O, M₂O₂ or MO₂ may be prepared. It may be noted that super oxide ion has three electron bonds i.e., it has one unpaired electron. Therefore, super oxides are colored.



For example, KO_2 is orange, RbO_2 is brown and CsO_2 is orange. These are also paramagnetic in nature . Sodium peroxides are also yellow in color probably due to the presence of some amount of superoxide in it. However, the normal oxides of alkali metals are colorless and diamagnetic. The normal oxides are basic because they dissolve in water to form alkali metal hydroxides. Therefore, the alkali metal oxides are basic in nature.

 $Na_2O + H_2O \rightarrow 2NaOH (aq)$

Peroxides and superoxides give hydrogen peroxide also.

$$Na_2O_2 + 2H_2O \rightarrow 2NaOH + H_2O_2$$

 $2KO_2 + 2H_2O \rightarrow 2KOH + H_2O_2 + O_2$

The peroxides and superoxides also act as oxidising agents because they react with water and hydrogen peroxide and oxygen respectively. Sodium peroxide is widely used as an oxidising agent in inorganic chemistry. The hydroxides are obtained by the reaction of alkali metals or their oxides with water. These are white crystalline solids.

(i) **Basic strength**- the hydroxides of alkali metals are strongly basic and their basic strength increases down the group. Because the M-OH bond in the hydroxides of alkali metals is very weak and it can easily ionise to form M^+ and OH^- ions.

MOH (aq)
$$\leftrightarrow$$
 M⁺ (aq) + OH⁻ (aq).

Kumud Bala

They are strongest of all bases and readily dissolve in water with the evolution of much heat. The hydroxides of alkali metals behave as strong bases due to their low ionization enthalpy. Therefore, the basic strength of the hydroxide increases down the group.

LiOH<NaOH<KOH<RbOH<CsOH

(ii) **Solubility and stability:-** All the hydroxides are highly soluble in water and thermally stable except lithium hydroxide.

$$2LiOH \rightarrow^{\Delta} Li_2O + H_2O$$

(iii) **Formation of salts with acids:-** Alkali metals hydroxides being strongly basic react with all acids forming salts.

NaOH + HCl \rightarrow NaCl + H₂O,

 $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

The salts are colorless ionic solids which are soluble in water.

2. Halides:- The alkali metals combine directly with halogens under appropriate conditions forming halides. These halides can also be prepared by the action of aqueous halogen acid (HX) on metal oxides, hydroxides and carbonates.

$$\begin{array}{rcl} M_2O &+& 2HX \rightarrow & 2MX + & H_2O \\ MOH &+& HX & \rightarrow & MX + & H_2O \\ M_2CO_3 &+& 2HX & \rightarrow & 2MX + CO_2 + H_2O \\ (Here, M \ symbolizes Li, Na, K, Rb \ or \ Cs \ and \ X = \\ F,Cl, Br, \ or \ I) \ . \end{array}$$

All these halides are colorless, high melting crystalline solids. All these halides have high negative enthalpies of formation (ΔH°_{f}). The enthalpies of formation for fluorides become less negative as we go down the group while the reverse is true for ΔH°_{f} for chlorides, bromides and iodides. For a given metal, the enthalpy of formation becomes less negative from the fluoride to the iodide. Thus, fluorides of alkali metals are most stable while iodides of alkali metals are least stable. Enthalpies of formation (kJmol⁻) of alkali metals halides:

Element	MF	MC1	MBr	MI
Li	-612	-398	-350	271
Na	-569	400	360	288
K	-563	-428	392	-328
Rb	-549	423	-389	-329
Cs	-531	424	-395	-337

The melting and boiling points of the alkali metal halides decrease with increase in atomic mass of the

halides As: Fluoride>Chloride> Bromide> iodide. All alkali metal halides are soluble in water. But LiF is insoluble in water due to its high lattice energy because of small cation and small anion size. The CsI has also low solubility due to smaller hydration energy of its two ions. Covalent character of alkali metal halides decreases as the size of the cation increases: LiCl>NaCl>KCl>RbCl>CsCl. Thus, LiCl is more covalent than KCl. Smaller the cation greater is its polarizing power and hence larger is the covalent character. Covalent character of lithium halides is in the order of LiI>LiBr>LiCl>LiF. Size of the anion becomes larger, greater is its polarizability. LiCl is soluble in pyridine. [What is polarizing power? -When a cation approaches an anion, the electron cloud of the anion is

towards the cation and hence gets distorted. This effect is called polarization. The power of



the cation to polarize the anion is called its polarizing power.]

