

# GYAN VIGYAN SARITA:शिक्षा

A non-remunerative, non-commercial and non-political initiative to Democratize Education as a Personal Social Responsibility (PSR)  
4th Monthly e-Buletin dt 1<sup>st</sup> February'19, Fourth Year of the Publication



We celebrated 70<sup>th</sup> Republic Day of our country  
on

26<sup>th</sup> January

With a resolve

To continue to work for Democratization of Education  
By reaching out to Deprived Children Through IOMS  
To Grrom in Them Competence to Compete

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*Start at the Best, but...*



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



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

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

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



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



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



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

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

Learning Center (if asked for by Mentor)		Mentoring Centre (if asked for by Mentor)	
Estimated Capital Cost (One Time)			
Particulars	Cost (in Rs)	Particulars	Cost (in Rs)
Desktop (without monitor)	20,000	Laptop	25,000
Projector	15,000	Projector	-
Web camera	10,000	Web camera	-
Mixer cum amplifier with Speaker and Wireless microphones	15,000	Headset with Microphone	3,000
Wireless Surface Writing device (Required after Whiteboard is suitable for IOMS)	15,000	Wireless Surface Writing device	15,000
Total	75,000		43,000
Estimated Recurring Cost			
a. Internet charges, based on estimated monthly data transfer which depends upon choice of cloud platform, and tariffs of ISP		Internet charges, based on estimated monthly data transfer which depends upon choice of cloud platform, and tariffs of ISP	
b. Cloud Platform Charges, to be shared across Learning Centers			
Cloud platform :			
a. A-VIEW indigenously developed by Amrita University. It is found to be best among available options for use in IOMS. It has been developed for use in imparting Interactive Online Education, with bilateral audio-visual access, in an interactive manner. Cloud platform.		IOMS is since an initiative driven with Personal Social Responsibility (PSR) operating n Zero-Fund-&-Zero-Asset (ZFZA) basis, the Cloud Platform has to provided by Learning Centers for deriving benefit of IOMS. Gyan Vigyan Sarita will be pleased to connect Learning Centres for collectively complementing the cost of Cloud Platform, whenever payable, for arriving at a mutual agreement for cost sharing.	
b. The IOMS envisages session upto Five Learning Centres. Charges for the platform whenever payable may be shared across in mutual agreement between Learning Centres.		So also IT Infrastructure with the Mentors has been in use and is working. But, at any stage if upgradation becomes essential, support of learning centres, beneficiaries of the initiative, is gratefully welcomed on ZFZA basis.	
c. Benefit of sharing of charges of cloud platform can be optimized with offset of schedule among multiple sessions of IOMS, to the extent Mentor can deliver.		Operating cost of Mentor, if required, shall be supported by Learning Centres	

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

These specifications have been updated based on experience of operation of IOMS with available options. Whiteboard application in the tried out cloud platforms are a bit inadequate in terms of writing lucidity. This deficiency is being managed with Microsoft OneNote application. Suggestions for a proper Whiteboard application as a shared space are welcomed; it will be extremely helpful in exploiting Interactive feature of IOMS with a wireless surface-writing device at each learning centre.

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

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

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

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

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

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

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

**संपादकीय****सफलता के लिये जरूरी : तनाव से दूरी**

सफलता हर एक की चाह होती है। सफल रहना मनुष्य का एक प्राकृतिक गुण है, पर हर सफलता की राह कोशिश से होकर ही गुजरती है। कोशिश जब सही तरीके से की जाती है तो मंजिल दिलाती है और जब कोशिश का तरीका गलत होता है, तब मंजिल तक पहुंचने में तमाम समस्याएँ आती हैं।

जब हम समस्याओं को समय रहते दूर करने में असफल रहते हैं तो हममें तनाव का जन्म होता है। जब हम निराशा होते हैं या नकारात्मक बातें सोचने लगते हैं तब भी हममें तनाव की शुरूआत होती है। निराशा सबसे पहले हमारे उत्साह को खत्म करती है। हर नकारात्मक सोच के पीछे असुरक्षा, डर, घबड़ाहट, संकोच आदि ही रहते हैं।

सामान्यतया, फरवरी और मार्च का महीना विद्यार्थियों के लिये परीक्षा का मौसम होता है। इन महीनों में कुछ विद्यार्थी अपनी दसवीं कक्षा की अंतिम परीक्षा, कुछ विद्यार्थी बारहवीं की अंतिम परीक्षा, उच्च कक्षाओं के कुछ विद्यार्थी अपने सेमेस्टर की अंतिम परीक्षा, तो कुछ विद्यार्थी उच्च कक्षाओं में प्रवेश के लिये प्रतियोगी परीक्षाओं में शामिल हो रहे होते हैं।

सभी परीक्षाएँ सालभर की तैयारी की जांच करने अथवा आगे की कक्षाओं में जाने की नियत से होती हैं। परीक्षाओं में जिसका जितना अधिक अंक होता है, वह उतना ही अधिक सफल अथवा अच्छा विद्यार्थी माना जाता है।

हम दूसरे शब्दों में कह सकते हैं कि परीक्षाएँ बेहतर भविष्य की नींव रखती हैं। एक तरह से परीक्षाएँ वह द्वार हैं जो हमें हमारे भविष्य की ओर ले जाती हैं। परीक्षाओं में अच्छे अंकों के पाने का दबाव भी विद्यार्थी में तनाव उत्पन्न करता है।

जब तनाव बढ़ जाता है, तब विद्यार्थी अच्छा करने की जगह अपना प्रदर्शन खराब कर बैठता है और अपनी पूरी मेहनत गंवा बैठता है। यह स्थिति तब होती है जब तनाव से उलझन पैदा होती है। हर विद्यार्थी को यह हमेशा याद रखना चाहिये कि तनाव कभी भी अनुकूल परिणाम नहीं देता है।

अतएव, जरूरत है कि हर विद्यार्थी यह जाने कि उसे परीक्षा के मौसम में क्या करना है, अपनी पढ़ाई कैसे करनी है जिससे सालभर की उसकी मेहनत बेकार न जाये और उसे उसकी मेहनत का पूरा फायदा मिले।

इसके लिये सबसे जरूरी है कि हर विद्यार्थी अपने को तनाव से दूर रखे और पूरे परीक्षा काल में सामान्य रहे। अपनी

जीवनशैली में असामान्य बदलाव न लाये। अपनी दिनचर्या सामान्य रखे यानि जो रहन सहन का तरीका उसने सालभर अपनाया है, उसी का पालन करता रहे। अपनी पढ़ाई का समय, अपने सोने का समय और अपने आराम करने का समय नियमित रखे। अपने शरीर को स्वस्थ रखने के लिये जो भी नियमित व्यायाम वह करता रहा है, उसे बरकरार रखे। यदि वह किसी निश्चित समय पर टहलता रहा है तो इसे जारी रखे। ऐसा करने से उसे पुरानी पढ़ी बातों को याद करने में मदद मिलती है और दिमाग भी शांत रहता है।

हर विद्यार्थी को हमेशा अपनी सकारात्मक सोच को बरकरार रखना चाहिये। सकारात्मक सोच यह है कि वह हमेशा यह सोचे कि उसके अंदर वह क्षमता है कि वह अच्छा प्रदर्शन कर सकता है। यही अच्छा प्रदर्शन करने की सोच उसके अंदर आत्मविश्वास जगाती है।

अगर आपने पूरा पाठ्यक्रम पढ़ा है तो परीक्षा के समय आपको कुछ नया नहीं पढ़ना चाहिये। नयी पुस्तक तो बिल्कुल ही नहीं उठानी चाहिये क्योंकि सामान्यतया हर पुस्तक की अपनी अलग शैली होती है, विषय को समझाने की।

अगर आपने पूरा पाठ्यक्रम न पढ़कर केवल चुनिंदा टॉपिक्स ही पढ़े हैं, तब भी अंतिम दौर में कुछ नया न पढ़ें बल्कि पुराने पढ़े भागों को ही बार बार दुहरायें।

अगर परीक्षा की तैयारी के दौरान किसी प्रश्न में फंस रहे हैं तो कोशिश करें कि इसमें आपका समय कम बर्बाद हो। तत्काल किसी की मदद से उस प्रश्न का हल ढूँढ़ें।

याद रहे, समय बहुत कीमती है। इसलिये निश्चित समय में ही प्रश्नों का हल लिखने और उसे बार बार दुहराने का अभ्यास करना चाहिये।

तैयारी के समय मन को इधर उधर भटकाना नहीं चाहिये बल्कि हमेशा स्थिर रखना चाहिये यानि विषय पर ही दिमाग को एकाग्र रखना चाहिये।

कभी भी यह नहीं सोचना चाहिये कि हमारा प्रदर्शन खराब होगा। जो हुआ नहीं है, उसकी चिंता करने से तैयारी के उत्साह में कमी आती है।

परीक्षा की तैयारी के दौरान चाय अथवा काफी आदि का सेवन ज्यादा नहीं करना चाहिये। इनमें कैफीन होती है जो मस्तिष्क की कार्यशैली को प्रभावित करती है।

एक बात कभी नहीं भूलनी चाहिये कि थोड़ा तनाव विकास के लिये जरूरी होता है क्योंकि हम ऐसी अवस्था में अपना ध्यान ज्यादा अच्छी तरह से केंद्रित कर पाते हैं, लीक से हटकर सोच पाते हैं। सितारों को देखने के लिये भी एक निश्चित अंधकार की जरूरत होती है।

हमें परीक्षाओं में संभावनायें बनाये रखनी चाहिये। यदि हम लगातार परीक्षाओं में बैठ रहे हैं तो हमें अंत तक सोच सकारात्मक रखनी होगी क्योंकि अंतिम परिणाम हर एक दिन के प्रदर्शन पर निर्भर रहता है।

हमें यह कभी नहीं भूलना चाहिये कि अगर हमने मेहनत की है तो परिणाम अवश्य अच्छा आयेगा। खुद की फिक्र करने वालों को अथवा अपनी उन्नति की ओर कदम बढ़ाते जाने वालों को तनाव नहीं होता है। जो दूसरों के बारे में अथवा अपनी तुलना दूसरों से करने लगते हैं, उनको तनाव घेरता है।

तनाव कम करने का एक आसान तरीका है: गहरी सांसें लेना। अगर दिल तेजी से घड़कने लगे तो एक गहरी सांस उसकी घड़कन की तेजी को कम कर देती है। दूसरा तरीका तनाव कम करने का है: मैं यह कर सकता हूं इस सोच को अपने अंदर रखना। तनाव कम करने का तीसरा तरीका है: अपनी पूरी नींद लेना। पूरी नींद शरीर और दिमाग दोनों को स्वस्थ रखती है। तनाव कम करने का चौथा तरीका है: शारीरिक रूप से सक्रिय रहना। थोड़ा पढ़ लिया, थोड़ा टहल लिया, थोड़ा व्यायाम कर लिया। ऐसा करते रहने से हमारा दिमाग तरोताजा बना रहता है और मन प्रसन्न रहता है।

जिस प्रकार खौलते पानी में हमें अपना चेहरा दिखायी नहीं देता है, ठीक उसी प्रकार घबड़ाये दिमाग से हम अपनी याद की हुयी बातें परीक्षा की कापी में लिखने के लिये वापिस नहीं पा सकते हैं।

अगर हम अभिभावक हैं तो हमें अपने बच्चों से अप्राकृतिक उम्मीदें नहीं लगानी चाहिये। यह अप्राकृतिक उम्मीद बच्चों में उसकी प्राकृतिक प्रगति को रोकने का काम करती है। हमें नहीं भूलना चाहिये कि विकास में हर बच्चा रूचि रखता है। उसे स्वाभाविक तौर पर उन्नति करने देना चाहिये। अवास्तविक उम्मीद तनाव पैदा करती है और अच्छा परिणाम नहीं देती हैं।

अब प्रश्न उठता है कि हम कैसे जान पायेंगे कि हम तनाव में आ गये हैं और हमें समय रहते इससे बाहर निकल आना है?

याद रखिये: अगर आपको चिड़चिड़ाहट हो रही है, भूख नहीं लग रही है, नींद अधिक आ रही है, विषय याद नहीं हो पा रहा है, बेचैनी हो रही है तो तय मानिये आपके अंदर तनाव पनप रहा है।

आपको अपनी पढ़ाई का स्थान निश्चित रखना चाहिये। उस समय अवश्य पढ़ना चाहिये जिस समय आपकी परीक्षा होनी है। यानि अगर आपकी परीक्षा दिन में 10 बजे से 1 बजे तक होनी है तो आपको नियमित इस समय में अपनी तैयारी करते रहना चाहिये। एक माडल पेपर लेकर निश्चित समय में परीक्षा का वातावरण बनाकर बिना किसी सहायता के पूरा पेपर लिखना चाहिये और उसको स्वयं से जांचकर अपनी तैयारी का मूल्यांकन करना चाहिये।

परीक्षा की तैयारी के समय मोबाइल फोन, रेडियो, टीवी आदि का प्रयोग नहीं करना चाहिये। इनके प्रयोग से एकाग्रता बनाये रखने में रूकावट पड़ती है।

परीक्षा की तैयारी और परीक्षा के दौरान दोस्तों अथवा रिश्तेदारों से दूरी बनाकर रखनी चाहिये। उन लोगों से दूर रहना चाहिये जो हमेशा राय देते रहते हैं।

हमारे भूतपूर्व राष्ट्रपति श्री अब्दुल कलाम का मानना था कि हम अपना भविष्य नहीं बदल सकते हैं लेकिन अपनी आदतें बदल सकते हैं और अगर हम ऐसा कर सके तो हमारी अच्छी आदतें हमारा भविष्य भी बदल ही देंगी। भूतपूर्व प्रधानमंत्री श्रीअटलबिहारी बाजपेयी का मानना था कि छोटे मन से कोई बड़ा नहीं होता है और टूटे मन से कोई खड़ा नहीं होता है।

तनाव कम करने का एक नायाब नुस्खा है कि आप यह सोचें कि अगर आपसे कोई अपना तनाव कम करने के लिये राय लेने आता तो आप इस अवस्था में उसे क्या राय देते जिससे वह अपने तनाव से छुटकारा पा जाता। मत भलिये : मन के जीते जीत है, मन के हारे हार।

अच्छा भविष्य आपके द्वार पर है, आपकी अच्छी तैयारी आपको अवश्य सफलता दिलायेगी, बस आप पूरे मन से और आत्मविश्वास से अपना प्रश्नपत्र लिखें। ज्ञानविज्ञानसरिता परिवार की शुभकामना आपके साथ है।



## Coordinator's View

### Cultural Relevance of IOMS

In education presence of teacher and his attention influence effectiveness of teaching, tuition and or Mentoring. This is where low student-teacher ratio has been a matter of concern. Teacher is neither a commodity which can be made available off-the-shelf nor it is available in abundance. Teaching is not a job but a matter of passionate and consistent commitment. Education is a like a process which yields passionately committed and competent students, which turn out to be teachers of tomorrow; they cannot be product of run-of-the-mill.

Seeing acute shortage of teachers with passion, dedication, consistency and commitment, a mushroom growth of remote learning models is seen. [Interactive Online Mentoring Sessions \(IOMS\)](#) is one of them, but with a difference.

