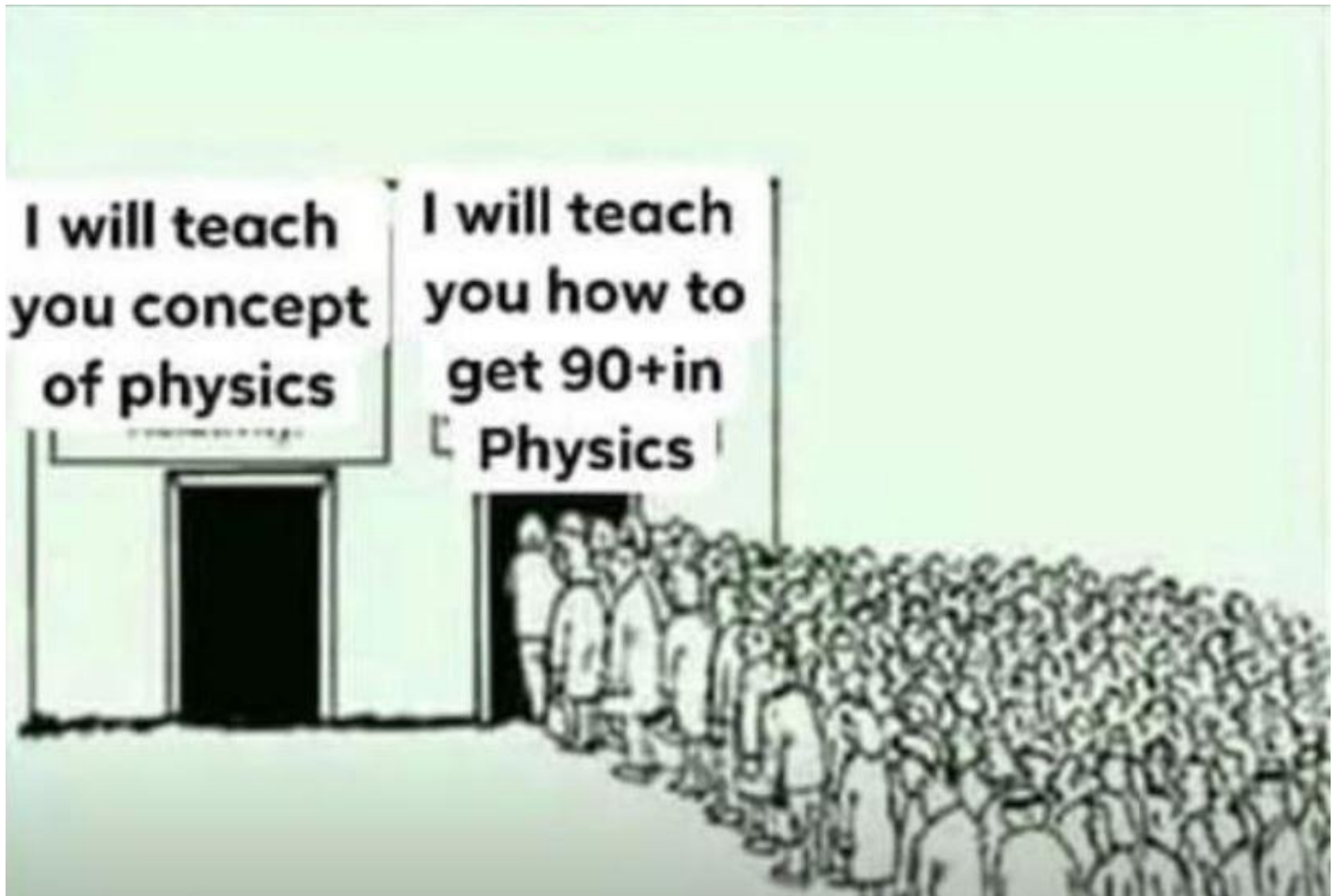


# GYAN VIGYAN SARITA:शिक्षा

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

8<sup>th</sup> Monthly e-Bulletin dt 1<sup>st</sup> June'19, Fourth Year of the Publication



Irony  
Of  
Excellence  
In  
Education.....!!!

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## Aim at the Best, but...



**Conceptual Representation  
of  
Online Mentoring**  
An Initiative To Bridge Gap between  
**Passionate Teachers**  
and  
**Desperate Students**  
**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 Centers in Interactive Online Mentoring Sessions (IOMS)**

Learning Center (if asked for by Mentor)		Mentoring Center (if asked for by Mentor)	
Estimated Capital Cost (One Time)			
Particulars	Cost (in Rs)	Particulars	Cost (in Rs)
Desktop (without monitor)	20,000	Laptop	25,000
Projector	15,000	Projector	-
Web camera	10,000	Web camera	-
Mixer cum amplifier with Speaker and Wireless microphones	15,000	Headset with Microphone	3,000
Wireless Surface Writing device	15,000	Wireless Surface Writing device	15,000
Total	75,000		43,000
Estimated Recurring Cost			
Internet charges, based on estimated monthly data transfer which depends upon choice of cloud platform, and tariffs of ISP		Internet charges, based on estimated monthly data transfer which depends upon choice of cloud platform, and tariffs of ISP	
Cloud platform : a. 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.  b. The IOMS envisages session upto Five Learning Centers. Charges for the platform whenever payable may be shared across in mutual agreement between Learning Centers.  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.		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 Centers for collectively complementing the cost of Cloud Platform, whenever payable, for arriving at a mutual agreement for cost sharing.  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 centers, beneficiaries of the initiative, is gratefully welcomed on ZFZA basis.  Operating cost of Mentor, if required, shall be supported by Learning Centers	

**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 centers and mentoring centers.

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 center.

