GYAN VIGYAN SARITA:शिक्षा

A Non-organizational, Non-remunerative, Non-commercial and Non-political Initiative To Mentor Unprivileged Children with a Sense of Personal Social Responsibility (PSR) Monthly e-Bulletin GgyanVigyanSarita: যিধ্য April 01, 2020 (55th Issue)





Stay Safe

Stay Healthy





Let us Conquer CORONA Collectively and Globally

Janta Curfew Effect

(Jabalpur, March 22'2020)



Applaud with Gratitude To our Saviours The CORONA FIGHTERS







A Fact Unknown : Dr SB Dhar

Solitude that made Newton Founding Father of Science!

Newton was born in 1642 on the Christmas day. In 1665, the outbreak of the bubonic plague in England forced Cambridge University to close its doors. Newton who was a student there was compelled to return home to Woolsthorpe Manor and forced to study in solitude, 60 miles away from Cambridge.

This solitude generated a great creativity in Newton. This period of year-plus is marked as the *Year Of Wonders*. With this creativity in the next coming years, Newton gained an extra ordinary period of productivity. He developed his theories on calculus, optics, and the laws of gravity and motion. However, it was not known to public until 1687 when he published his findings *Philosophiae Natuaralis Principia Matematica*.

Learning

When a great plague can transform a simple genius into an extra ordinary Founding Father of Science, why can't we use these days of Lockdown to develop some extra intelligence amongst us so that we can do great things for us and our country in the coming days?

Our country is struggling to break the chain of CORONA EPIDEMIC through Three Weeks Home Confinement. Let us use this opportunity to discover our potential and bring to humanity something unimaginable.

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Aim at the Best, but...



... 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	lentor)	Mentoring Centre (if asked for)	by Mentor)		
Est	imated Capital	Cost (One Time)			
Particulars	Cost (in Rs)	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 (Max. if nothing is available)	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 Total with WSWD (<i>at a later date once IOMS stabilizes</i>)	60,000	Total with Total with WSWD	43,000		
Estimated Recurring Cost			•		
 a. Internet charges, based on estima monthly data transfer which depe upon choice of cloud platform, and tan of ISP b. Cloud Platform Charges, to be sha across Learning Centres 	ated Internet ch nds depends up riffs ured	arges, based on estimated monthly d on choice of cloud platform, and tariffs	ata transfer which s of ISP		
 Cloud platform : Google Hangouts is a free Video Conference cloud platform. Though it provides connectivity upto 15 nodes, connectivity maximum 5 Learning centres is made in IO. This self-imposed limitation is to – a) maintain quality of interaction mentoring, b) open an opportunity for more co-passion mentors to collectively participate mentoring deprived and unprivile children. 	in the product of the	since an initiative driven with ility (PSR) operating on Zero-Fu sis The IT Infrastructure with the Ment king. But, at any stage if upgradation acilitators or learning centres would be g sis, to maintain continuity of this selfless ost of Mentor, if required, shall be sup	Personal Social ind-&-Zero-Asset fors has been in use becomes essential, gratefully welcomed, initiative ported by Learning		

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: Google Hangout, a free-ware is used for IOMS in video-conferencing mode. Though it provides pre connectivity upto 15 Nodes, connecting maximum only 5 Learning Centres in one session is envisaged.

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.

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<u> संपादकीय</u>



कोरोना वायरस के संक्रमण से बचाव हेतु जरूरीः सफाई से नाता और भीड़ से दूरी

31 दिसंबर 2019 से शुरू होकर अबतक का समय, मौसम की उलटफेर और कोरोना वायरस के फैलने के कारण, आम जन-जीवन के लिये काफी संघर्षमय है। भारतवर्ष का रंगों का पर्व होली, भीड़ से बचने के लिये हर्षोल्लास से नहीं मनाया जा सका। लोग एक दूसरे से मिलने में परहेज करते रहे।

संपूर्ण विश्व में कोरोना वायरस का प्रकोप एक प्रकार की जैविक आपदा है। भारत में पाये गये कोरोना वायरस से संक्रमित लोगों की संख्या तो बढ़ती रही परंतु क्लीनिकल आधार पर सबकी हालत स्थिर रही। कोरोना वायरस को डब्ल्यू0 एच0 ओ0 ने "नोवेल कोविड-19 (COVID-19) नाम दिया है और विश्व के लिये इसे महामारी माना है।

कोरोना वायरस SARS (Severe Acute Respiratory Syndrome), और MERS (Middle East Respiratory Syndrome) फैमिली से है।

विश्व स्वास्थ्य संगठन के अनुसार विश्व के 195 देशों में से चीन के बाहर 110 से अधिक देशों में इसका प्रसार हो चुका है। इन देशों में थाईलैंड, ईरान, इटली, जापान, सिंगापुर, दक्षिण कोरिया, ऑस्ट्रेलिया, मलेशिया, अमेरिका, ब्रिटेन, फ्रांस, जर्मनी, संयुक्त अरब अमीरात आदि शामिल हैं।

कोरोना का प्रसार उन लोगों से हुआ जो उन देशों से लौटे जहां यह वायरस फैला हुआ था। डाक्टरों के अनुसार कोरोना का पता लगाने के लिये नाक, गला, और गहरी सांसों के नमूने सहायक सिद्ध हुये।

कुछ अफवाहों से यह खबर फैली कि कुछ देशों द्वारा जैविक हथियार बनाने के चक्कर में यह वायरस किन्हीं गलतियों से बाहर आ गया। एक कहावत है कि विकास की चरम परिस्थिति में ही विनाश-लीला प्रारंभ होती है।

क्या विचार करने का वह समय आ गया है, जब मनुष्य अपना विकास करते-करते अपने को नष्ट करने के उपायों पर विचार करने लग गया है?

हमें नहीं भूलना चाहिए कि जीवन बचाने के लिये वायरस का प्रयोग मानवीय कार्य है, पर जीवन को समाप्त करने के लिये इसके प्रयोग के बारे में सोचना हमारी मूर्खता ही मानी जायेगी।

डाक्टरों का अध्ययन रहा है कि कोरोना वायरस कुछ खास प्रजातियों के जानवरों में पाया जाने वाला वायरस है। यह सांप अथवा चमगादड़ जैसे जीवों में पाया जाता है। यह वायरस इंसानों में भी अपने को विकसित करने में सक्षम हो गया है। ऐसा इसलिये हुआ है कि कुछ देशों में सांप और चमगादड़ जैसे जीवों को खाने का शौक है।

वर्तमान का कोरोना वायरस चीन के वुहान शहर से फैलना शुरू हुआ। इसके फैलने का मुख्य कारण रहा-इसका संक्रमण। सांस के द्वारा एक मनुष्य से दूसरे मनुष्य में इसका फैलाव हुआ। इस वायरस का नाम कोरोना पड़ने के पीछे इसका आकार है। हम जानते हैं कि जब सूर्यग्रहण होता है यानि जब सूरज की रोशनी हमारी पृथ्वी पर चंद्रमा के सूरज और पृथ्वी के बीच में आ जाने से रूक जाती है, तब उसके इस रूप को कोरोना कहते हैं। सूर्य बीच में काला और उसके चारों ओर से छिटकता प्रकाश सूरजमुखी के फूल जैसा दिखायी पड़ता है।

यह वायरस भी आकार में गोल है और इसके सतह पर कोरोना की तरह प्रोटीन की शाखायें उगी हुयी हैं जो हर दिशा में फैलती नजर आती हैं।

इससे बचाव के लिये साबुन से बार-बार हाथ धोना और भीड़ भाड़ वाली जगहों पर किसी चीज को छूने से अपने को दूर रखना एक जरूरी उपाय सुझाया गया।

इसके रोकथाम के लिये अभी कोई टीका नहीं बना है और न ही इसके उपचार की कोई दवा ही है। इससे रक्षा अपनी प्रतिरोधक क्षमता को बढ़ाकर ही किया जा सकता है। प्रतिरोधक क्षमता इतनी जल्दी बढ़ नहीं सकती है। इसलिये सफाई एक मात्र कारगर उपचार लोगों के पास अवशेष रहा है।

डाक्टरों के अनुसार, हमें उन चीजों का प्रयोग खाने में करना चाहिये जिनमें विटामिन-सी की मात्रा अधिक पायी जाती है जैसे नीबू, संतरा, गिलोय आदि। पर याद रहे-ये सब चीजें इसकी दवा नहीं हैं बल्कि प्रतिरोधक क्षमता बढ़ाने के लिये उपाय हैं।

अन्य उपायों में डाक्टरों ने समझाया कि हमें अपने शरीर को निर्जलीकरण (Dehydration) से बचाना चाहिये। इसके लिये हमें गुनगुने पानी हर एक-आध-घंटे पर लेते रहना चाहिये। हमें खांसी, जुकाम, तेज बुखार न हो पाये, ऐसी सावधानी बरतनी चाहिये।

इस वायरस की शुरूआत खांसी, जुकाम, शरीर-दर्द, आंखों से पानी आने से होती है। मनुष्य अगर सावधानियां बरते तो खुद ही कुछ दिनों में ठीक हो जायेगा।

इस वायरस को इसके फैलने की प्रकृति को देखते हुये विश्व स्वास्थ्य संगठन ने मनुष्यों के लिये बहुत घातक बताया है। इसके घातक प्रभाव का अंदाजा इस बात से लगाया जा सकता है कि अंतर्राष्ट्रीय जगत में मेडिकल आपात्काल घोषित कर दिया गया है।

माना जा रहा है कि यह वायरस सतहों पर कुछ घंटों के लिये ही जीवित रहता है पर शरीर के अंदर पहुँच जाने पर काफी दिनों तक पनपता रह सकता है।

उन लोगों को जो इससे संक्रमित हो जायें, उनको सावधानी के तौर पर सर्जिकल मास्क पहनना चाहिये, साबुन से लगभग 20 सेकंड तक अपने हाथ धोने चाहिये, खासकर वाशरूम से आने के बाद, खाना खाने के पहले, और नाक पोंछने के बाद। अल्कोहल आधारित हैंडवाश सैनेटाइजर जिसमें कम से कम 60 प्रतिशत अलकोहल हो, का उपयोग सफाई में कारगर साबित हुआ।

बचाव के तरीकों में, टिश्यू का प्रयोग, रूमाल से अच्छा पाया गया क्योंकि इसे एक बार प्रयोग कर कूड़ेदान में फेंक दिया जाता है। खांसने वाले व्यक्ति से दूर रहना और खुद मुंह पर कपड़ा, टिश्यू अथवा हाथ की कोहनी रखकर खांसने के लिये बताया गया। भीड़भाड़ वाली और खुली जगहों पर अपनी आंखें, नाक, चेहरा आदि को अपने ही हाथों से छूने से बचने को बताया गया।

कोरोना वायरस से डरने की जरूरत नहीं है। हमें अफवाहों पर ध्यान नहीं देना चाहिये। इस पर भी विश्वास नहीं करना चाहिये कि इसकी कोई दवा है या हर व्यक्ति के लिये मास्क की जरूरत है। हमें जरूरत है कि खुद जागरूक रहें और अपने आसपास के वातावरण को साफ-सुथरा रखते हुये अन्य लोगों को स्वच्छ रहने के लिये जागरूक करें।

सावधानी ही कोरोना के संक्रमण से बचने का सही उपाय है। अगर हम भीड़ से दूरी बनाये रखें और सफाई से नाता जोड़े रखें तो हम इस वायरस के प्रकोप से अपने को बचाकर रख पायेंगे।

ज्ञानविज्ञानसरिता परिवार का अपने पाठकों से आग्रह है कि अफवाहों से बचें और सावधानी बरतने पर ज्यादा ध्यान दें। अफवाहें बीमारी से ज्यादा घातक होती हैं, इनका कोई उपचार नहीं होता है। हम अपने पाठकों से यह भी आग्रह करते हैं कि आप सभी लोग विशेषज्ञ डाक्टरों के द्वारा सुझाये गये बचाव के तरीकों को ही अपनाकर खुद को स्वस्थ रखें और दूसरों को भी ऐसा करने के लिये जागरूक बनायें।

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CORONA virus has become a global disaster. Though it is stated to have originated in China, the most populous country, yet, it has been the FIRST to contain it.

How China could do it?

It is important for us to learn from China.

They firmly implemented shutdown, without exception. China has a different kind of sociopolitical system, to be able to do that.

In a democracy like ours, for the success of such shutdown, people's participation is a must. It requires to respect need of survival and coexistence above personal, social, geographical, communal and political preferences.

It is a time for all of us to know, think, introspect and decide upon priority between coexistence, and personal liberty vis-à-vis human rights. We need to ask ourselves - what for are the human rights?

Let us be honest and judicious about the priority and its implementation. Let us exercise patience to bear order of the day unambiguously.

Instantly, at times curtailing human liberties may appear to be cruelty. But, such a cruelty if self-inflicted, brings home altogether a different experience. It is vouched from first-hand realizations that such self-impositions build a kind of resilience and a self-discipline, necessary to accomplish tasks which are apparently impossible. It helps to reap thrill of survival, and an ability to grow in tougher times.

Without this, all the talks of human liberty may turn out to be only cosmetic.

Let us stay safe, impose self-restrictions and collectively emerge as victorious nation.

It is time to patiently and bravely capitalize this disaster, like any other challenge, as an opportunity to carve better times ahead all human beings...

May GOD bless us all...

-00-

प्रकृति और कोरोना

कोरोना से सबक

मुकेश आनंद

यूं ना सोच ऐ मूर्ख इन्सान, कि सिर्फ बीमारी जान लेती है, याद रख कोरोना से बच भी गए, तो जिंदगी मार देती है।

कौन रहता है यहां उम्र मुकम्मल होने के बाद, वक्त वो आग है जो हर ख्वाब को खाक कर देती है।

बहुत सजा कर और संवार कर प्यार से रखते हो जो जिस्म, उसी को एक दिन, अपनों की लगाई आग राख कर देती है।

ये ऊंच नीच, बड़ा छोटा सब हमारे अपने बनाए चोंचले हैं, ये मौत है जो आखिर, बराबर सबका हिसाब कर देती है।

कैसे दुबके हैं घरों में जान के डर से 'आनंद' वो इंसान भी, देख शेर के मानिंद गरजने वालों को भी, मौत कैसे मेमना बना देती है।

प्रकृति होती है समुद्र के समान, सतत जाग्रत, प्रयत्नशील, लहराती और गर्जन करती।

देती है चुनौती, सभी आनेवाले को, किनारे खड़े होकर देखेंगे, या अंदर घुस कर करेंगे अनुभव? या डूब जाएँगे और निकलेंगे बार बार।

कुछ कर लेते हैं दोस्ती इसकी लहरों से, और झूमते हैं लहर बन, जब दो तिहाइ वही है तो करोगे क्या?

कोरोना जैसी लहरें और तरंग आती जाती आती ही रहेंगी, प्रकृति गरजती ही रहेगी। निर्णय करिए, बह जाना है या झूमना है, समुद्र के गर्जन के साथ।



कविअधिवक्ता एवं सामाजिक कार्यकर्ता हैं| सामाजिक विषयों पर पाठन, चिंतन –मनन, लेखन एवं उन पर कार्यान्वन उनकी अभिरुचि है | E-mail ID: lawexcel@gmail.com

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

- R. Buckminster Fuller

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EVOLUTION OF IOMS

- 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 2nd 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 75 students in Two rural schools, one is RKM High School in A.P. and other is Army Public School, Dinjan, Assam, are being ng mentored. At Dinjan it is our first step to mentor children of our brave soldiers securing our frontiers

> We continue to look forward.....

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Roots of education are bitter, but the fruit is sweet.

- Aristotle

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Strength and sense of judgement comes from wisdom and not mere knowledge.

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INVITATION FOR CONTRIBUTION OF ARTICLES

Your contribution in the form of an article, story poem or a narration of real life experience is of immense value to our students, the target audience, and elite readers of this Quarterly monthly e-Bulletin **Gyan-Vigyan Sarita**: **Right**, 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 <u>20th of each month</u> 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 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>: \widehat{RIET} due on 1st of ensuing month.
- > This cycle of monthly supplement e-Bulletin <u>Gyan-Vigyan Sarita: [शिक्षा</u> is aimed to continue endlessly, till we get your तन and मनsupport 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.

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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.



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I have been impressed with the urgency of doing. Knowing is not enough; we must apply. Being willing is not enough; we must do.'' - Leonardo da Vinci

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Coordinator's View

Half Truth ?

Truth signifies reality and is, therefore, absolute and invariant to all. The reality is something which whenever verified by whomsoever remains the same; it is a scientific phenomenon and a belief in non-scientific world. The process of verification is based on observations which lead to understanding of variants of the Truth.