A question may occur: **(a)** How does the IOMS touch the educational needs at ground level? **(b)** How does it focus on students' ability to – **(i)** observe, **(ii)** correlate observations, **(iii)** discriminate observations, **(iv)** analyze reasons of the differences, **(v)** evolve remedies to correct and optimize, **(vi)** select a remedy which is feasible, economical and sustainable for coexistence with nature, and **(vii)** implement the solution. Education is neither about accumulation of information nor thumb-rules.

**IOMS** is based on a belief that there is no shortcut to knowledge and excellence, while it is an endeavour of passionate mentoring with continuity, consistency, commitment and perseverance to steer a common student into a journey, and extend finger holding whenever necessary. While Eklavya was a phenomenon, but success of IOMS is seen in its ability to groom deprived students tending to be Eklavya. This does not discriminate students coming from affluent families as long as they maintain humility to learn with deprived children in and their circumstances. This approach is essential to create innovators and performers; these attributes are essential to have ingenuity and adaptability in ever changing circumstances.

**Culture** is deeply embedded impressions of actions and experiences, on a society, in its long history. It is the culture which regulates society's behavior leading towards amicable coexistence. Impression on human mind under hardship calls upon collective survival instinct. It leaves deeper and sustained impressions; their residual effects act as a glue to keep the society intact. It may not always effect into higher Intelligence Quotient (IQ), but certainly it leads to higher Emotional Quotient (EQ). Learning in good times may lead to higher IQ, but on the scale of EQ it is lower. Therefore, pleasure of good times is volatile.

It is human nature to strive today for a better tomorrow, and therefore it leaves no room for complacency, at any stage. Anything that leads to peaceful coexistence and growth of excellence is relevant in the prevailing circumstances. Circumstances are ever changing, they are dynamic, and therefore it is the blend of IQ with EQ which shown its compound effect. This necessitates a periodic review for moderation of educational systems to maintain their relevance. Intervention of IOMS in prevalent education system has become **relevant** due to involvement review of prevalent systems.

There are many reported studies viz-a-viz criticism on state of education, problems, suggestions, programmes on quality of education. But, one thing that is most urgent is corrective actions, and this is where IOMS has got evolved from a philosophy into a reality. It is driven with a sense of *Personal Social Responsibility (PSR)*. It is an outcome of an endeavour of a small group of Four persons who have volunteered to *collectively complement teachers in schools* in a manner which is *non-organizational, non-remunerative, non-commercial and non-political*. It works on a financial model *Zero-Fund-&-Zero-Asset (ZFZA)*, elaborated in *IOMS proposition*.

*In the context of IOMS, Culture and relevance, discretely brought out above, this article interleaves them into a purposeful working solution and a roadmap to take it forward for a larger good.*

Education is an investment for future and has been very appropriately defined by Confucius. In a world confronting wide inequalities, pains of deprivation and sufferings are alike to all. Difference lies only in complacency with the real life experiences and ability to strive to change the circumstances. While ability to strive comes from education, complacency is a result of lack of education.

Buddha, Socrates, Confucius, Kabir, Raheem, Shakespeare, Tolstoy, Tagore, Galileo, Newton, Einstein, and a long list of many more, who had developed ability to observe happenings in their surrounding and pursue their

observations for a logical and substantial conclusions. Each of them did it in their own ways, field and circumstances. This is result of a process of education, not necessarily formal. What they promulgated, or said or wrote has changed the course of development of the human race. It was their sheer passionate and selfless commitment. It could not have seen light of the day without their approach to observe out-of-box and beyond them. In real sense they were educated in school of life. They evolved a discipline of educational culture. It

perpetuated into teaching-&-learning of their pupils, without harming anyone.

Had they been engaged only in accumulation of information they would have ended up with thumb-rules with a blind following; its remanence would have found place in enlarging and preserving their belongings in terms of wealth, power, position and sphere of influence. All these prophets lead a tough life in perpetuating their convictions.

Followers of these prophets, who could not rise to the level of their masters indulged in capitalizing the preaching in an orthodox manner to create their own fortune. It would not be incorrect to call such self-centric persons as literates and opportunists, who continued to live and work in confinement of self-interests and remain oblivious of sufferings and deprivation in their immediate surroundings. They are often found to make big talks using jargons out of information and thumb-rules in their possession, without walking a single step on it. Such literate persons irrespective of their position lead to different type of corruptions. Most talked about is financial corruption, it is like a tip of the ice-berg and is visible. But, there are much bigger engagements of such literates to meet their ends; it is in the form of moral, intellectual and professional corruption which is invisible but has much deep rooted consequences. It has led to imbalance between overall growth and spirit of coexistence. Despite bright legendry persons in the history of prevalent civilization, their school of thought have got confined in books and some of them in archive. They are excellent references for citation, but their place in real life is getting scarce.

This anomaly has always been there and continues to exist. Otherwise, there is no reason why human race over its long journey and having produced great persons, thinkers, laureates, scientists, humanists, statesman, and teachers is still so fragmented and behaving in nomadic manner. Now it appears to have become rampant and more visible; this is attributed to an easy access to communication, thanks to Maxwell for integrating discrete experimental observations of electromagnetic phenomenon into a unified Electromagnetic Field Theory in 1861 and later Hertz and Marconi took it forward to demonstrate wireless signaling.

First step towards realizing a global democracy conceived by Tagore in Geetanjali, is to democratize education. It requires equal opportunity for everyone to learn and grow, with mutual faith and respect, without discrimination or prejudice to the ability of an individual to strive for. Need of this is so mammoth that no omniscient, omnipotent and omnipresent person or institution can accomplish it singularly. Unless each of the stake holders comes forward to collectively complement for it, this task would remain unaccomplished.

In doing so elite and accomplished senior citizens can come forward to collectively complement for it and pay their demographic dividend rather than becoming a demographic liability. They having lived their life and are under no obligation to work more. Yet, they are a big

resource of the society by virtue of their rich experience, increase in their longevity, better health condition and financial independence. Age related problems definitely grow with passage of time; this is where IOMS comes as one of the alternatives and a respite. It offers facility to impart education right from place of stay. In addition, it gives a greatest solace of being use to person leading hopeless life. It can be done by imparting education a non-perishable asset of elites. These elites, by virtue of their accomplishments, have their living in high-tech environment where bottleneck of internet connectivity might not be there. All that they may need is marginal upgradation for their integration into IOMS.

There are cases of senior citizens having their children grown and moved away for further growth. Despite all kind of amenities and resources at their command they are either living in isolation or in search of a company of similar ones, or a place in an old-age-home. It may not be out of place to vouch that our engagement in IOMS has become so demanding that there is hardly any time to have a grudge. One thing which is most important in this engagement is discipline of punctuality, continuity and consistency, and it cannot be left to personal convenience. Another most prevalent apprehension among senior citizens is loss of touch with subject matter for imparting education. Gaining comfort in this initiative requires one to remember that cycling, swimming, typing and one's own education is never forgotten; one may get out of context and gaining a confidence to use it requires little efforts to sail into it. There is another fear among them that subject matter in current curriculum has advanced making them obsolete to impart education. An honest introspection is requested which would reveal that real learning of education was ability to think, explore and apply; this is invariably used by all accomplished persons in their growth and making contributions in new and nascent areas in their professional career. Should such accomplished persons, at that age and stage, find it difficult to dovetail their place as a mentor? It is not a valid excuse; it is just not believable. Last but not the least, in the process of paying their demographic dividend they are collectively complementing a weak educational system where deprived students do not have an access to passionate teachers. Demographic diversity of our country makes it more critical. This is a God blessed opportunity to achieve lucidity in mentoring by making a humble yet responsible beginning. The most cherishable dividends of this endeavour in old age are – **(a)** leading a satisfied life by becoming useful to others, despite growing in age, and living with related problems, **(b)** creating a legacy, for beloved descendents, of caring and sharing the deprived ones, and **(c)** give a reason to flourishing youngsters to feel proud of, being descendent of parents respected by society.

Likewise, job scenario in corporate world facilitates youngsters to work from home and also office hours. This is a God blessed opportunity for passionate youngsters to discharge their PSR. In corporate world encouragement is being given to youngsters to complement efforts of schools which are catering to deprived children. This flux can be

reoriented and made optimally purposeful with the intervention in IOMS .

All that this kind of engagement in IOMS needs is- **(a)** social recognition of such stray efforts, lest they get unnoticed, **(b)** thus encourage more persons to come forward and participate in this reform, and **(c)** extend marginal support for upgradation of infrastructure available with mentors for adapting to IOMS. As regards schools, most of them have IT infrastructure which is either not in use or inadequately used. Their setup can be made operational with little efforts and cost; it is insignificant as compared to invaluable mentoring resource available for free, practically, and a much needed reform of collective complementing with a sense of PSR.

All those who are placed in responsible positions of policy making, administration, execution and facilitation in the field of education may like to consider potential of elite senior citizen and youngsters in India. With country growing digital, it is a rich resource available at a marginal cost for its deployment into IOMS, a big strength and an opportunity. This is seen as a social, economic, cultural and educational reform towards building a self-reliant, strong and peacefully prosperous nation. It is an opportunity to integrate self-sufficient and accomplished elites into main stream of developmental reform, who are otherwise living in their own comforts. There are many who are outside decision making in educational field. But, either they had held such positions or, are directly/indirectly connected with person involved in decision process in educational system. Connecting this initiative to person of relevance is also a big role of PSR for the larger good with only तन और मन and not the धन .

The uniqueness of IOMS is that it is an open model without any kind of propriety. It is in the process of evolving. Everyone is free to know, add, modify, change or even take away and use it in one's own way for the larger good. This model is just not centered on mentoring to mathematics, physics and chemistry from class 9<sup>th</sup> to 12<sup>th</sup>. This choice of subjects and levels is strategic and is based

on our ability to deliver the best at it. Its openness offers an opportunity to all co-passionate persons to come forward and collectively complement in the initiative, and/or add wings to their own disciplines of competence. This can be done with a little care and concern, beyond self. This is based on a journey of a non-teacher who, after retirement, got inspired to groom competence to compete among unprivileged students. It started in the year 2012 with the mentoring of target students in Chalk-N-Talk mode. The mentoring was upgraded to IOMS in July'2016. In fact it is not a model; it is an evolution based on ground level realities experienced during the journey.

**Conclusions:** In this IOMS model mentoring is by **(a)** involving surroundings of students and correlating them with the subject matter. **(b)** This is aimed at making subject matter not a compendium of information to be remembered. It is about assimilating the learning and making it intuitive in an out-of-box manner. **(c)** It emphasizes upon mental revision to sharpen thought provocation. **(d)** It emphasizes upon group dynamics where students organize themselves into small groups. These groups interact among themselves on various concepts within and outside the subject matter. Questions or problems unresolved within the group are posed to mentor, **(e)** Subject teacher or local teacher who might have lesser exposure are involved as coordinator and groomed as torch bearer, Online Mentors of tomorrow, a chain reaction to slowly grow and adapt to the educational needs of time, place and people, **(f)** Lastly it is open to all the make value addition for the larger good of society, nation and humanity, a dire necessity to cultural relevance of educational system.

Cognizance of this model is requested to all, who are capable of making a difference, without prejudice to other models in prevalence, or those which may come up in due course. The IOMS is a tested solution relevant to our prevalent needs og educational culture. It is economical, feasible and sustainable as long as internet connectivity is available.

*We have celebrated on 26<sup>th</sup> January'2019, 70<sup>th</sup> Republic Day of India. Let us commit our resolve to democratize education where everyone has access to affordable and equal opportunity to grow into human competence. This we can accomplish by collectively complementing worthy teachers of the country, who are passionately working to impart real education to children; those disconnected from main stream due to numerous kind of boundaries.*

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*The moment I have realized God sitting in the temple of every human body, the moment I stand in reverence before every human being and see God in him – that moment I am free from bondage, everything that binds vanishes, and I am free.*

- Swami Vivekananda

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

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

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

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

### **Operation:**

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

### **Involvement:**

- a. **Promoter** –
  - i. Initiate a Learning Center,
  - ii. Sponsor a Mentor who is willing to join on certain terms,
  - iii. Sponsor cost of operation and up-gradation of infrastructure to voluntary mentors,
- b. **Facilitator** –
  - i. Provide space and infrastructure for **Interactive Online Mentoring Sessions (IOMS)**. Most of it is generally available, and may need marginal add-on,

- ii. Garner support of elite persons to act as coordinators at the Learning Centre.
- c. **Participant** –
  - 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 9<sup>th</sup> upto 12<sup>th</sup>. Since then it has gone through many ground level experiences and in July'16 it was upgraded to IOMS, philosophy in action to forward to reachout to more number of deprived students. Currently regular sessions of IOMS are held regularly for students of class 9<sup>th</sup> and above at few Learning Centeres. Efforts are being made to integerate more learning centers and mentos to diversify its scope.*

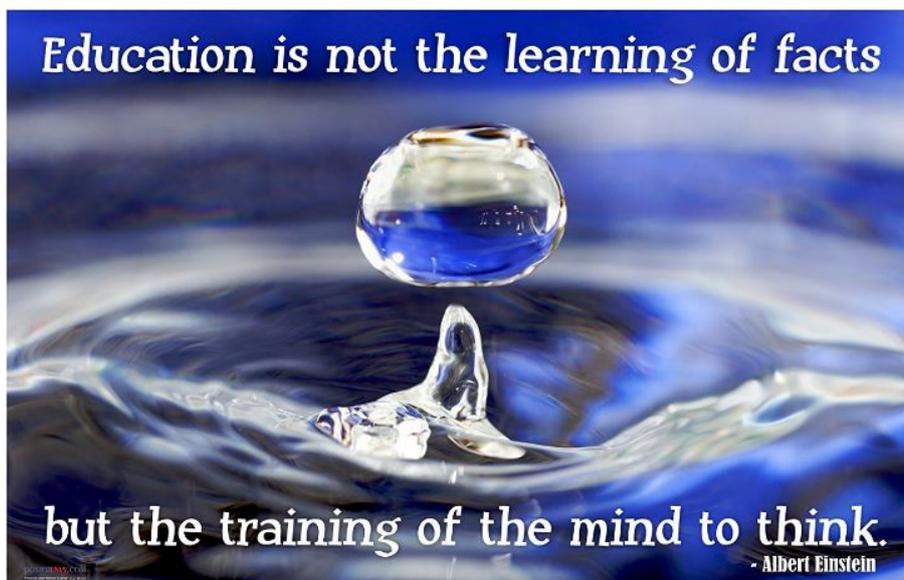
*It is a small group of Four persons including **Prof. SB Dhar**, Alumnus-IIT Kanpur, **Shri Shailendra Parolkar**, Alumnus-IIT Kharagpur, settled at Texas, US and **Smt. Kumud Bala**, Retd. Principal, Govt. School Haryana. More details of the initiative are available on our [website](#) and operational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

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

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

**Address:** #24 87, Mahagun Moderne, Sector-78, NOIDA, UP– 201309, **(R): 0120-4969970;**  
**(M):+91-9711061199,**

**e-Mail ID:** [subhashjoshi2107@gmail.com](mailto:subhashjoshi2107@gmail.com), **Website:** <http://www.gyanvigyan sarita.in>



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

*- John F. Kennedy*

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## INVITATION FOR CONTRIBUTION OF ARTICLES

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

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

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

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

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## अंदाज ए बयां

### आखिर बेटा हूँ तेरा

समीर लाल 'समीर'

सरौता बाई नाम था उसका. सुबह सुबह ६ बजे आकर कुंडी खटखटाती थी. तब से उसका जो दिन शुरू होता कि ६ घर निपटाते निपटाते शाम के ६ बजते. कपड़ा , झाड़ू, पौछा, बरतन और कभी कभी मालकिनों की मालिश. बात कम ही करती थी.