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

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

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

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

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

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

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

**संपादकीय****अच्छा आचरण देश के विकास के लिये जरूरी होता है**

विविधताओं से भरे भारतवर्ष में विगत माह में आमचुनाव हुये। देश चलाने के लिये, जनता को मार्गदर्शन देने के लिये और प्रधानमंत्री बनने के लिये नेताओं में होड़ दिखी। इस होड़ में भाग लेने वाले कुछ राजनेताओं, अभिनेताओं और देश-विदेश से पढ़े बुद्धिजीवियों ने खूब भाषण दिया। हर एक के भाषण का एक ही मकसद था - जितना हो सके देश और समाज को धर्म व जाति के नाम पर बांटो। इनके भाषणों में विद्वेष और घृणा भरी रही।

जब भी इन नेताओं ने बोलने के लिये अपना मुंह खोला, उन्होंने जनता में नफरत का बीज बोया। समझ में नहीं आया कि इन नेताओं के ऊपर उनके राजनीतिक दल अथवा उसके मुखिया का नियंत्रण क्यों नहीं है? 'बसुधैव कुटुंबकम्' के देश में एक दूसरे को धमकी देने और झूठ बोलने के अलावा इन लोगों का कोई दूसरा उद्देश्य क्यों नहीं रहा? जब देश ही टुकड़ों टुकड़ों में बिखर जायेगा तो फिर सबको साथ लेकर कैसे चलेंगे और सबका विकास कैसे करेंगे?

इन चर्चाओं के बाद, एक शंका उभरी कि क्या हमारे कुछ राजनेता किसी के आदर्श नहीं हो सकते हैं? क्या इनके जीवन में मर्यादा जैसी कोई चीज नहीं है? क्या इन्होंने इतिहास से कुछ पढ़ा अथवा सीखा नहीं है? क्या जिन्होंने विदेशों से पढ़ाई की है, उनकी शिक्षा देश की संस्कृति और सभ्यता के अनुरूप नहीं है? क्या जिन्होंने देश में पढ़ाई की है, उन्हें जीवन के लिये उपयोगी चीजें याद नहीं हैं? क्या इनके पास आमजनता को देने के लिये, उसे सिखाने के लिये अथवा उसके मार्गदर्शन करने के लिये कुछ नहीं है? क्या इनके घरों में अच्छी बातें सिखाने वाली पुस्तकों का अभाव है?

एक बात और इनके भाषणों से उभर कर आयी कि इन नेताओं के व्यक्तिगत जीवन से कुछ भी नहीं सीखा जा सकता है क्योंकि इनका सार्वजनिक जीवन बहुत अच्छा नहीं है।

सच तो यह है कि जिसकी भाषा गंदी होती है, उसकी सोच गंदी होती है और जब इंसान की सोच अच्छी नहीं होती है, तब उसके कार्य अच्छे नहीं होते हैं। भाषा व्यक्तित्व का दर्पण होती है।

शिष्ट आचरण का मतलब होता है विनम्र एवं शालीन व्यवहार। विनम्र रहने का आसान तरीका है कि हम हमेशा याद रखें कि कैसे हमने विद्यार्थी रहते हुये अपने शिक्षकों से व्यवहार किया, अपने माता-पिता व घर के अन्य सदस्यों से व्यवहार किया, मित्रों से व्यवहार किया, अपने आस-पड़ोस से व्यवहार किया, किसी उत्सव, समारोह, अथवा भोज में लोगों से मिलते समय व्यवहार किया, अथवा मेजबान और मेहमान बनते हुये व्यवहार किया।

शिष्टाचार अभ्यास से आता है। हमें गाड़ी में बैठते समय पहले अपने से बड़ों को बैठने देना, बड़ों के आने पर खड़ा हो जाना, बड़ों के सामने उनसे ऊँचे स्थान पर नहीं बैठना, और जब कोई आदरणीय व्यक्ति अपने यहां आये, तब कुछ कदम आगे बढ़कर उसका स्वागत करना चाहिये।

हमें नहीं भूलना चाहिये कि ईश्वर ने सबको सब चीजें नहीं दी हैं। अगर कोई व्यक्ति शरीर के किसी अंग से ठीक नहीं है तो उसका उपहास नहीं करना चाहिये।

अमेरिकी लेखक स्वेट मार्टन का विचार है कि हर उस इंसान ने जिसने बड़ी चीजें हासिल की, उसने जीवन को सामाजिक दृष्टि से और शालीनता से देखा था।

शिष्टाचार वर्तमान समय में soft skill है। इससे हमें प्रज्ञा कौशल, सामाजिक कौशल, संप्रेषण कौशल, आचरण कौशल, नजरिया कौशल, जीवनवृत्ति कौशल, सामाजिक बुद्धिमानी कौशल और भावनात्मक कौशल सीखने और सिखाने में मदद मिलती है। जीवन में आगे बढ़ने के लिये hard skill जहां 20 प्रतिशत प्रभावी होती है, वहीं soft skill 80 प्रतिशत महत्व रखती है। hard skill स्कूली शिक्षा तक ही सीमित है।

मनोवैज्ञानिक निकोलस का कहना है कि यह सामाजिक बुद्धिमानी (Social Intelligence) है जो मनुष्य को परिभाषित करती है। शिष्टाचार से हम औरों से अच्छा बनकर दूसरों के दिल में अपनी पहचान बनाते हैं। शिष्टाचार से हम अपनी जिंदगी में बहुत ऊंचाइयों तक जा सकते हैं।

एक व्यक्ति 100 प्रतिशत मेहनत करे और अपना व्यवहार फीका रखे तो वह उस व्यक्ति की तुलना में कम आंका जायेगा जिसका काम भले ही कम हो पर जिससे सभी खुश रहते हैं।

कार्यकारी समाज में व्यवहारकुशलता की आवश्यकता तकनीकी कुशलता से ज्यादा होती है। निजी जिंदगी हो या सामाजिक जिंदगी हर जगह व्यवहार कुशलता की चाभी से कोई भी ताला खुल जाता है। कुशल व्यक्ति वह होता है जो जानकारी न होने पर सामने वाले से सीखने की कोशिश करता है। बोलकर बिगाड़ने से अच्छा है-चुप रहकर बेवकूफ समझा जाना। एक बुद्धिमान प्रश्नकर्ता एक बेवकूफ वक्ता से अच्छा होता है।

अच्छा व्यक्तित्व धैर्य और विवेक का प्रयोग कर अपने सवालियों के सही जवाब ढूंढता है। वह अपने को एक Acknowledgable person के रूप में पेश करने की कोशिश करता है, न कि एक Knowledgeable person के रूप में।