3. Salts of oxo acids:- Alkali metals are electropositive metals and therefore, they form salts with oxo acids. Oxo acids are those in which the acidic proton is on a hydroxy group with an oxo group attached to the same acid. For example, carbonic acid (H_2CO_3) or $OC(OH)_2$, sulphuric acid, H_2SO_4 or $O_2S(OH)_2$, phosphoric acid, H₃PO₄ or OP(OH)₃ etc. The alkali metals form salts with all the oxo acids. These are generally soluble in water and are thermally stable. The carbonates of alkali metals (M₂CO₃) and bicarbonates $(MHCO_3)$ are highly stable to heat. As the electropositive character increases down the group, the stability of the carbonates and bicarbonates increases. The behaviour of lithium is unusual because its carbonate is not so stable to heat and its bicarbonate does not exist as a solid. Li2CO3 decomposes readily because it is not very stable. $Li_2CO_3 \rightarrow^{\Delta} Li_2O$ Lithium does not form solid bicarbonate + CO₂. though it does exist in solution. All the other bicarbonates on gentle heating undergo decomposition to form carbonates with the evolution of carbon dioxide.

 $2MHCO_3 \ \rightarrow^{\Delta} M_2CO_3 \ + \ CO_2 \ + \ H_2O$

General characteristic of compounds of alkaline earth metals:- Due to higher enthalpy of formation in the solid state and due to higher hydration enthalpy in the aqueous solution, alkaline earth metals uniformally form dipositive ions. Further due to increased nuclear charge and smaller size, alkaline earth metals form compounds which are less ionic than corresponding compounds of alkali metals. Usually the oxides and other salts of Be and Mg are more covalent than those formed by the heavier and larger members (Ca, Sr and Ba). Some of their compounds are presented below:

1. Oxides:- The oxides of alkaline earth metals (MO) are obtained by heating the metals in oxygen or by thermal decomposition of their carbonates.

 $2M + O_2 \rightarrow^{\Delta} 2MO$ (M= Be, Mg, Ca) MCO₃ $\rightarrow^{\Delta} MO + CO_2$ (M= Be, Mg, Ca, Sr, Ba) The decomposition temperatures for these carbonates are:

BeCO ₃	MgCO ₃	CaCO ₃	SrCO ₃	BaCO ₃
523K	813K	1173K	1562K	1633K

All these alkaline earth metals oxides except BeO have rock salts (NaCl type) structure. The BeO is essentially covalent in nature. The enthalpies of formation of these oxides are very high and therefore, they are very stable.

Metal oxides	BeO	MgO	CaO	SrO	BaO
$\Delta_{\rm f} {\rm H}({\rm kJmol}^{-})$	550	590	623	590	545

These have high melting points, have very low vapour pressures, are very good conductors of heat. They are chemically inert and act as electrical insulators. Because of these properties, these oxides are used for lining furnaces and hence are use as refractory materials. Due to small size of beryllium ion, BeO is covalent but still has high melting point because of its polymeric nature. Each Be atom is tetrahedral coordinated to four other oxygen atoms. Therefore, like other metal oxides, BeO is also used as a refractory. Among the oxides BeO is amphoteric while oxides of other elements are basic in nature [BeO (amphoteric), MgO (weakly basic), CaO, SrO, BaO (basic)]. The amphoteric character of BeO is supported by the fact that it reacts with acids as well as alkalis. $BeO + HCl \rightarrow BeCl_2 + H_2O$ (basic nature) $BeO + NaOH \rightarrow Na_2BeO_2 + H_2O$ (acidic nature)

The increase in basic character of oxides from Be to Ba is because of decrease in polarizing power with increase in ionic size. 2. Hydroxides:- the oxides of Be and Mg (BeO, MgO) are almost insoluble in water while the oxides of rest of the metals dissolve in water to form hydroxides. The reaction of these oxides with H₂O is also sometimes called as slaking.