Face value is the first perception on an observation which has been beautifully explained with word 'relative' in the scientific world and quite often it is used for relative velocity, relative density etc. where each observation is invariant as long as frame of reference remains unchanged, either by intent or limitation of observations, but, with the change in frame of reference observation changes. The understanding of science from motion of celestial bodies to Boson is not an end but a part of the continuous journey.

This article is in the context of first-experiences of half-truths and lies in pursuit of <u>Interactive Online Mentoring</u> <u>Sessions (IOMS)</u>, the flag-ship of <u>Gyan Vigyan Sarita</u>. Each of the experience is left with a question for reader so that we collectively evolve solution to the problems. It is with an optimism that readers would find a need of change.

It is considered contextual to mention in brief about IOMS, a selfless initiative, for readers who are aware of it, to refresh the thrust, and the readers who are not aware of it may like to know it for a better clarity. This initiative is driven by a small set of four senior persons, three of them are Senior Citizens, with a sense of Personal Social Responsibility (PSR) to democratize education. It is pursued in a non-organizational, non-remunerative, non-commercial and non-political manner. It's financial model is Zero-Fund-&-Zero-Asset (ZFZA). A brief reference to this is essential. In this initiative, effort is to mentor deprived children, crossing all barriers, interactively in an online mode and without discrimination. This does not deny opportunity to learn to children from privileged families, provided they and their parents are willing to embrace IOMS in it's frame. We are at a stage of entering 9th year, and are able to sustain it due to the fact that in such an initiative inspiration, passion, commitment, persistence and perseverance are highly demanding.

While bringing here typical realizations on the ground, care is being taken to veil the identity of person or institution. This may apparently look to be Half-Truth. Nevertheless, it is done deliberately in wake of the rampant spread of lies that is adversely affecting pursuit of education. It is a systemic menace, and individuals who are not <u>inspired</u> are drifted in the current.

Practice of Half-Truth is a human psychology that exists naturally. This point is made with a classical story from Indian epic the Mahabharata. During the battle of Kurukshetra, Guru Dronacharya wanted to ascertain from Dharmaraj Yudhishthira the truth of rumors on death Ashwathama. The latter replied "अश्वयामा हथ: , इति नरोवा कुझरोवा" (Ashawathama hatah, Iti narova kunjarova) means Ashawathama (son of the Guru) died, but it is a man or elephant not sure. Hearing this Dronacharya got deeply saddened and it became easy for Pandavas to neutralize Dronacharya, who was otherwise invincible. The veiled statement, Half-Truth, was made by the Dharmaraj, and it is upheld on moral grounds in the battle regarded as धर्म युद्ध

(Dharma Yuddha), to uphold righteousness. The battle is estimated to have been fought about 3100 B.C.

There is another story in Mahabharata, a great food for thought, when King Dhrutrashtra was required to judge between Duryodhana and Yudhishthira for princely crown. Four accomplices of a crime were produced in the court and both the princes were asked to pass on judgement. Duryodhana passed a simple and a plain judgement of equal punishment to each of the accomplice. Instead, Yudhishthira enquired the background of each of the accomplices. Then astonishingly, he pronounced differential punishment to each of the accomplices in proportion of their status, and not the crime. Ultimately, judgement of Yudhishthira was upheld on truth and wisdom and he was crowned as prince. The Mahabharata is full of many complex and thought provoking stories with multiple twists and turns.

Any act or incidence is a truth, half-truth or a lie based upon how it is observed, perceived and presented. Scientifically truth at one stage, may become Half-Truth with the increase in resolution or accuracy of observation. But, in humanities when truth is perceived in context of gain or loss and presented in a veiled manner for a larger good then it is regarded as Half-Truth, while complete denial of the truth or feigning ignorance is a lie.

Courts pass on judgement after examining truth, half-truth and lies against accomplice of a heinous crime. Review of a few judgement reveals that penal consequences of a crime are based on nature and extent of involvement in crime. Penal consequences for similar crime in different cases also depends upon the context and the circumstances.

Gain or loss are purely relative and, therefore, any judgement is decisive in classifying truth in one of its two variants. In real life one cannot either restrain or escape from choosing an action that may lead to either gain or loss. This ability to judge between the two, deeply depends upon learning that one has had. <u>Learning</u> is complex process; it can be either informal in school of life, or in institution. *It grows cyclically with observation, correlation, evolution of alternatives, choosing one of the alternatives based on many considerations including coexistence, implementation of the choice and* *finally review of the implementation that sets in beginning of next cycle of learning.* Out-of-box choice for the larger-andsustainable good will be gain for many while it may be a loss for a few. But, the way it is perceived and presented may lead to distinction in truth, half-truth and lie.

At this point it is pertinent to classify lies; a *plain lie* is that when one makes veiled statement to fan innocence, a white *lie* is denial of truth despite all evidences against the claim, and a *statistical lie* is based on available that is used to deny the truth. Its excellent example is Zero probability of an event; it does not mean that the expected event would never occur. This game of statistical lies is being extrapolated to classify *honesty*, a pious and desirable attribute yet highly scarce. Its antonym is *dishonesty*. If one fails to make honesty a ground reality then it is only of cosmetic value and dubious. Some of the variants of dishonesty are being briefly brought out. Financial dishonesty is most commonly discredited. But, it is observed that, barring exceptions, most of the financial dishonesty are tip of the ice berg. It is supported by invisible dishonesty of much larger proportion and are called moral dishonesty in giving wrong advice for certain gains. Intellectual dishonesty is about use of intelligence and logic to disprove truth. While, in professional dishonesty a person by virtue of incumbency, qualification and/or stature supports an untenable propositions or decisions. These are invisible dishonesty, called white collared dishonesty, and are seen to be rampant among elite persons.

Education: Education is like blood flowing into social, cultural, economic and political order to distinguish one from the other. Education has been state's responsibility in India since unmemorable time. But, liberalization in education has seen a mushroom growth of private schools, parallel schools and expensive international schools of sorts. Despite RTE in prevalence for more than a decade real fee structure at such schools is eye widening. Many of the advanced countries across the globe support free school education. But, it is paradoxical to see rat-race to collaborate with the international brands in a mesmerizing manner. As a result, education has become a commercial commodity where selling points are marks, placement, package and opportunities of growth to self. While the main purpose of learning during education is getting lost in oblivion. Is it not the half-truth of prevalent educational environment?

Medical Profession: This experience is a glaring example of professional dishonesty referred to earlier. It is one of the noblest profession and it has potential of providing immediate relief to ailing persons. We have grown from a stage most of the families had a family physician for an immediate relief within the available resources. While developments in medical science are encouraging but we are now in times when it is extremely difficult to get a doctor for consultation to an immovable patient. The only place for consultation is multi-specialty hospitals good enough to empty purse, provisions of health insurance or any other funding, if available, but *does it not end at that*?

Despite a dedicated Insurance-TPA desk in each of such hospitals to guide caretakers of patients, plight of ailing patient is worsened when insurance companies deny the claims on silly ground of deficiency of some documents from hospitals. This makes care takers too distressed to pursue the settlement of claim. Eventually such claims are foregone with accountability of none.

Medical and blood donation camps are flagships of flourishing doctors, hospitals, associations and clubs. We are yet to come across a case where, during medical care, anyone has received proper blood supplements despite blood donations in past. Most of these camps are promotional frontends of a vicious trap of the exponents of the medical welfare.

Are all these agencies not in collusion with each other? Are not such half-truths or lies prevalent in other professions?

Administrators: All plans, programmes, slogans and claims of various governments, cutting across party lines, are quite impressive and fascinating. Real worth of all this to the people is a relief through implementation of the promises. But, these are of political worth in mesmerizing the masses. Such, promises and claims appear at high peak during elections. Administrators are a bridge between government and execution agencies. They are duty bound to work in the interest of the nation and people and neither of the incumbent government nor their own conveniences and preferences. It is disloyalty of the administration if it deviates from national interests.

In this journey of 8+ years many administrators, in different parts of country, right from bottom to the heads were approached with a selfless IOMS proposition. Despite desperate persuasion there was a blind and deaf response. *Is it unreasonable to expect 4-5 schools across states and the country, for pilot implementation of IOMS?* In light of this, *are the claims of administrators are half-truth or lies?*

Spiritual and Welfare Centers: Becoming a monk by changing name and attire is external and motivational, but being a monk without any of these external gestures is internal and inspirational. Inspiration and motivations are distinctly different. Despite approaching many centers of spiritual excellence only one has embraced IOMS on its school. Most of these places have an educational wing of international class, but it is in their closed domain. They are unwilling to open up to IOMS proposition, for interaction and to collectively complement in social welfare. Why are they so closed and self-centric? There is only one such school which is willing to continue IOMS in Fourth year. But, its administration is gradually closing doors of interaction. They are not available to make IOMS more effective. The pretext taken by one of the monk of the school responsible for its operation is being quite busy. All monks vouch for नर सेवा ही नारायण सेवा है (Nar seva hi Narayan seva hai), it means to serve GOD through deprived ones. But, non-availability of such a responsible person to know and remedy concerns, if any, that too of a mentor who has been associated with the school for nearly three years is not comprehensible. Are such pretexts from exponents of people's welfare half-truths or lies?

Educational Institutes: Head of schools, academic institutes are vested with discretionary powers to work for welfare of students and improving credentials of their institution. In case of necessity there are established processes for seeking approval of competent authority. Yet, they are found to be too occupied in bolstering buzzwords and glamorously titled events involving a good expenditure. But, holding IOMS sessions, without any cost, is a nightmare for them. Only one school has embraced IOMS and committed to pursue it; it is a pleasant accident. Moreover, Directors/Principals of College of Education, trainers of the teachers, who could be approached, are silent on the merit of holding a few online sessions to convey experiences and effectiveness of IOMS, in their programmes and courses on education. Can this silence be construed as their acceptance? Certainly not. Are such inactions the Half-Truth or lies?

CSR & NGOs: Statutory tax exemption on expenditures for social welfare under Corporate Social Responsibility (CSR) is an excellently conceived proposition. Likewise, at personal level there are tax exemptions on donations to NGOs under section 12A and 80G. These provisions are on the basic premise that social welfare need to be collectively complemented by those who are able to do it within their comfort zone. State alone cannot do it. But, the corporate houses and NGOs, including philanthropic wing of an internationally acclaimed company, were approached for facilitation of IOMS on ZFZA principle. But, real experience is contrary to their claim. It is seen that CSR spending are either for brand promotion or in a manner which is selfserving. On the contrary NGOs are open to accept donations, but too closed to be available for interaction on social welfare through education, our core area. In light of this, are these claims under CSR and of NGOs Half-Truths or lies? Yet there are a few individuals whose selfless support is behind this initiative.

Hang up Boots: Every person during discharge of professional and family responsibilities places his passion and vision at the rear seat. Superannuation is an opportunity to take care of unfulfilled passion and vision. Instead, it is observed that there are many welfare associations of Senior Citizens, subscribed by elite persons. But, beneficiary, through these welfare associations are mostly elites, while most of the senior citizens who deserve assistance have no access to them. Despite, elites do not hesitate to cite examples of developed countries where 'no age to retire' is an acceptable norm. While claiming indispensability to grab work opportunities by elites, it is forgotten that developed countries have manpower far less than us, while there work opportunities are much higher. Therefore, these countries have only two options (a) either to allow work opportunities to the extent one can or (**b**) import human resource; the latter has socio-economic ramifications.

There is overall increase in longevity with better health and greater financial independence in India. In such a scenario grabbing work opportunities, when it is the time to hang boots, is *firstly* at the cost of those who need it more and

secondly it is an utter failure of these elites in grooming second line during their professional career. Are such that denials to hand up boots, on one or the other pretext, halftruths or lies?

Pragmatism: Generally, it is seen that truth is circumvented on one or the other pretext be it professional, moral, intellectual, political etc. In its backdrop there is the logic of personal convenience and is lucidly phrased as a pragmatism,, compromise or avoiding confrontation. Are not these notions inability to evolve a solution for the larger good? are not they Half-Truths or lies?

Personal Commitment: Compulsions and necessities do wait for none. This phrase applies to everyone in every field. It is contextual in the sense that privileged persons treat charity and philanthropy to their convenience and their prerogative. A responsible and concerned reciprocation to any selfless welfare initiative be it even regretting the inability with a sense of urgency is also a help. This helps one to explore another option. But, lack of will is supported by abundant excuses. Are not such excuses half-truths or lies?

Conclusions: This initiative as PSR is not with a sense of either magnanimity or making any obligation, but with indebtedness to the all of those whose misfortune has blessed us to be in a thin class of privileged ones.

As stated earlier these experiences are without prejudice, and/or malice to anyone. However, they are with a sense of urgency to pro-act for the larger good, which was not possible for us, earlier. But, our engagement on the initiative with an inspiration, passion and conviction leaves neither time or energy or resources to manage confrontations. Because, in words of Robert Frost "...we have miles to go before we sleep, miles to go before we sleep".

Yet, if any or more of the readers have experienced the truth contradicting the above, we would gratefully welcome their story. It would be helpful to all those who wish to perpetuate the truth and trigger an introspection among each one of us to make the truth more enduring and purposeful.

We equally welcome reciprocation of those who have practiced Half-Truth, to kindly advise us if we are anywhere faltering. Perhaps, they are better placed to discover any deviation in our walk-the-talk. If they find any, then it is (a) breach of trust by us, (b) detrimental to the cause that we espouse and (c) needs to exposed in a manner that none dares to betray the trust bestowed upon.

These requests are made with only one consideration that in our country a larger section of society comprises of deprived ones. They are waiting for someone to extend them handholding, to enable them to change their fortune. Can we become one of the torch bearers?

In this world we elites are responsible to uphold truth; there should not be any space for us to either practice or perpetuate Half-Truths or lies. This is the essence of spirituality understood by us. Kindly correct us, if you think.....

<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. **Promote**r –

- 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.

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अंदाज ए बयां

नमस्कार का चमत्कार

समीर लाल 'समीर'

कुछ लोग नमस्कार करने में पीर होते हैं और कुछ नमस्कार करवाने में. नमस्कार करने वाले पीर, चाहे आपको जाने या न जाने, नमस्ते जरुर करेंगे. कुछ हाथ जोड़ कर और कुछ सर झुका कर, शायद उनको मन ही मन यह शान्ति प्राप्त होती होगी कि अगले को नमस्ते किया है और उसने जबाब भी दिया है याने वो पहचानने लगा है और साथ वालों पर उसकी पहचान की धाक पड़ेगी.

नमस्कार करवाने वाले पीर, सीधे चलते चलते, इतना स्टाइल में धीरे से सर को झटकते हैं और कभी कभी सिर्फ आँख को कि मानो आपको नमस्ते कर रहे हों और जब आप पलट कर नमस्ते करते हो तो इतनी जोर से जबाबी नमस्ते करते हैं जैसे कि पहल आपने की हो. अक्सर वो अपनी वापसी नमस्ते के साथ हाल भी पूछते नजर आ जाते हैं कि कैसे हो? और बिना जबाब सुने आगे भी बढ़ चुके होते हैं अगले नमस्ते के इन्तजार में. इस केटेगरी में नेता बनने की पहली पायदान पर खड़े बहुतेरे शामिल रहते हैं और उससे उपर की पायदान वाले तो इसी पायदान से गुजर कर निकले हैं तो उनकी तो खैर आदत हो गई है.

वैसे नमस्कार, प्रणाम, चरण-स्पर्श आदि पहले कभी आदर, अभिवादन के सूचक रहे होंगे किन्तु समय के साथ साथ मात्र पहचान और नाम जमाने की औपचारिकता मात्र रह गये हैं. नेताओं को उनके चेले इतनी तत्परता से चाचा कह कर चरण स्पर्श करते हैं जितनी जोर शोर से उन्होंने अपने चाचा की तो छोड़ो, कभी अपने पिता जी का भी न किया होगा.

इन नेताओं के चेलों को भी पता होता है कि चाचा को चरण-स्पर्श करवाना कितना पसंद है. अतः जब आप जैसे किसी को उनसे मिलवाने ले जाते हैं तो आपकी रीढ़ की हड्डी का जाने कौन सा हिस्सा, चाचा से मिलवाते हुए, पीछे से दबाते हैं कि आप थोड़ा सा झुक ही जाते हो और चाचा, एकदम से, खुश रहो के आशीष के साथ पूछते हैं –बोलो, काम बोलो. कैसे आना हुआ?

और इन सबके आगे एक जहाँ और भी याद आता है. पहले हम किसी को पसंद करते थे और पसंद पसंद करते प्यार कर बैठते थे. याने किसी को लाइक करना लव करने की पहली पायदान होती थी. तब के जमाने में लड़का लड़की को, लड़की लड़के को लाइक करके धीरे धीरे लव तक का सफर पूरा किया करते थे.... अब तो खैर लड़का लड़की का फार्मूला भी आवश्यक न रहा. कोई भी किसी को लाइक करके लव तक का सफर कर सकता है. ये सब दुनियावी बातें अब सड़क से उठकर इन्टरनेट पर आ पहुँची है मगर व्यवहार वैसा का वैसा ही है. मगर यहाँ लाइक, मात्र लव का गेट वे न होकर नमस्कार, प्रणाम और चरण-स्पर्श आदि सबका पर्याय बन चुका है.