पता चला कि उसका पति शराब पी पी कर मर गया कुछ साल पहले. पास ही के एक टोला में छोटी सी कोठरिया लेकर रहती थी १० रुपया किराये पर.

एक बेटा था बसुआ. उसे पढ़ा रही थी. उसका पूरा जीवन बसुआ के इर्द गिर्द ही घूमता. वो उसे बड़ा आदमी बनाना चाहती थी.

हमें ७.३० बजे दफ्तर के निकलना होता था. कई बार उससे कहा कि ५.३० बजे आ जाया कर तो हमारे निकलते तक सब काम निपट जायेंगे मगर वो ६ बजे के पहले कभी न आ पाती. उसे ५ बजे बसुआ को उठाकर चाय नाश्ता देना होता था. फिर उसके लिये दोपहर का भोजन बनाकर घर से निकलती ताकि जब वो १२ बजे स्कूल से लौटे तो खाना खा ले.

फिर रात में तो गरम गरम सामने बैठाल कर ही खाना खिलाती थी. बरसात को छोड़ हर मौसम में कोशिश करके कोठरी के बाहर ही परछी में सोती थी ताकि बसुआ को देर तक पढ़ने और सोने में परेशानी न हो.

समय बीतता गया. बसुआ पढ़ता गया. सरौता बाई घूम घूम कर काम करती रही. एक दिन गुजिया लेकर आई कि बसुआ का कालिज में दाखिला हो गया है. बसुआ को स्कॉलरशिप भी मिल गई है. कालिज तो दूर था ही , तो स्कॉलरशिप के पैसे से फीस , किताब के इन्तजाम के बाद जो बच रहा , उसमें कुछ घरों से एडवान्स बटोरकर उसके लिये साईकिल लेकर दे दी. पहले दिन बसुआ अपनी माँ को छोड़ने आया था साईकिल पर बैठा कर. सरौता बाई कैरियर पर ऐसे बैठकर आई मानों कोई राजरानी मर्सडीज कार से आ रही हो. उसके चेहरे के भाव देखते ही बनते थे. बहुत खूश थी उस दिन वो.

बसुआ की प्रतिभा से वो फूली न समाती. बसुआ ने कालिज पूरा किया. एक प्राईवेट स्कूल से एम बी ए किया. फिर वो एक प्राईवेट कम्पनी में अच्छी पोजीशन पर लग गया. हर मौकों पर सरौता बाई खुश होती रही. उसकी तपस्या का फल उसे मिल रहा था. उसने अभी अपने काम नहीं छोड़े थे. एम बी ए की पढ़ाई के दौरान लिया कर्जा अभी बसुआ चुका रहा था शायद. सो सरौता बाई काम करती रही. उम्र के साथ साथ उसे खाँसी की बीमारी भी लग गई. रात रात भर खाँसती रहती.

बसुआ का साथ ही काम कर रही एक लड़की पर दिल आ गया और दोनों ने जल्द ही शादी करने का फैसला भी कर लिया सरौता बाई भी बहुरिया आने की तैयारी में लग गई.

एक दिन सरौता बाई ५.३० बजे ही आ गई. आज वो उदास दिख रही थी. आज पहली बार उसकी आँखों में आसूँ थे. बहुत पूछने पर बताने लगी कि कल जब घर पर चूना गेरु करने का इन्तजाम कर रही थी बहुरिया के स्वागत के लिये , तब बसुआ ने बताया कि बहुरिया यहाँ नहीं रह पायेगी. वो बहुत पढ़ी लिखी और अच्छे घर से ताल्लुक रखती है और वो शादी के लिये इसी शर्त पर राजी हुई है कि मैं उसके साथ उनके पिता जी के घर पर ही रहूँ. वैसे , तू चिन्ता मत कर, मैं बीच बीच में आता रहूँगा मिलने.

कोई भी काम हो तो फोन नम्बर भी दिया है कि इस पर फोन लगवा लेना. उसे चिन्ता लगी रहेगी. बहुत ख्याल रखता है बेचारा बसुआ. जाते जाते कह रहा था कि अब तो मेरा खर्च भी तुझको नहीं उठाना है. बसुआ पढ़ लिख गया है तो तू एकाध घर कम कर ले और हफ्ते में एक टाईम की छुट्टी भी लिया कर. अकेले के लिये कितना दौड़ेगी आखिर तू. और अब इस उम्र भी तू पहले की तरह काम करेगी तो सोच , मुझे कितनी तकलीफ होगी. आखिर बेटा हूँ तेरा.



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

ई-मेल: [sameer.lal@gmail.com](mailto:sameer.lal@gmail.com)

## Ayurveda- Health Care

### Arthritis

Dr Sangeeta Pahuja

*In my previous articles, in this series, I have written about Prevention from diseases in winter like Respiratory infection, skin infection. Arthritis is another common condition which is triggered during winters.*

Arthritis is an inflammatory condition of one or more joints manifesting typically with pain, swelling, tenderness, stiffness in the morning in affected joints. There are different types of Arthritis. The most common types are three and are elaborated below :

**Osteoarthritis ( Known as Sandhivata in Ayurveda ) :** Osteoarthritis is essentially a vata disorder with the involvement of Pitta and Kapha. Ayurveda has provided some diet and lifestyle guidelines for the prevention and treatment of diseases.

#### (i) Diet

*Favourable :* Consume Vata pacifying food viz. sweet, sour, salty( Madhur-amal-lavan) food items, they pacify Vata. Wheat, old basmati rice, kulath, mustard, patole, bathua, gourd, chaulai, sehjan, carrot, phalsa, sweet mango, pomegranate, walnut, almond, figs, dates etc. are also favourable diet. It is also recommended to eat lot of vegetables, freshly cooked food, hot soups of lentils, cow ghee in moderation. Vata pacifying herbs like saunth, asafoetida, cardemom seeds, Fenugreek seeds, pippali, dalchini, jaipal, cardamom etc.

*Unfavourable Diet:* It is recommended to Avoid vatavardhak Aahar-Vihar like the food items which are dry in nature. Avoid sali rice, barley, roasted chana, moth, Masood, arhar, excess sugar, cauliflower, French beans, tea, coffee, alcohol, drugs. Fasting for long hours or consuming low calorie diet for long period (less than the required calories for your body) should be avoided.

#### (ii) Lifestyle

*Favourable :* Vata pacifying lifestyle include regular body massage with Til oil or Almond oil. Hot water bath and drinking of lukewarm water is favourable. Regular mild exercise, including walk, yoga, pranayam, meditation and avoiding excessive fasting is recommended.

*Unfavorable :* It includes sedentary lifestyle, night awakening, suppression of natural urges, stress, anxiety, fear, excess travelling, too much exertion, exposure to severe cold and dry weather.

**Rheumatoid Arthritis ( Known as Aamvata in Ayurveda ) :** Rheumatoid Arthritis It is an autoimmune disease that causes chronic inflammation in the joints. It usually inflames multiple joints in a symmetrical pattern with the symptoms like joint pain, stiffness and fatigue. Wrist, fingers, knees, feet and ankles are commonly affected. According to Ayurveda Arthritis is caused by an imbalance of Vata Dosha, which leads to accumulation of ama in the joints. Aam are toxins that are produced by poor digestion, and they accumulate and clog the channels in the body. Line of treatment in Ayurveda for Rheumatoid Arthritis is the following.

- (a) *Langhnam (Fasting):* It is done by means of complete fasting or light diet which includes green gram, rice, batley soups according to the condition of the patient.
- (b) *Shodhana chikitsa (Purification of body):* It is achieved through Panchkarma therapy. Usually the treatment is long term and various procedures are done according to the condition of patient.
- (c) *Shaman chikitsa (Treatment for subsiding the symptoms) :* It is done by using effective Ayurvedic formulations. Ayurveda provides guidelines for the prevention and treatment of the diseases.

#### (i) Diet:

*Favourable :* Fasting or Very light diet once or twice a week is beneficial. Barley, red variety of sali Rice, kullath, drum stick, parval, bitter gourd, turmeric, garlic, carom seeds, rock salt, Black pepper, castor oil, celery, raw juice of potato are good for an arthritic patient.

*Unfavorable:* Avoid Oily, spicy, heavy food items like deep fried stuff, junk food, sweets, dairy products except buttermilk. Avoid arreated

drinks, tea, coffee , alcohol. Avoid incompatible food items like curd with fish, milk with green vegetables, milk with fish etc. Avoid canned, preserved food. Avoid meat and meat fat. Avoid black

gram,wheat,bacon/pork,oranges,milk,oats,rye,eggs,beef,malt,cheese, grapefruit, tomato, peanut,, sugary foods.

(ii) **Lifestyle**

**Favourable:** Keep yourself warm, drink warm water. Moderately active lifestyle, hot water bath, and sun exposure. Follow Ayurvedic Dincharya and Ritucharya.

**Unfavorable:** Avoid day sleeping, night awakening, suppression of natural urges, sedentary lifestyle viz. stress, anxiety and fear.

**Gout (Known as Vatarakta in Ayurveda):** Gout is also called as metabolic Athritis and is known as Vatarakta in Ayurveda. Gout is a disease that happens because of defective uric acid metabolism in the blood. Uric acid needs to be excreted properly through the body. Elevated levels of uric acid causes inflammation in the joints and leads to pain, burning, swelling, redness, warmth and stiffness in the joints. Usually the Big Toe is affected. It can affect other joints also such as the Ankle, Heel, knee,

elbow, wrist, fingers and spine. According to Ayurveda Gout it is a result of imbalance of Vata Dosha which disturbs the smooth blood circulation in the body.

(i) **Diet**

**Favourable :** Vegetarian diet is preferable for patients suffering from gout. Celery helps in reducing the acidic content of the body,so very helpful in the treatment of gout. Barley, wheat, sali rice, pigeon pea, chickpea, green gram, masoor daal, white gourd, melon, patole, makoya, shatavari are good to consume.

**Unfavourable :** Avoid food that are high in purines. purine breakdown into uric acid in the body and an excess of uric acid in the body is the reason for gout. High protein foods are rich in purine like yeast, meat and muscles. Hence, should be avoided. Processed foods like white bread should be avoided. Avoid oily, spicy food and sea food. Avoid tea, coffee and alcohol.

(ii) **Lifestyle**

**Favourable :** Castor oil massage is helpful in relieving pain. Maintain healthy weight. Drink plenty of water and take adequate sleep.

**Know Ayurveda, Follow Ayurveda and Stay Healthy.**



Author is an Ayurvedic Medical Practitioner. She did B.A.M.S. from M.D. University, Rohtak. She has consultation centres at Delhi and Noida. She is keenly interested in spiritual, women and social developmental activities. Contact No.: 9953967901, E-mail - [sangeeta.pahuja3@gmail.com](mailto:sangeeta.pahuja3@gmail.com)

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*"Imagination is more important than knowledge.*

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

- **Albert Einstein**

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*Life is neither a fiction nor a dream, it beauty lies in living together.*

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## एक खूबसूरत विचार : अपेक्षा या समीक्षा ?

मत पूछिए कि शिक्षक कौन है?  
आपके प्रश्न का सटीक उत्तर  
आपका मौन है।  
शिक्षक न पद है, न पेशा है,  
न व्यवसाय है।  
ना ही गृहस्थी चलाने वाली  
कोई आय हैं।।

शिक्षक सभी धर्मों से ऊंचा धर्म है।  
"मा फलेषु"वाला कर्म है।।

शिक्षक एक प्रवाह है।  
मंजिल नहीं राह है।।

शिक्षक पवित्र है।  
महक फैलाने वाला इत्र है  
शिक्षक स्वयं जिज्ञासा है।  
खुद कुआं है पर प्यासा है।।

वह डालता है चांद सितारों,  
तक को तुम्हारी झोली में।  
वह बोलता है बिल्कुल,  
तुम्हारी बोली में।।

वह कभी मित्र,  
कभी मां तो,  
कभी पिता का हाथ है।  
साथ ना रहते हुए भी,  
ताउम्र का साथ है।।

साथ ना रहते हुए भी,  
ताउम्र का साथ है।।

वह नायक, खलनायक,  
तो कभी विदूषक बन जाता है।  
तुम्हारे लिए न जाने,  
कितने मुखौटे लगाता है।  
इतने मुखौटों के बाद भी,  
वह समभाव है।  
क्योंकि यही तो उसका,  
सहज स्वभाव है।।

शिक्षक कबीर के गोविंद सा,  
बहुत ऊंचा है।  
कहो भला कौन,  
उस तक पहुंचा है।।

वह न वृक्ष है,  
न पत्तियां है,  
न फल है।  
वह केवल खाद है।  
वह खाद बनकर,  
हजारों को पनपाता है।  
और खुद मिट कर,  
उन सब में लहराता है।।

शिक्षक एक विचार है।  
दर्पण है, संस्कार है।।

शिक्षक न दीपक है,  
न बाती है,  
न रोशनी है।  
वह स्निग्ध तेल है।  
क्योंकि उसी पर,  
दीपक का सारा खेल है।।

शिक्षक तुम हो, तुम्हारे भीतर की  
प्रत्येक अभिव्यक्ति है।  
कैसे कह सकते हो,  
कि वह केवल एक व्यक्ति है।।

शिक्षक चाणक्य, सान्दिपनी  
तो कभी विश्वामित्र है।  
गुरु और शिष्य की  
प्रवाही परंपरा का चित्र है।।

शिक्षक भाषा का मर्म है।  
अपने शिष्यों के लिए धर्म है।।

साक्षी और साक्ष्य है।  
चिर अन्वेषित लक्ष्य है।।

शिक्षक अनुभूत सत्य है।  
स्वयं एक तथ्य है।।

शिक्षक ऊसर को  
उर्वरा करने की हिम्मत है।  
स्व की आहुतियों के द्वारा,  
पर के विकास की कीमत है।।

वह इंद्रधनुष है,  
जिसमें सभी रंग है।  
कभी सागर है,  
कभी तरंग है।।

वह रोज़ छोटे - छोटे  
सपनों से मिलता है।  
मानो उनके बहाने  
स्वयं खिलता है।।

वह राष्ट्रपति होकर भी,  
पहले शिक्षक होने का गौरव है।  
वह पुष्प का बाह्य सौंदर्य नहीं,  
कभी न मिटने वाली सौरभ है।।

बदलते परिवेश की आंधियों में,  
अपनी उड़ान को  
जिंदा रखने वाली पतंग है।  
अनगढ़ और बिखरे  
विचारों के दौर में,  
मात्राओं के दायरे में बद्ध,  
भावों को अभिव्यक्त  
करने वाला छंद है।।

हां अगर दूढ़ोगे, तो उसमें  
सैकड़ों कमियां नजर आएंगी।  
तुम्हारे आसपास जैसी ही  
कोई सूरत नजर आएगी।।

लेकिन यकीन मानो जब वह,  
अपनी भूमिका में होता है।  
तब जमीन का होकर भी,  
वह आसमान सा होता है।।

अगर चाहते हो उसे जानना ।  
ठीक - ठीक पहचानना ॥

तो सारे पूर्वाग्रहों को,  
मिट्टी में गाड़ दो।  
अपनी आस्तीन पे लगी,  
अहम् की रेत झाड़ दो॥

फाड़ दो वे पत्रे जिन में,  
बेतुकी शिकायतें हैं।  
उखाड़ दो वे जड़े,  
जिनमें छुपे निजी फायदे हैं॥

फिर वह धीरे-धीरे स्वतः  
समझ आने लगेगा  
अपने सत्य स्वरूप के साथ,  
तुम में समाने लगेगा॥

सभी शिक्षकों को सादर समर्पित  
(एक अज्ञात शिक्षक के सानिध्य से)

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### An Inspiring Poem

The woods are lovely, dark, and deep,  
But I We have promises to keep,  
And miles to go before I We sleep,  
And miles to go before I We sleep.