जीवन में आईक्यू (IQ) से हमेशा काम नहीं आता है बल्कि ईक्यू (EQ) ज्यादा प्रभावी होता है क्योंकि ईक्यू दिल से जुड़ा रहता है और आईक्यू दिमाग से।

शिष्टाचार सिखाता है कि दिखावे की जिंदगी से दूर रहो, दिखावे की जिंदगी बहुत लंबी नहीं है। शिष्टाचार बचपन से सीखने और सिखाने वाली चीज है। जब हम अशिष्ट होते हैं तब हम जल्द ही दूसरों से घृणा करने लगते हैं, धीरे धीरे हम खुद तिरस्कृत होने लगते हैं और अंत में हमारी उन्नति के दरवाजे बंद हो जाते हैं।

सामान्य शिष्टाचार का नियम है कि जब हमें कोई बुलाये तो हमें सदैव 'जी हां' अथवा 'जी नहीं' से ही जबाब देना चाहिये। रेलगाड़ी, बस अथवा मेट्रो में अपने से अधिक उम्र के व्यक्ति को, बच्चों को अथवा महिला को सीट देना, अंधों को सड़क पार कराना, दूसरों की बातों में दखल न देना, रोगी को अस्पताल ले जाना, और दुःखी व्यक्ति को सांत्वना देना, अच्छे आचरण के आवश्यक हिस्से हैं।

नियम का पालन करना शिष्ट होना है। पुस्तकालय में जाकर जोर से बोलना अशिष्टता है क्योंकि वहां शांत रहना एक सर्वमान्य नियम है।

अच्छा आचरण करने वाला व्यक्ति अच्छी भाषा का प्रयोग करता है, मीठी वाणी बोलता है, समाज के हर व्यक्ति के लिये काम करता है, मौलिक रहता है और साहसी होता है क्योंकि उसमें कुछ भी छिपाने के लिये नहीं होता है। यह वह व्यक्ति होता है जो जानता है कि अगर नये महासागर की खोज करने निकलना है तो समुद्र के किनारे को खोने का साहस रखना ही होगा।

ज्ञानविज्ञानसरिता परिवार की सोच है कि भारतवर्ष के हर नागरिक में, चाहे वह आम व्यक्ति हो अथवा एक राजनेता, सामान्य शिष्टाचार का भाव जगेगा जिसका उपयोग देश के विकास में होगा। देर से ही सही, पर कबीरदास के इस दोहे का मर्म एक दिन अवश्य समझ में आयेगा:

शब्द बड़ा बलवान है, शब्द समान न कोय।

सब शब्दहि से होत है, शब्दहि में सब होय॥

अर्थात् शब्द बहुत शक्तिशाली होता है। इसके समान कुछ भी नहीं है। संसार में सब कुछ शब्द से ही है और सारी दुनिया शब्दों में ही स्थित है।

—00—

## INVITATION FOR CONTRIBUTION OF ARTICLES

*Your contribution in the form of an article, story poem or a narration of real life experience is of immense value to our students, the target audience, and elite readers of this Quarterly monthly e-Bulletin Gyan-Vigyan Sarita: 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 to have your association in taking forward path our plans as under-*

- *With the release of 1st Monthly e-Bulletin in its consecutive Fourth Year, we are gearing up for next Monthly e-Bulletin Gyan-Vigyan Sarita: शिक्षा due on 1<sup>st</sup> of ensuing month.*
- *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 selfless educational initiative to groom competence to compete among deprived children.*

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

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

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## Coordinator's View

### स्वान्तः सुखाय - परमार्थ में स्वार्थ

*Every language has its own genesis and therefore it always contains some words whose perfect synonym in other language is missing. So is the case with this title which has made it inevitable for this article. Efforts have been made to substantiate the understanding of the title with first hand realization on the mission of [Gyan Vigyan Sarita](#) which is aimed at mentoring unprivileged children so as to groom in them competence to compete, It is being pursued with a sense of [Personal Social Responsibility \(PSR\)](#). Accordingly key words in Hindi, having origin in Sanskrit, have been used as such all through and elaborated at their first use.*

स्वार्थ is that trait which directly or indirectly is for fulfills self-objective. Thus actions for स्वार्थ are driven whenever there is a motivation. परमार्थ is the trait which drives benevolence for those who are otherwise disconnected. Actions in परमार्थ are driven with inspiration arising out of realization of problems of those who have nothing to reciprocate in return. Thus 'परमार्थ में स्वार्थ' and 'स्वार्थ में परमार्थ' though generally used as synonyms are in real sense antonyms. Difference between [Inspiration vis-a-vis Motivation](#) behind the two traits has been separately analyzed, and is underlying concept behind the conflicting traits analyzed in the article.

'स्वान्तः सुखाय' is spiritual in essence and has bearing on 'वसुधैव कुटुम्बकम्'. Literal meaning of स्वान्तः सुखाय in English is that which gives self-pleasure. It is a aspiration of those whose needs have been fulfilled and can afford to relish it. Whereas, for persons who are struggling for survival it is an illusion. Thus स्वान्तः सुखाय if practiced in its English sense it reduces to mere स्वार्थ में परमार्थ; it is a severe aberration. It is like placing cart before the horse where primary objective is स्वार्थ and in the process if at all any परमार्थ occurs it is incidental and not intentional. On the contrary in परमार्थ में स्वार्थ primary objective is sustainable welfare of others with coexistence and, therefore, self-fulfillment is just incidental.

Indulgence in परमार्थ में स्वार्थ in the spirit of स्वान्तः - सुखाय requires a person to get elevated from the level of competence and accomplishments in life onto a plane of spirituality, self-actualization, wisdom and last but not the least humility and humanity. Its essence is in sensible sensitivity, where adjective 'sensible' places pain and suffering of self at the center of the sphere of realization encompassing suffering of others. It leads to a situation where self becomes insignificant. Such acts in real sense are aimed at परमार्थ में स्वार्थ. Going forward, स्वान्तः - सुखाय is a natural consequence of परमार्थ में स्वार्थ. Elite persons who are capable of making a difference are expected to take a first step in this direction. It would be a bitter mockery to expect deprived and unprivileged persons to engage in acts of benevolence. Here, it is pertinent to appreciate that for a sphere to exist and grow a center is a must. Therefore, to be able to do परमार्थ में स्वार्थ, if it has to sustain, it should be preceded by a thorough introspection. It's pursuit cannot be abrupt, rather should never be so.