फेसबुक पर यदि कोई आपकी फोटो को, लिखे को या पोस्ट को लाइक करे तो कतई ये न समझ लिजियेगा कि उसे आप बहुत पसंद आ गये...आपका फोटो फिल्म स्टार जैसा है और आपका लेखन बहुत उम्दा है... इनमें से अधिकतर ने तो उपर बताई किसी एकाध वजह से पसंद किया होता है और वो भी चूँकि फेसबुक एक क्लिक मात्र में लाइक कर की अद्भुत क्षमता प्रदान करता है - बस इससे ज्यादा कुछ भी नहीं. अन्यथा यदि लिखकर बताना होता कि आप को लाइक किया है तब देखते की कितने सही में लाइक करते हैं.

अब आप ही देखिये, वो तो एक-एक करके सौ जगह पसंद बिखरा कर चले गये मगर जब इन सौ लोगों ने जब पलट नमस्ते में इनकी तस्वीर या पोस्ट लाइक की, तो वहाँ एक साथ सौ लाइक दिखने लगे और जनाब हो लिए सेलीब्रेटी टाईप. ऐसे लोग आपको लाइक करने तभी आते हैं जब इन्होंने अपनी टाईम लाईन पर कुछ नया पोस्ट किया हो और उन्हें लाइक की दरकार हो.

इनका संपूर्ण दर्शन मात्र इतना है कि मैं तेरी पीठ खुजाता हूँ, तू मेरी खुजा!!

इन फेसबुकिया लतियों को इन लाइकों से वही उर्जा प्राप्त होती है जैसी इन फूहड़ चुटकुले बाज कवियों को तालियों से, इन छुटभय्यिया नेताओं को भईया जी नमस्ते से और इन सड़क छाप स्वयंभू साहित्यकारों को सम्मानित होने से भले ही उस सम्मान को कोई जानता भी न हो!!

आप देख ही रहे हैं कि आपसे उर्जा प्राप्त किए इन कवि सम्मेलनों की हालत, इन छुटभय्यिये नेताओं की हरकतें और साहित्यिक सम्मानों के नाम पर गली गली खोमचेनुमा दुकानें. ध्यान रखना, यह समाज के लिए कतई हितकर नहीं है.

तो जरा संभलना, जहाँ फेसबुक पर लाइक करना एक लत बन जाती है वहीं यह अपने आपको सेलीब्रेटी सा दिखाने का नुस्खा भी है.

इसका इस्तेमाल अपने विवेक के साथ करें वरना इस लत से आपका जो होगा सो होगा मगर समाज का ये स्वयंभू सेलीब्रेटी बंटाधार करके रख देंगे.



लोकप्रिय चिट्ठाकार समीर लाल व्यवसाय से चार्टर्ड एकाउंटैंट 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।

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Problems are meant to be solved; every solution opens doorway to new problems. This is an endless journey to discovery of nature.

We are, what we are, because of rigorous effort of countless persons.

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

- Wilma Mankiller

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

- John F. Kennedy

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Ayurveda- Health Care

Amla (Excellent Immunity Booster)

Dr Sangeeta Pahuja

Amla, Amalki, is the best among Rejuvenative Herbs as mentioned in Charak Sanhita. It is an excellent immunity booster and helpful in the prevention of viral infections and contextual under prevailing circumstances..

It is the most nutritious food and is used in many Ayurvedic herbal formulations.

Amla is called Tridoshamak. Regular consumption of Amla balances the all three Doshas Vata,Pitta and Kapha.Which when aggravated causes diseases. Amla is sour in taste and therefore decreases Vata Dosha. Due to its cold nature, it pacifies Pitta.

Due to rough(ruksh)nature of Amla, it's helpful in pacifying kapha. Hence, Amla is considered Tridoshshamak.

In ayurveda, Osteoarthritis is called Sandhivat. which is due to aggravated vata. which leads to pain and swelling in joints. Amla has vata balancing properties and this relieves pain and improves joints mobility.

Amla is excellent source of vitamin C, which strengthen the immune system of our body. Vitamin C in the Amalki fruit is bonded with tannins that protects it from being destroyed by heat. Amla enhances the food absorption. It enhances all thirteen digestive fires.

Amla helps purify the Ras dhatu (nutrient fluid)and rakt dhatu (blood),supporting the functions of liver and also stimulate the liver to eliminate toxins from the body. Research shows that it helps lowers cholesterol.

Amlais also called medhya in Ayurveda.It enhances coordination among Dhi (acquisition),Dhriti (retention)and Samriti (memory).And sharpen the intellect and mental functioning. It supports the nervous system and strengthen the senses.

In Ayurveda Amla is called Hridya also. So it supports the cardiovascular system.

Amla also pacify apan vayu, so it is helpful in elimination of toxins from the body.

Amla is called Vrishya in Ayurveda. Amla enhances the fertility in both men and women by balancing apan vata and by nurturing all dhatus. This herb nurture the ovaries and sperms and it had a property called Garbhsathapana, which means it enhances fertility and the possibility of conception.

Amla is also very helpful in treating urinary tract problems. It is a natural diuretic.

As Amla strengthen the digestive system and help the liver to detoxify and rich in vitamin C and other nutrients, it's very good in treating skin problems. It improves the complexion, enhances the glow and luster.

Amla increases the vitality .It supports regeneration of cells, .according to research studies, Amla inhibits the growth and multiplication of cancer cells.

Amla is called Chaksushya in Ayurveda, which means strengthening the eyes. Chakshu means eyes and ayushya means Rasayan (Rasayan for eyes).

Amla enhances the protein synthesis, which makes it good for strengthening the muscles and building lean muscle mass.

Amla is an excellent antioxidant ,thus slow the ageing process.

Amla has antispasmodic properties and thus helpful in treating gastrointestinal problems.

Amla is potent stress reliever and induce sound sleep.

Amla prevent hair fall and prevent premature greying of hair.

According to Ayurveda regular consumption of Amla can help us to live for more than hundred years.

Follow Ayurveda and stay healthy.



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The Geeta: Template of Mentor-Students Interaction (Part II)

Prakash Kale

Introduction- Geeta, by which the Arjuna a dejected and bewildered person's morale gets restored and he becomes ready for war, is an unparallel book (Grantha) in Indian culture and philosophy. Labeling it as religious Grantha, is limiting its all pervasive usefulness. Sages and thinkers alike have written many commentaries on it. It has been also described as Psychological book (Better than Carl Jung's) or a unique mental treatment process itself. *In fact out of ignorance, in young age we feel it can be read in old age and in old age we feel had we read it in young age life would have been different and better.* So here like part I, an attempt has been made to use it as model for class room interaction (useful for young ones). However, now the knowledge revealed gets progressively more and more abstract and confidential then hitherto. Being in very condensed form, continuity has been sacrificed and so while reading meaning of content may be ignored; concentration be made on process of teaching and learning. (Uniting with Parmatama =Uniting the individual consciousness with the Ultimate Consciousness)

Arjuna Said: O Krishna, as you described Your Ultimate Self, this is so. O greatest of all personalities I wish to see Your omnipotent majestic form. (3/11).(Out of curiosity).

Krishna said: O Arjuna, behold at once the whole universe of moving and stationary being situated in only one part of this body of Mine and whatever else you wish to see. (5/11) But with these present eyes of yours you will not be able to see Me; I grant you divine sight; behold the omnipotent majesty of My Ultimate transcendental power. (8/11)(Krishna not only agrees to request but helps him to see, not accepting it might have put doubt in Arjuna's mind; And having seen universal angered form, and out of fear)

Arjuna said: Please reveal who You are of such fearsome form. I offer obeisance unto you. O Lord of all be merciful to me. I wish clearly know you, the Primeval Being because I cannot fathom your intention. (31/11).

Lord Krishna said: *I am terrible time the destroyer* of all beings in all worlds, engaged to destroy all beings in this world; of those heroic soldiers presently situated in the opposing army, even without you none will be spared.(32/11) Therefore arise for battle, O Arjuna. You will gain fame by conquering the enemy and enjoy a flourishing kingdom. All these warriors have been slain by Me due to previous design you are merely the instrument.(33/11) Slay Dronacharya and

Bhishmdeva and all the other warriors bent on fighting are already slain by Me, do not be distressed, just fight and you will surely conquer your enemies in the battle.(34/11) (Here again Krishna reminds Arjuna that he is not doer but only instrumental and declare his victory is sure; now Arjuna describe and praise Krishna's power and Request forgiveness for earlier friendly behavior) Arjuna said: It is justly so O Krishna, the entire universe is exalted by singing Your glories becoming attracted; all the demons out of fear are fleeting in the four directions(36/11) and The whatever has been spoken presumptuously by me thinking of You as a friend due to delusion or due to affection thus : O Krishna, O Yadav, O Dear friend without knowing Your glories and universal form; O infallible one whatever disrespect may have occurred in jest at times of sporting, resting, sitting and eating; alone are also among companions, all these things I am beseeching You to please forgive.(41,42/11) (and request Krishna to become ordinary human being; Krishna did so and)

Krishna said: O Arjuna, one who engages in action for Me, considering Me the Supreme goal, engaging in devotional service for Me, freed from the contamination of fruitive activities and mental speculation, devoid of enmity toward any living entity; such a person attains Me.(55/11) (Now Arjun have seen God in Person (Sagun) and before this had known the God as impersonal absolute devoid of perceptible form(Nirgun), so he asks). Arjuna said: Those devotees who thus are always engaged in exclusive worship of You (Sagun) and then again those who betake the impersonal absolute devoid of perceptible form(Nirgun) and attributes; between them who is most perfect in knowledge of the science of uniting with Parmatama. (1/12).

Lord Krishna said: Of those who are endowed with firm faith of a special kind beyond material conceptions; fixing the minds on Me (Sagun), always engaged exclusively worshipping Me. They are considered by me the most superior of all. (2/12) (Further gives many choices of devotion having less and less effort; these are) Concentrate the Mind upon Me, apply spiritual intelligence for Me; verily you will reside with Me after this existence without doubt (8/12)Arjuna , if therefore you are unable to completely establish the mind steadfastly in Me; then try to obtain Me by practicing the science of uniting individual consciousness with the Ultimate Consciousness by remembering Me(9/12). And if in the practice of remembering Me, you are also unfit then be dedicated in the performance of duties for Me and in performing activities for My satisfaction you will achieve perfection.(10/12) And if also this you are unable to perform then taking shelter of Me by the science of uniting with Parmatama, controlling the mind perform all activities renouncing the results. (11/12)(Now Arjuna raises following questions based on earlier verse, a few of which were not understood by him)

Arjuna said: O Krishna, I wish to understand this material energy (Maya), the individual consciousness, the field of activity, the knower of the field of activity, knowledge and the goal knowledge. (1/13)

Lord Krishna Said: O Arjuna, the material body is known as the field of activity; those who know this describe those who know this as knower of the field of activity (2/13). O Arjuna, certainly knowing Me as well within all bodies as the knower of the field of activity such knowledge of the field of activity and the knower of the field is actual knowledge in My opinion. My devotee understanding this field of activity, knowledge and what is to be known thus described in summery becomes qualified for My divine nature.(19/13) Anyone who perceives in this way those activities in all respects is being

performed only by the material energy (by Maya/GUNA, not by self); such a one perceives perfectly the embodied self as non-doer.(30/13) (Further) Lord Krishna said: The supreme wisdom I shall reveal again, the best of all knowledge; which knowing all the great sages attained perfection in the material energy. (Maya/GUNA) (1/14). O Mighty armed one, the qualities of goodness, passion and ignorance (Satvik, Rajas and Tamas Guna) thus produced by the material energy enslaves the immutable, consciousness of the self within the body. When through the perceptual senses of the body illuminating knowledge manifests; know that certainly the mode of goodness predominates (11/14)(Satvik) O Arjuna, when greed, restless exertion, agitation of the senses, incessant desire for sensual indulgence; when all arise the mode of passion predominates.(12/14)(Rajas).O Arjuna, nescience, neglectfulness and also illusion; when these arise the mode of ignorance predominates (13/14) (Tamas). The result of virtuous activities in the mode of goodness is declared purity, the result in the mode of passion is misery and the result in the of ignorance is nescience. mode (16/14). Transcending the three modes of material nature, which are the cause of the material body; being freed from birth, death, old age and misery; the embodied being, enjoys ambrosial nectar. (Now Arjun ask)

Arjuna said: O Lord, by which symptoms is known transcendence of these three modes of material nature, what is the behavior and how to transcend these three modes of material nature? (21/14). (Lord Krishna again replies and answer is mostly on the line of equipoised person. Now again on its own in chapter fifteen Lord Krishna reveals the virtues, the glories and transcendental characteristics of God being omnipotent, omniscient and omnipresent. Also He explains the purpose and value of knowing about God. In chapter sixteen Lord Krishna describes in detail the divine properties, conduct and actions which are righteous in nature and conducive to divinity. Also he delineates the evil propensities and ill conducts which are unrighteous in nature and which are antagonistic to divinity.)

Krishna Said: There are only two types of created beings in the material worlds; the divine and demoniac. The divine has been described extensively; now hear from Me O Arjuna, of demoniac. (6/16) Overwhelmed with a life full of unlimited fears and anxieties; the demoniac consider that the gratification of the senses as the highest goal of life; being bound by the entanglement of hundreds of schemes, overcome by lust and anger striving to accumulate wealth illicitly for the purpose of gratifying their senses.(12/16) Afflicted with innumerable fears and anxieties, enveloped in a net of illusions, engrossed in gratification of the senses they glide down into abominable hells.(16/16) The three kinds of doorways to hell are lust, anger and greed; therefore these three are so destructive to the embodied self must be abandoned.(21/16) Therefore the injunctions of the Vedic scripture in ascertaining what should be done and what should not be done are your authority; knowing the ordinances of the Vedic scripture, you should perform actions in this world as a matter of duty.(24/16). (But now Arjuna asks what if someone could not follow Vedic scripture).

Arjuna said: O Krishna what of those who transgress the injunctions of Vedic Scripture; but perform sacrifices possessing faith)? Is the conviction of those to be in goodness, passion or ignorance? (1/17) (Krishna explains three type of faith or shraddha and says)

Krishna said: O Arjuna, offering oblations, enacting charity, austerities and anything else performed without faith is declared as counterproductive; not in this world nor in the next.(28/17)

Arjuna said: *I wish to understand the factual distinction of renunciation and the renouncing of the fruit of action.* (1/18). (So far, Arjuna was not able to clarify (3/3) wherein these two, were told and so now ask).

Lord Krishna, the possessor of all opulences said: The learned know that abandonmenting of activities inspired by fruitive desire is renunciation and the experienced say relinquishing the results of all actions is renunciation. Some in wisdom say to renounce action, due to defects of being a desire and others say that actions based on performance of sacrifices, charity should not be renounced.(2,3/18) (First gives opinion of others ;Now gives own opinion) O Arjuna, hear from Me, the factual understanding regarding renunciation; verily renunciation is described as threefold, O tiger among men.(4/18) Actions based on performance of sacrifices, charity and austerity should never be renounced; they certainly must be enacted; performance of sacrifice, charity and austerities are purifying for those in wisdom.(5/18) Moreover these activities should be performed as duty, renouncing attachment to fruitive results; this is My top most, definitive conclusion, O Arjuna.(6/18)

(Now conclusion with repetition starts) The embodied being can never completely give up activities; but it is described that by renouncing the fruitive results of actions that one is renounced.(11/18) Results of three kinds of activities accrue after death, leading to hellish planets, leading to heavenly spheres and to human worlds in between for those desiring the results of actions; but who) time never at any for (the renunciate.(12/18).One whose mentality never considers being the doer and whose spiritual intelligence is not attached to fruitiveness; such a person even if warring with the whole world; does not actually slay any one nor become entangled by fruitiveness(17/18). (Further) There is no being existing on the earth, in celestial sphere or in any universal planetary system which is free from the influence of these three modes of born of material nature (Guna).(40/18) O Arjuna, the activities of the Brahmanas, Kshatriya, Vaisyas and Sudras are clearly divided according to the qualities born of their own nature (Guna).(41/18) (based on nature not by born caste, kashtrya must fight) From whom is the existence of all living entities, by whom all this is pervaded; through worshipping Him, by one's own actions prescribed according to qualification a man achieves perfection.(46/18)(Work is worship). Ones righteous duty imperfectly done is better than another's duty done perfectly; by performing actions predicated according to one's own nature sinful one does not incur sinful reactions.(47/18)(Repeat) Actions prescribed according to one's own nature must not be given up, O Arjuna, even if defective; since all endeavors are covered with defects as fire is covered by smoke (48/18)(Repeat, Metaphor). Being in consciousness of Me, you will overcome all obstacles and difficulties, by My grace; but if due to false ego, you do not listen, you shall perish.(58/18)(promise of protection if obeyed, and if not perish) If rationalizing due to false ego, you resolve not to fight

such a decision is only in vain; your own nature will compel you.(59/18)(Guna will compel you). O Arjuna, that which out of delusion, you do not wish to perform, you will unavoidably, being bound by your inclinations born of your own nature.(60/18) Thus the most confidential wisdom of all that is confidential has been described by Me to you; deliberating fully on this; accordingly act as you wish.(63/18). (Conclude and decision left to Arjuna, however again instruct him, which can be the summery of Geeta).