 $CaO + H_2O \rightarrow Ca(OH)_2 + heat$

The insolubility of BeO and MgO in water is due to their large lattice enthalpies. $Be(OH)_2$ and $Mg(OH)_2$ being insoluble are obtained from suitable metal ion solutions by precipitation with OH⁻ ions.

 $BeCl_{2} + 2NaOH \rightarrow Be(OH)_{2} \downarrow + 2NaCl$ MgSO₄ + 2NaOH \rightarrow Mg(OH)₂ $\downarrow + Na_{2}SO_{4}$

Properties of Hydroxides:-

(i) **Basic character**- due to small size and high ionization enthalpy, $Be(OH)_2$ is amphoteric. It therefore, dissolves both in acids and bases.

$$\begin{array}{rcl} Be(OH)_2 + 2HCl & \rightarrow BeCl_2 & + 2H_2O \\ Be(OH)_2 + 2NaOH \rightarrow & Na_2BeO_2 + 2H_2O \\ & Sodium \ beryllate \end{array}$$

Or,
$$Be(OH)_2 + 2OH^- \rightarrow [Be(OH)_4]^{-2}$$

Beryllate ion

The hydroxides of Mg, Ca, Sr and Ba are basic. Their basic strength increases as we move down the group. The basic character of these hydroxides is due to their low ionization enthalpies. Because of low ionization enthalpy, the M-O bond in MOH is weak and thus, breaks to give OH ions in solution. On moving down the group, the ionic sizes increase and ionization enthalpies decrease. As a result, M-O bond becomes weaker and weaker down the group and hence the basic character increases down the group. The hydroxides of alkaline earth metals are less basic than alkali metal hydroxides because of higher ionization enthalpies, smaller ionic sizes, dipositive charge on the ions and greater lattice energies.

(ii) Solubility in water- Alkaline earth metal hydroxides are less soluble in water as compared to the alkali metal hydroxides. However, the solubility of hydroxides in water increases with increase in size of the metal. $Be(OH)_2$ and $Mg(OH)_2$ are almost insoluble, $Ca(OH)_2$ is sparingly soluble while $Sr(OH)_2$ and $Ba(OH)_2$ are fairly soluble. This trend is due to the increase in size of the cation on moving down the group so that their lattice energies decrease. Due to decrease in lattice enthalpies, the hydration enthalpies become more and more and the solubility of hydroxides in water increases.



3. Halides:- The halides of alkaline earth metals can be obtained either by direct reaction with halogen or by the action of halogen acids on metals, their oxides carbonates or hydroxides.

 $\begin{array}{rcl} M & + & X_2 & \longrightarrow & MX_2 & (\ X = Cl_2 \ or \ Br_2) \\ MO & + & 2HX & \longrightarrow & H_2O \\ M(OH)_2 & + & 2HX & \longrightarrow & MX_2 \ + \ 2H_2O \\ MCO_3 & + & 2HX & \longrightarrow & MX_2 \ + \ CO_2 + H_2O \end{array}$

Properties of halides:

(i) All beryllium halides are covalent and are soluble in organic solvents. They are hydroscopic i.e. they absorb water molecules and form hydrates such as On hydrolysis, it gives fumes of $BeCl_2.4H_2O.$ hydrochloric acid and produces acidic solution. $BeCl_2 + 2H_2O$ \rightarrow Be(OH)₂ +2HCl (ii) The halides of all other alkaline earth metals are ionic. Their ionic character, however, increases as the size of the metal ion increases. As the ionic character increases or the covalent character decreases, their tendency towards hydrolysis decreases.

BeCl₂>MgCl₂>CaCl₂<SrCl₂>BaCl₂

(iii) The hydrated chlorides, bromides and iodides of Ca, Sr and Ba can be dehydrated on heating but those of Be and Mg undergo hydrolysis.