If स्वान्तः - सुखाय and परमार्थ में स्वार्थ are so synonym and naturally interlinked then the obvious question is - where lies the conflict in realizing wellbeing of all? The answer is

very simple; human being is the most intelligent animal. This intelligence prompts him to grab more and more and accumulate it for the future, knowing well that future is most uncertain. Reciprocation to the society and the nature out of what one has received, for the larger good, requires wisdom. It is an ability which demands personal efforts for mitigating sufferings of others. Accordingly, there are different perceptions of स्वान्तः - सुखाय across different people depending upon their degree of wisdom and logic of convenience.

Right from childhood until age of 58 years, I remained a familed man and married to my profession. It was only during Ph.D., undertaken after superannuation, realization of the other dimension of life occurred. It was in addition to academic pursuit. This realization became an urge to take a plunge in 2012 into mentoring unprivileged children. Objective was to groom competence to compete among them with a sense of PSR in a non-remunerative, non-commercial and non-political manner for the larger good. Since then, it is a journey of seven years during which every possible door was knocked right from poor families and schools catering their children to avail the benefit of the initiative. It was also taken to accomplished persons, proponents of social cause, academician, educationists, institutes, professional, administrators, NGOs, corporate and government organizations and many others yet to name. Frantic efforts were made all around in search of an opportunity to plant a new seed and see it growing on its own. Still we are not sure as to when someone would uproot the sapling of seeds grown earlier. The basic reason behind this is that each of them are operating in their respective comfort zone, and not prepared to venture out in search of better opportunities in discharge of their role and responsibilities for the larger good.

At this juncture a deep introspection has led to explore answers to some of the salient questions that have been bothering us, and are as under –

- Does the omniscient, omnipotent and omnipresent GOD exist? If yes! Then be it of any form or name, why is HE a silent spectator? If no! Then we take it as a feedback for relentless continuance of तपस्या, until it is pacifies HIM and we receive showers of his blessings in the form of a clear forward path which is commensurate to our capacity for larger good deprived ones, HIS creations.*
- Is the model of [Interactive Online Mentoring Session \(IOMS\)](#) evolved in this pursuit is irrelevant in the*



*prevalent scenario?* Qualitatively we are yet to encounter any objection to the model from anyone, whomsoever, among those with whom we have interacted. Effectiveness of IOMS as a pragmatic proposition with optimum resources has been demonstrated wherever it was taken. Yet, deficiency in stabilization of IOMS, if any, was due to infrastructural inadequacy. This model is since ICT based for which infrastructure is now-a-days readily available. It is just a matter of placing request and there are persons and companies to fulfill it at competitive prices. Communication network going fiber optical, it is merely a matter of persuasion with Internet Service Providers (ISP). They are already competing with each other to widen their customer base. In such a scenario they would be pleased to welcome any service requests. Since, the financial model of IOMS is a Zero-Fund-&Zero-Asset (ZFZA) it is for the beneficiary institution to become proactive to avail benefits of the voluntary and free IOMS initiative at their door-step.

- (c) *Has anyone observed any kind of non-transparency in aims, objectives, vision, methodology and operation of this initiative? If yes! Is there anyone whose feedback has remained un-responded?* We are committed to translate our philosophy in action. Moreover, the model is open to all to know, add value or take away. In our every communication we gratefully welcome feedback for value addition, and donot have any feedback which is unresponded.
- (d) *Has anyone ever noticed any hidden agenda or personal or professional gain in the pursuit?* The very statement of PSR, operational philosophy and [ZFZA](#) model and its reiteration at every possible occasion is to provide a ready reference to persons interacting with us. Should they find any deviation in our actions or intentions anywhere, they are free to hold us culpable.
- (e) *Are teachers and infrastructure at schools catering to students coming from common and unprivileged families? If this be true why are there so many hue and cries for shortage of teachers, inadequate proficiency in language and numerical skills?* We have experienced deficiencies. But instead of harping and criticizing the players in the system we have come up with this PSR based [IOMS model](#). It is to collectively complement efforts with the teachers, in place, for the benefit of those students who are nowhere at fault for the prevalent scenario.
- (f) *Can any incumbent in public office responsible for educational domain insulate himself from such selfless educational initiative coming to them at their door step?* It is mandatory for every person in public office to grant audience to any voluntary initiative to collectively complement in role and responsibilities of the state. This will help to explore honesty of purpose, its merits and decide as to how best it can be dovetailed in the programmes of government or organization for the larger

good. If such a response is not meted it is betrayal of the trust bestowed upon the incumbent by the state.

It is important to appreciate that state can reform the systems only through proactive involvement of persons holding public office. It needs to be driven with passion, dedication and honesty, of all players and not with mere orders. Proactive involvement with commitment, within one's own capacity, is necessary for the larger good. There is nothing absolute in this journey. It is the best of the synergy of all players which will evolve automatically as the journey progresses.

- (g) *Does a passionately driven selfless pursuit, that too in education, deserve either neglect or a demand of immediate results?* A system which has got subjected to gradual decline in past cannot be remedied surgically. Moreover, educational reform is a long drawn process and needs support of statesman who care for next generation. In this pursuit politicians have a little role; their focus is to remain in position; their priority is pacification of their constituency. If one cannot support such initiatives then subjecting it to neglect is a sort of disrespect, irrespective of motive. It is a blatant abuse of position or power bestowed upon the incumbent.
- (h) *Is it appropriate for anyone to defend inabilities in enablement of such selfless initiative using emotional shield as a wish of God or any other reason?* Despite being an atheist I give credit for every small progress in the initiative to the [mercy of GOD](#). But, it would be sheer hypocrisy to shield inabilities on spiritual or personal account. This conviction is based on the fact that no spiritual power, regarded as Supreme Father or Mother can be against any selfless initiative undertaken for the larger good, specially innocents and deprived ones. It is pertinent to state that any defense of inactions or ill-actions breeds incompetence and must be outrightly rejected.
- (i) *Is it correct for anyone to defend inactions due to increase in work pressures?* Having witnessed socio-economic-technological changes and survived with perpetual growth for about seven decades, it is vouched that each age has its own challenges and will remain there forever. Let us take a premise that present age of information poses tougher challenges as correct! But, it is equally true that better access to communication and information systems is a potential tool for demonstrating higher efficiency. As against this, in earlier times major part of time and efforts were consumed in collating relevant information and evaluating it before taking decisions to be followed in action. Thus in present times decision making and monitoring has become easier, swifter and smarter than ever before, and therefore it has become more demanding. Yet in every time there were persons who stood out. They could do it not because they were supenhuman. They did it because they were inspired, had a strong self-conviction and passionately committed to the cause.