Krishna said : Just think of Me, be My devote, worship Me, offer obeisance unto Me, certainly you will come to Me, I promise this in truth to you being dear to Me. Relinquishing all ideas of righteousness, surrender unto Me exclusively; I will deliver from all sinful reactions, do not despair. (65,66/18) O Arjuna, have you heard this with concentrated attention? O conqueror of wealth has your bewilderment due to illusion been dispelled? (72/18)

Arjuna said: My illusion has been dispelled, O Krishna, by Your grace realization is restored to me: I am stable and all my doubts are removed. I shall execute Your command. (73/18) To conclude, first (in part I) in spite of accepting own weakness and surrendering to teacher, disciple doubts him. Once he understands teacher's greatness and capacity; doubt changes to curiosity, appreciation and readiness to learn new subjects. He also feels sorry for earlier behavior. Further, disciple properly takes up un-explained or not understood points and finally obeys teacher. On teacher's part he fully understands disciple's state of mind. Gives many examples, uses metaphor, first give other's opinion and shows alternative routes to reach goal. Not only he teaches but helps disciple to understand, do not evade any question etc and in spite of all this never loses track of object of lesson (to prepare Arjun for war and links everything to war and time to time reminds him about this). In short, teacher exhibit exemplary patience and strength to create faith in disciple about path offered by him, and assure him not only all help but create confidence in him about achieving goal. However, he do not force anything on disciple and leaves final decision to him, but also do not forget to remind him of consequences of not listening to teacher.

Thus Geeta seems to be an ideal template for class room interaction to achieve learning objective.



Author is M.Sc.(Physics) and a retired Banker. During his career he was also a faculty, at CBD Staff College of Indian Bank, Mumbai. Post retirement he was 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.

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

William Buttler Yates

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Who cares what am I or I do, 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.

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Calendar 2020: On The Tip Of Your Tongue

H.D. Motiramani

Want to know what day will be 15th August 2020 or any other date of any month of the year 2020 ?

Well here is the formula:

"Add the code of the concerned month to the date. Divide by 7 and look for the remainder."

The codes for the 12 months from January to December respectively are:-- 2 5 6 240 251 361

These twelve codes are one each for every month January to December. Again, the codes are:

Jan = 2
Feb = 5
Mar = 6
APR = 2
May = 4
Jun = 0
Jul = 2
Aug = 5
Sep = 1
Oct = 3
Nov = 6
Dec = 1

So all we need to do is remember this code 256 240 251 361 by heart because each of them is for a particular month.

Now, let us apply our formula. All of us are aware that we have 7 days in a week. So 10th March, if it is Tuesday then 17th march and 24th march will also be Tuesdays. Tuesday means 2nd working day of the week. So, as per formula if



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Inetellectualism is not about criticizing or advising without any responsibility of implementation; it is about taking upon responsibility of actions for the larger good.

we add 6 (which is the code for March) in 10, the result will be 16. If this number 16 is divided by 7 the result (Remainder which we have to look for) will be 2 to tell us that it is 2^{nd} day of the week that is Tuesday.

Now for 15^{th} August if we need to find the day, we find that 5 is the code for August. So 5+15 will make it 20. If we divide this number 20 by 7 we get 6 as remainder which tells us that it is the sixth day of the week that is Saturday.

Some more examples "what was the day on 26th January?

Well, January month code is 2. Add to this the date 26.26+2 becomes 28. When we divide this by 7 we get 0 (Zero as remainder tells us that it is Sunday.

Another example: what day will be 31st Dec 2020

The code for Dec being 1, 31+1=32, 32 when divided by 7 gives us 4 as remainder to tell us that it will be a Thursday.

So friends, Cram the code 256 240 251 361 or register it in your mind by any memory technique. For example, I will remember it by remembering first quarter codes as 256. Now second quarter codes are 16 less than first quarter. Likewise third quarter codes are 7 less than first quarter and last quarter (that is October, November, December codes) are 110 more than third quarter codes. Alternatively, try to see this figure below and recall.



Remember the formula or the process to add the code of respective month to the date, divide by 7 and look for remainder.

प्रगति की गति रहे ...

जड चेतन है...

मुणालिनी घुळे

	जड़ चेतन है उसकी रचना
सफलता के दीप जला कर	अपनी ही छवि सबमें लखना
	डाह, द्वेष से दूर ही रहना
प्रशस्त कर ल राह अपना	मन में हो ममता का झरना ।
हर निकष पर खरा उतर कर	सीख बड़ों की गुनते रहना
पूरी कर ले चाहें अपनी	सत्य-राह पर चलते रहना
मदी में जो आसमान हो	फल की इच्छा कभी न करना
	कर्म सदा ही करते रहना ।
फैला पूरी बाहे अपनी	पर उपकार धर्म हो अपना
सारा जग हो तेरे बस में	परिचारण ही कर्म हो अपना
रख ध्येय पर निगाहें अपनी	ध्यान हटे ना पथ से अपना
गगति की गति रहे अलाधित	वसुधा ही कुटुंब हो अपना ।
	सफलता के यही सूत्र हैं
प्रगति की गति रहे अबाधित ।	जीवन पथ पर यही मित्र हैं
	खुश रहने के यही मंत्र हैं
	खुश रखने के यही मंत्र हैं ।



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 हैं।

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

Albert Einstein

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आगे बढ़ना है, मुझे

भावना मिश्रा

अपनो के तरह मिलना और महकना है मुझे, गमों को भूल कर हँसना है मुझे ।

दूसरो में गलती ढूंढनी नहीं है मुझे, कमल बनकर खिलना है, मुझे ।

आगे बढने में कठिनाई आएगी बहुत ही,मुझे गिर गिर कर उठना और संभलना है, मुझे ।

कुछ आएंगे लोग, गिराने के लिए, मुझे पर आगें बढ़ते ही रहना है मुझे।

सब बाँधाओ से लड़ते हुए, हौसलों से उड़ना है, मुझे ।

अपना अधिकार ,सम्मान को पाने के लिए, ताउम्र लड़ना है, मुझे ।

गलती तो सभी करते हैं, अपनी गलतियों को सुधार करना है मुझे। प्रकृति....

डॉ. संगीता पाहुजा

सृष्टिकर्ता से ऐसा सुंदर-सलोना रूप प्रकृति ने पाया झील,झरने,पर्वत,नदियाँ और हरियाली ने मन को इत्र सा महकाया।

सूरज-चाँद,सितारों ने इस सौन्दर्य को अपूर्व बनाया, सूरज-चाँद के उदय और अस्त को मानव ने पर्यटक स्थल बनाया. चित्रों में दृश्यों को कैद कर, मानव भी इतराया।

प्रकृति और मानव दोनों को ही मानव ने वैज्ञानिक दृष्टिकोण का निशाना बनाया हर दिन होता संहार प्रकृति का, हर दिन मानव का स्थान मशीनों ने है पाया।

सब कुछ जानकर भी हमने स्वयम को अप्राकृतिक साधनों में फंसाया। मानव और प्रकृति दोनों पर प्रदूषण है छाया।

दोनों के सामंजस्य से ही होगा प्रदूषण का सफाया। यही सन्देश हमने सब तक पहुँचाया।



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।

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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,

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

- Frank A. Clark

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Answers: Science Quiz- March'2020

Kumud Bala

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

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ANSWER: CROSSWORD PUZZLE, MatchC2020 (Water Conservation)

Prof. S.B. Dhar

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							Ν						v			7C	L	Е	Α	Ν	w	Α	Т	Е	R	
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							E										С		11B	R	U	S	н	1	Ν	G
						12F	R	Е	S	н	w	Α	т	Е			н								G	
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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.

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





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A Man and A Dove

Natchya Tiwari

Once upon a time, there was a man who was poor and



orphaned by his parents, he was a hard worker. He worked for an old man who wasn't rich and got not much money but enough to eat for a day.

The old man had seen that this man worked hard for all the time, so he sent a magic dove for him. One day when he was walking home, a dove came and sat at his shoulder, so he took it home and put it in a beautiful cage and gave

seeds for eating.

One day when the man was sleeping, the dove started making strange sounds. The man quickly walked to it and saw that the dove had spit out a diamond which was of a size of seed. Next morning, the man quickly ran to the diamond shop and sold it. He got a lot of money. He bought a new house and a farm for him.

One month later, the dove again spit out a diamond. The man sold this diamond also and got much more money this time. Now he got married. He told his wife, "If the dove is spitting out a diamond every month, it means it has many diamonds in its stomach".

The man and his wife started thinking again and again about this. Lastly, they decided to rive the dove's stomach. When they rived the stomach of the dove, they found not any piece of diamond in it.

Moral of the story:

We shouldn't be greedy because greediness brings loss.



Author is a student of CRM School in Chiangrai (Thailand). She studies in Grade 8. Her hobbies are swimming, playing basketball, badminton & bicycling. She loves reading books. She is fond of writing short stories. She believes that one should always live by the rules because staying with the rules generates discipline. Discipline is very necessary for the students.







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Paarth Karve

This creative artist is student of Class IVth, Pune Institute of Computer and Technology Model School, Pune. His fond of playing cricket

TIME MANAGEMENT

Bala Ramyasri

Failure is just another form of success which people don't tend to look at. Let's know about a person. He was born on February 12,1809 in poverty in a log cabin, was raised on the frontier primarily in Indiana. He was selfeducated. He preserved the Union, abolished slavery, strengthened the federal government and modernized the US economy. This man who failed in business at the age of 21; was defeated in a legislative race at the age 22; failed again in business at the age of 24. He overcame the death of his sweetheart at the age of 26; had a nervous breakdown at the age of 27. Even though his zeal to succeed had not subside and he continued trying. He lost a congressional race at age 47; lost a senatorial race at 49. This great person is still alive in the hearts of people, the great **Abraham Lincoln**. He became the 16th president of United States.

To Lincoln failure was a detour but not a dead end. If you want to succeed, double your failure rate.



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Very relevant when globally we are fighting to survive out of CORONA

Never let crisis go to waste

Winston Churchill

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Growing With Concepts - Mathematics

LET'S DO SOME PROBLEMS IN MATHEMATICS-XVIII

Prof. SB Dhar

Math is crazy. Its basics are pretty simple. The philosophy behind some of very simple fundamentals can be quite profound and even bewildering. For example, if you add up all of the positive integers from 1 to infinity, you will get the sum as $-\frac{1}{12}$. Can you believe it? Yes, it is true. If you have 2 types of socks in your drawer and you randomly grab 3 without looking, you are guaranteed to have a matching pair. Don't be surprised, it is true mathematically. Can you imagine the difference between One Million and One Billion? One Million seconds is 11 and a half days while One Billion seconds is just under 32 years.

This article deals with some interesting and mind teasing problems for the readers of all standard. Let us enjoy reading and solving the problems!

Q1. Write the equation using only addition symbol (+) and eight 8's to get 1000.

Answer:

The key to this riddle is realizing that the *Ones Place* must be zero, so the equation is 888 + 88 + 8 + 8 + 8 = 1000.

Q2. Two fathers and two sons sit down to eat apples. They ate exactly three apples, each person had an apple. Explain, is it possible, and if possible how?

Answer:

One of the 'fathers' is also a grandfather. Therefore the other father is both a son and a father to the grandson. In other words, the one father is both a son and a father

Q3. In a certain country, $\frac{1}{2}$ of 5 = 3. If the same proportion holds, what will be the value of $\frac{1}{3}$ of 10?

Answer: 4

Hints:

$$\frac{1}{2} of 5 = 3$$

$$\Rightarrow \frac{1}{3} \left(\frac{1}{2} of 5 \right) = \frac{1}{3} of 3 = 1$$

$$\Rightarrow \frac{1}{6} of 5 = 1$$

$$\Rightarrow 2 of \left(\frac{1}{6} of 5 \right) = 2 of 1 = 2$$

$$\Rightarrow \frac{1}{3} of 5 = 2$$
$$\Rightarrow 2 of \left(\frac{1}{3} of 5\right) = 2 of 2 = 4$$
$$\Rightarrow \frac{1}{3} of (2 \times 5) = 4$$

Q4. If 9999 = 4, 8888 = 8, 1816 = 6, 1212 = 0, then write the value of 1919.

Answer: 4

Look at how many *closed areas* there are.

- (a) 9999 has 4 closed areas (the top of the '9')
- (b) 8888 has 8 closed areas, the top and bottom parts of the 8 and there are no other digits
- (c) 1816 has 3 closed areas, (top and bottom of 8 and bottom of 6, and it has 2 other digits ($3 \times 2=6$)
- (d) 1212 has 0 closed areas, $(0 \times 4=0)$
- (e) Similarly, 1919 has 2 closed areas of 9 and 2 other digits, so the answer is $2 \times 2=4$

Q5. Find the answer to the following on three lines:

1 + 1 + 1 + 1 + 1 1 + 1 + 1 + 1 + 1 $1 + 1 \times 0 + 1 = ?$

Answer:

2.

Do not add all the 1's as there is no mathematical operator symbol at the end of the first 2 lines and before the third line, such as + or -.

Q6. There were some people on a train. 19 people get off the train at the first stop. 17 people get on the train. Now there are 63 people on the train. How many people were on the train to begin with?

Answer: 65

17 people get on the train. Now there are 63 people on the train. So subtract the 17 people from the 63 people on the train.

63 - 17 = 46.

19 people get off the train at the first stop.

Now, add 19 to the 46 on the train after the first stop.

46 + 19 = 65.

Q7. The day before yesterday I was 25. The next year, I will be 28. This is true only one day in a year. What day is my Birthday?

Answer: My birthday is on December 31.

Hints:

I am telling this on January 1.

Day before yesterday (December 30) = I am 25

Present day (January 1) = I am 26

This year December 31 = I will be 27.

Next year December 31 = I will be 28.

Q8. I have two bottles, one 3 litre bottle and the other 5 litre bottle. How can I measure 4 litres of water by using 3Lt and 5Lt bottles?

Solution 1 :

- 1. First fill 3Lt bottle completely and pour 3 litres into 5Lt bottle.
- 2. Again fill 3Lt bottle completely and now pour 2 litres into 5Lt bottle until it becomes full.
- 3. Now empty 5Lt bottle.
- 4. Pour remaining 1 litre in 3Lt bottle into 5Lt bottle.

- 5. Now again fill 3Lt bottle completely and pour 3 litres into 5Lt bottle.
- 6. Now I have 4 litres in 5Lt bottle.

Solution 2 :

- 1. First fill 5Lt bottle completely and pour 3 litres into 3Lt bottle.
- 2. Empty 3Lt bottle.
- 3. Pour remaining 2 litres in 5Lt bottle into 3Lt bottle.
- 4. Again fill 5Lt bottle completely and pour 1 litre into 3 Lt bottle until it becomes full.
- 5. Now I have 4 litres in 5Lt bottle.

Q9. 3 Friends went to a shop and purchased 3 toys. Each person paid 10 which is the cost of one toy. So, they paid 30 i.e. total amount. Shop owner gave a discount of 5 on the total purchase of 3 toys for 30. Then, among 5, Each person has taken 1 and remaining 2 given to the beggar beside the shop.

Answer:

Now, the effective amount paid by each person is `9 and the amount given to beggar is `2. So, total effective amount paid is $9\times3 = 27$ and the amount given to beggar is `2, thus the total is `29. Where has the other `1 gone from the original `30?

The logic is payments should be equal to receipts. We cannot add amount paid by persons and amount

given to beggar and compare it to `30.

The total amount paid is `27. So, from `27, shop

owner received `25 and beggar received `2. Thus, payments are equal to receipts.

Q10. A man is climbing up a mountain which is inclined. He has to travel 100 km to reach top of mountain. Every day, he climbs up 2 km forward in day time. Exhausted, he then takes rest there at night time. At night, while he is asleep, he slips down 1 km backward because mountain is inclined. Then how many days does it take him to reach mountain top?

Answer: 99 days Each day, Total progress = 2 km - 1 km = 1 kmSo, 98 days = 98 Kms. On 99th day, he can reach mountain top by travelling 2 km in day time. So, answer is 99 days.