—Robert Frost

(In this poem 'I' has been struck-out and replaced with 'We' to deliberately convey larger sense of responsibility of elite and accomplished section of society, apologies! Collectively they are capable of making a difference.. This is considered relevant when we are going to complete **Seven decades of Indian Republic.**)

गहन सघन मनमोहन वन तक मुझको हमको आज बुलाते हैं  
किंतु किए जो वादे मैंने याद मुझे हमें आ जाते हैं  
अभी कहाँ आराम बदा, यह नेह निमंत्रण छलना है  
अरे! अभी सोने से पहले मुझको हमको मीलों चलना है  
अरे! अभी सोने से पहले मुझको हमको मीलों चलना है

— हरिवंश राय बच्चन (अनुवादक)

( इस अनूदित कविता में **मुझको** एवं **मुझे** के स्थान पर **हमको** एवं **हमें** का प्रयोग, जानबूझ कर, किया गया है, ताकि समाज के सभ्रान्त और पारंगत वर्ग को उनकी महत्वपूर्ण जिम्मेदारी संप्रेषित की जा सके, क्षमा याचना! समाज का यह तबका संयुक्त होकर सुधार की प्रक्रिया को दिशा देने में समर्थ है। यह प्रासंगिक है जब हम **भारतीय गणतंत्र के सात दशक** पूरे करने जा रहे हैं ।)

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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**

—00—

## World Is In Danger ?

**Prakash Kale**

Now and then, I hear and read that world is in danger. Now a day, most vocal warning is about Global Warming. It needs to be remembered that if earth had not warmed earlier, we would not have come in to existence. Thirty year back it is was Ozone hole in sky or before that danger of nuclear war. We must take note that causes of dooms are changing, it means we are progressing by way of hopping from one problem to next.

Another thing that these warning etc. presume/proclaims that human has become more powerful then Mother Nature to be able to manipulate laws of nature. This I strongly dispute. In spite of all progress human beings have made, fact is we are still struggling to protect ourselves from nature only. This nature has history of billions of years, and our known history is merely 5000-6000 year old. Whatever changes we are recording are just 200-300 year's study or record. Many of these observations are merely 40-50 year old. We do not know for sure, whether there are changes, and if changes are there, they are due to human activity or nature's cyclic change. It is our only an act of creating fear syndrome by saying that we are causing change.

However, I do not belittle the sincerity of the people who care about this country or planet. Nor I do underestimate the message for improvement given by all stakeholders, be it, parents, schools, newspaper, TV, Govt, NGO and so on to save earth.

But taking them seriously can harm our own life and in turn can take away joy out of life. First thing to remember is whatever prophets of doom are saying, they are saying this for since many centuries and always do not prove to be correct. In fact nobody can predict future of a country or society beyond 5 years. For example, my generation took population explosion seriously and limited family to one child, depriving the child of natural company. And down 30 years, we are hearing population dividend for India.

In fact all predictions assume logic in 2 ways. First is presumption on- one or the other account/activity will continue forever and second, consequences may be irreparable with the available solutions, ie, an in-box approach. It is to be remembered that, nature is always changing and human mind is not able to understand/imagine out-of-box possibilities; these are what has not happened yet or mind has not experienced it. The best example of this is, when we search life beyond earth, always we link it with availability of water and oxygen. Is

it not possible that there may be other life system which may be surviving and growing on any other natural elements? Another example, just 50 year ago none might have thought that internet will change the way we communicate or socialize.

Thus it is essential to envision that happening of today will change tomorrow, and new things will come into being, not only because of science but because of changing perceptions, laws, religion, politics and economics etc. This can be visualized from a small example of perishable nature of petro product viz-a-viz shortage of means to use alternative energy sources; it is not that, they are not available. They are readily available, but presently at higher price then petro products. As per economic law, if supply of petro products goes down, their prices will go up. It will force upon invention on alternative sources of energy for optimally economical means to make it competitive to petro products. It has started happening, and solar energy is coming up in a big way.

Further, a century ago Mumbaikar must have been crying about heavy population influx, life becoming miserable and so on, but high rise apartments, flyovers etc. which were never thought of then have come up to accommodate ever increasing population pressure. Fact is that, the day Mumbai will have more problems as compared to opportunities of survival, population flux would automatically reverse.

There is tendency to oppose new development by raising false alarms, which some time seems ridiculous after a gap of generation. That is why when X -ray was discovered, people thought, it will encroach on privacy of people and encourage pornography and nudity. Similarly, when Hydroelectric power came in to existence there was a wide spread belief that potency of water will be lost while passing through turbines and water so available will neither be good for agriculture or drinking, rather it was considered to be harmful. None of these presumptions are true.

The fact is that continents and kingdoms might have prospered and perished but the history of human being is a smooth history of progress, starting from discovery of fire, wedge, and wheel to present day of space missions. Every generation has faced problems and solved them in their own way. Today, we may complain about shortage of food but compare it with famines of nineteenth century. Further, we may see inequality among different groups

but, society evolved out of nomadic era has undergone many changes before it evolved into democracies. Such examples of progress can be observed in every walk of life.

Last but not the least, as compared to life of nation and society, our own life is very-very short; and every phase of

life comes to us only once. Therefore, let us not waste our time in presumption and imaginations of problems and dangers in future. The best that needs to be done is to make best of the available means without being reckless to the nature. The nature is for all with no exception to our beloved descendents

Be Happy, Live your life, Act responsibly but do not be scary of future.



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

E-mail: [kaleprakash23@gmail.com](mailto:kaleprakash23@gmail.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.”*

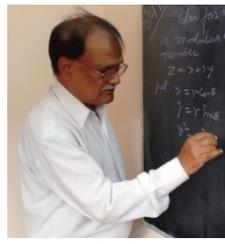
Albert Einstein

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### हमारा पंचवर्षीय प्रवास



Start: June-2012



April-2015



June-2016.....

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

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

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## Women In Social Dynamics

Charu Yeotikar

8 th March is celebrated as International Women's Day. On this day women activists and women organizations arrange seminars and workshops. On this day newspapers and other mass media are full of reportings on women. Government announces many facilities to attract half the voters.

Women one of the most fascinating creatures of mother nature so much is criticized about, wrote about, discussed about, painted about, abused about and what not? Let us have a look on the scenario on women.

Women, though they represent half the world but property and power wise their representation is very low. They even don't own hundredth part of the property of the world and power wise their representation is not much remarkable. Why half the population of the world is leading such a miserable life so that their day or year is to be celebrated? Actually a day or year is to be celebrated when a species is in danger and needs to be conserved, preserved or attention of the world is needed at some objects. Are women in danger and need protection or the world is to be reminded that after so many aeons of civilizations women are still to be paid attention?

Who is responsible for women's pitiable conditions? The answer is simple women themselves are responsible for the miseries because they are not aware of their inner strength and unless they understand their strength and utilise it properly they will remain silent sufferers. From time immemorial whatever laws were implemented on them they all were always accepted by the women. In the whole history of mankind there is not a single event when women had revolted against the laws applied on them.

Perhaps women is the only species who is governed by the laws of society and not by the laws of the nature. In her **plight** /cycle from womb to the death every step she has to pass through pyre. The darker side of the women is that even women are unkind to women. In male dominating societies perhaps all the rights are reserved for men and all the duties, services, obedience, customs, modesties, humanities and nonviolence are bound to women only.

In the early times when survival was the only task women equally struggled with the men but in homo sapiens' journey from hunter gatherers to civilizations, when gradually the concept of family and society was developed women gradually became

a commodity, and from there only men stopped worrying about them as co-human beings.

Woman is always considered as the carrier of culture. Women is governed by sentiments and traditions and not by reasoning, logic and awareness. After 70 years of Independence we are a nation where women are openly sold in the market. The country having biggest written constitution of the world could not implement the laws to protect children and women from all sorts of cruelties. As the world is ruled by the men it's men's responsibility to govern it properly so that the weaker sections of the society be treated with dignity. Nature made male and female equal under the category of homo sapiens but the religions differentiated them. No religion on the earth is ready to treat women as equal to men. The criteria set for women are harsher, stricter and some times against the laws of nature.

The so called democratic countries of the world have given the right of vote to women very late even participation of women in active politics was started quite late. Still there are so many fields where whether women be permitted to work or not is yet under discussion.

Criminality against women is common but with changing trends of society criminalization of women is rapidly increasing. The way women are made to be apart in the crime is unfair.

Though motherhood is always highly respected among all the cultures and religions, a question of utmost importance arises why there never existed a healthy society on the earth? The answer we can find in the treatment given to women from her birth to death and the high criteria of judging her never allowed her to maintain a healthy mind and psyche. An unhealthy woman delivers an unhealthy generation and that is how unhealthy societies are generated.

Even the ideology of aesthetic sense about women is very cruel all over the world, women judge themselves with the current criteria of beautification. The craze for beautifying is so high among women most of them suffer from glamour glands.

When distribution of work among male and female were decided all outside activities were considered as responsibility of men and all indoor activities came under women's field. All her life a woman cares for her house and family, but whenever there are

disputes between husband and wife it is always a woman who has to leave the house, that time only a woman realises that she is not the owner of the house but only care taker. Even she can't claim her own off-springs. No religion allowed woman to live independently and raise her children. Its only that modern laws which started giving her some rights. Family, society and country wise women are always considered as second grade citizens.

As long as l women were busy with household affairs at least they were at some peace, but when women accepted outdoor responsibilities their workload has increased immensely . The greed of men demanded women to earn but at the same time their deep-rooted oriental ideologies never allow them to share the domestic responsibilities. Women are doing injustice to themselves performing at both the fronts.

Even marriages were considered very sacred for women only because polygamy was a common practice. Willingly are unwillingly once a woman is tied to nuptial, religious laws never permit her to break it. Thanks to the modern laws that at least they had given this right to a woman to break her marriage.

Though there is a positive aspect also, women have progressed a lot than their predecessors. In all the fields of life they are performing well but a lot is still to be done.

When we are at the threshold of a new Millennium let women be treated as human being instead of worshipping her as goddess, or ill-treating her as the slave. We better follow the basic principles of French revolution of Liberty, Equality and Fraternity so that their day or yea need not to be celebrated in the next Millennium.



Author is a resident of Sanawad, M.P.. She is M.Sc.( Physics), M.Sc.( Environ. Sc.). She has taught in various schools of M.P., Gujarat , Rajasthan and in Engineering college. She is fond of reading and travelling to discover various dimension of society.

E-mail: [charuyeotikar@gmail.com](mailto:charuyeotikar@gmail.com)

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*The moment I have realized God sitting in the temple of every human body, the moment I stand in reverence before every human being and see God in him – that moment I am free from bondage, everything that binds vanishes, and I am free.*

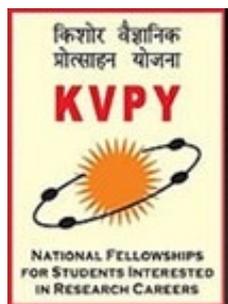
- Swami Vivekananda

**TRUE MORALITY**  
is doing what is right without the threat of divine retribution nor the possibility of divine reward.  
— Arthur Paliden  
Atheist Republic.com

**“If people are good only because they fear punishment, and hope for reward, then we are a sorry lot indeed.”**  
~Albert Einstein

## KISHORE VAIGYANIK PRO TSAHAN YOJANA

Prof. SB Dhar



KVPY is a **Young Scientist Incentive Plan**. It is a national scholarship program for students. It is funded by the Government of India's Department of Science and Technology. The purpose of this **Yojana** is to encourage the exceptionally brilliant students to take up research careers in the field of basic sciences. This program was started in 1999. It is administered by the **Indian Institute of Science, Bangalore**. The students who qualify KVPY examination become eligible for the fellowship as well as admissions into institutes like **IISc (Indian Institute of Science) or IISER (Indian Institutes of Science Education and Research)**.

### The examination has three streams:

- SA (Class 11),
- SX (Class 12), and
- SB (First year BSc).

For receiving a fellowship, both Aptitude Test (75%) and Interview Marks (25%) are considered.

### Objectives:

- To identify students with talent and aptitude for research;
- To help them realize their academic potential;
- To encourage them to take up research careers in Basic Sciences, Engineering and Medicine
- To ensure the growth of the best scientific minds for research and development in the country.

### Process of Selection:

- Selection of the students is made from those studying in XI standard to 1st year of any undergraduate Program in Basic Sciences namely B.Sc./B.S./B.Stat./B.Math./Int. M.Sc./M.S. in Mathematics, Physics, Chemistry and Biology having aptitude for scientific research.
- Special groups / Committees are set up at IISc to screen the applications and

conduct an aptitude test at various centres in the country.

- Based on the performance in the aptitude test, short-listed students are called for an interview which is the final stage of the selection procedure.
- For receiving a fellowship, both aptitude test and interview marks are considered.

### All India Rank List – General Merit and cut off marks

- [Stream – SA](#) (54.00 % and above)
- [Stream – SX](#) (52.00 % and above)
- [Stream – SB](#) (49.00 % and above)

### All India Rank List under Empowerment Initiative for SC/ST students in the KVPY Fellowship Program and cut off marks:

- [Stream – SA](#) (40.00 % and above)
- [Stream – SX](#) (40.00 % and above)
- [Stream – SB](#) (35.00 % and above)

### All India Rank List under Empowerment Initiative for PWD students in the KVPY Fellowship Program and cut off marks:

- [Stream – SA](#) (40.00 % and above)
- [Stream – SX](#) (40.00 % and above)
- [Stream – SB](#) (35.00 % and above)

**Note:**

- (a) One **can** appear for **KVPY** thrice in his/her life.
- (b) First in 11 which **is** SA stream,
- (c) Second in 12 which **is** SX stream, and
- (d) Third in college first year which **is** SB stream.
- (e) **The syllabus for SB and SX is normally same.**
- (f) KVPY Syllabus includes topics from Class X, XI and **XII** depending upon the stream **applied** for.
- (g) Each paper has questions from **Physics, Chemistry, Mathematics and Biology.**
- (h) One can pursue studies from class 11 up till pre-Ph.D. level, including courses B.Sc./Integrated M.Sc. and first/second year of B.E./ B.tech/ B.Arch./MBBS.

**Eligibility:**

- (a) **The KVPY Fellowships are given to Indian Nationals to Study in India.**
- (b) **Stream SA**

Students enrolled in XI Standard (Science Subjects) having secured a minimum of 75% (65% for SC/ST/PWD) marks in aggregate in MATHEMATICS and SCIENCE subjects in the X Standard Board examination.