(j) *Am I too blunt and ill-tolerant? Why do I mean to be candid in case of disagreement on the mission?* A close examination of this journey in person and social life would help anyone to reason out our straight forward expressions. If a person is passionate and honest about his commitment in a selfless initiative he would not only appreciate rather welcome candid expression of concerns, experiences and expectations. If it is not, then slightest disagreement or submission in pursuance of the selfless cause is seen to be taken an offensive posture/gesture, and responded accordingly. There is nothing to gain or lose in person in the initiative which is being operated insignificant resources to cater to mammoth requirement. It is, therefore, not expected to keep on bearing dilly-dallying and indecision, indefinitely. A straight answer, be it NO would help us to decide upon worth of spending more time in pursuance with the incumbent on the initiative.

(k) *Is it appropriate to connect परमार्थ में स्वार्थ with the educational initiative?* The initiative is founded on the sense of PSR which has its roots in the spirit of वसुधैव कुटुम्बकम् that has culminated into परमार्थ में स्वार्थ theme of as PSR. This spirit has to sustain and perpetuate for the larger good and stable growth of humanity. Making education a tool for self-accomplishment will defeat the basic objective of education. Real education starts from home with human sensitivity to persons doing smallest work by inculcating dignity of labour such as rinsing of dinner plate before leaving for cleaning by maid, leaving toilet clean after use, leaving work place better than what one got.... These small things go a long way to build personality of a child which is perpetuated in finer professional qualities through formal education. Personality is intrinsic to the personal quality that distinguishes a person from others in respect of human and professional values.

Like this there are large number of instances which can be put forth as case studies with facts and commentaries. Summarily, all these experiences reveal that lack of sense of PSR or परमार्थ में स्वार्थ, specially towards an educational initiative, is not a problem of an individual. It is a systemic problem where mostly individuals are in rat-race for immediate-material gains. In this pursuit the level of realization of damage being accrued to the human civilization will be left behind as a legacy to our beloved descendents; it is irrevocable. In this scenario citing specific instances would tantamount to publicly admonishing an individual, while others may be at a difference of degree. It is, therefore, requested that this is not taken either for cursory or pleasure time reading or a stuff to criticize either the incumbency or the predecessors. Lest this happen it would meet the fate of [Someone, Anyone, Everyone and None](#).

Here it considered to be contextual to recall a devotional song in Marathi composed by unknown poet "परमार्थस्तिव संसाराचा डाव ही मोडू नको, मना रे प्रपंच सोडू नको...". The complete

song seems to be emphasizing upon the need of परमार्थ में स्वार्थ. Let us, without wasting time, explore first opportunity to collectively complement for परमार्थ में स्वार्थ, whichever way we think to be the best. But, those who are in disagreement with the proposition there are a few submissions -(i) this endeavour shall continue in an unabated manner until last breadth, kindly bear with it, (ii) sharing of concern with is to enlighten others with the need of PSR, should they not be fan innocencet, (iii) each one is requested to introspect one's own actions, priorities with sensible sensitivity, (iv) one is never too late to take first step in right direction so as to annul the damage done in past, (v) once need of the moving in the directions is realized do not delay it, lest it might create a unbearable repentance, and (vi) be honest to accept inadvertent subjectivity, inaction or ill-actions. Finally, we will leave behind a satisfaction and legacy to the extent of our objective assessment and reciprocation of sensible-sensitivity that is परमार्थ. It would serve as a road map for our beloved descendant to grow in harmony and coexist with the surrounding in accomplishment of ultimate स्वार्थ and स्वान्तः – सुखाय. It assumes importance because [life is too precious](#).

This article might be viewed by some as an aggressive posturing. It is neither an emotional burst nor passionate extremism. It is a considered treatise in furtherance of selfless conviction for the larger good, without taking cognizance of counter arguments or actions, but within the framework of the law-of-land. The answers to the questions have been shared after giving reasonable opportunity to every person to correct wrongs that may have been committed either knowingly or unknowingly. Only those experiences have been cited where correction did not come up. Wherever interaction was terminated it was based on incorrigible experiences. Such steps were taken after sufficient persuasion followed with proper and firm caution of the consequences. All this was part of a care to avert abrupt discontinuity of pursuit where sufferers are the deprived children who deserve better care and concern. Path of pleasure (सुख) is easy and there are plenty of takers for it. Path of happiness (आनंद) is tougher. And path of happiness to others (परमार्थ में स्वार्थ) is toughest. All that it needs is sensible sensitivity to sufferings of others, and willingness to collectively complement wisdom with each other for the cause to the extent it is possible. Let it be a bit, but driven selflessly. It is like drops of water which don't know their collective might is an ocean.

There are citations that [तुलसी रघुनाथ गाथा](#), was composed by Goswami Tulsi Das ji was an attempt for स्वान्तः – सुखाय, self pleasure in English sense. It is stated that he had confessed this in his writings. A close study of his creations and life reveals that it was his humility and that he did not wish to impose his faith on others. His composition progressively over Five centuries has attained epitome of popular idealism where Lord Rama is regarded as मर्यादा प्ररुषोत्तम. It must have been his intense desire of परमार्थ में स्वार्थ which made his creation touching hearts of every person of Indian origin.