Q11. For 1, a man can get 40 Bananas. For 3, he

can get 1 Mango. For '5, he can get 1 Apple.

He wants to get 100 fruits for `100. So, how many Bananas, Mangoes and Apples will he buy?

Answer: 100

`95:19 Apples

`3:1 Mango

`2: 80 Banans

Total 100 Fruites for `100.

Q12. A 2-digit number is such that the sum of its digits is 5 times the difference of digits. If the number is neither prime number nor a square, then how many such 2-digit numbers are possible and

what are they?

Answer: 4 numbers, 32, 46, 96, 69.

Let 2 digits of number be x and y.

The given condition is

x+y=5(x-y);

 \Rightarrow x+y=5x-5y;

⇒4x=6y;

 $\Rightarrow \frac{x}{y} = \frac{3}{2}$

From the above condition we can get following pairs.

(x=3,y=2); (x=6,y=4); (x=9,y=6);

Combinations of above pairs are

32, 23, 64, 46, 96, 69.

In these numbers 64 is perfect square, and 23 is prime number.

So, the required 2-digit numbers are 32, 46, 96, 69.

Q13. Solve the equation:

 $8 - 1 \times 0 + 2 \div 2 = ?$

Answer:9

Q14. What are the next two numbers in this sequence?

1, 11, 21, 1211, 111221, ??, ??

Answer:

This is the example of look-and-say sequence. It is the <u>sequence of integers</u> beginning as follows:

1, 11, 21, 1211, 111221, 312211, 13112221, 1113213211,

To generate a member of the sequence from the previous member, read off the digits of the previous member, counting the number of digits in groups of the same digit. For example:

(a) 1 is read off as "one 1" or 11.

(b) 11 is read off as "two 1s" or 21.

(c) 21 is read off as "one 2, then one 1" or 1211.

(d) 1211 is read off as "one 1, one 2, then two 1s" or 111221.

(e) 111221 is read off as "three 1s, two 2s, then one 1" or 312211.

The look-and-say sequence was introduced and analyzed by John Conway, an English Mathematician.

Q15. I am an odd number. Take away one letter and I become even. What number am I?

Answer: Seven. Remove S, I become EVEN

The author, is **Editor of this Quartrerly 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.

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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 <u>Mentors' Manual</u>. 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.

CROSSWORD PUZZLE April'2020 : OBSERVANCE DAYS OF APRIL

Prof. SB Dhar

ACROSS

2 Day UNESCO Celebrates on 23rd April

5 Day Odisha celebrates on 1st April

6 Day WHO celebrated on 7th April

9 Partners of AYUSHMAN Bharat Scheme

10 National Health Protection scheme of India

DOWN

1 World celebrates on 10th April

3 Day India celevrates on 24th April

- 4 Day that is celebrated on April 22nd
- 8 Day India celebrates on April 13th

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Answer to this Crossword Puzzle shall be provided in next issue of this e-Bulletin

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.

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Growing with Concepts : Physics

Wave and Motion : Geometrical Optics (Set 1)

These question banks have been developed for students who are - (a) in initial stages of solving problems from text book or reference book so as to gain proficiency in application of concepts learnt, and (b) deprived of adequate exposure at learning. Such unprivileged and deprived students need guidance for stepwise application of concepts and associated mathematics, while evolving solutions. Main purpose of is to inculcate in students an ability to appreciate physics and related mathematics involved in problems and apply them. Accordingly, illustrations have been made explanatory to the extent possible. Once, students get equipped with that capability, gradually they themselves would be able to evolve optimized solutions. Greater is the practice more intuitive becomes the optimization of steps. Those students who are at a stage of refining their problem solving skills or more apt at concepts may choose to use these illustrations. However, they may please bear in mind our target students and, therefore, they skip detailing in illustrations to the best of their advantage.

Science is a subject not to learn but a matter of realization through experiments and its visualization in surrounding. But, our target students are not equipped either to conduct experiment or an environment which facilitates visualization of science in play around him. This is where simulation is a technique to validate concepts and study effect of variation in parameters related to the concept. Education creates an opportunity of systematic learning concepts without reinventing the wheel.

Solving typical problems with gradual increase in complexity helps to build power of visualization of concepts, without losing confidence in one's ability. It requires reasonable proficiency in language to understand problem, in first go. Next comes evolving solution or answer based on concepts learnt. At this stage extremely simpler calculations are being skipped, with a hope that reader would be able to decipher intermediate steps.

Questions and problems appearing in competitive examinations are seldom encountered in real life, and are never straight application of formula. They demand integration interdisciplinary knowledge. Yet ability to solve such typical problems, enhances competence to handle unknown problems speedily, correctly and with a greater degree of clarity and confidence, an essential attribute of thought process needed for success in life.

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 severely lack in exposi\ure. Moreover, they are disconnected from us by virtue of multiple barriers. Despite, efforts to establish direct interaction through Interactive Online Mentoring Sessions (IOMS) its reach to target students is extremely feeble. Nevertheless, IOMS has established as a working model of selfless mentoring unprivileged children. This experience is being disseminated to the teachers spread out by writing of chapters of an open source Mentors' Manual. India, growing digital, provides optimism to every student to be able to have an access to virtual laboratory; it is an alternative to physical laboratory. It provides an opportunity to carry out virtual experiments in an eenvironment. In this environment excellent simulation videos available on the web either free or on price. But, problem mostly encountered by students is in sequencing and scaling of concepts and selection of an appropriate video out of a big list available in web-search. This is severely distracting. Mentors are, however, the best persons to use these videos to modulate and upgrade their illustrations. Yet it does not rule out importance of handson by students in problem solving and is called dry-run of concepts, in the parlance of computer programming.

In light of this Question Banks including problems from various sources and they are being supported with illustrations is being created. These illustrations are not just solutions but an attempt to bring home use of basics involved in solving problems. In this effort repository of problems from good books viz. Prof. H.C. Verma and a team of authors Robert Resnick, David Halliday and Kenneth S. Krane and many more have been used. These questions 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 this stream of efforts Question Bank, Part-3, Set-2 with illustrations on Geometrical Optics has been uploaded on the web. Out of this few selected question are brought out here.

This initiative of a small group of passionate persons is aimed at to mentor unprivileged children and is driven with a sense of **Personal Social Responsibility (PSR)** in a *non-organizational, non-remunerative, noncommercial 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 passion and convenience.

Wave and Motion : Geometrical Optics – Selected Questions –Set I

Question 1: Image formed by a concave mirror is

- (a) Always real
- (c) Is certainly real if the object is virtual Velocity
- (b) Is always virtual(d) Is certainly virtual if the object is real

Illustration: The formula of reflection from spherical mirror is $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$. On case of a concave mirror f is always (+)ve and u cannot be (-)ve since that would having an object behind the mirror and contradicts necessary condition of formation of image by a mirror which requires object to be in front of the mirror. Hence, always u is positive. But, if $u < f \Rightarrow \frac{1}{u} > \frac{1}{f} \Rightarrow \frac{1}{v}$ is negative it implies that v is (-)ve i.e. image is

virtual. This analysis rules **option (a), (b) and (c) as incorrect**. But certainly image is virtual if object is real and u < f, that makes **option (d) as correct**. **N.B.:** For option to be correct, necessary condition is u < f, that adds to certainty, but this information is latent in the question.

Question 2: Four modifications are suggested in the lens formula to include the effect of the thickness t of the lens. Which one is likely to be correct?

(a) $\frac{1}{v} - \frac{1}{u} = \frac{t}{\mu f}$ (b) $\frac{t}{v^2} - \frac{1}{u} = \frac{1}{f}$ (c) $\frac{1}{v-t} - \frac{1}{u+t} = \frac{1}{f}$ (d) $\frac{1}{v} - \frac{1}{u} + \frac{t}{uv} = \frac{t}{f}$

Illustration: Formula for refractive index of a lens is $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$...(1). Here, *u* and *v* are distances of object and image from P₁. But, in a thin lens of thickness *t* values of *u* and *v* get modified as $u \to u + t$ and $v \to u - t$ from P₂. Accordingly, modified formula for the thin lens with new values is $\frac{1}{v-t} - \frac{1}{u+t} = \frac{1}{f}$ and this matches with **option (c), which is correct**.

Question 3: The image of an extended object, placed perpendicular to the principal axis of a mirror, will be erect if(a) The object and the image are both real(b) The object and image are both virtual

(c) The object is real but the image is virtual (d) The object is virtual but the image is real

Illustration: Statement of principal axis, is indirect reference to a case of spherical mirror. Further, extended object implies that it is not a point and it may has a height, which is placed perpendicular to principal axis implies the object is erect. In this context each of the iption is being analyzed separately –

Option (a): Real image of real object is always inverted. Hence, option (a) is incorrect.

Option (b): Object is placement is defined to be real and hence both object and image cannot be virtual. This makes option (b) to be incorrect.

- **Option (c):** There are positions in concave mirror where real object produces virtual image. And in convex mirror image of a real object is always virtual. **Hence option (c) is correct.**
- **Option (d):** Virtual object is a virtual image of a real object. This can be created by either concave or convex mirror. Now if another concave mirror is placed infront of such mirror, , both facing each other, such that the distance (d) of the virtual object from second mirror is d > f then a real image would be produced. **Hence option (d) is correct.**

Hence, answers are options (c) and (d).

- Question 4: A screen is placed at a distance 40 cm away from an illuminated object. A converging lens is placed between the source and the screen and it is attempted to form an image of the source on the screen. If no position could be found, the focal length of the lens
 (a) must be less than 10 cm
 (b) must be greater than 20 cm
 - (c) must not be greater than 20 cm (d) must not be less than 10 cm.

Illustration: As per lens formula $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$. As per Cartesian sign convention distance of object from lens is u = -x cm and distance of image formed on the screen Σ is v = 40 - x cm. Thus for image formed on the screen the equation with the available data is $\frac{1}{f} = \frac{1}{40-x} - \frac{1}{-x} \Rightarrow \frac{1}{f} = \frac{1}{40-x} + \frac{1}{x}$. Limiting value of position of lens is $0 \le x \le 40$. Accordingly, we have $\frac{1}{f} = \frac{40}{(40-x)x} \Rightarrow \frac{1}{2} = \frac{-(-40)\pm\sqrt{(-40)^2-4\times1\times(40f)}}{2} \Rightarrow x = \frac{40\pm4\sqrt{100-10f}}{2} \Rightarrow x = 20 \pm 2\sqrt{100-10f}$

For real value of x, the discriminant $\sqrt{100 - 10f}$ should be positive it implies that 100 - 10f > 0. It leads to $100 > 10f \Rightarrow f < 10$. This matches with the **option (a), the correct answer.**

Question 5: A concave mirror has a focal length of 20 cm. Find the position or positions of an object for which the image size is double of the object-size.

Illustration: From the study of ray diagrams of formation of images by concave mirror having f = 20 cm if size of image is double the object, there are two possibilities – (a) object is between focal point and center of curvature forming a real image infront of the mirror thus h_0 is (-)ve, and (b) object is between pole of mirror and its focal point, forming virtual image behind the mirror making h_0 (+)ve as per Cartesian sign convention.

virtual image behind the mirror making h_0 (+)ve as per Cartesian sign convention. The formula image formation by spherical mirror is $\frac{1}{f} = \frac{1}{u} + \frac{1}{v} \dots (1)$. and that of lateral magnification by mirror is $-\frac{v}{u} = \frac{h_i}{v}$

 $\frac{h_i}{h_0}$...(2). Applying the formula for both the cases with the available data we have -

Case(a): Using formula (2) we have $-\frac{v}{u} = \frac{-2h_0}{h_0} \Rightarrow v = 2u...(3)$ And using (3) in (1) we have $\frac{1}{20} = \frac{1}{u} + \frac{1}{2u} \Rightarrow \frac{2}{3}u = 20 \Rightarrow u = 30$ cm Case(a): Using formula (2) we have $-\frac{v}{u} = \frac{2h_0}{h_0} \Rightarrow v = -2u...(3)$ And using (3) in (1) we have $\frac{1}{20} = \frac{1}{u} - \frac{1}{2u} \Rightarrow 2u = 20 \Rightarrow u = 10$ cm. Thus answers are 10 cm and 30 cm from the mirror.

Question 6: A U shaped wire is placed infront of a concave mirror having radius of curvature 20 cm as shown in the figure. Find total length of the image.

Illustration: The problem has two parts one is to determine position of image of both arms of U shaped wire and other is to determine height of image of both arms of wire. Accordingly, all parameters of left arm are suffixed with 1 while corresponding parameters of the right arm are suffixed with 2. It is to be noted that concave is so placed that all distances along the principal axis are on the left of pole P and hence as per Cartesian sign convention they are (-)ve.

Therefore, problem of determination of total length is done in three stages- Stage 1: position and height of the left arm of wire, Stage 2: position and height of the left arm of wire, Stage 3: length of the base of the U shaped wire. Stage wise solution is as under – Stage 1: $f = -\frac{R}{2} = -\frac{20}{2} \Rightarrow f = -10$ cm. Distance of object $u_1 =$ -(30 + 10) = -40 cm. Therefore, we have $\frac{1}{f} = \frac{1}{u_1} + \frac{1}{v_1}$ Using the available data, $\frac{1}{-10} = \frac{1}{-40} + \frac{1}{v_1} \Rightarrow \frac{1}{v_1} = \frac{1}{40} - \frac{1}{10} \Rightarrow$ $v = \frac{40 \times 10}{10 - 40} \Rightarrow v_1 = -\frac{40}{3}$ cm. Therefore, from formula of linear magnification $-\frac{v_1}{u_1} = \frac{h'_1}{h_1} \Rightarrow h'_1 = -\frac{-10}{-40} \times \frac{40}{3} \Rightarrow$ $h_1' = -\frac{10}{3}$ cm. Stage 2: f = -10 cm. Distance of object $u_2 = -30$ cm. Therefore, $\frac{1}{f} = \frac{1}{u_2} + \frac{1}{v_2}$. Using the available data, $\frac{1}{-10} = \frac{1}{-30} + \frac{1}{v_2}$. $\frac{1}{v_2} \Rightarrow \frac{1}{v_2} = \frac{1}{30} - \frac{1}{10} \Rightarrow v_2 = \frac{30 \times 10}{10 - 30} \Rightarrow v_2 = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula of linear magnification } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula } -\frac{v_2}{u_2} = -15 \text{ cm Therefore, from formula }$ $\frac{h_2'}{h_2} \Rightarrow h_2' = -\frac{-15}{-30} \times 10 \Rightarrow h_2' = -5 \text{ cm}.$ Stage 3: Length of image L' is sum of absolute values of height of two arms and separation between the two arms. Thus $L' = |h'_1| + |h'_2| + |v_1 - v_1| = \frac{10}{3} + 5 + \left(15 - \frac{40}{3}\right) = \frac{10}{3} + 5 + \frac{5}{3} = 10 \text{ cm is the answer.}$ Question 7: A particle goes in a circle of radius 2.0 cm. A concave mirror of focal length 20cm is placed with its principal axis passing through the center of the circle and perpendicular to its plane. The distance between the pole of the mirror and the center of the circle is 30 cm. Calculate the radius of the circle formed by the image. **Illustration:** The problems is conceptualized as object OA placed at a distance PO = 30 cm. from a concave mirror. Height of object $r = h_1 = 2.0$ cm. Focal Reflecting surface of a length of the mirror f is 20 cm. Grayed surface of the mirror is non-reflecting concave mirror surface. Thus as per Cartesian sign convention we have u = -30 cm and f =-20 cm. We are required to determine radius of the circle formed by the image Therefore, as per image formula $\frac{1}{f} = \frac{1}{u} + \frac{1}{v} \Rightarrow \frac{1}{-20} = \frac{1}{-30} + \frac{1}{v} \Rightarrow \frac{1}{v} = \frac{1}{30} - \frac{1}{20} \Rightarrow$ 30 cm $v = \frac{20 \times 30}{(20 - 30)} \Rightarrow v = -60$ cm, it implies that image would be formed in front of the mirror. Now, radius of the circle of image h_2 can be determined using formula of lateral magnification $-\frac{v}{u} = \frac{h_2}{h_1}$, it leads to $h_2 = \left(-\frac{v}{u}\right) \times h_1$. Using the available data $h_2 = \left(-\frac{-60}{-30}\right) \times 2.0 = -4.0$ cm. This implies that it would be an inverted image such that at every position of the particle on the circle, its image would be at the position determined but diametrically opposite on a circle of radius 4.0 cm with its centre on principal axis at a distance 60 cm from pole. Thus answer is 4.0 cm. **Question 8:** A point source S is placed midway between two converging mirrors having equal focal length f as shown in the figure. Find the value of d for which only one image is formed.