MgCl₂. $6H_2O \rightarrow^{\Delta} MgO + 2HCl + 5H_2O$ CaCl₂. $6H_2O \rightarrow^{\Delta} CaCl_2 + 6H_2O$

 $aCl_2.6H_2O \rightarrow CaCl_2 + 6H_2O$

Anhydrous calcium chloride is used as a dehydrating agent. CaCl₂ is widely used for melting ice on roads, particularly in very cold countries because 30% eutectic mixture of CaCl₂/ice freezes at 218K compared to NaCl/ice at 255K. Anhydrous MgCl₂ is used in the electrolytic extraction of magnesium.

(iv) BeF_2 is highly soluble in water due to the high hydration energy of the small Be^{+2} ion. The other fluorides (MgF₂, CaF₂, SrF₂ and BaF₂) are almost insoluble in water. Their solubility increases slightly with increase in cation as we move down the group, lattice energy decreases more rapidly than hydration energy. CaF₂ (fluorspar) is very important because it is the only large scale source of fluorine. The chlorides, bromides and iodides of all other elements, i.e., Mg, Ca, Sr, Ba are ionic have lower melting points than the fluorides, and are readily soluble in water. The solubility decreases somewhat with increasing atomic number. (v) Except $BeCl_2$ and $MgCl_2$ the other chlorides of alkaline earth metals impart characteristic colour to flame; $CaCl_2$ (Bricked red), $SrCl_2$ (Crimson red), $BaCl_2$ (grassy green). Solid phase of $BeCl_2$ has polymeric structure with chloro bridges in which a halogen atom bonded to one beryllium atom uses a lone pair of electrons to form a coordinate bond to another beryllium atom as shown below:



In the vapour phase it tends to form a chloro bridged dimer which dissociates into the linear triatomic monomer at high temperature (1200K).

4. Salts of Oxo Acids:- The salts containing one or more atoms of oxygen such as oxides, hydroxides, carbonates, bicarbonates, nitrites, sulphates, oxalates and phosphates are called oxo salts. Let us now discuss the solubility and thermal stability of some of the oxo salts of alkaline earth metals.

(i) **Sulphates-** The sulphates of alkaline earth metals (MSO₄) are prepared by the action of sulphuric acid on metals, metals oxides, hydroxides and carbonates.

 $\begin{array}{ll} M+H_2SO_4 & \rightarrow MSO_4+H_2 \\ MO+H_2SO_4 & \rightarrow MSO_4+H_2O \\ M(OH)_2+H_2SO_4 & \rightarrow MSO_4+2H_2O \end{array}$

 $MCO_3 + H_2SO_4 \rightarrow MSO_4 + CO_2 + H_2O$

Properties of sulphates:- the sulphates of alkaline earth metals are all white solids. Beryllium, magnesium and calcium sulphates crystallize in the hydrated form, i.e. BeSO₄.4H₂O, MgSO₄.7H₂O, CaSO₄.2H₂O but sulphates of strontium and barium crystallize without water of crystallization.

Solubility:- The solubility of the sulphates in water decreases down the group, i.e. Be>Mg>>Ca>Sr>Ba. Thus, $BeSO_4$ and $MgSO_4$ are highly soluble, $CaSO_4$ is sparingly soluble but the sulphates of Sr, Ba, and Ra are insoluble. This is due to the decreasing hydration energies from Be^{+2} to Ba^{+2} . The high solubility of $BeSO_4$ and $MgSO_4$ is due to the high hydration energies because of smaller size of Be^{+2} and Mg^{+2} ions. The sulphates of alkaline earth metals are less soluble than the corresponding salts of alkali metals. This is due to higher lattice enthalpies of alkaline earth metals sulphates.

Stability:- the sulphates of alkaline earth metals decompose on heating giving the oxides and SO₃.

$$MSO_4 \rightarrow^{\Delta} MO + SO_3$$

The temperature of decomposition of these sulphates increases as electropositive character of the metal or the basicity of the metals hydroxides increase down the group. For example:

Compound	BeSO ₄	MgSO ₄	CaSO ₄	SrSO ₄	BaSO ₄
Temperature of	773K	1168K	1422K	1647K	-
decomposition					

Uses:- (i) The almost negligible solubility of $BaSO_4$ in water is used in the detection and estimation of SO_4^{-2} ions. (ii) $BaSO_4$ is insoluble in water and opaque to X-rays. Therefore, 'barium meal' is used to obtain a shadow of the stomach on an X-ray film which is useful in diagnosing stomach ulcers.