## मना रे प्रपंच सोडू नको..... (मराठी भाषा में) - अज्ञात

परमार्थस्तव संसाराचा, डाव ही मोडू नको,  
मना रे प्रपंच सोडू नको, मना रे प्रपंच सोडू नको।

प्रपंचात ह्या स्वार्थ त्याजावा, लोकांसाठी देह झिजावा,  
करताना रे तू जनसेवा, मी पण दावू नको,  
मना रे प्रपंच सोडू नको,....

||1||

कर्म तुझे तू नित्य करावे, कर्तव्याचे माप भरावे,  
देश देव हे तद्वत सारे, स्वार्था जाऊ नको,  
मना रे प्रपंच सोडू नको,...

||2||

एक रूप हे परमेशाचे, प्रपंच आणिक परमार्थाचे,  
ओळख गुज अन् श्रीरामाचे, नामा विसरू नको  
मना रे प्रपंच सोडू नको, ....

||3||

## हे गृहस्थ ना हो विरक्त रे.... (हिंदी अनुवाद)

करें जगत में परमार्थ बहुत, रहे बना सम-तोल रे,  
हे गृहस्थ ना हो विरक्त रे, हे गृहस्थ ना हो विरक्त रे।

रहे गृहस्थ निःस्वार्थ सदा, जियें सदा परमार्थ किये,  
जनसेवा करते मन रे, न करना स्वप्रदर्शन रे।  
हे गृहस्थ ना हो विरक्त रे, ....

||1||

कर्म करे तू नित्य सदा, रहे कर्तव्य सर्वोपरि,  
देश-देव हे रहे ध्यान में, स्वार्थ न हो उनके परि।  
हे गृहस्थ ना हो विरक्त रे, .....

||2||

एक रूप है परमेश्वर का, घर चले परमार्थ साथ ही,  
ध्यान रहे उससे रिश्ते का, ना भूलना उसे कभी।  
हे गृहस्थ ना हो विरक्त रे, .....

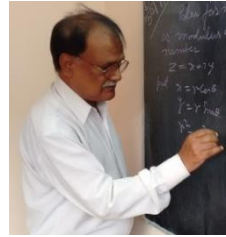
||3||

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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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*"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—

## **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. **Participator –**
  - i. As a Mentor,
  - ii. As a Coordinator,
  - iii. Operational support
  - iv. E-Bulletin and Website promotion for increasing its depth and width across target students

**Background:** *The initiative had its offing in May'12, when its coordinator, a non-teacher by profession, soon after submission of Ph.D. Thesis in 2012, at one of the IITs, under taken after retirement got inspired to mentor unprivileged students.*

*The endeavour started with Chalk-N-Talk mode of mentoring unprivileged students starting from class 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, a philosophy in action 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 Centres. Efforts are being made to integrate more learning centers and mentors to diversify its scope and utilize our full capacity.*

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

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(M):+91-9711061199,

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



## अंदाज ए बयां

### अगले जनम मोहे गोरा ही कीजो ...

समीर लाल 'समीर'

भारत में तो हम पैदाईशी तय श्याम वर्णीय थे . दूर से भी कोई किसी को कल्लु या कालिया बुलाता , तो स्वतः हीहमारासर आवाज की दिशा में घूम जाता था कि कहीं हमको तो नहीं बुला रहा है कोई?

कनाडा आकर अफरीकन जमात के सामने ब्राऊन याने भूरे कहलाने लगे . काले वो कहलाते हैं औरसाऊथ ईस्ट एशियन ब्राऊन. कई बार तो उन अफरीकनस के प्रति श्रद्धा से सर झुक जाता है कि हे प्रभु , कितना बड़ा उपकार कर दिया आपने. जो भगवान न कर पाया आजतक हमारे साथ हमारे ही भारत में वो इन गोरो के बीच आप ने कर दिखाया परदेश में वरना तो इनकी गोराहट के आगे हमें तो और अधिक गर्त ही नसीब होती.

लोग कई बार पूछते हैं मुझसे कि क्या हासिल कर लिया तुमने देश छोड़ कर ? अब हम उन्हें क्या बतायें कि हमने जो यहाँ हासिल कर लिया , वो तो देश में कभी भी न हासिल कर पाते . रुपया पैसा शान शौकत सब बेकार है इस अचिवमेन्ट के आगे . काले से भूरा हो जाने का आनन्द सिर्फ वो समझ सकता है जो इस दौर से गुजरा हो ..जैसे दाद खुजाने का आनन्द बिना दाद खुजाये शब्दों से कभी बयाँ नहीं किया जा सकता है .

वैसे भी कनाडा में न तो धूल मिट्टी होती है और न ही बेहिसाब गर्मी तो रंग काले में भी साफ वाला काला तो हो ही चला था . मने कि कीचट हुई काली शर्ट और कायदे से धुली प्रेस करी हुई काली शर्ट में अंतर के जैसा . ऐसे में पिछले वीक एण्ड की दोपहरमें जब खासी धूप खिली तो हम उसकी चिलचिलाहट की परवाह किये बगैर बैक यार्ड सजाने में पूरे तन मन से सारा दिन जुटे रहे. ऐसे में धूप की मार खा कर हमारा काला रंग थोड़ा सा १९ से २० की तरफ चला गया और उसी शाम जिम के रिसेशन पर लड़की ने टोक भी दिया तारीफ के अंदाज में ओह!! नाईसली टैन्ड .. ( बढ़िया गहरा रंग चढ़ा कर आये हो )

कहीं करेबियन (गर्म जगह) गये थे क्या ..वेकेशन पर? अब क्या कहते..लड़कियों से वैसे भी कम ही बात करते हैं तो हाँ कर दिये और वो इस बात की बेस्ट विशेष देकर मुस्कराई कि मेन्टेन करो जब तक कर सको ..अब उसे क्या बतायें ये कोई गोरा बन्दा गर्मी में खुद को शौकिया जला कर नहीं लौटा है ..जो मेन्टेन करे जब तक कर सके ..ये तो परमानेन्टली मेन्टेन्ड ही है .

याद आया जब मैं क्यूबा गया था . बीच पर सब बिना कपड़ों के सन स्क्रीन क्रीम लगा कर टैन होने के लिए पड़े हुए थे , तो हम भी पहुँच लिये. सन स्क्रीन लगा ही रहे थे कि एक बंदा आ गया बोला अरे सर , क्या कर रहे हैं ? हमने कहा बस जरा बीच पर लेटेंगे इनकी तरह..टैनिंग वगैरह हो जायेगी .