- (c) **Stream SX**

Students enrolled in XII Standard/ (+2) (Science subjects) aspiring to join undergraduate program in Basic Sciences namely Physics/Chemistry/Mathematics & Biology leading to B.Sc./B.S./B.Stat./B.Math./Int. M.Sc./Int. M.S. provided they have secured a minimum of 75% (65% for SC/ST/PWD) marks in aggregate in MATHEMATICS and SCIENCE subjects (Physics/Chemistry/Biology) in the X Standard Board Examination and a minimum of 60% (50% for SC/ST/PWD) marks in aggregate in MATHEMATICS and SCIENCE subjects

(Physics/Chemistry/Biology) in the XII standard Board Examination.

- (d) **Stream SB**

Students enrolled in the 1st year of undergraduate program in Basic Sciences namely Physics/Chemistry/Mathematics & Biology leading to B.Sc./B.S./B.Stat./B.Math./Int. M.Sc./Int. M.S. during the academic year 2018–19 and having secured a minimum of 60% (50% for SC/ST/PWD) marks in aggregate in MATHEMATICS and SCIENCE subjects (Physics/Chemistry/Biology) in the XII Standard Board Examination. In the 1st year final examination of B.Sc./B.S./B.Math./B.Stat./Int. M.Sc./Int. M.S. they must secure 60% (50% for SC/ST/PWD) marks before taking up the fellowship, if awarded.

**Fellowships:**

- (a) **SA/SX/SB**

During 1st to 3rd years of B.Sc./ B.S./ B.Stat/ B.Math / Integrated M.Sc / M.S,

The Monthly Fellowship is Rs. 5000 and the Annual Contingency Grant is Rs. 20000.

- (b) **SA/SX/SB**

During M. Sc. / 4th to 5th years of Integrated M.Sc. /M.S./ M.Math / M.Stat,

The Monthly Fellowship is Rs. 7000 and the Annual Contingency Grant is Rs. 28000.

**Other Privileges:**

Each KVPY Fellow will be issued an Identity Card so as to have access to National Laboratories/ Universities who have agreed to extend special privileges like library, laboratory facilities, etc. to KVPY Fellows on production of the ID card.

**Some Facts of KVPY 2018:**

- (a) **Application Fees**  
**General/OBC Category: Rs. 1000**  
**SC/ST/PWD: Rs. 500**
- (b) **KVPY-2018 APTITUDE WAS COMPLETELY ONLINE**
- (c) **Candidates were to apply through online only. No hard copy of the application was available. Each candidate was to apply individually. Bulk applications from school/college authorities were not entertained.**
- (d) **Syllabus for the aptitude test**  
 There is no prescribed syllabus for the aptitude test. The aptitude test aims to test the understanding and analytical ability of the student than his/her factual knowledge. However, students are tested for the syllabus up to class X/XII/1st year of B.Sc./B.S./B.Stat./B.Math./Int. M.Sc./M.S. as applicable.
- (e) **In the Stream-SA all questions are compulsory (Science and Mathematics)**
- (f) **In respect of the streams SB and SX**, there will be four sections in Part I (Physics, Chemistry, Biology and Mathematics) and four sections in Part II (Physics, Chemistry, Biology and Mathematics). Candidates may answer any THREE of the four subjects in Part I and any TWO of the four subjects in Part II. In case candidate attempts more sections, best of three in Part I and best of two in Part II is considered.
- (g) **Examination Time:**  
**Stream SA :** Forenoon 9:30 AM to 12:30 PM  
**Stream SB/SX :** Afternoon 2 PM to 5 PM

**Note:**

- (a) **The Advertisement for KVPY** is published on 2nd Sunday of the month of July every year.
- (b) The results of Aptitude test are generally declared in the second fortnight of December.
- (c) Final results of the exam (i.e. Aptitude Test + Interview) are declared in the second fortnight of March.

**Results Of KVPY Aptitude Test 2018**

The cut off marks for the KVPY Aptitude Test held on November 4th, 2018 for different Streams are given below:

***Stream SA***

- GN and OBC: 45 marks out of 100  
 SC/ST : 32 marks out of 100  
 PWD: 32 marks out of 100

***Stream SB***

- GN and OBC: 43 marks out of 100  
 SC/ST: 30 marks out of 100  
 PWD: 30 marks out of 100

***Stream SX***

- GN and OBC: 53 marks out of 100  
 SC/ST: 40 marks out of 100  
 PWD: 40 marks out of 100

**NOTE: Please note that there is no re-evaluation for the ONLINE examination.**

**The contact details:****(a) Mailing Address**

The Convener  
Kishore Vaigyanik Protsahan Yojana (KVPY)  
Indian Institute of Science  
Bangalore - 560 012

**(b) Fax:** (080) 2360 1215**(c) Telephone:**(080) 22932975 / 76, 23601008, 22933536**(d) Email for Application related Query:**[applications.kvpy@iisc.ac.in](mailto:applications.kvpy@iisc.ac.in)**(e) Email for Fellowship related Query:** [fellowship.kvpy@iisc.ac.in](mailto:fellowship.kvpy@iisc.ac.in)

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

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

- Jonathan Lockwood Huie

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

- Gautama Buddha

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**वसंत कैसे आए ?**

सूखी नदियां, जली वादियां  
वसंत कैसे आए ?

कटे पेड़ हैं, लुटे नीड़ हैं  
वसंत कैसे आए ?

अनल- आग, पंछी गुम-सुम, हवाएं गरम  
वसंत कैसे आए ?

भू हिमशीतल धूप है अनल  
वसंत कैसे आए ?

उजड़े कानन भवनों के वन  
वसंत कैसे आए ?

रिश्ते-नाते धन से तुलते  
वसंत कैसे आए ?

**परंतु ----**

पर्यावरण हो मनभावन  
तब ही वसंत आए।

पंछी चहकें बगिया महके  
तब ही वसंत आए।

प्रेम - पगे मन और घर आंगन  
तब ही वसंत आए।

शीतल पवन धरती उपवन  
तब ही वसंत आए।



कवियत्री एक सामाजिक चिंतक एवं विचारक हैं। आपकी कविताएँ वर्तमान पर्यवेक्ष्य में बुद्धि-जीवियों को उनके सामाजिक उत्तरदायित्व के प्रति उन्हें चिंतन के लिए प्रेरित करती हैं। आपकी लेखनी प्रादेशिक एवं राष्ट्रीय स्तर पर प्रकाशित है।

E-mail: mrinalini ghule46@gmail.com

**मृणालिनी घुळे****मकर संक्रान्ति****डॉ. संगीता पाहुजा**

आया मकर संक्रांति का यह पावन दिन  
साथ में लाया शुभ कार्यों की शुरुआत गिन गिन।

इस दिन देवताओं का हुआ आगमन पृथ्वी पर,  
पाकर दर्शन धन्य हुआ जन जन।

गंगा स्नान से, धान दान से मिलता पुण्य,  
पावन हो जाता तन मन, देखकर दृश्य मनभावन।

सूर्य अग्रसर हो जाता, दक्षिणायण से उत्तरायण में।  
हो जाती रात छोटी और होता बड़ा दिन।

स्वादिष्ट खिचड़ी, मीठा गुड़ और तिल  
खाकर, खिल जाते सबके दिल।  
रंग बिरंगी आसमां में उड़ती पतंगे  
बिखेरती इंद्रधनुषी रंग।

डोर हाथ में, पैर धरातल पर और आसमां छूती पतंग,  
अवगत कराती प्राणी को, जमीं पर रहकर,  
ऊंचाइयों को छूने का ढंग।

कृषक की बीज बुवाई का दृश्य, नवजीवन का देता संदेश।  
हर्षोल्लास से पुलकित हो जाता हर मन। आया मकर  
संक्रांति का यह पावन दिन।।



कवियत्री आयुर्वेदिक चिकित्सक हैं। आपने B.A.M.S. की उपाधि M.D. University, रोहतक से प्राप्त की। आपके दिल्ली एवं नॉएडा में परामर्श केंद्र है। धार्मिक, नारी एवं समाज उत्थान कार्यों में आपकी विशेष रूचि है।

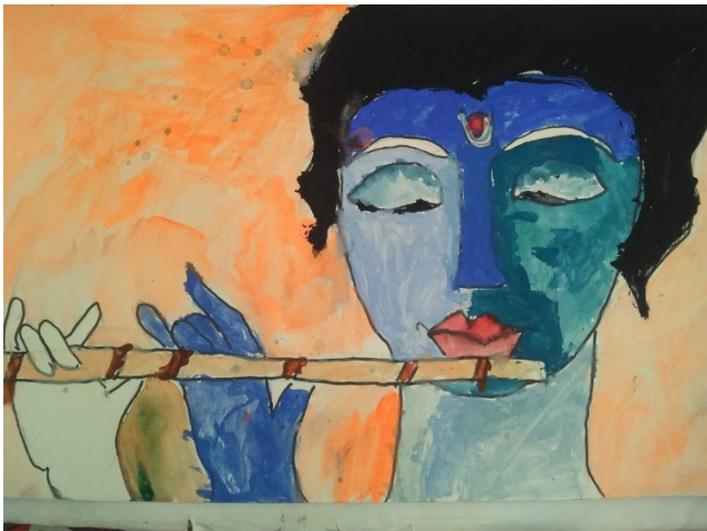
संपर्क: मो. क्र.- 9953967901,

E-mail: sangeeta.pahujia3@gmail.com

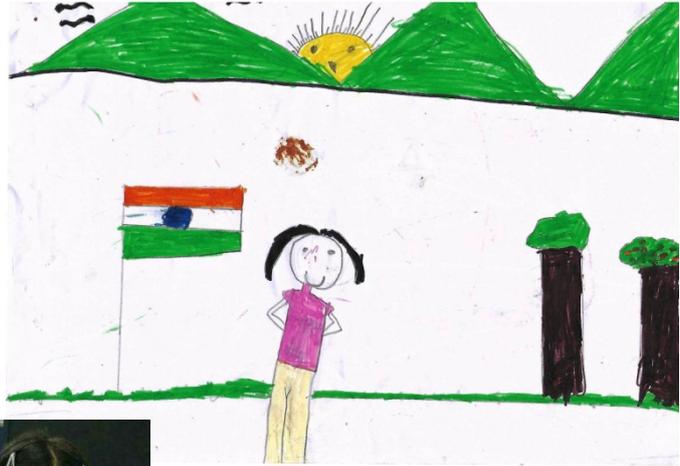
## Students' Section



Anupra Dubey, Student Class III, De Indian Public school, Delhi,  
Father: Shri Anup Dubey, Mother: Mrs Prachi, Dubey  
E-mail ID: [prachi0986@gmail.com](mailto:prachi0986@gmail.com)



Bhavika Singh, Student Class II, Vishwa Bharati Public School, NOIDA,  
Father: Shri Rohit Singh, Mother: Mrs Laxmi Singh  
E-mail ID: [rohitsinghmm@gmail.com](mailto:rohitsinghmm@gmail.com)



Krittika Dwivedi, Class I, Brigade School, Mahadevpura, Bangalore  
Father : Sachish Dhar Dwivedi  
Mother : Shivangi Dwivedi  
E-Mail ID: [sachish.dwivedi@gmail.com](mailto:sachish.dwivedi@gmail.com)



Natchya Tiwari, Class 7<sup>th</sup>,  
School : Thidanukhro School Sonkhla Hatyai Thailand  
Father: : Dr Hariram Tiwari (Cardiologist)  
Mother: Pragya Tiwari  
E-mail ID:  
[prgd2000@yahoo.com](mailto:prgd2000@yahoo.com)



## GROWING WITH CONCEPTS

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

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

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

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

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

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

—00—

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

*- Wilma Mankiller*

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

*- John Adams*

—00—



*Growing With Concepts - Mathematics***LET'S DO SOME PROBLEMS IN MATHEMATICS-VI****Prof. SB Dhar**

In this article, the Questions from the **KVPY Examination** are being selected. The purpose is to make the readers aware of the types and the standard of the problems being asked in KVPY Examinations. The questions relate to the different segments of KVPY.

**Stream SA is for the students who study in class XI. The Question Paper for this examination consists of Two Parts.**

Part 1 contains 15 Questions from Mathematics, 15 from Physics, 15 from Chemistry and 15 from Biology section. The type of questions is MCQ. The questions are printed in Hindi and English both languages. The marking scheme for these first 60 Questions (From 1 to 60) is (+)1 Mark for each correct Answer and (-)0.25 for each wrong Answer.

Part 2 contains 20 Questions. In this part there are 5 questions from Mathematics, 5 from Physics, 5 from Chemistry and 5 from Biology. Each question from 61 to 80 gives (+)2 marks for each correct answer and (-)0.5 for each wrong answer.

**Some Selected Problems**

1. The number of pairs (a,b) of positive real numbers satisfying  $a^4+b^4 < 1$  and  $a^2+b^2 > 1$  is  
(a) 0 (b) 1 (c) 2 (d) more than 2

**Answer: (d)**

2. The number of real roots of the polynomial equation  $x^4-x^2+2x-1=0$  is  
(a) 0 (b) 2 (c) 3 (d) 4

**Answer: (b)**

3. Consider the following two statements:

I: Any pair of consistent linear equations in two variables must have a unique solution.

II: There do not exist two consecutive integers, the sum of whose squares is 365.

Then

- (a) both I and II are true  
(b) both I and II are false  
(c) I is true and II is false  
(d) I is false and II is true

**Answer: (b)**

4. A solid hemisphere is attached to the top of a cylinder, having the same radius as that of the cylinder. If the height of the cylinder were doubled keeping both radii fixed, the volume of the entire system would have increased by 50 percent. By what percentage would the volume have increased if the radii of the hemisphere and

the cylinder were doubled keeping the height fixed?