(ii) **Carbonates:-** The carbonates of alkaline earth metals can be prepared by passing carbon dioxide in limited supply through the solutions of their hydroxides.

 $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 \downarrow + H_2O$

When sodium or ammonium carbonate is added to the solution of the alkaline earth metal salts such as $CaCl_2$, carbonates of alkaline earth metal are obtained as white precipitates.

 $CaCl_2(aq) + Na_2CO_3(aq) \rightarrow CaCO_3(s) + 2NaCl(aq)$

Properties of carbonates:- All carbonates are ionic but beryllium carbonate is prone to hydrolysis. It contains the hydrated ion $[Be(H_2O)_4]^{+2}$ rather than Be^{+2} and hence is precipitated only in an atmosphere of CO_2 .

 $BeCO_{3} + 4H_{2}O \xrightarrow{absence of CO2} \rightarrow [Be(H_{2}O)_{4}]^{+2} + CO_{3}^{-2}$ $\leftarrow_{Presence of CO2}$

Solubility:- The carbonates of magnesium and other are sparingly soluble in water and their solubility decreases down the group from Be to Ba. For example, MgCO₃ is slightly soluble in water but BaCO₃ is almost insoluble. As we move down the group, the lattice energies of carbonates remain approximately the same. The reason being that carbonate ion is so large that relatively small changes in the sizes of the cations from Be^{+2} to Ba^{+2} do not make any difference. Hence, solubility of carbonates of the alkaline earth metals decreases down the group mainly due to decreasing hydration energies of the cations from Be^{+2} to Ba^{+2} .

Stability:- The carbonates of all alkaline earth metals decompose on heating to form the corresponding metal oxide and CO_2 . $CaCO_3 \rightarrow CaO + CO_2$

Thermal stability of these carbonates increases down the group.

BeCO ₃	MgCO ₃	CaCO ₃	SrCO ₃	BaCO ₃
< 373K	813K	1173K	1563K	1633K

BeCO₃ is thus unstable and can be kept only in an atmosphere of CO₂. Thermal stability depends upon their lattice enthalpy. It depends upon two factors: (i) the smaller the ions, the more closely they can approach in the lattice and higher is the lattice enthalpy. (ii) The greater the charge on the ions, the larger is the attraction between them and higher is the lattice enthalpy. Bicarbonates of alkaline earth metals are prepared by passing CO₂ through a suspension of metal carbonates in water. For example,

 $\begin{array}{l} \text{CaCO}_{3}(s) + \text{CO}_{2}\left(g\right) + \text{H}_{2}\text{O}\left(aq\right) \rightarrow \text{Ca}(\text{HCO}_{3})_{2}\left(aq\right) \\ \text{Insoluble} \qquad \qquad \text{Soluble} \end{array}$

All the bicarbonates of alkaline earth metals are stable only in solution and have not been isolated in the pure state.

(iii) **Nitrates:-** Alkaline earth metal nitrates are prepared in solution and can be crystalline as hydrated salts by the action of HNO_3 on oxide, hydroxides and carbonates.

 $MCO_3 + 2HNO_3 \rightarrow M(NO_3)_2 + CO_2 + H_2O$

Here, M symbolizes Be, Mg, Ca, SR, Ba. Magnesium nitrate crystallizes as $Mg(NO_3)_2.6H_2O$ while barium nitrate Ba $(NO_3)_2$ crystallizes as anhydrous salt. Beryllium nitrate is unusual because it forms basic nitrate, i.e. $[Be_4O(NO_3)_6]$ in addition to the normal salt. This again shows that tendency to form hydrates decreases with increasing size and decreasing hydration enthalpy down the group. All nitrates and hydroxides on heating give the corresponding oxides. The O⁻² ion is more highly charged than NO₃⁻¹ and OH⁻¹therefore, M⁺²O⁻² have high lattice enthalpies than nitrates and hydroxides.