वो हँसने लगा और बोला कि गजब करते हैं आप भी .अरे, ये सारे गोरे लोगधूप में नंग धड़ंग समाधि लगाये इसलिए खुद को जला रहे हैं कि अपना रंग कुछ दिन के लिए ही सही , थोड़ा डार्क कर ले और आप तो इस समाधि की उस चरम अवस्था में ऑलरेडी हो जिसमें ये पहुँच जायें तो भगवान पा लिया कहलायें. इन्हें तो इसकी १० % मंजिल भी मिल जाये तो ये बुद्ध सा व्यवहार करने लगेंगे .

आप जाओ उधर ..स्वीमिंग पूल में . थोड़ा एक दो पैग लगाओ वोदका के और पानी में बैठ कर गाओ ठंडा ठंडा ..कूल कूल.

ये अभिशप्त हैं..इन्हें तपस्या करने दिजिये .

अब उससे क्या कहते..चुपचाप लौट आये और स्वीमिंग पूल में वोदका का ग्लास थामे धंस कर बैठ लिए एक कोने में ..प्रार्थना में लीन कि हे प्रभु, अगले जनम मोहे गोरा ही कीजो .



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

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## Ayurveda- Health Care

### Prevention From Seasonal Problems In GRISHM RITU

(Summer season: May 15 – July 15)

Dr Sangeeta Pahuja

This period causes vata sanchaya (mild increase) and Katu (pungent) Ras pradhan in nature. That's why leads to headache, giddiness etc. And over exposure to heat increased Pitta which leads to Gastrointestinal problems like acid reflux, diarrhea, dysentery, vomiting, skin rash, acne and emotional mood swings like frustration, anger, impatience etc.

This requires some changes in dietary and lifestyle to cope up with the season's nature to stay healthy without any medication. I have already described about gastrointestinal disorders and skin problems in my previous articles. Some of the health problems in this period are discussed with remedies from the perspective of Ayurveda.

**Diarrhoea:** It is the most commonly occurring problem in summers, specially in children.

**Ayurvedic view:** According to Ayurveda diarrhea occurs due to Mandagni (weak digestive fire), which is caused by aggravated Pitta, which leads to slow absorption and assimilation of food and causes watery stools. The line of treatment is to pacify Pitta and kindle Agni gently. This Dosha (imbalance) can be prevented by following the appropriate diet and lifestyle.

#### Favourable diet:

##### Helpful Herbs and remedies :

**Bilberry:** It has Astringent properties which helps in pacify Pitta. Therefore it has been used since many years to cure diarrhea, nausea and indigestion.

**Ginger:** It provides enzymes that encourage the release of gastric juices, which are required for proper digestion. Ginger can be used alone or in combination with other natural ingredients to promote proper digestion. It can be consumed in many ways (a) One tablespoon (tbs) of ginger juice twice a day to cure diarrhea, (b) One tbs ginger juice with 1tsf raw honey twice a day, (c) Mixture of one tsf each ginger powder, cinnamon powder, cumin powder and honey thrice a day, (d) Ginger tea is also helpful. (e) Ginger powder with Salt and Water, (f) Fresh lemon juice with 1tsf ginger paste, (g) Mixture of ginger juice, mint juice and honey thrice a day, (h) Ginger powder with buttermilk, (i) Ginger with yoghurt can be taken, (j) Ginger with pomegranate juice and rice

**Lemon balm:** It has antimicrobial, antiviral, antispasmodic properties. So it is used in the disorders of gastrointestinal tract. Lemon balm tea supports healthy digestion and ensures proper absorption.

**Chamomile:** Chamomile tea is one of the best home remedy, which you can use, if you suffer from diarrhea.

**Fenugreek seeds:** These are rich in mucilage content, which has antidiarrheal effect. This can help you to get rid of diarrhea.

**Yoghurt:** It is the best home remedy for diarrhea which has bacterial culture such as bifid bacterium, lactobacillus. Consumption of yoghurt supplies to intestinal friendly bacteria which are restored in intestine and become helpful to stop diarrhea.

**Banana:** It is rich in pectin, which is water soluble fiber, which can help you to get rid of diarrhea. This fruit also has high amount of potassium, an electrolyte, which can help you to have normal functions in the body.

**Apple Cider Vinegar:** Add one tsf Apple Cider vinegar in one glass of water and drink it if you suffer from diarrhea. It has antibacterial properties. It is Pitta pacifying. Thus helpful in diarrhea.

**White Rice:** This is the best domestic remedy for diarrhea. As it increases the absorption of water, thus helpful to stop diarrhea.

**Other remedies:** Carrot juice is also helpful in diarrhea. Old rice, green gram, dry ginger, pomegranate, banana, bottle gourd, buttermilk, cumin, coriander are good to eat. In addition coconut water, vegetable soups and clear broths are also helpful in treating diarrhea. It is essential to keep yourself hydrated by consuming – (i) ORS to maintain the electrolytes, (ii) Curd with banana (iii) Lemon, orange, pomegranate juices.

**Favourable Lifestyle:** Do Meditation, Yoga, Deep breathing and other relaxing techniques are also helpful in diarrhea.

#### Unfavorable diet and lifestyle:

**In respect of diet :** avoid (i) Tea, coffee, alcohol, dairy products, (ii) Oily, spicy food items. (iii) Preserved and stale food, (iv) Refrigerated food items. (v) Potato, brinjal, black gram, maida, sugarcane products, beans,

cucumber, anjeer, jackfruit, cauliflower, tamarind, pickles etc.

As regards lifestyle : (i) Do not drink unfiltered water, (ii) Donk consume food or drinks without proper hygiene i.e. washing of hands and nails.

In case of severity, visit your doctor as soon as possible.

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



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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.*

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*Nothing is more important in our national life than the welfare of our children.*

*- Harry S. Truman (33rd President of the US)*

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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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## Frame of Reference

**Prakash Kale**

At the outset I have a disclaimer that “arguments and conclusions made in this article are purely based on logic and in no way, myself hold them personally (may be because of “Sanskar etc”), and/or promote, encourage etc. the behavior by any individual or group as derived from logic presented herein.