- (a) 300% (b) 400% (c) 500% (d) 600%

**Answer: (c)**

5. Consider a triangle PQR in which the relation  $QR^2+PR^2=5PQ^2$  holds. Let G be the point of intersection of medians PM and QN. Then angle QGM is always  
(a) less than  $45^\circ$   
(b) obtuse angle  
(c) a right angle  
(d) acute and larger than  $45^\circ$

**Answer: (c)**

6. A 100 mark examination was administered to a class of 50 students. Despite only integer marks being given, the average score of the class was 47.5. Then the maximum number of students who could get marks more than the class average is  
(a) 25 (b) 35 (c) 45 (d) 49

**Answer: (d)**

7. Let s be the sum of the digits of the number  $15^2 \times 5^{18}$  in base 5. Then  
(a)  $s < 6$  (b)  $6 \leq s < 140$   
(c)  $140 \leq s < 148$  (d)  $s \geq 148$

**Answer: (b)**

8. All the vertices of a rectangle are of the form (a,b) with a,b integers satisfying the equation  $(a-8)^2-(b-7)^2=5$ , then the perimeter of the rectangle is  
 (a) 20 (b)22 (c)24 (d)26

**Answer: (a)**

9. A very large block of ice of the size of a volleyball court and of uniform thickness of 8m is floating on water. A person standing near its edge wishes to fetch a bucketful of water using a rope. The smallest length of rope required for this is about-  
 (a) 3.6m (b) 1.8m (c) 0.9m (d) 0.4m

**Answer: (c)**

10. A box filled with water has a small hole on its side near the bottom. It is dropped from the top of a tower. As it falls, a camera attached on the side of the box records the shape of the water stream coming out of the hole. The resulting video will show  
 (a) the water coming down forming a parabolic stream  
 (b) the water going up forming a parabolic stream  
 (c) the water coming out in a straight line  
 (d) no water coming out

**Answer: (d)**

11. An earthen pitcher used in summer cools water in it essentially by evaporation of water from its porous surface. If a pitcher carries 4kg of water and the rate of evaporation is 20g per hour, temperature of water in it decreases by  $\Delta T$  in two hours. The value of  $\Delta T$  is close to ratio of latent of evaporation to specific heat of water is  $540^\circ\text{C}$ .  
 (a)  $2.7^\circ\text{C}$  (b)  $4.2^\circ\text{C}$  (c)  $5.4^\circ\text{C}$  (d)  $10.8^\circ\text{C}$

**Answer: (c)**

12. The number of water molecules in 250mL of water is closed to (Given that the density of water is  $1.0\text{g mL}^{-1}$ ; Avagadro's number =  $6.023 \times 10^{23}$ )  
 (a)  $83.6 \times 10^{23}$   
 (b)  $13.9 \times 10^{23}$  (c)  $1.5 \times 10^{23}$   
 (d)  $33.6 \times 10^{23}$

**Answer: (a)**

13. Among the following, the correct statement is  
 (a) pH decreases when solid ammonium chloride is added to a dilute aqueous solution of  $\text{NH}_3$   
 (b) pH decreases when solid sodium acetate is added to a dilute aqueous solution of acetic acid  
 (c) pH decreases when solid NaCl is added to a dilute aqueous solution of NaOH  
 (d) pH decreases when solid sodium oxalate is added to a dilute aqueous solution of oxalic acid

**Answer: (a)**

14. The hybridization of xenon atom in  $\text{XeF}_4$  is  
 (a)  $\text{sp}^3$  (b)  $\text{dsp}^2$  (c)  $\text{sp}^3\text{d}^2$  (d)  $\text{d}^2\text{sp}^3$

**Answer: (c)**

15. Lecithin is a  
 (a) Carbohydrate (b) Phospholipid  
 (b) Nucleoside (d) Protein

**Answer: (b)**

16. Erythropoietin is produced by  
 (a) heart (b) kidney  
 (c) bone marrow (d) adrenal gland

**Answer: (b)**

17. Which one of the following reactions is catalyzed by high-energy ultraviolet radiation in the stratosphere?  
 (a)  $\text{O}_2 + \text{O} \rightarrow \text{O}_3$  (b)  $\text{O}_2 \rightarrow \text{O} + \text{O}$   
 (b)  $\text{O}_3 + \text{O}_3 \rightarrow 3\text{O}_2$  (d)  $\text{O} + \text{O} \rightarrow \text{O}_2$

**Answer: (b)**

18. An example of nastic movement (external stimulus-dependent movement) in plants is  
 (a) folding =up of the leaves of Mimosa pudica  
 (b) climbing of tendrils  
 (c) growth of roots from seeds  
 (d) growth of pollen tube towards the ovule

**Answer: (a)**

**Stream SX Examination is for the students who study in Class XII and Stream SB Examination is for the students who have passed Class XII and study in BSc etc. The syllabus for both the examinations are almost same.**

These Question Papers have also two Parts: Part 1 and Part 2

Part 1 has in all 80 Questions: 20 Questions each from Mathematics, Physics, Chemistry, and Biology. The type of questions is MCQ. The questions are printed in Hindi and English both languages. The marking scheme for the first 80 Questions (from 1 to 60) is (+)1 Mark for each correct Answer and (-)0.25 for each wrong Answer.

Part 2 has total 40 Questions: 10 Questions each from Mathematics, Physics, Chemistry, and Biology. Each question from 81 to 120 gives (+)2 marks for each correct answer and (-)0.5 for each wrong answer.

### Some Problems :

1. Suppose  $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$  is a real matrix with non-zero entries,  $ad-bc=0$ , and  $A^2=A$ , then  $a+d$  is  
 (a) 1 (b) 2 (c) 3 (d) 4

**Answer (a)**

2. For  $0 < \theta < \frac{\pi}{2}$ , four tangents are drawn at the four points  $(\pm 3\cos\theta, \pm 2\sin\theta)$  to the ellipse  $\frac{x^2}{9} + \frac{y^2}{4} = 1$ . If  $A(\theta)$  denotes the area of the quadrilateral formed by these four tangents, the minimum value of  $A(\theta)$  is  
 (a) 21 (b) 24 (c) 27 (d) 30

**Answer (b)**

3. The number of real solutions  $x$  of the equation  $\cos^2(x(\sin 2x)) = \frac{1}{1+x^2} + \cos^2 x + \sec^2 x$  is  
 (a) 0 (b) 1 (c) 2 (d) infinite

**Answer (b)**

4. Let  $f(x) = x |\sin x|$ ,  $x \in \mathbb{R}$ , then  
 (a)  $f$  is differentiable for all  $x$ , except at  $x = n\pi, n=1,2,3,\dots$   
 (b)  $f$  is differentiable for all  $x$ , except at  $x = n\pi, n=\pm 1, \pm 2, \pm 3, \dots$   
 (c)  $f$  is differentiable for all  $x$ , except at  $x = n\pi, n=0,1,2,3,\dots$   
 (d)  $f$  is differentiable for all  $x$ , except at  $x = n\pi, n=0, \pm 1, \pm 2, \pm 3, \dots$

**Answer (b)**

5. A spiral galaxy can be approximated as an infinitesimally thin disk of uniform surface mass density (mass per unit area) located at  $z=0$ . Two stars A and B start from rest from heights  $2z_0$  and  $z_0$  ( $z_0 \ll$  radial extent of the disk),

respectively, and fall towards the disk, cross over to the other side, and execute periodic oscillations. The ratio of time periods of A and B is  
 (a)  $2^{-1/2}$  (b) 2 (c) 1 (d)  $2^{1/2}$

**Answer (d)**

6. Among  $\text{Ce}(4f^1 5d^1 6s^2)$ ,  $\text{Nd}(4f^1 6s^2)$ ,  $\text{Eu}(4f^7 6s^2)$  and  $\text{Dy}(4f^9 6s^2)$ , the elements having highest and lowest 3<sup>rd</sup> ionization energies, respectively, are  
 (a) Nd and Ce (b) Eu and Ce  
 (c) Eu and Dy (d) Dy and Nd

**Answer (b)**

7. If the acidic, basic and hydrophobic residues of proteins are considered to be red, green, and blue in colour, respectively, then a globular protein in aqueous solution would have  
 (a) red and blue on the surface and green at the core  
 (b) red and green on the surface and blue at the core  
 (c) blue on the surface and red and green at the core  
 (d) blue and green on the surface and red at the core

**Answer (b)**

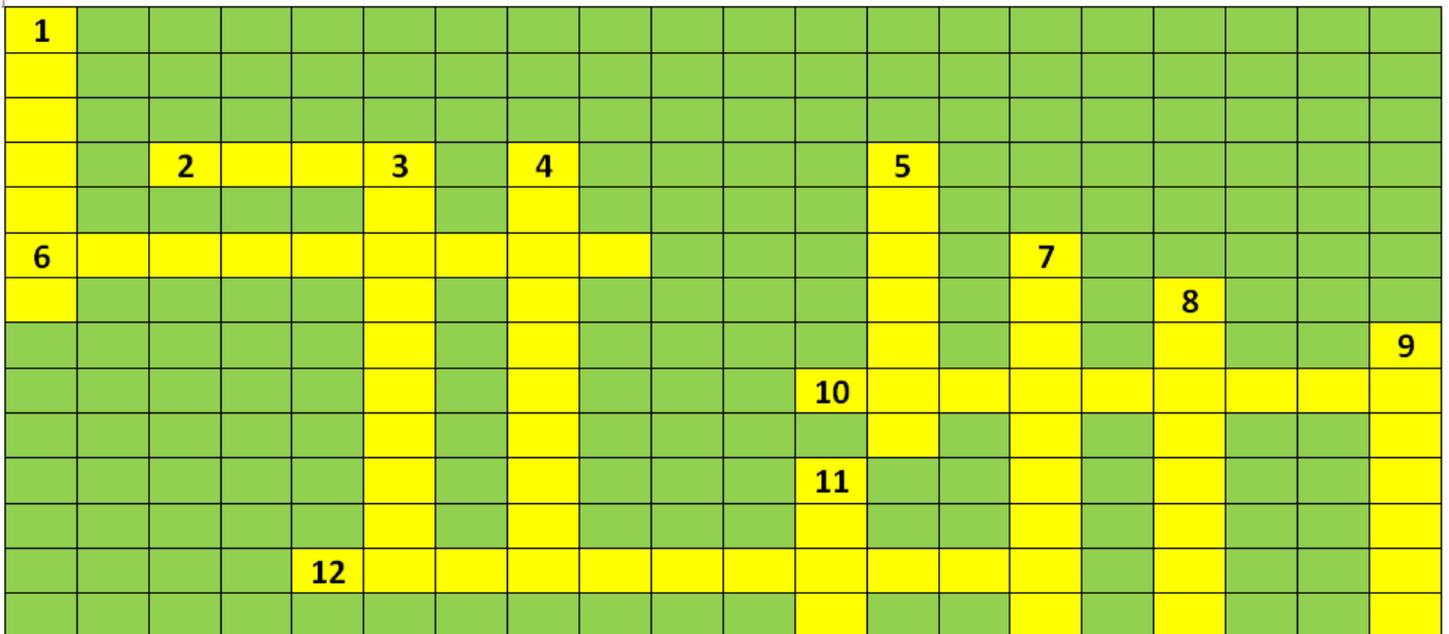
8. A lysosome vesicle of  $1 \mu\text{m}$  diameter has an internal pH of 5.0. The total number of  $\text{H}^+$  ions inside this vesicle would range from  
 (a)  $10^3$  to  $10^4$  (b)  $10^4$  to  $10^5$   
 (c)  $10^5$  to  $10^{10}$  (d)  $10^{10}$  to  $6.023 \times 10^{21}$

**Answer (a)**



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

**e-Mail ID:** [maths.iitk@gmail.com](mailto:maths.iitk@gmail.com)

**CROSSWORD PUZZLE February'19 : EXAMINATION****Prof. SB Dhar****Across**

- 2 A piece of paper used for cheating  
 6 Reviewing key points in a paragraph  
 10 Who directs awarding marks  
 12 Official document declaring pass

**Down**

- 1 Look closely to evaluate  
 3 Not good enough to define pass  
 4 Judgement by teacher  
 5 Who invigilates exam  
 7 Explain the meaning  
 8 Giving marks  
 9 To say something to happen in future  
 11 Tp practice a ea; work in advance

**Answer to this Crossword Puzzle shall be provided in 5<sup>th</sup> Issue dt 1<sup>st</sup> March'19 of this-Bulletin**

*Growing with Concepts : Physics***Prologue : Foundation Mathematics**

Relevance of mathematics in exploring science in general and physics in particular does not elaboration. In [Chapter G-02 on Basic Mathematics](#) concepts of mathematics viz arithmetics, algebra and geometry were elaborated. Elaborations of mathematical concepts in [Chapter G-03 Foundation Mathemaics](#) is helpful to elaborate a concepts necessary for exploring mathematics and science to be studied upto intermediate level i.e. class 12<sup>th</sup>. A little finger hoding of students to practice problems from references books cited in the chapter shall not only accelerate learning of both mathematics and physics, rather it would become enjoyable, explorative and intuitive.

Accordingly, this hapter starting with introduction to coordinates geometry, dwells into trigonometry, higher algebra including complex numbers, extending coordinate geometry into conic sections and calculus, both integral and differential. Complex numbers, coordinate geometry and vectors have different application yet uniformity in their analysis with trigonometry helps in integration subject matter.

Further complexities of these topics shall be elaborated in Mathematics Section of Mentors' Manual.

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

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

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

These Two chapters (G-02 & G-03) are placed in intentionally common section of Mentors' Manual. These will cater to mathematical concepts necessary for understanding contents of separate sections on Mathematics developed by Prof. SB. Dhar, Physics developed by Dr. S K Joshi and Dr Vibhu Mishra, and Chemistry by Mrs Kumud Bala. In these sections efforts have been made to elaborate basic concepts with the subject matter upto class XIIthafter. Complete Mentors' Manual is being progressively uploaded as a [free web resource](#). Mentors and students are welcome to make their observations and/or suggestion to make value addition and make it more purposeful, for the larger good.

In next issue, Question Banks on Physics shall be resumed.

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

***It is a real thrill, full of fun.***

***But, it can't be done in dicrete manner, it has to be done patiently, like climbing stair far a faster and purposeful journey.***

***This is where role of education come in; it is to streamline the process.***

—00—

## Growing with Concepts: Chemistry

### BEHAVIOUR OF REAL GASES: DEVIATIONS FROM IDEAL BEHAVIOUR

Kumud Bala

**Ideal and real gases-** A gas which obeys the ideal gas equation,  $PV=nRT$  under all conditions of temperature and pressure is called an ideal gas. In reality, the gases are found to obey the gas laws fairly well if the pressure is low or the temperature is high. Such gases are, therefore, known as 'real gases'. Hence, the concept of ideal gas is only the theoretical or hypothetical. It is seen that gases which are soluble in water or are easily liquefiable, e.g.  $\text{CO}_2$ ,  $\text{SO}_2$ ,  $\text{NH}_3$  etc. show larger deviations from the ideal behavior than the gases like  $\text{H}_2$ ,  $\text{O}_2$ ,  $\text{N}_2$  etc.

#### To study the deviations from ideal behavior:

let us study how real gases show deviations from Boyle's law. According to Boyle's law,  $PV = \text{constant}$

at constant temperature.

Hence, at

constant

temperature,

plot of  $PV$  verse

$P$  should be a

straight line

parallel to x-

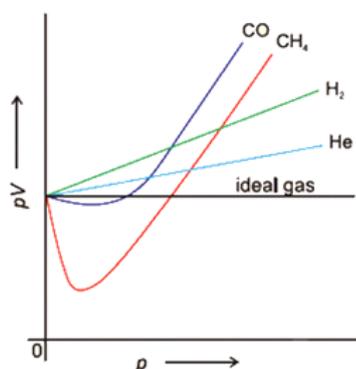
axis. However,

the real gases

do not show

such a behavior

as shown in figure.



From the plots, we observe that for gases like  $\text{H}_2$  and  $\text{He}$ ,  $PV$  increases continuously with increase of pressure whereas for gases like  $\text{CO}$ ,  $\text{CH}_4$ , etc.  $PV$  first decreases with increase of pressure and reaches a minimum value and then increases continuously with increase of

pressure. Similarly,

if we plot

experimental values

of pressure verses

volume at constant

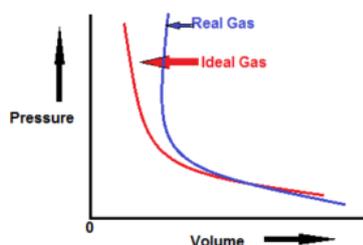
temperature for real

gas and ideal gas

the curves do not

coincide with each other

as shown in figure..



From the plots, we observe that at higher pressure, the observed volume is more than the calculated volume. At lower pressure we observe that the calculated volume approach each other.