 $\begin{array}{l} 2M(NO_3)_2 \rightarrow 2MO + 4NO_2 + O_2 \\ (M=Be, Mg, Ca, Sr, or Ba) \\ 2Mg(NO_3)_2 (s) \rightarrow MgO (s) + 4NO_2 (g) + O_2(g) \\ Mg(OH)_2 \qquad \rightarrow MgO (s) + H_2O (l) \end{array}$

Strontium and barium nitrates are used in pyrotechnics for giving red and green flames.

(iv) Oxalates:- the oxalates of Ca, Sr and Ba are sparingly soluble in water but their solubility increases from Ca to Ba. Beryllium oxalate is highly soluble in water.

Assignment

1. Which of the following is most stable?

(A) BeCO₃ (B) MgCO₃ (C) SrCO₃ (D) CaCO₃

2. Which of the following has largest solubility in water?

(A) $Mg(OH)_2$	(B) Ca(OH) ₂
(C) $Ba(OH)_2$	(D) $Sr(OH)_2$

3. The correct order of stability of the following alkali metal chlorides is

(A) LiCl>KCl>NaCl>CsCl
(B) CsCl>KCl>NaCl>LiCl
(C) NaCl .KCl. LiCl. CsCl
(D) KCl>CsCl>NaCl>LiCl

- 4. The following compounds have been arranged in order of their increasing thermal stability. Identify the correct order. K₂CO₃ (I), MgCO₃ (II), CaCO₃ (III) BeCO₃ (IV)
 (A) I< II <III < IV
 (B) IV < II <III < I
 - (C) IV < II < II < III
 - (D) II < IV <III < I

5. The correct order of increasing ionic character is -----

(A) $BeCl_2 < MgCl_2 < CaCl_2 BaCl_2$ (B) $BeCl_2 < MgCl_2 < BaCl_2 < CaCl_2$

 $\begin{array}{l} (C) \ BeCl_2 < BaCl_2 < MgCl_2 < CaCl_2 \\ (D) \ BaCl_2 < CaCl_2 < CaCl_2 < MgCl_2 < BeCl_2 \\ \end{array}$

- 6. For two ionic solids KI and CaO, identify the wrong statement among the following---.
 (A) lattice energy of CaO is much higher than that of
 - (A) lattice energy of CaO is much higher than that of KI
 - (B) KI is soluble in benzene
 - (C) CaO has melting point
 - (D) KI has high melting point.
- 7. A metal M readily forms water soluble sulphate MSO₄, water insoluble hydroxide M(OH)₂ and oxide MO which becomes inert on heating. The hydroxide is soluble in NaOH. The metal is -----(A) Be (B) Mg (C) Ca (D) Sr
- KO₂ (Potassium superoxide) is used in oxygen cylinders in space and submarines because it ----- (A) absorbs CO₂ and increase O₂ content

- (B) eliminates moisture
- (C) absorbs CO₂
- (D) produce ozone
- **9.** Solubility of carbonates decrease down the group 2 due to decrease in-----
 - (A) entropy of solution formation
 - (B) lattice enthalpies of solids
 - (C) hydration enthalpies of cation
 - (D) inter-ionic attraction
- 10. Which of the following metal has most stable carbonate?(A) Na (B) Mg (C) Al (D) Si
- 11. Based on the lattice enthalpy and other considerations which one of the following alkali metal chlorides is expected to have highest melting point.(A) LiCl (B) NaCl (C) KCl (D) RbCl
- **12.** Which of the following statements about alkaline earth metals are correct?
 - (i) hydration enthalpy of Sr^{+2} is greater than that of Be^{+2}

- (ii) CaCO₃ decomposes at a higher temperature than BeCO₃
- (iii) $Ba(OH)_2$ is a strong base than $Mg(OH)_2$
- (iv) SrSO₄ is less soluble in water than CaSO₄.