Illustration: Given that both the mirrors have focal length f. Position image formed by each mirror shall be determined such that they coincide to form a single image as desired. The problem can be solved using pre-knowledge of ray diagrams of concave mirrors, Second method is using more generic equation $\frac{1}{t} = \frac{1}{u} + \frac{1}{u} \dots (1)$ and is used here. Taking S as origin as Cartesian sign convention for mirror M1, focal distance mirror $u_1 = \frac{d}{2}$, focal length is $f_1 = f$, while for mirror M₂, focal distance mirror $u_2 = -\frac{d}{2}$ focal length is $f_2 = -f$. Therefore, using (1) distance of image from P₁ formed by M₁ is $\frac{1}{v_1} = \frac{1}{f_1} - \frac{1}{u_1} \Rightarrow \frac{1}{v_1} = \frac{1}{f} - \frac{1}{\frac{d}{d}} \Rightarrow \frac{1}{v_1} = \frac{1}{f} - \frac{2}{d}$. It leads to $v_1 = \frac{fd}{d-2f}.$ Next is image formed by mirror M₁ acts as an object for mirror M₂. Accordingly, $u_2 = d - \frac{fd}{d-2f}$. It leads to $u_2 = d - \frac{fd}{d-2f}$. $\frac{d^2 - 2fd - fd}{d - 2f} \Rightarrow u_2 = \frac{d^2 - 3fd}{d - 2f}.$ Accordingly, $\frac{1}{v_2} = \frac{1}{f_{21}} - \frac{1}{u_2} \Rightarrow \frac{1}{v_2} = \frac{1}{-f} - \frac{1}{\frac{d^2 - 3fd}{d - 2f}}.$ It further solves to $\frac{1}{v_2} = \frac{d-2f}{d^2-3fd} - \frac{1}{f} \Rightarrow v_2 = \frac{f(d^2-3fd)}{(df-2f^2)-(d^2-3fd)}.$ Taking it ahead, $v_2 = \frac{f(3fd-d^2)}{2f^2+d^2-4df}.$ As per sign convention, v_2 is (-)ve and hence condition to be satisfied is $v_1 - v_2 = d$. Accordingly, $d = \frac{fd}{d-2f} - \frac{f(3fd-d^2)}{2f^2+d^2-4df}$. Therefore, $1 = \frac{f}{d-2f} - \frac{f(3fd-d^2)}{d-2f}$. $\frac{f(3f-d)}{2f^2+d^2-4df}$. It is further solved as under – $(d - 2f)(2f^{2} + d^{2} - 4df) = f(2f^{2} + d^{2} - 4df) - (d - 2f) \times f(3f - d)$ $\Rightarrow (2f^{2} + d^{2} - 4df)(d - 3f) = (df - 2f^{2})(d - 3f)$ $\Rightarrow 2f^{2} + d^{2} - 4df = df - 2f^{2} \Rightarrow d^{2} - 5df + 4f^{2} = 0$ Factorizing the last form, (d - 4f)(d - f) = 0. It implies possible values of separation between the two mirrors is d = 04f or f**N.B.**: Deliberately algebraic solution has been brought out at illustration. It may give a satisfaction to students that in case a student accidently chooses it, it needs to be pursued with confidence rather than abandoning it for a quick and short answer. Otherwise in this case rays diagram gives quick and correct solution. Question 9: A converging mirror M₁, a point source S and a diverging mirror M₂ are arranged as shown in the figure. A source is placed at a distance of 30 cm from M_1 . The focal length of each mirror is 20 cm. Consider only the images formed by a maximum of two reflections and the images coincide. (a) Find the distance between the two mirrors. (b) Find the location of the image formed by the single reflection from M_2 . **Illustration:** Given that focal length of both the mirrors have focal lengths f = 20 cm, while distance of source S from concave mirror is d = 30. Cartesian sign convention is used taking origin as S, and all distances are measured from pole of mirror under consideration and accordingly (+) or (-) signs are attributed. Two reflections, one from each mirror, are required to be considered using formula $\frac{1}{f} = \frac{1}{u} + \frac{1}{v} \dots (1)$, and are as under –

Mirror M₁: Taking distances w.r.t. P₁, $f_1 = f = 20$ cm and $u_1 = 30$ cm. Accordingly, position of the image using (1). $\frac{1}{20} = \frac{1}{30} + \frac{1}{v_1} \Rightarrow \frac{1}{v_1} = \frac{1}{20} - \frac{1}{30}$, it leads

to $v_1 = \frac{20 \times 30}{30 - 20} \Rightarrow v_1 = 60$ cm w.r.t. P₁ infront of M₁. **Mirror M**₂: Taking distances w.r.t. P₂, $f_2 = f = 20$ cm and $u_2 = -(d - 30) = 30 - d$ cm. Accordingly, position of the image using (1). $\frac{1}{20} = \frac{1}{30 - d} + \frac{1}{v_2} \Rightarrow \frac{1}{v_2} = \frac{1}{20} - \frac{1}{30 - d}$, it leads to $v_2 = \frac{20 \times (30 - d)}{30 - 20 - d}$. It leads to $v_2 = \frac{600 - 20d}{10 - d}$ cm w.r.t. P₂, and it would be behind M₁.

Now, considering the given conditions that the images coincide, hence $v_1 = v_2 + d \Rightarrow 60 = \frac{600-20d}{10-d} + d$, it leads to $60 = \frac{(600-20d)+(10d-d^2)}{100} \Rightarrow 600 - 60d = 600 - 20d + 10d - d^2 \Rightarrow d^2 - 50d = 0 \Rightarrow d = 50 \text{ cm is the separation}$ 10-d of mirrors is answer of part (a). Position of image of source caused by single reflection from M₂ it is inside or behind the reflecting surface of the mirror, is virtual and at a distance 10 cm, is answer of part (b). Answers are (a) 50 cm (b) 10 cm inside the diverging mirror i.e. virtual image. **Question 10:** A light ray falling at an angle of 45[°] with the surface of a clean slab of ice of thickness 1.00 m is refracted into it at an angle of 30° . Calculate the time taken by light to cross the slab. Speed of light in vacuum is 3×10^{8} m/s. **Illustration:** Given the angle of incidence $i = 45^{\circ}$ and angle of refraction $r = 30^{\circ}$, the refracted ray BC crosses slab of thickness BE = d = 1.00 m. Refractive index of the medium $\mu = \frac{\sin i}{\sin r} = \frac{v}{v_i}$...(1), here $v = 3 \times 10^8$ m/s is velocity of light in vacuum and v_i is velocity of light in ice slab. Time taken by light to cross the slab is $t = \frac{BC}{v_i}$...(2). Here, $\frac{BE}{BC} = \cos r \Rightarrow BC = \frac{BE}{\cos r}$...(3). Combining (1), (2) and (3) we have $t = \frac{\frac{BE}{\cos r}}{\frac{v}{\mu}} \Rightarrow t = \frac{BE}{\cos r} \times \frac{\mu}{v} \Rightarrow t = \frac{BE}{\cos r} \times \mu \times \frac{1}{v}$. It further leads to $t = \frac{BE}{\cos r} \times \mu \times \frac{1}{v}$. $\frac{\sin i}{\sin r} \times \frac{1}{v}$. Using the given data, $t = \frac{1.00}{\cos 30^0} \times \frac{\sin 30^0}{\sin 30^0} \times \frac{1}{v} \Rightarrow t = \frac{1.00}{\frac{\sqrt{3}}{2}} \times \frac{1}{\frac{1}{2}} \times \frac{1}{3 \times 10^8}$. It leads to $t = \frac{1.00 \times 2 \times \sqrt{2}}{3 \times \sqrt{3}} \times 10^{-8} \Rightarrow t = \frac{1.00}{\sqrt{3}} \times \frac{1}{\sqrt{3}} \times \frac$ $0.544 \times 10^{-8} \Rightarrow t = 5.44 \times 10^{-9}$ s, or **5.44 ns is the answer**. **N.B.**: Numerical part of the problems done at the ends apparently makes it a long calculation and algebraic part tedious. But it has following advantages -(a) Mostly in last stage many values are cancelled, incidentally in this it is not so, (b) Calculation at each stage makes it apparently simple, but may lead to error creeps in while considering significant digits (c) It is easier to apply SDs at last stage based on given data. **Question 11:** An object P is focused by a microscope M. A glass slab of thickness 2.1 cm is introduced between P and M. If the refractive index of the slab is 1.5 by what distance should the microscope be shifted to focus the object again? **Illustration:** Let d is the distance, optical path length, of microscope M from object P in focus in air. When a glass slab of refractive index μ and thickness t is introduced between M and P, the optical path length changes to $d' = (d - t) + \frac{t}{\mu} \Rightarrow d' = d - \left(1 - \frac{1}{\mu}\right)t$. Distance between P and M depends upon size of P and hence it remains fixed. Therefore, to keep P in focus of M the latter shall have to be shifted by Δd such that $d' + \Delta d = d \Rightarrow \Delta d = d - d' =$ $d - \left(d - \left(1 - \frac{1}{\mu}\right)t\right) \Rightarrow \Delta d = \left(1 - \frac{1}{\mu}\right)t$. Using the given data $\Delta d = \left(1 - \frac{1}{1.5}\right) \times 2.1 = 0.70$ cm away from the object, is the answer. **Question 12:** Consider the situation shown in the figure. The bottom of the pot is a reflecting ¥____4 E plane mirror, F is a small fish and E is a human eye. Refractive index of water is *u*. (a) At what distance(s) from itself will the fish see the images(s) of the eye? (b) At what distance(s) from itself will the eye see the image(s) of the fish?

Contd...(Question 13)

Illustration: The system given in the problem is shown in the figure with particle P placed at bottom of the cylindrical vessel at a distance PO = 5 cm ...(1), from the centre O. The vessel is filled upto height x with water of refractive index $_{a}\mu_{w} = 1.33$ to be able to see the particle along ED when the vessel is empty. Refracting index of water from air to water $_{a}\mu_{w}$, becomes $_{w}\mu_{a} = \frac{1}{_{a}\mu_{w}} = \frac{1}{_{1.33}}$...(2) for rays regacting from water to air. Therefore, the ray from particle along PB, after reflection is aligned to ED making angle $\theta = \tan^{-1}\frac{30}{_{30}} = \tan^{-1} 1$, or $\theta = 45^{0}$, and hence geometrically angle of refraction at B is $r = 90^{0} - \theta = 45^{0}$.

Therefore, from Snell's Law $_{W}\mu_{a} = \frac{\sin i}{\sin r} \Rightarrow \frac{1}{1.33} = \frac{\sin i}{\sin 45^{\circ}} \Rightarrow \sin i = \frac{1}{\sqrt{2}} = \frac{1}{1.33} = 0.532$. For achieving this angle i, vessel is required to be filled upto height x such that in Δ PAB, $\tan i = \frac{P0+OA}{x}$, and $\tan i = \frac{\sin i}{\sqrt{1-\sin^{2}i}} = \frac{0.532}{\sqrt{1-(0.532)^{2}}} = 0.628$. Therefore, $0.628 = \frac{5+OA}{x} \Rightarrow 0.628 \times x = 5 + OA$...(3) And in Δ PAB, $\tan \theta = \tan 45^{\circ} = \frac{AB}{E0+OA} \Rightarrow 15 + OA = x...(4)$

Eliminating OA from (3) and (4), we have $0.628 \times x = 5 + (x - 15) \Rightarrow (1 - 0.628)x = 10 \Rightarrow x = 26.88$ cm say **26.9** cm is the answer.

Question 14: A light ray is incident at an angle of 45° with the normal to a plate $\sqrt{2}$ cm thickness having of refractive index 2.0. Find shift in the path of the light as it emerges out from the plate.

Illustration: Given that light ray is incident at B at an angle $i = 45^{\circ}$ on a plate of thickness $\sqrt{2}$ cm, or refractive index $\mu = 2$ after refraction passes along BC at angle *r* and again after refraction at point C on the other face of the plate refracts along CD. As per Snell's Law $\mu = \frac{\sin i}{\sin r}$. Since, there is air on the both sides of the plate and hence ray CD emergent from the plate remains parallel to projected incident ray AE, but displaced by AE = *d*. Geometrically in Δ BCP, we have CP = BC × sin(*i* - *r*) ...(1), and in Δ BDC, we have BC = BD × sin *r*...(2).

Using given data $\sin r = \frac{\sin i}{\mu} = \frac{\sin 45^{\circ}}{2} = \frac{1}{\sqrt{8}}$(3). Therefore, $\cos r = \sqrt{1 - \sin^2 r} = \sqrt{1 - \left(\frac{1}{2\sqrt{2}}\right)^2} = \sqrt{\frac{7}{8}}$...(4) . Further, $\sin 45^{\circ} = \cos 45^{\circ} = \frac{1}{2}$.

From (1) and (2), shift in the path of ray is $d = CP = \left(\frac{BD}{\cos r}\right) \times \sin(i - r)$. It leads to $d = \frac{BD}{\cos r} \times (\sin i \cos r - \cos i \sin r).$

Using the available data
$$d = \sqrt{2} \times \frac{1}{\sqrt{\frac{7}{8}}} \times \left(\frac{1}{\sqrt{2}} \times \frac{\sqrt{7}}{\sqrt{8}} - \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{8}}\right) = \frac{4}{\sqrt{7}} \times \frac{\sqrt{7}-1}{4} \Rightarrow d = 1 - \frac{1}{\sqrt{7}} = 0.62.$$
 cm

N.B.: This illustration demonstrates nicely benefit of exercising patience to defer calculation until last step.

Question 15: Light is incident from glass ($\mu = 1.50$) to water ($\mu = 1.33$). Find the range of angle of deviation for which there are two angles incidence. $_{a}\mu_{g} = 1.50 = \frac{3}{2}$ and Illustration: Problem states that there is a composite medium of glass having refractive index $_{g}\mu_{W} = \frac{_{a}\mu_{W}}{_{a}\mu_{g}} = \frac{\frac{4}{3}}{\frac{3}{2}} =$ water with $_{a}\mu_{w} = 1.33 = \frac{4}{3}$. Therefore, refractive for light passing from glass to water is $\frac{\delta}{\alpha}$...(1) A normal to the interface of the two medium (*i* = 0) passes without refraction and therefore $\delta_{min} = 0$. But, for a ray of light passing from denser to rarer medium, as is given in the problem, the rays undergoes refraction for angle of incidence $0 \le i \le i_c$, here i_c is called critical angle of incidence at which refracted ray becomes tangential to the interface i.e. $r = 90^{\circ}$ beyond which refraction is not possible. Accordingly, $g\mu_w = \frac{\sin i_c}{\sin 90^{\circ}}$. It leads to $\sin i_c = \frac{1}{\sin 90^{\circ}}$. $_{g}\mu_{w}...(2)$ Angle of deviation $\delta = r - i$, therefore at i_{c} we have $\delta_{max} = 90 - i_{c}...(3)$. A simplified presentation of result is made using a bit of trigonometry using figure where $\sin \theta = \frac{AB}{AC}$ and $\cos(90^{\circ} - \theta) = \frac{AB}{AC} = \sin \theta \Rightarrow 90^{\circ} - \theta = \cos^{-1}(\sin \theta)...(4)$. In the instant case $\theta = i_c$ and hence combining(1), (2), (3) and (4) we have $\delta = \cos^{-1}(\sin i_c) = \cos^{-1}\frac{8}{2}$. Thus, for angle of deviation in the range $0 \le \delta \le \cos^{-1} \frac{8}{a}$ there are two possible angle of incidence. N.B.: Mathematics is a great tool of simplification of problem and answer, and it has been used here. Question 16: Light falls from glass ($\mu = 1.50$) to air. Find the angle of incidence for which the angle of deviation is 90⁰. **Illustration:** Refractive index of glass is given to be $_a\mu_g = 1.5 = \frac{3}{2}$. Further it is stated light falls on glass and refracts into air a rarer medium and hence $_g\mu_a = \frac{1}{_a\mu_g} = \frac{2}{_3}$. At boundary condition of refraction, critical angle of incidence ray AO is refracted along OS such that $_{g}\mu_{a} = \frac{\sin i_{c}}{\sin 90^{0}} \Rightarrow \sin i_{c} = _{g}\mu_{a} = \frac{2}{3} = 0.67.$ Accordingly, we have $i_{c} = \sin^{-1} 0.67 =$ 41.8°. An incident ray BO at an angle $i = i_c + \theta|_{\theta>0}$ is reflected along OC at an angle r = i, as shown in the figure. Thus reflected ray is deviated from BD through an angle $\delta = 180^\circ - 2i$. Using the given value of deviation $\delta = 90^{\circ}$ it leads to $i = \frac{180-90}{2} = 45^{\circ}$ is the answer. Question 17: A point source is placed at a depth h below the surface of water having refractive index μ . (a) Show that light escapes through a circular area on the water surface with its centre directly above the point source. (b) Find the angle subtended by a radius of the area on the source. **Illustration:** Refractive index of glass is given to be $_a\mu_w = \mu$. Further it is stated light falls on glass and refracts into air a rarer medium and hence $_{w}\mu_{a} = \frac{1}{a^{\mu}w} = \frac{1}{\mu}$. At boundary condition of refraction, critical angle of incidence i_c ray PA with normal at A is refracted is along surface of water such that ${}_w\mu_a = \frac{\sin i_c}{\sin 90^0} \Rightarrow \sin i_c = \frac{1}{\mu} \Rightarrow i_c =$ $\sin^{-1}\frac{1}{u}$. Any ray of light having angle of incidence $i > i_c$ will undergo total reflection and will not be visible to an observer in the air. Thus light that escapes through a circular area of radius r with its centre at O just above the point source P where $r = h \tan i_c$. This illustration forms answer of part (a), while algebraic expression is only for academic importance. The value of $i_c = \sin^{-1} \frac{1}{u}$ derived above is the answer of part (b).