#### Measuring deviations from ideal behavior:-

**The effect of pressure-** the extent to which a real

gas deviates from ideal behavior can be conveniently studied in terms of a quantity 'Z' called the compressibility factor, which is defined as  $Z = \frac{PV}{nRT}$ .

For an ideal gas, as  $PV = nRT$ ,  $Z=1$ . For a real gas, as  $PV \neq nRT$ ,  $Z \neq 1$ .

Hence, two cases arise:

- When  $Z < 1$ , (e.g. for  $\text{CH}_4$ ,  $\text{CO}_2$  etc.) the gas is said to show negative deviation. This implies that the gas is more compressible than expected from ideal behavior. This is also attributed to predominance of attractive forces among the molecules of these gases.
- When  $Z > 1$ , the gas is said to show positive deviation. This implies that the gas is less compressible than expected from ideal behavior. This is attributed to the predominance of the strong repulsive forces among the molecules.

Greater is departure in value of Z from unity, greater

is the deviation from

ideal behavior. At

the same

temperature and

pressure, the extent

of deviation depends

upon the nature of

the gas as shown in

figure. Thus, at

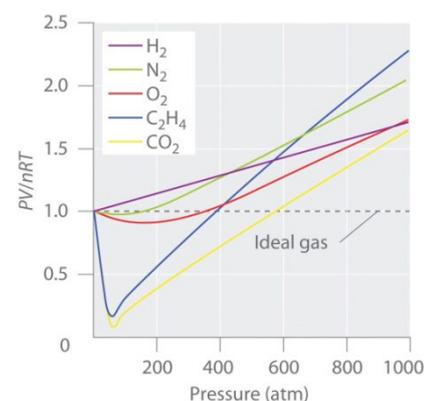
intermediate

pressures,  $\text{CO}_2$

shows much larger

negative deviation

than  $\text{H}_2$  and  $\text{N}_2$ .



For same gas, at a particular pressure, the extent of deviation

depends upon

temperature, as

shown in figure

for the case of  $\text{N}_2$

gas. Plots in

figure show that

as the

temperature

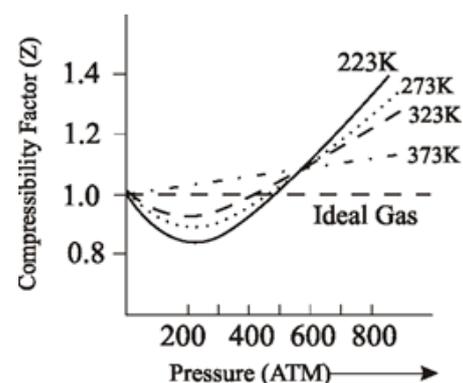
increases, the

minimum in the

curve shifts

upwards,

ultimately, a temperature is reached at which the



value of  $Z$  remains close to 1 over an appreciable range of pressure. For example, in case of  $N_2$ , at 323K, the value of  $Z$  remains close to 1 up to nearly 100 atmospheres.

The temperature at which a real gas behaves like an ideal gas over an appreciable pressure range is called Boyle temperature or Boyle point. So we have learnt that behavior of the gas becomes more ideal when pressure is very low. The Boyle temperature is different for different gases. For example, the Boyle temperature for  $N_2$  is 59°C and for hydrogen is -165°C.

**Significance of compressibility factor-** The significance of compressibility factor can be further understood from the following deviation:  $Z = \frac{PV_{real}}{nRT}$  (i) , if the gas shows ideal behavior,

$PV_{ideal} = nRT$ , i.e.  $V_{ideal} = \frac{nRT}{P}$  substituting this value of  $\frac{nRT}{P}$  in equation (i) we get,  $Z = \frac{V_{real}}{V_{ideal}}$ , thus,

compressibility factor is the ratio of the actual molar volume of the gas (i.e. experimentally observed value) to the calculated molar volume( considering it is as an ideal gas) at the same temperature and pressure. Thus, we conclude: (i) the real gases show ideal behavior at low pressures and fairly high temperature. (ii) At low temperature and high pressure, the gases differ significantly from ideal behavior.

**Causes of deviation from ideal behavior:** As explained above, the real gases obey ideal gas equation ( $PV = nRT$ ) only if the pressure is low or the temperature is high. However, if the pressure is high or the temperature is low, the real gases show marked deviations from ideal behavior. The reasons for such behavior shown by the real gases have been found to be as follows: The derivation of the gas laws is based upon the kinetic theory of gases which in turn is based upon certain assumptions. Thus, there must be something wrong with certain assumptions. A careful study shows that at high pressure or low temperature, the following two assumptions of kinetic theory of gases are faulty: (i) The volume occupied by the gas molecules is negligible as compared to the total volume of the gas. (ii) The forces of attraction or repulsion between the gas molecules are negligible. The above two assumptions are true only if the pressure is low or the temperature is high so that the distance between the molecules is large. However, if the pressure is high or the temperature is low, the gas molecules come close together. Hence, under these conditions: (i) the forces of attraction or repulsion between the

molecules may not be negligible. (ii) the volume occupied by the gas may be so small that the volume occupied by the molecules may not be negligible.

**Equation of state for the real gases (van der Waals equation):-** To explain the behavior of real gases, J.D. Van der Waals, in 1873, modified the ideal gas equation by applying appropriate correction so as to take into account: (i) the volume of the gas molecules; and (ii) the forces of attraction between the gas molecules. He put forward the modified equation, known after him as van der Waals equation. This equation for 1 mole of the gas is  $(P + \frac{a}{v^2})(V - b) = RT$  and for n mole of the gas, it is  $(P + \frac{an^2}{v^2})(V - nb) = nRT$  where 'a' and 'b' are constants, called Van der Waals constants. Their values depend upon the nature of the gas.

**Derivation of van der Waals equation:-** van der waals equation has been obtained by modifying the ideal gas equation  $PV = nRT$  by applying corrections for volume and pressure. .

**(i) Correction for the volume:-** suppose the volume occupied by the gas molecules is 'v'. When the molecules are moving, their effective volume is four times the actual volume, i.e. 4v. Let us call it 'b', i.e.  $b = 4v$  (called excluded volume or co-volume). Thus, the free volume available to the gas molecules for movement, i.e. corrected volume for one mole =  $(V - b)$ , and corrected volume for n moles =  $(V - nb)$ .

**(ii) Correction for pressure:-** The pressure of a gas is due to the hits of the molecules on the walls of the containing vessel. The attractive force between the molecules comes into play when the molecules are brought close together by compressing the gas. A molecule in the body of the gas is attracted in all the directions when forces acting in opposite directions cancel out, but a molecule at the boundary of the wall is subjected to an inward pull due to unbalanced molecular attraction.

In this way some of the energy of the molecule about to strike the wall of the vessel is used up in overcoming this inward pull. Therefore, it will not strike the opposite wall with the same force. The observed pressure consequently will be less than the ideal pressure.

In other words, observed pressure is less than the ideal pressure. Hence, corrected pressure =  $P + p$ . evidently, the correction term 'p' is proportional to density of the gas near the wall and the density of

the gas inside, i.e.  $p \propto (\text{density})^2$  or  $p \propto d^2$  but  $d \propto \frac{1}{V}$  for one mole or  $d \propto \frac{n}{V}$  for n moles. Hence,  $p \propto \frac{1}{V^2}$  for one mole or  $p = \frac{a}{V^2}$  for one moles or  $p \propto \frac{n^2}{V^2}$  for n moles or  $p = \frac{an^2}{V^2}$  for n moles.  $\therefore$  Corrected pressure =  $(P + \frac{a}{V^2})$  for one mole or  $(P + \frac{an^2}{V^2})$  for n moles, where 'a' is a constant depending upon the nature of the gas. Substituting the corrected values of volume and pressure in the ideal gas equation, we get  $(P + \frac{a}{V^2})(V-b) = RT$  for one mole or  $(P + \frac{an^2}{V^2})(V-nb) = nRT$  for n moles.

#### Significance of van der Waals constants:-

- (i) The value of Van der Waals constant 'a' is a measure of the magnitude of the attractive forces among the molecules of the gas. Greater the value of 'a', larger are the intermolecular forces of attraction.
- (ii) Van der Waals constant 'b' is a measure of the effective size of the gas molecules. Its value is equal to four times the actual volume of the gas molecules. It is called excluded volume or co-volume.

**Units of van der Waals constants:** (i)  $p = \frac{an^2}{V^2} \therefore a = \frac{p \times V^2}{n^2} = \text{atm.L}^2 \text{ mol}^{-2}$  or  $\text{bar dm}^6 \text{ mol}^{-2}$  (ii)  $v = nb \therefore b = \frac{v}{n} = \text{L mol}^{-1}$  or  $\text{dm}^3 \text{ mol}^{-1}$ .

**Explanation of the behavior of real gases by van der Waals equation:-**  $(P + \frac{a}{V^2})(V-b) = RT$

- (i) At low pressure – the volume is sufficiently large and therefore, b can be neglected in comparison

to V so that  $(P + \frac{a}{V^2})V = RT$  or  $PV = RT - \frac{a}{V}$  or  $\frac{PV}{RT} = 1 - \frac{a}{VRT}$  or  $Z = 1 - \frac{a}{RTV}$ . Thus, at low pressure,  $\frac{PV}{RT}$  i.e. Z is less than one. As pressure increases (V decreases), the term  $\frac{a}{RTV}$  increases, consequently Z decreases with increase in P. This explains why initially a dip in the plot of Z versus P is observed.

- (ii) At high pressure- when P is high, V will be small so that 'b' cannot be neglected in comparison to V. But  $\frac{a}{V^2}$  may be considered negligible in comparison to P so that van der Waals equation is  $P(V-b) = RT$  or  $PV = RT + Pb$  or  $\frac{PV}{RT} = 1 + \frac{Pb}{RT}$  or  $Z = 1 + \frac{Pb}{RT}$  thus,  $\frac{PV}{RT}$  i.e. Z is greater than 1 and increases as pressure increases. This explains why after minima in the curves, the compressibility factor increases continuously with pressure.
- (iii) At high temperature and very low pressure- if temperature is high, V is very large and therefore, b as well as  $\frac{a}{V^2}$  may be neglected so that equation reduces to ideal gas equation  $PV = RT$ .

**Exceptional behavior of H<sub>2</sub> and He-**We have seen in figure that for H<sub>2</sub> and He, the compressibility factor (Z) is always greater than 1 and increases with increase of pressure. This is because H<sub>2</sub> and He being very small molecules, the intermolecular forces of attraction in them are negligible, i.e. 'a' is very small so  $1 + \frac{Pb}{RT}$ ,  $Z = 1 + \frac{Pb}{RT}$ ,  $Z > 1$  and increase with increase in the value of P at constant T.

#### Numericals:

1. Calculate the temperature of 2 moles of SO<sub>2</sub> gas contained in a 5L vessel at 10 bar pressure. Given that for SO<sub>2</sub> gas, van der Waals constants are: a= 6.7 bar L<sup>2</sup>mol<sup>-2</sup> and b = 0.0564L mol<sup>-1</sup>.

**Solution:** According to van der Waals equation  $(P + \frac{an^2}{V^2})(V-nb) = nRT$ , as pressure is in bar, taking  $R = 0.0823 \text{ L bar K}^{-1} \text{ mol}^{-1}$  and substituting the given values, we get

$$(10\text{bar} + \frac{(6.7\text{bar L}^2 \text{ mol}^{-2})(2\text{mol}^{-2})}{(5\text{L})^2})(5\text{L} - 2\text{mol} \times 0.0564\text{L mol}^{-1}) = 2\text{mol} \times 0.0823\text{L bar K}^{-1} \text{ mol}^{-1} \times T$$

$$(10\text{bar} + 1.072\text{bar})(5\text{L} - 1.128\text{L}) = .166\text{L bar K}^{-1} T$$

$$11.072\text{bar} \times 4.8872\text{L} = .166\text{L bar K}^{-1} T$$

$$T = \frac{11.072 \text{ bar} \times 4.8872\text{L}}{.166\text{L bar K}^{-1}} = \frac{54.111}{.166} \text{K} = 326\text{K}$$

2. One mole of SO<sub>2</sub> gas occupies a volume of 350ml at 27°C and 50 atmosphere pressure. Calculate the compressibility factor of the gas. Comment on the type of deviation shown by the gas from ideal behavior.

**Solution:** compressibility factor,  $Z = \frac{PV}{nRT}$  substituting, n= 1 mol, P=50 atmosphere, V = 350×10<sup>-3</sup>L= 0.35L, R = 0.0821L atmosphere K<sup>-1</sup>mol<sup>-1</sup>, T = 27+273 = 300K, we get, Z =

$$\frac{50 \text{ atmosp here} \times 0.35L}{1 \text{ mol} \times 0.0821 \text{ Latmosp here } K^{-1} \text{ mol}^{-1} \times 300K} = \frac{50 \times 0.35}{.0821 \times 300} = 0.711$$

for ideal gas,  $Z=1$ , as for the given gas,

$Z < 1$ , it shows negative deviation, i.e. it is more compressible than expected from ideal behavior.

### ASSIGNMENT

- Real gases approach ideal behavior at:
  - Low pressure and low temperature
  - Low pressure and high temperature
  - High pressure and low temperature
  - High pressure and high temperature.
- The van der Waals equation accounts for:
  - The intermolecular forces only
  - The actual volume of the molecules only
  - Both the inter molecular forces and the molecular volume
  - Neither the intermolecular forces nor the molecular volume.
- The compressibility factor for an ideal gas is:
  - Unity at all temperature
  - Unity at Boyle's temperature
  - Zero
  - Decreases with pressure.
- The value of van der Waals constant 'a' for  $N_2$  and  $NH_3$  are 1.39 and 4.17  $\text{atm.L}^2\text{mol}^{-2}$  respectively. If these two gases have the same value of constant 'b' then under similar conditions:
  - the pressure exerted by  $N_2$  gas is more than that of  $NH_3$
  - the pressure exerted by  $N_2$  gas is less than that of  $NH_3$
  - both exert equal pressure
  - none of these.
- The compressibility of a gas is less than unity at S.T.P. Therefore,
  - $V_m > 22.4$  litres
  - $V_m < 22.4$  litres
  - $V_m = 22.4$  litres
  - $V_m > 44.8$  L.
- Positive deviation from ideal gas behavior takes places because of
  - molecular interaction between atoms and  $\frac{PV}{nRT} > 1$
  - molecular interaction between atoms and  $\frac{PV}{nRT} < 1$
  - finite size of the atoms and  $\frac{PV}{nRT} > 1$
  - finite size of atoms and  $\frac{PV}{nRT} < 1$ .
- In van der Waals equation of state of the gas law, the constant 'b' is a measure of:
  - volume occupied by the molecules
  - intermolecular attractions
  - intermolecular repulsions
  - intermolecular collision per unit volume.
- A gas is deviated from ideal behavior at a high pressure because its molecules:
  - have kinetic energy
  - are bound by covalent bonds
  - attract one another
  - show the Tyndall effect.
- A van der Waals gas may behave ideally when --
  - the volume is very low
  - the temperature is very low
  - the pressure is very low
  - the temperature, pressure and volume all are very high.
- At extremely low pressure the van der Waals equation of one mole may be written as:
  - $PV = RT + Pb$
  - $(P+a)(V-b) = RT$
  - $PV = RT - a/V$
  - $PV = RT$ .
- Maximum deviation from ideal gas is expected from
  - $CH_4$
  - $NH_3$
  - $H_2$
  - $N_2$
- The van der Waals equation explains the behavior of:
  - ideal gases
  - real gases