Select the correct answer using the codes given below:

(A) (iv) only	(B) (i) and (iii)
(C) (ii), (iii) and (iv)	(D) (ii) and (iii)

13. The carbonate that will not decompose on heating is -----

(A) NaCO ₃	(B) CaCO ₃
(C) BaCO ₃	(D) SrCO ₃

- 14. Which of the following on thermal decomposition yields a basic as well as acidic oxide?
 (A) KClO₃ (B) Na₂CO₃
 (C) NaNO₃ (D) CaCO₃
- 15. Which pair of the following chlorides do not impart colour to the flame?
 (A) BeCl₂ and SrCl₂
 (B) BeCl₂ and MgCl₂
 (C) MgCl₂ and CaCl₂
 (D) BaCl₂ and SrCl₂

ANSWERS

					12 (B)	14 (D)	(A) EI	15 (C)	11 (B)
(A) 01	(C) 6	(A) 8	(A) 7	9 (D)	(A) č	4 (B)	(A) E	5 (C)	1 (C)



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. e-Mail ID: kumud.bala@vahoo.com

We are about to sacrifice our civilization for the opportunity of a very small number of people to continue to make enormous amount of money... But it is the sufferings of the many which pay for the luxuries if the few... You say that you love your children above everything else. And yet you are stealing their future.

- Greta Thumnberg

Kumud Bala

SCIENCE QUIZ : November-2019

1. A place where animals are protected in their natural habitat is called ---------e

(A) wildlife sanctuary	(B) biosphere reserv
(C) Zoo	(D) fauna

- 2. What will happen if we go on cutting trees? Select the incorrect statement.
 - (A) The temperature will increase to a greater extent.
 - (B) The chances of natural disaster to occur will increase.
 - (C) The water cycle will get disturbed.
 - (D) The exposed layer will lose all its nutrients, especially the hummus.
- 3. Conversion of fertile land into deserts is known as ----(A) deforestation (B) desertification (C) conservation (D) none of these.
- 4. The first national park in India is -----
 - (A) Bandipur national park
 - (B) Kaziranga national park
 - (C) Jim Corbett national park
 - (D) Satpura national park
- 5. All type of plant life is known as -----
 - (A) fauna (B) flora
 - (C) forest (D) none of these
- 6. When no member of a species exists, it is known as ---(B) endangered species (A) endemic species (C) extinct (D) vulnerable species
- 7. Growing new trees in forests is known as -----(A) deforestation (B) desertification (C) reforestation (D) none of these
- 8. Wild buffalo is an endangered species because -----(A) its population is diminishing
 - (B) it has become extinct
 - (C) it is found exclusively in a particular area
 - (D) its poaching is strictly prohibited
- 9. Which one of the following statements is true about a biosphere reserve?
 - (A) It is a protected area where only endemic species live.
 - (B) It is meant only for the conservation of plants and animals.
 - (C) It is meant to conserve both, the biodiversity and the culture of that area.
 - (D) There are no other protected areas within its limits.

- **10.** The places meant for conservation of biodiversity in their natural habitat are -----
 - (a) zoological gardens
 - (b) botanical gardens
 - (c) wildlife sanctuaries
 - (d) national parks.

Select the correct options. (A) (a) and (b) (B) (b) and (c) (C) (c) and (d) (D) (d) only

- **11.** What do black buck, elephant, python and golden cat together represent in a forest? (A) Fauna (B) Ecosystem
 - (C) Flora (D) Species.
- 12. The Red Data Book keeps a record of all the -----(A) endemic species and extinct species (B) extinct species and endangered plants (C) endangered plants and endangered animals (D) endemic species and endangered animals
- 13. In our country, large patches of forests are being cleared for cultivation of crops. The environmental impact of such a practice will teds to: (B) soil pollution (A) soil erosion (C) soil conservation (D) soil fertility.
- 14. Why is it important to conserve forests? (A) Maintain the level of CO_2 in the atmosphere

 - (B) Bind the top layer of soil that increass its fertility
 - (C) Help in absorbing rain water and thus, preventing floods.
 - (D) All the above
- **15.** Choose the correct statement:
 - (A) There can be a wildlife sanctuary within a biosphere reserve
 - (B) Plants of a particular area are collectively termed as fauna
 - (C) Deforestation leads to an increase in the water holding capacity of the soil
 - (D) Bison is not an endemic fauna of Pachmarhi biosphere reserve.
- 16. Which is the first reserve forest of India?
 - (A) Satpura national park
 - (B) Kaziranga national park
 - (C) Botanical garden
 - (D) none of these.
- 17. Migratory birds fly to faraway places because of ----change. (A) Climatic

(B) Global warming

(C) Natural calamities (D) Deforestation

- **18.** Which two animals have vanished from Satpura national park?
 - (A) tiger and leopard
 - (B) white buffalo and swamp deer
 - (C) lion and elephant
 - (D) rhinoceros and leopard
- 19. How many endangered species have listed in the Red Data Book of India?