- **Question 18**: A container contains water upto height of 20 cm and there is appoint source at the centre of the bottom of the container. A rubber ring of radius r floats centrally on the water. The ceiling of the room is 2.0 m above the water surface.
 - (a) Find the radius of the shadow of the ring formed on the ceiling if r = 15 cm.
 - (b) Find the maximum value of r for which the shadow of the ring is formed on the ceiling. Refractive index of water is $\frac{4}{2}$.

Illustration : Given that refractive index of water, it implies for light entering from air, is glass is given to be $_a\mu_w = \frac{4}{3}$. Therefore, for light from a source inside water at a depth h = 0.2 m entering air would be $_w\mu_a = \frac{1}{_{a}\mu_w} = \frac{3}{4}$. Therefore, for a ray SA touching inner radius of the ring, a = 0.15 m, making an angle of incidence *i* will be refracted along AQ with an angle of refraction *r*, such that $_w\mu_a = \frac{\sin i}{\sin r}$. From Δ SAC we have $\tan i = \frac{a}{h} \Rightarrow \sin i = \frac{\tan i}{\sqrt{1 + \tan^2 i}} \Rightarrow$ $\sin i = \frac{a}{\sqrt{a^2 + h^2}} = \frac{15}{\sqrt{15^2 + 20^2}} = \frac{3}{5}$. As per Snell's Law $_w\mu_a = \frac{\sin i}{\sin r} \Rightarrow \sin r = \frac{\sin i}{w\mu_a} = \frac{\frac{3}{5}}{\frac{3}{4}} = \frac{4}{5}$.

With this analysis answers for each part are being determined. **Part (a):** Radius of the shadow of the ring is $a' = PR + RQ = a + AR \times \tan r$. Again trigonometrically $\tan r =$

$$\frac{\sin r}{\sqrt{1-\sin^2 r}} = \frac{\frac{4}{5}}{\sqrt{1-(\frac{4}{5})^2}} = \frac{4}{3}.$$
 Therefore, using the available data, $a' = 0.15 + 2.0 \times \frac{4}{3} = 2.8$ m is the answer of

part (a) considering SDs.

Part (b): Maximum value of a_{max} for which shadow of the ring would be formed is determined by critical angle of

incidence such that
$$\sin i_c = {}_w \mu_a = \frac{3}{4}$$
. Therefore, $\tan i_c = \frac{\sin i_c}{\sqrt{1 - \sin^2 i_c}} = \frac{\frac{3}{4}}{\sqrt{1 - \left(\frac{3}{4}\right)^2}} = \frac{3}{\sqrt{7}}$(1). And

geometrically
$$\tan i_c = \frac{a_{max}}{h} \Rightarrow a_{max} = h \times \tan i_c = 20 \times \frac{3}{\sqrt{7}} = 22.7$$
 cm is the answer.

N.B.: It is to be noted that here calculations of $\sin i$ and $\tan r$ have been made where they occur first to simplify calculations. This it is purely a conscious judgement as to where calculations to be deferred till end or to be done intermittently. This sense of judgement is evolved with practice.

Question 19: A light ray, going through a prism with the angle of prism 60° , is found to deviate by 30° . What limit on the refractive index can be put from these data?

Illustration: Given that angle of prism $A = 60^{\circ}$, a ray of deviates thorough an angle 30° . It is required to find limiting value of refractive index μ . Since, $\mu = \frac{\sin(\frac{\delta \min^2 A}{2})}{\sin\frac{A}{2}}$ where for δ_{\min} depends upon μ and vice-versa. There one relation with Two variables and hence by taking $\delta_{\min} = 30^{\circ}$, we can determine limiting value of refractive index. Accordingly, using the available data $\mu = \frac{\sin(\frac{30^{\circ}+60^{\circ}}{2})}{\sin\frac{60^{\circ}}{2}} \Rightarrow \mu = \frac{\sin 45^{\circ}}{\sin\frac{30^{\circ}}{2}} = \frac{1}{\sqrt{2}} = \sqrt{2}$ is the limiting value of refractive index. But, point of contention to be ascertained is whether it is maximum or minimum. This depends upon $f'' = \frac{d^2}{d\delta_{\min}^2} \mu$. If f'' is (-)ve then it is maximum value.

Accordingly,
$$f'' = \frac{d^2}{d\delta_{min}^2} \left(\frac{\sin(\frac{min}{2})}{\sin\frac{A}{2}} \right) = \frac{1}{\sin\frac{A}{2}} \frac{d}{d\delta_{min}} \left(\frac{1}{2} \times \cos\left(\frac{\delta_{min}+A}{2}\right) \right) = \frac{1}{2\sin\frac{A}{2}} \left(-\frac{1}{2} \times \sin\left(\frac{\delta_{min}+A}{2}\right) \right)$$
. It is found that $f'' = (-)\frac{1}{4}\mu$ is (-) hence, **limit of refractive index is** $\mu \le \sqrt{2}$ **is the answer.**

Question 20: A biconvex thick lens is constructed with glass $\mu = 1.50$. Each of the surfaces has a radius of 10 cm and the thickness at the middle is 5 cm. Locate the image of an object placed far away from the lens.

Illustration: Statement of variables in the problem are depicted in the figure on the left side. Here $\mu_2 = \mu = 1.5, \mu_1 = 1.0, R_1 = R_2 = R = 10$ cm and thickness of lens in the middle is t = 5 cm. Since, it is not the case of a thin lens and hence refraction from each surface as a houndary of the two medium is being analyzed separately using $\frac{\mu_2}{\mu_1} = \frac{\mu_1}{\mu_2 - \mu_1}$

boundary of the two medium is being analyzed separately using $\frac{\mu_2}{v} - \frac{\mu_1}{u} = \frac{\mu_2 - \mu_1}{R}$...(1), for which geometrical details are shown in the figure on right side. Cartesian sign convention is assigned to distances used in determi8ning position of image.

Since lens is symmetrical and hence object can be placed on either side for determining the final image. Taking object placed on the left side of the lens.

Image by Left Surface of Lens: Geometry of the lens for this case is shown in the with P₁ as a reference pole. Using (1) with the available data $\frac{1.5}{v_1} - \frac{1.0}{\infty} = \frac{1.5 - 1.0}{10}$. It leads $v_1 = 30$ cm. Distance of image I₁ from O is $d_1 = P_1C_1 - P_1O$. It solves to $d_1 = v_1 - \frac{t}{2} = 30 - \frac{5}{2} \Rightarrow d_1 = 27.5$ cm from O.

Image by Right Surface of Lens: Geometry of the lens for this case is also shown in the figure with P₂ as a reference pole. The image I₁ formed by left surface of the lens becomes source for the right surface and thus in this case $u_2 = 0I_1 - P_2I_1 = d_1 - \frac{t}{2}$. Using d_1 determined above $u_2 = 27.5 - \frac{5}{2} = 25$ cm, while in this case $R = R_2 = -10$ cm and v_2 is the distance if image from P₂.

Here it is to be noted that position of image I_1 was arrived at material of refractive index on right

of the left surface of the lens is of refractive index $\mu = 1.5$. It implies that object is embedded inside the glass. Therefore, refraction at right surface of the lens is arrived at by reversing the refractive indices on both sides of the right surface such that $\mu_1 = 1.5$ and $\mu_2 = 1.0$ is the refractive index on the side of the lens facing source. Accordingly, using the available data in (1) we have $\frac{1}{v} - \frac{1.5}{25} = \frac{1.0 - 1.5}{-10} \Rightarrow \frac{1}{v} = \frac{1.5}{25} + \frac{0.5}{10}$. It leads to $\frac{1}{v} = \frac{5.5}{50} \Rightarrow v = 9.1$ cm from the farther face of the lens.

- **N.B.:** (1) Here formula $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$ cannot be applied since thickness of the lens is significant w,r.t. to radius of its spherical surfaces. And hence refraction from each surface is considered separately to determined position of image as a combined effect.
- (2) Consideration in change of refractive indices while determining image formed by surface of lens farther from the source is important and need to be noted.
- (3) This problem can be extrapolated with different radius of curvatures for both the spherical surfaces and different refractive indices for medium on each side of the lens

Question 21: If an object far away from the convex mirror moves towards the mirror, the image also moves. Does it move faster, slower or at the same speed as compared to the object?

Illustration: Formula for image in spherical mirror is $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$...(1). Here, *u* is distance of object from pole, *v* is the distance of image from the pole, *f* is distance of focus from the pole. Using the Cartesian sign convention, the equation can be written as $-\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$...(2) Here, v < f, while $u \gg$ but *f* is constant for a spherical mirror. Hence, u > v...(3). Since speed are to be compared and hence differentiating (2) we have $\frac{d}{dt}\left(-\frac{1}{u}\right) + \frac{d}{dt}\left(\frac{1}{v}\right) = \frac{d}{dt}\left(\frac{1}{f}\right)$. It leads to $\frac{1}{u^2} \times \frac{du}{dt} - \frac{1}{v^2} \times \frac{dv}{dt} = 0 \Rightarrow \frac{du}{dt} = \left(\frac{u}{v}\right)^2 \frac{dv}{dt}$...(4). Combining (3) and (4) we have $\frac{du}{dt} > \frac{dv}{dt}$, i.e. **image move slower than object.**

Object

Question 22: A thin converging lens is formed with one surface convex and the other plane. Does the position of image depend whether the convex surface or the plane surface faces the object?

Illustration: Lens formula for a spherical lens, shown in the figure, is $\frac{1}{f} = \left(\frac{\mu_2}{\mu_1} - 1\right) \left(\frac{1}{R_1} - \frac{1}{R_2}\right)$. Position image is determined from formula $\frac{1}{v} - \frac{1}{u} = \frac{1}{f} \Rightarrow \frac{1}{v} = \frac{1}{f} + \frac{1}{u}$. For a given object position of image depends upon focal length of the lens, of a given material, which in turn is dependent upon radius of curvature. In question Two cases are given as under –

Case 1: Convex surface having radius of curvature $R_1 = R$ faces the object as shown in the figure, while for plane surface $R_2 = \infty$. Accordingly, focal length of the lens would be $\frac{1}{f_1} = \left(\frac{\mu_2}{\mu_1} - 1\right) \left(\frac{1}{R} - \frac{1}{\infty}\right) \Rightarrow \frac{1}{f_1} = \left(\frac{\mu_2}{\mu_1} - 1\right) \times \frac{1}{R}$.

Case 2: Plane surface faces the object and in this case $R_1 = \infty$ and $R_2 = R$ and accordingly focal length would be $\frac{1}{f_2} = \left(\frac{\mu_2}{\mu_1} - 1\right) \left(\frac{1}{\infty} - \frac{1}{R}\right) \Rightarrow \frac{1}{f_2} = -\left(\frac{\mu_2}{\mu_1} - 1\right) \times \frac{1}{R}$.

In the two case $f_2 = -f_1 \Rightarrow f_2 \neq f_1$ and hence $v_2 \neq v_1$

Question 23: An air bubble is formed inside water. Does it act as a converging lens or diverging lens?

Illustration: A water drop resembles to a convex-convex lens where refractive index of the medium surrounded by the water is $\mu > 1$. But, bubble is a hollow sphere of water with air inside and outside it. Thus rays passing it encounter a combination of convex-concave AND Concave-Convex lens. Accordingly, the ray diagram indicates that the **bubble is diverging lens**.

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It has been observed that normally a person responds to a problem or a situation either extempore or thoughtfully. Extempore response is intuitive and instant, while thoughtful response is delayed. This delay depends upon one's ability, patience to analyze the situation and the time available to respond. Accuracy of instant response is regulated by intuitive skills of the person. Growth of this intuition in turn is regulated by expertise attained by a person to analyze and act upon a situation. Multidimensionality in versatility, depth and spread of the intuition leads to wisdom.

This expertise or wisdom cannot be achieved in one leap. It is a result perseverance in the pursuit of striving against cyclic failure-success and grows like a spiral.

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Growing with Concepts: Chemistry

ALLOTROPES OF CARBON

Kumud Bala

Anomalous behavior of carbon: Carbon, the first member of group 14, differs from the rest of the members of its family. The main reasons for this difference are:

- (a) exceptionally small atomic and ionic size
- (b) higher electronegativity (-2.5)
- (c) higher ionization enthalpy
- (d) absence of d-orbitals in the valence shell.
- The main points of difference are:
- (i) Carbon in form of diamond is very hard as compared to other members of group 14.
- (ii) It has higher melting and boiling point than other members of the group (4373K).
- (iii) Carbon has only four valence orbitals (one 2s and three 2p), therefore, at the maximum it can accommodate four pairs of electrons around it. Therefore, the maximum covalency of carbon is 4. The other elements of this group due to the presence of d-orbitals can expand their covalency to 6. Thus, carbon does not form $[CF_6]^{-2}$ whereas silicon forms $[SiF_6]^{-2}$.
- (iv) Due to small size and high electronegativity, carbon has a strong tendency to form $p\pi$ - $p\pi$ multiple bonds either with itself or with other atoms such as oxygen, nitrogen and sulphur. The remaining elements, however, do not form $p\pi$ - $p\pi$ bonds because their atomic orbitals are too large and diffused to have effective overlapping.
- (v) Carbon has the remarkable property of catenation and unique strength of carbon-carbon bonds. Due to the property of catenation and $p\pi$ - $p\pi$ bond formation, carbon shows allotropic forms.

Allotropes of carbon: The phenomenon of existence of an element in two or more forms which have different physical properties but identical chemical properties is called allotropy and the different forms are called allotropes. Carbon exists in two allotropic forms: (i) crystalline (ii) amorphous

Crystalline allotropic forms of carbon are:

(a) diamond (b) graphite (c) fullerenes

Due to different structures, they have different properties.

Diamond: It occurs in nature. It can also be prepared artificially but because of the high cost and poor quality, diamonds are seldom made artificially.

Structure: In diamond, carbon is sp³-hybridized. Each carbon is tetrahedral linked to four neighboring carbon atoms through four strong C-C, sp³-sp³, and σ bonds. This network extends in three dimensions and is very rigid.

Properties:

- (i) Purity: diamond is the purest form of carbon.
- Bond length: because of sp³-hybridization, C-C bond length in diamond are 1.54 A° (154pm)
- (iii) Hardness: since diamond exists as a threedimensional network solid, it is the hardest substance known with high density and melting point.
- (iv) Conductivity: In diamond, all the valence electrons are involved in forming carbon-carbon bonds and does not have free electrons and therefore, it is a bad conductor of electricity.
- (v) Reactivity: In diamond, all the four valencies of carbon are satisfied by bonds with other carbons atoms. Therefore, diamond is entremely unreacting at room temperature.
- (vi) Transparency: because of its high refractive index(2.5), diamond can reflect and refract light. It is, therefore, a transparent substance.

Uses:

- (i) Due to its hardness, it is used for cutting glass, making bores for rock drilling and for making abrasives for sharpening hard tools.
- (ii) When diamond is cut and polished, brillant light is refracted from its surfaces. That is why diamond is used for making precious gems and jewellary.
- (iii) Diamond is used for making dies for drawing thin wires from metals.

(iv) (iv) It is used in the manufacture of tungsten filaments for electric light bulbs.

Graphite: It occurs in nature and can also be manufactured by heating coke to 3273-3300K in an electric furnace.

Structure: In graphite, carbon is sp²-hybridized. Each carbon is covalently bonded to three other carbon atoms by single bonds. The fourth electron on each carbon atom results in the formation of π bonds. In this way, graphite consists of hexagonal rings in two dimensions. The C-C covalent distance in rings is 142pm indicating strong

bonding. These arrays of ring form layers. The layers are separated by a distance of 340pm. The large distance between these layers indicates that only weak vander Waal's forces hold these layers together. The weak vander Waal's forces which hold these layers together are responsible for soft nature of graphite.