(c) vapours (d) non-real gases.

$$(d) \left(P + \frac{an^2}{V^2}\right)(V-b) = \Delta nRT.$$

13. The correct expression for the van der Waals equation of states is –

(a)  $\left(P + \frac{an^2}{V^2}\right)(V-nb) = nRT$

(b)  $\left(P + \frac{an^2}{V^2}\right)(V-nb) = \Delta nRT$

(c)  $\left(P + \frac{an^2}{V^2}\right)(V-b) = nRT$

14. The term that accounts for intermolecular forces in van der Waals equation for non-ideal gas is

(a) RT (b) V-b (c) a/V<sup>2</sup> (d) (RT)<sub>1</sub>

### ANSWERS

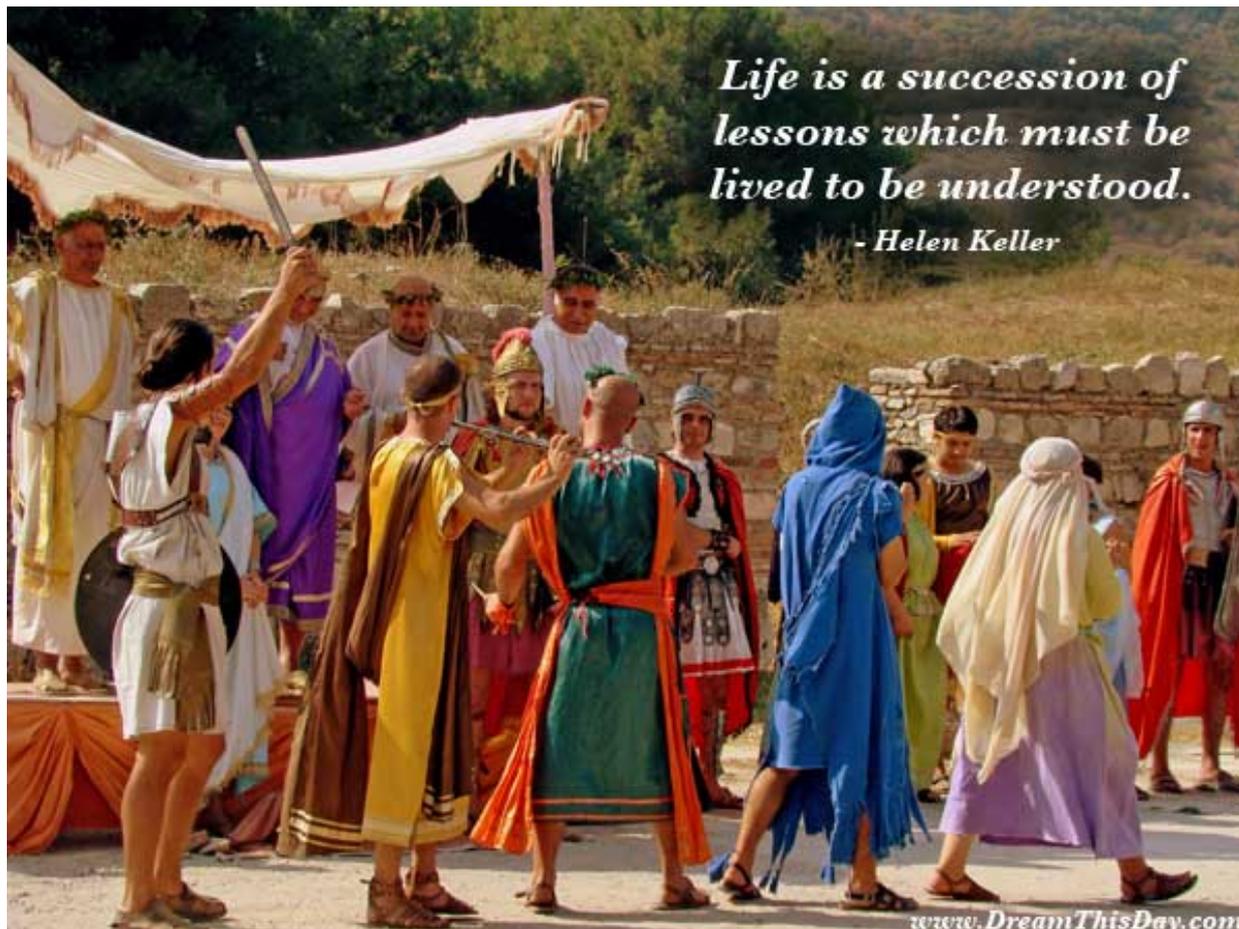
8.(c)	9.(c)	10.(c)	11.(b)	12.(b)	13.(d)	14.(c)
1.(b)	2.(c)	3.(a)	4.(a)	5.(b)	6.(a)	7.(a)



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

e-Mail ID: [kumud.bala@yahoo.com](mailto:kumud.bala@yahoo.com)

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## SCIENCE QUIZ February-2019

**Kumud Bala**

1. Yeast respire anaerobically using sugar as a substrate out of the options given below; (choose the correct combination of condition and product).

	Condition	Product
a	Aerobic	Alcohol
b	Aerobic	Lactic acid
c	Anaerobic	Alcohol
d	Anaerobic	Lactic acid

2. The table shows the percentage composition of four samples of air. Which sample could have been breathed out by a person after vigorous exercise?

Sample	Oxygen	Carbon dioxide	Water Vapors
a	16	0.3	Saturated
b	16	4	Saturated
c	21	0.03	Trace
d	21	3	Trace

3. Which changes occur when a person breathe in deeply?

	Diaphragm Muscle	External Intercostals Muscles
a	Contracts	Contract
b	Contracts	No change
c	Relaxes	Contract
d	Relaxes	Relax

4. The table given below shows the percentage composition of a gas in inspired and in expired air

% composition		
Inspired air	21.0%	
Expired air	16.0%	

What is the gas?

- (a) Carbon dioxide (b) Nitrogen  
(c) Oxygen (d) Water vapour

5. Three directions in which nerve impulse can travel in the nervous system are listed below:

- (i) away from the central nervous system  
(ii) towards the central nervous system

- (iii) within the central nervous system. In which directions do impulses in sensory and relay (intermediate) neurons travel?

	Sensory Neuron	Relay Neuron
a	(i)	(ii)
b	(i)	(iii)
c	(ii)	(i)
d	(ii)	(iii)

6. In a nerve pathway, the following events take place in a coordinated order: (i) Activation of muscle (ii) Activation of receptor (iii) passage of impulses along a motor neuron (iv) Passage of impulses along a sensory neuron. Read the events given and identify the correct of these events from the table given below:

First	→	Last
(a)	(ii), (iii)	(iv), (i)
(b)	(ii), (iv)	(iii), (i)
(c)	(iv), (i)	(iii), (ii)
(d)	(iv), (ii)	(i), (iii)

7. The ability of a cell to divide into several cells during reproduction in Plasmodium is called-
- (a) Budding (b) Reduction division  
(c) Binary fission (d) Multiple fission

8. Characters that are transmitted from parents to offspring during reproduction show:
- (a) Only similarities with parents  
(b) Only variations with parents  
(c) Both similarities and variations with parents  
(d) Neither similarities nor variations

9. A feature of reproduction that is common to amoeba, spirogyra and yeast is that--

- (a) They reproduce asexually  
(b) They are all unicellular  
(c) They reproduce only sexually  
(d) They are all multicellular

10. Which among the following statements are true for unisexual flowers?

- (i) They possess both stamen and pistil  
(ii) They possess either stamen or pistil  
(iii) They exhibit cross-pollination

- (iv) Unisexual flowers possessing only stamens cannot produce fruits.
- (a) (i) and (iv)      (b) (ii), (iii) and (iv)  
(c) (iii) and (iv)      (d) (i),(iii) and (iv)
11. Which among the following statement are true for sexual reproduction in flowering plants?
- (i) It requires two types of gametes  
(ii) Fertilization is a compulsory event  
(iii) It always results in formation of zygote  
(iv) Offspring formed are clones.
- (a) (i) and (iv)      (b) (i) and (ii)  
(c) (i), (ii) and (iii)      (d) (i), (ii) and (iv)
12. Factors responsible for the rapid spread of bread mould on slices of bread are: (i) large number of spores (ii) availability of moisture and nutrients in bread (iii) presence of tubular branched hyphae (iv) formation of round shaped sporangia.
- (a) (i) and (iii)      (b) (ii) and (iv)  
(c) (i) and (ii)      (d) (iii) and (iv)
13. The correct sequence of reproduction stages seen in flowering plant is-
- (a) gametes, zygote; embryo, seedling  
(b) zygote, gametes, embryo, seedling  
(c) seedling, embryo, zygote, gametes  
(d) gametes, embryo, zygote, seedling.
14. Offspring formed by asexual method of reproduction have greater similarity among themselves because:
- (i) Asexual reproduction involves only one parent  
(ii) Asexual reproduction does not involve gametes  
(iii) Asexual reproduction occurs before sexual reproduction  
(v) Asexual reproduction occurs after sexual reproduction.
- (a) (i) and (ii)      (b) (i) and (iii)  
(c) (ii) and (iv)      (d) (iii) and (iv)
15. Two flowers are identified by a botanist with the following features that flower A is having only stamen and flower B is having both stamen and pistil. Which of the following statements is correct?
- (a) Flower A will bear seeds and flower B cannot bear seeds after fertilization.  
(b) Flower A will produce pollen grains and flower B cannot produce pollen grains.  
(c) Flower A cannot be fertilized and flower B can show fertilization.  
(d) Neither flower A and nor flower B can show self-pollination.
16. Due to several human activities water bodies are polluted resulting in decreased availability of usable water. Maya was testing the samples of polluted water in lab. The presence of which factor will confirm to her that the water sample is polluted. Select the correct option:
- (a) The presence of coli form bacteria  
(b) High Biochemical Oxygen Demand (BOD)  
(c) Both (a) and (c)  
(d) Either (a) or (b).
17. The construction of large dams has faced a lot of oppositions like the Sardar Sarovar Project on river Narmada lead to 'Narmada Bachao Andolan'. Raj has to identify the correct problem. Choose the correct option.
- (a) Large areas of agricultural land and human habitation submerged.  
(b) Destruction of large ecosystem and loss of biological diversity.  
(c) Displacement of large number of local population without adequate rehabilitation.  
(d) All of the above.
18. Ganga has been considered as a symbol of purity but it is grossly polluted by waste dumped in it. Government has been making plans to revive this basin. Which steps should according to you incorporated in the plan to prevent any further polluting of this river? Choose the correct option.
- (a) Renovation of sewage pumps and treatment plants.  
(b) Extension of sewerage in unsewered areas to bring waste from those areas to treatment plant.

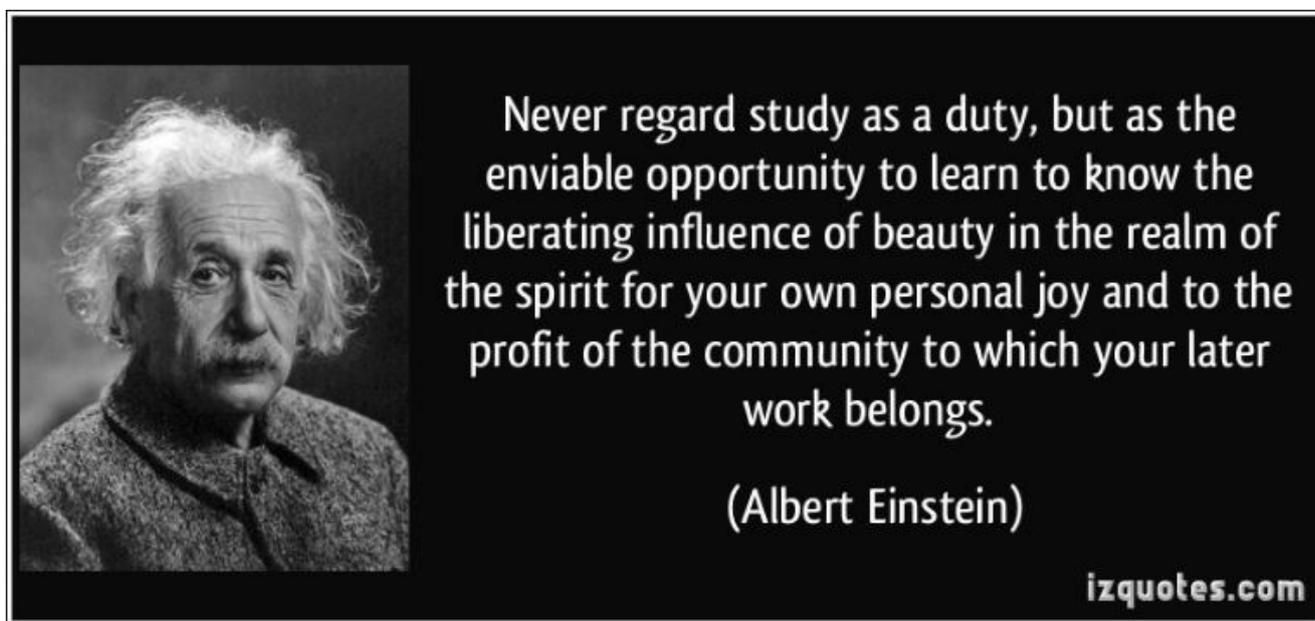
- (c) Installation of new treatment plants.  
(d) All of the above.
19. Madhur was reading about rain water harvesting and its benefits. He came to learn about different types of structures that are built in different states to conserve rain water. Select the correct option which represents such structures.
- (a) Bhundhis                      (b) Khadins  
(c) Both (a) and (b)          (d) Compost pit.
20. A student reading an article on sustainable development came across some statement

which confused him. Those statements are being given below. Choose the incorrect statement from them by selecting an option.

- (a) Economic development is linked to environmental conservation  
(b) Sustainable development encourage development for current generations and conservation of resources for future generations.  
(c) Sustainable development does not consider the view points of stakeholders.  
(d) Sustainable development is a long planned and persistent development

***(Answers to this Science Quiz January'19 shall be provided in Monthly e-Bulletin dt. 1<sup>st</sup> March'19)***

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***What is easy and what is difficult?***

***It is easy to hate and it is difficult to love.***

***This is how the whole scheme of things work.***

***All good things are difficult to achieve; and bad things are easy to get.***

***- Confucius***

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## OUR MENTORING PHILOSOPHY

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

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

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

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

***Mathematics is the language of natural consequence.***

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

***-Swami Vivekananda***

## Theme Song :

**PREMISE:** *We are pleased to adopt a song " इतनी शक्ति हमें देना दाता....." from a old Hindi Movie Do Aankhen Barah Haath दो आँखें बारह हाथ of year 1957, directed by The Late V. Shantaram. The lyrics are by Shri Bharat Vyas, singer Melody Queen Sushri Lata Mangeshkar, and Music Direction by Vasant Desai. It has become a widely accepted inspirational song and/or prayer in many educational institutions and socially inspired initiatives engaged in mentoring of unprivileged children. This newly formed non-organizational initiative, being selflessly operated by a small set of compassionate persons, finds its philosophy in tune with the song and conveys its gratitude to all the 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 ...*