(A) 4 (B) 5 (C) 2 (D) 3

 20. Endangered species listed in the Red Data Book of India are ---- (A) Asiatia lion
 (B) Parcel tiger

(A) Asiatic lion	(B) Bengal tiger
(C) Blue whale	(D) All the above

- **21.** How many full green trees are needed to make 1 tonne of paper?
 - (A) 25 trees (B) 35 trees
 - (C) 45 trees (D) 20 trees
- **22.** Which of the following is not a part of Pachmarhi biosphere reserve?
 - (A) Bori wildlife sanctuary
 - (B) Satpura national park
 - (C) Bandipur national park
 - (D) Pachmarhi wildlife sanctuary
- 23. The migratory bird which comes from Siberia to India for a few months every year is -----(A) crow (B) koel(C) graph (D) kingfisher
 - (C) crane (D) kingfisher
- 24. Sanjay Gandhi wildlife sanctuary is in ----(A) Rajasthan
 (B) Manipur
 (C) Madhya Pradesh
 (D) Maharashtra
- 25. Which of the following activities, if not checked in time, may ultimately lead to the rise in sea level causing the flooding of low-lying coastal areas?
 (A) Desalination (B) Description
 (C) Defense time
 - (C) Deforestation (D) Desegregation
- **26.** A highly poisonous animal Z which inhabits crop field is commonly known as friend of the farmer. It eats up pests like Y and saves the crops from damage. The animal Z is killed in large numbers to get its X which sells in the market at a high price. What is X, Y, Z?

- (A) X= snake, Y= rats, Z= skin
 (B) X= rats, Y= snake, Z= skin
 (C) X= skin, Y= rats, Z= snake
 (D) X= snake, Y= skin, Z= rats
- **27.** The species P and Q of wild animals are found only in a particular area. The species R of wild animals is listed in Red Data Book of India where as species S of wild animals no longer exists anywhere on the earth. What name is given to species like P, Q, R and S?
 - (A) P and Q are endemic species, R is endangered species is extinct species
 - (B) P and Q are endangered species, R is extinct sp ecies, S is endemic species
 - (C) P and Q are extinct species, R is endemic species and S is endangered species.
 - (D) P and Q are endangered species, R is endemic species and S is extinct species.
- **28.** Large scale deforestation leads to the decrease in the amount of gas A in the atmosphere where as the amount of gas B increases. The increased amount of gas B in the atmosphere causes an effect C which leads to excessive heating of the earth and its atmosphere producing an undesirable phenomenon D. What are A, B, C, and D?
 - (A) A= oxygen, B= CO₂, C= global warming, D= greenhouse effect
 - (B) $A=CO_2$, $B=O_2$, C= global warming, D= greenhouse effect
 - (C) A=green house effect, $B=CO_2$, $C=O_2$, D= global warming
 - (D) A= global warming, $B = O_2$, $C = CO_2$, D = green house effect.
- 29. One of following is not a part of the fauna of Pachmarhi biosphere reserve. This one is ----- (A) Yak (B) Leopard
 - (C) Blue bull (D) Barking deer
- 30. Which organization that produces the Red list?
 - (A) International Union for conservation of nature and natural resources
 - (B) World wildlife fund
 - (C) United nations Organization
 - (D) none of these

(Answers to this Science Quiz shall be provided inMonthly e-Bulletin)

__00__

Theme Song :

<u>PREMISE:We are pleased to adopt a song</u>" 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 nonorganizational initiative, being selflessly operated by a small set of compassionate 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 ||



Every end, so also end of this e-Bulletin, is a pause for a review, before Resuming of the journey far beyond ...