Structure of Graphite

Properties:

- (i) Purity: like diamond, graphite is also the purest form of carbon.
- (ii) Bond length: Because of sp²-hybridization the C-C bond lengths in graphite are 1.415A° (142pm).
- (iii) Softness: since any two successive layers are held together by weak forces of attraction, one layer can slip over the other. This makes graphite soft and a good lubricating agent.
- (iv) Conductivity: Since only three electrons of each carbon are used in making hexagonal rings in graphite, fourth valence electron of each carbon is free to move. This makes graphite a good conductor of heat and electricity.
- (v) Opaqueness: Unlike diamond, graphite is a black substance and possesses a metallic lustre.

Uses:

- (i) It is used for making electrodes for dry cells.
- (ii) Mixed with wax or clay, graphite is used for making lead pencils.
- (iii) Garphite marks paper black and is therefore, called black lead.
- (iv) It is used in the manufacture of crucibles which can withstand high temperature

- (v) Graphite is also used as a moderator for fast moving neutrons in atomic reactors.
- (vi) It is used as a lubricant for heavy machines running at high temperature, where oil cannot be used as a lubricant.
- (vii) It is used as a reducing agent in steel manufacturing.

Fullerenes: Before 1985, only two crystalline allotropes of carbon called diamond and graphite were known. But in 1985, a third crystalline allotrope of carbon called fullerene was discovered collectively by three scientists namely R.E. Smalley and R.F. Curl of Rice University, Houston, Texas (U.S.A) and H.W.Krote of the University of Sussex, Brighton U.K. For this discovery, these scientists shared the 1996 Noble prize in chemistry. Preparation and Separation: Fullerenes were originally made by the evaporation of graphite using a layer. Now, these are synthesized from soot obtained by striking an electric arc between graphite electrodes at about 3773K in the presence of an inert atmosphere of helium or argon. The sooty material formed by the condensation of vapourised C_n small molecules consists of mainly C₆₀ with small amount of C70 and traces of other fullerenes consisting of even number of carbon atoms upto 350 or more. The C₆₀ and C₇₀ fullerenes can be readily separated from the fullerene soot by extraction with benzene or toluene followed by chromatography over alumina. The process may be represented as:

 $\begin{array}{l} \text{graphite} \rightarrow^{\text{electric arc}}_{\text{He or Ar}} \text{ vapourised carbon} \rightarrow^{\text{condensation}} \\ \rightarrow \text{fullerene soot} \rightarrow^{\text{chromatographic separation over alumina}} \rightarrow C_{60} + \\ C_{70} \end{array}$

The fullerenes dissolve in organic solvents. A solution of C_{60} in toluene is purple where as that of C_{70} is orange red. Both graphite and diamond are insoluble in organic solvents. In fact, fullerenes are the only pure form of carbon because they do not have dangling edge or surface bonds which attract other atoms as is the case of garphite or diamond.

Structure: Of all the fullerenes, C_{60} allotropes is most stable. It looks like a soccer ball and is sometimes called as bucky ball. It contains 20 (six membered) rings and 12 (five membered) rings. Six membered rings are fused both to other six membered rings are connected only to sixmembered rings. In this case all the carbon atoms are equivalent and these are single and double bonds with C-C distance of 145.3 and 138.3 pm respectively. C_{60} fullerene is named 'Buckminster fullerene', after the name of American architect Robert Buckminster Fuller, who desinged 'geodesic domes' (having hexagonal and pentagonal patterns) that exactly resembled with it. C_{70} fullerene has 12 pentagonal and 25 hexagonal faces. It

resembles a rugby ball. There are five types of carbon atoms and thus eight distinct types of C-C bonds which vary from 139 to 154pm.

Properties:

- (i) Fullerenes being covalent are soluble in organic solvents.
- (ii) They can be reduced electrochemically and react with group 1 alkali metals, forming solids such as K_3C_{60} . This compound behaves as a superconductor below 18 K which means that it carries electric current with zero resistance.
- (iii) It reacts with OsO4 which adds across one of the double bonds in the cage.
- (iv) It also forms platinum complexes.

Uses: At present, fullerene does not have any practical uses . However, it is projected that fullerenes may find many nanotechnological applications. It is interesting to note that of all the crystalline allotropes of carbon, graphite is thermodynamically the most stable allotrope. Its standard enthalpy of formation ($\Delta_{\rm f} {\rm H}^{\circ}$) is taken as zero. The standard enthalpy of formation ($\Delta_f H^\circ$) of diamond and fullerene are 1.90 and 38.1KJmol⁻¹ respectively.

Amorphous Allotropic Forms of Carbon: Some important amorphous allotropic forms of carbon are coke, charcoal and carbon black. These are all impure forms of carbon.

Coke: It is a greyish black hard solid which is obtained by destructive distillation (strong heating in the absence of air) of coal. It is commonly used as a fuel in boilers, engines and it is also used in furnaces as a reducing agent in

metallurgy. *Charcoal*: It is black, soft and highly porous substance. It is obtained in the following four forms.

Wood charcoal: It is obtained by strong heating of wood in a limited supply of air. It is highly porous and is therefore used as an adsorbent for gases and in making gas masks.

Animal charcoal: It is also known as bone black and is obtained by destructive distillation of bones. It consists of about 10% carbon rest being calcium phosphate. It is mainly used for decolourising sugar syrup in the manufacture of sugar and other organic substance.

Sugar charcoal: It is the purest form of amorphous carbon and is obtained by the action of conc. H₂SO₄ on sucrose or canesugar.

 $C_{12}H_{22}O_{11}(s) \rightarrow^{\text{conc. H2SO4}} 12C(s) + 11H_2O(l)$ Sugar charcoal

Activated charcoal: All forms of charcoal are highly porous substance and can adsorb many times their own volume of gases. Their adsorption capacity can be further increased by heating charcoal at 1273K in a current of super heated steam. It is used as black pigment. This treatment removes the impurities such as residual hydrocarbons, oxygen etc. sticking on the surface and thus blocking the capillary pores. Charcoal thus prepared is called activated charcoal.

Carbon black or lamp black: It is an almost pure form of amorphous carbon containing 98-99% carbon. It is obtained when hydrocarbons such as natural gas and other substance rich in carbon such as kerosene oil, petroleum, turpentine oil, acetylene etc. are burnt in a limited supply of air. The soot obtained is made to stick on wet blankets hung in a chamber. After drying the soot is removed from the blankets. The soot thus collected is called the lamp black or carbon black.

$$CH_4 + O_2 \rightarrow^{\Delta} C + 2H_2O$$

All the allotropic forms of carbon, whether crystalline or amorphous, burn in excess of oxygen at different temperatures to form carbon dioxide. This shows that all the above forms are allotropes of carbon.

Assignment

1. In graphite, electrons are ----

- (A) localized on every third carbon
- (B) present in antibonding orbitals
- (C) localized on each carbon atom
- (D) spread out between the structure.
- 2. Graphite is soft solid lubricant extremely difficult to melt. The reason for this anomalous behavior is that graphite -----
- (A) has carbon atoms arranged in large plates of rings of strongly bound carbon atoms with weak interpolate bonds.
- (B) is a non-crystalline substance
- (C) is an allotropic form of carbon
- (D) has molecules of variable molecular masses like polymers.

3. Thermodynamically the most stable form of carbon is

(A) diamond	(B) graphite
(C) fullerenes	(D) coal

- 4. Percentage of lead in lead pencils is ------(A) zero (B) 20 (C) 80 (D) 60
- 5. Diamond is hard because -----
 - (A) all the four valence electrons are bonded to each carbon atom by covalent bonds
 - (B) it is a giant molecule
 - (C) it is made up of carbon atoms
 - (D) it cannot be burnt
- 6. Which of the following statement is not correct?
 - (A) graphite is a good conductor of electricity.
 - (B) graphite can act as lubricant
 - (C) graphite is black
 - (D) carbon in diamond involves sp²-hybridisation
- 7. Which of the following statement is correct?
 - (A) fullerenes have dangling bonds
 - (B) fullerenes are not cage like molecules
 - (C) graphite is thermodynamically most stable allotrope of carbon
 - (D) graphite is slippery and hard and therefore used as a dry lubricant in machines
- 8. The inert pair effect is predominant in -----(A) Si (B) Pb (C) Ge (D) Sn

- 9. Lead pencils contain -----(A) lead nitrate (B) lead
 (C) graphite (D) mixture of lead and carbon
- 10. What is the hybridization of carbon in diamond?
 (A) sp² hybridization
 (B) sp³ hybridization
 (C) sp hybridization
 (D) dsp hybridization
- 11. Family of carbon allotropes consisting of carbon atoms such as C₃₂, C₅₀, C₆₀, C₇₀ etc. are called ---(A) fullerenes (B) graphite
 (C) carbides (D) none of these
- 12. C₆₀ is called -----(A) Buckminister fullerene (B) rugby ball
 (C) carbide (D) black pigment
- 13. C₆₀ fullerene dissolves in toluene to give ----- solution.
 (A) orange (B) purple
 (C) yellow (D) orange red
- 14. C₇₀ fullerene has ----- pentagonal and ------ hexagonal faces.
 (A) 12,25 (B) 25,12
 (C) 20,12 (D) 12, 20
- 15. Fullerenes dissolve in ----- to give coloured solution
 (A) organic solvents
 (B) inorganic solvents
 (C) water
 (D) none of these

1. (b) 2. (A) 3. (B) 4. (A) 5. (A) 6. (D) 7. (C) 8. (B) 9. (C) 10. (B) 11. (A) 12. (A) 13. (B) 14. (A) 15. (A)

VASWERS

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

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

Albert Einstein

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.

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- Greta Thumnberg

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

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Kumud Bala

SCIENCE QUIZ : April'2020

1. Which one of the following statements is correct regarding the velocity of sound?

(A) it does not depend upon the nature of media.

- (B) it is maximum in solids and minimum in liquids
- (C) it is maximum in gases and minimum in liquids
- (D) it is maximum in solids and minimum in gases.
- **2.** The ceilings of a concert hall are generally curved because -----

(A) they reflect the sound to the audience

- (B) they can absorb noise
- (C) it better aeration in the hall

(D) as any sound from outside cannot pass through a curved ceiling.

3. A human heart beats 72 times in a minute. Its frequency will be -----

(A) 1.9Hz (B) 1.2 Hz (C) 2.5 Hz (D) 8.2 Hz

4. A list of mediums is given below(i) wood (ii) water (iii) air (iv) vacuum

In which of these mediums can sound travel?

(A) (i) and (ii) (B) (i), (ii) and (iii)

(C) (iii) and (iv) (D) (ii), (iii) and (iv)

- 5. If sound of lightening is heard after 12 seconds of lightening, then distance of observation of sound from the place where lightening occurs, is ----- (given, speed of sound= 330 m/s)
 (A) 1980m (B) 2970 m
 - (C) 3960m (D) 1485m
- 6. The loudness of sound depends on -----(A) its amplitude (B) its time period(C) its frequency (D) its speed
- 7. Loudness of sound can be increased by ------(A) increasing frequency
 - (B) decreasing frequency
 - (C) increasing amplitude
 - (D) decreasing amplitude
- **8.** A sound wave has frequency of 2 kHz and wavelength of 35cm. If an observer is 1.4km away

from the source, at what time interval could the observer hear the sound? (A) 2s (B) 20s (C) 0.5s (D) 4s

- 9. A baby recognizes her mother by her voice. The characteristics of sound involved is ----(A) quality
 (B) pitch
 (C) loudness
 (D) shrillness
- 10. By which property of sound the change in air temperature is affected?(A) amplitude (B) intensity
 - (C) frequency (D) wavelength
- 11. The range of human audibility lies between ----

 (A) 10 to 10,000Hz
 (B) 20 to 20,000Hz

 (C) 30 to 30,000Hz
 (D) 40 to 40,000 Hz
- 12. Bat can know about their prey at a long distance even in the night by emitting ------(A) infra-red lights(B) ultraviolet lights
 - (C) chemicals from their body
 - (D) ultrasonic sounds
- **13.** Which one of the following statement is not correct about sound waves?

(A) sound waves in gases are longitudinal in nature(B) sound waves having frequency below 20 Hz are known as ultrasonic wave

(C) sound waves having higher amplitudes are louder (D) sound waves with high audible frequencies are sharp

- **14.** Ultrasound cleaner uses ultrasonic waves of frequency about ------
 - (A) 40 kHz (B) 80 kHz (C) 5 kHz (D) 100kHz
- **15.** A person standing on railway platform listens to the whistles of arriving and departing trains. The whistle heard is -----
 - (A) the same in both cases in all respects
 - (B) of higher intensity when train arrives
 - (C) of higher pitch when train arrives
 - (D) of higher pitch when train departs.
- 16. The unit of noise pollution(level) is measured in -----(A) decibel (B) decimal

(C) ppm	(D) none of these	(D)
17. Sonar is a dev	ice to measure distance, direction and	26. Pite
speed of under	water objects. It is based on	(A)
(A) light wave (C) ultrasonic	s (B) infrasonic waves waves (D) radio waves	(C)
(0) unuusonii		27. Lig
18. The location of	f submerged object can be detected by	See
		sou
(A) radar	(B) sonar	from
(C) quasar	(D) pulsar	sou
		(1)

19. The depth of oceans can be measured by -----(A) radar (B) sonar

20. The study of behavior of vibrating string can be detected by the instrument of sound called ------

(A) sonometer	(B) barometer
(C) hydrometer	(D) hygrometer

21. What is the name of the string which vibrate in our voice box when we talk is -----

(A) air column	(B) pinna
(C) vocal cord	(D) string

- 22. Which of the following statements are correct?
- (i) sound is produced by vibrations
- (ii) sound requires a medium for propagation
- (iii) light and sound both require a medium for propagation
- (iv) sound travels slower than light.

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

- **23.** In order to reduce the loudness of a sound, we have to -----
 - (A) decrease the frequency of vibration of the sound
 - (B) increase the frequency of vibration of the sound
 - (C) decrease the amplitude of vibration of the sound
 - (D) increase the amplitude of vibration of the sound
- **24.** When we hear a sound, does any part of our body vibrate? Name the part.
 - (A) vocal cord (B) eardrum
 - (C) skin (D) eye lashes
- **25.** 1 Hz is equal to -----
 - (A) 1 vibration per minute
 - (B) 10 vibration per minute
 - (C) 60 vibration per minute

(D) 600 vibrations per minute

26. Pitch of sound is determined by its -----

(A) frequency	(B) speed
(C) amplitude	(D) loudness

- 27. Lightning can be seen at the moment when it occurs. Seema observes lightning in her area. She hears the sound 5s after she observed lightning. How far is she from the place where lightning occurs? (speed of sound= 330m/s)
 - (A) 1.65km (B) 1.75km (C) 2.65km (D) 3.65km
- **28.** Voice of which of the following is likely to have a minimum frequency?
 - (A) baby girl(B) baby boy(C) a man(D) a women
- **29.** What is the length of vocal cords in men?

(A)	20mm	(B)	15mm
$\langle \mathbf{a} \rangle$		(T)	~ ~

- (C) 10 mm (D) 25mm
- **30.** Which animal can hear sounds of frequency higher than 20,000Hz?

(A) dog	(B) bat	
(C) cat	(D) bird	

31. The frequency of a given sound is 1.5 kHz. The vibrating body is -----

(A) completing 1500 vibrations in one second(B) taking 1500 seconds to complete one vibration(C) taking 1.5 seconds to complete one vibration(D) completing 1.5 vibrations in one second.

- **32.** A given sound is inaudible to the human ear, if -----
 - (A) its amplitude is too small
 - (B) its frequency is below 20Hz
 - (C) its frequency is above 20Hz
 - (D) it has any of the three characteristics listed above
- 33. When lightning and thunder take place, they ----(A) occur together and are also observed together
 (B) occur one after the other but are observed together
 (C) occur together but the thunder is observed a little after the lightning
 (D) occur together but the thunder is observed a little before the lightning
- **34.** What are sources of noise pollution in your surroundings?

(A) sounds of vehicles(B) loudspeakers(C) sounds of bursting crackers(D) all the above

35. Which is the percussion instrument?(A) violin (B) drums(C) flute (D) jal tarang

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

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

Albert Einstein

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

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Education breeds confidence.

Confidence breeds hope.

Hope breeds peace.

Confucius

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Theme Song :

<u>PREMISE</u>: We are pleased to adopt a song" इतनी शक्ति हमें देना दाता....."from a old Hindi MovieDo Aankhen Barah Haath *दो आँखें बारह हाथ* of year 1957, directed by The Late V. Shantaram. The lyrics are by Shri Bharat Vyas, singer Melody Queen Sushri Lata Mangeshkar, and Music Direction by Vasant Desai. It has become a widely accepted inspirational song and/or prayer in many educational institutions and socially inspired initiatives engaged in mentoring of unprivileged children. This newly formed 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 ||

Together Each Achieves More (TEAM)

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