To begin with, as a science student I learned that - things which exist must have theoretical base and what is proved theoretically must exist in reality. Best and well known example is prediction of “Black Holes” by theory a century ago, which proved correct this year. Another rule of science is, any statement, definition is subject to terms and condition specified therein. For example, when we make statement “water boils at 100 degree centigrade” the statement is subject to pressure being of certain value. Similarly, when we say car is moving with a speed of 100 km/hr, it is implied that the speed is with reference/relative to our earth. Changing terms and condition or putting in different “Frame of Reference”- boiling point of water (say at Everest peak) and speed of car (with reference to say another car) will give way to different statement. Similarly, many commonly used sentences are purely wrong in the light of logic/science or understood/said in wrong frame of reference. For example, correct sentence for “Sun rises in east at 6.30 am” is “Due to rotation of earth I can see Sun in east at 6.30 am” or when we hear announcement in train/bus etc. “Bhopal aa Gaya (Bhopal has come)” what correctly should be announced is “We/train/bus has reached Bhopal”.

But in ordinary life or communication we do not mention all this and if we do, we may be labeled as mad person. Nevertheless remembering and extending this to sociology/state-polity, that every so called “Virtue/Evil” labeled is in certain “frame of reference” and need not be seen same from another “frame of reference”, can calm down our agitating mind to a large extent. It can also show way to use/encourage proper frame of reference (in communication) to change the behavior of individual or group.

To explain my point, let us start with word “corruption” much maligned in daily discussion but largely adopted in practical life by all, mighty and sundry, based on their capacity and opportunity. But, whole economics is based on principle that man can be incentivized to do or not to do an act or decide based on MONEY. In economics such persons are labeled as RATIONAL person and there is no place for irrationality in economics. Another basis of economics is “less resources and more needs”. The day resources match or exceed needs, the study of economics will become redundant.

Based on above two principles of economics, let us examine when corruption crept in society? As we know, before the advent of currency there was a system known as “Barter Economy”- goods exchanged for goods. Later due to lack of mutual want and other shortcomings, barter system gave way to “Currency System”. Similarly, when society was small and stable, people used to work/help each other (without bribe); knowing well, 5-10 years down the line such act will be reciprocated in the form of Vyavhar. But as society grew in size and unknown people started exchanging needs and without being assured that the act (of favor) will be reciprocated in future. Then the questions/thoughts arose in the minds of favor giver “A” (resource) as well as favor seekers “B” and “C” (need). A is thinking why I should favor B over C, and B thinking what I should do so that A favors me over C. In History such situation is explained to put forth the idea that in India corruption started with arrival of British (As human being we, always blame others). By taking the “extra” by which “A” decides the things in favor of “B”, as per economics is an act of rationality and is perfectly OK. But, it is being seen as “Corruption” and despise.

Having established the theoretical base of “Bribe (corruption)” among the persons or groups not having surety of future transaction (If future reciprocity is assured there cannot be corruption but reason for favor will take different names like nepotism, caste, regionalism and so on). Before we move further, let us try to quantify the “Bribe”. A is asking Rs. X and B offering Rs. Y, and ultimately amount is settled between Rs. X and Rs. Y. What factors/situation decide wherein chance of “Bribe” and its quantum comes into play? In economics for this (factors/situation), is called “Consumer Surplus”. In simple terms it means, consumer derives more value or satisfaction than cost paid for it.

Illustration can be many, but being an ex-banker, I take a simple example of year 1980s. IRDP (Integrated Rural Development Program) loan, a subsidy (a part of it is paid by govt.) linked loan and due to prevailing socio-political environment supposed to be not repaid. Let us assume loan to borrower is Rs. 10000 and subsidy Rs. 2000 (govt. will pay Rs 2000 to bank). In updated version we can call it MUDRA LOAN by appending two extra zeroes for amount. Now, stage is ready for bribe, in best scenario (when borrower is ready to repay net loan of Rs 10000-2000=8000) bribe amount cannot exceed Rs. 2000 (consumer surplus) and in worst scenario Rs. 10000 (Loan not to be repaid). The bribe amount can be anything from Rs. 0 (whole surplus is pocketed by influential/conscious borrower) to Rs. 10000 and shared by banker and govt. officials depending on their muscle power and/or moral

leaning. Similar reasoning can be made for other commercial loans (trader/transport etc), where consumer surplus was difference in market rate of interest and bank rate of interest.

With the opening of economy and availability of loans becoming very easy (shortage of credit gone) this surplus is vanished and so also bribe (from commercial loans). Such examples of vanishing bribe/black-money are many. In 1970's, there was no concept of day or show-time wise rate of cinema tickets. So black of ticket (bribe for obtaining tickets) was common. Over the years, system changed and now the ticket rates are as per day or show time and system of bribe/black gone (No surplus left in the hand of viewers). Similar trends are visible in aviation sector etc. and are now being adopted by Railways also as flexi fare. Common thread is either scarcity is vanished or surplus is pocketed by owner itself. Thus taking advantage of adverse situation, in which consumer and the vendor finds themselves in need of mutual accommodation, they have legalized bribe in the form of an accepted system, with complaint from none.

Next question comes, does only common man always pay "Bribe" or only powerful people indulge in bribe taking? Answer is NO. At times roles can get reversed also. For example to achieve family planning targets, doctors and nurses have paid bribe to individuals undergoing operations. LIC or NSC agents do pay a part of premium or commission to clients. Once a while, during election, political leaders also pays bribe to voter and so on. Civilians purchasing from Military canteen (at below market price) and primary teacher taking "Independence Day" sweet without distributing to students are also example of corrupt practices by common man. Furthermore many a times there may not be a corrupt practice at all in an individual case. We go by general perception, rich are corrupt and poor are "kamchor" etc., held in society by one group against another.

Our next query is, does, as generally perceived, society is suffering due to corruption and its progress is blocked? Imperial evidence indicates otherwise. It is observed, corrupt babu/officer is more efficient (knows rules better to complete work) and due to personal stake ready to put more hours of work. Contrary to this honest babu/officer will find excuse for not carrying out work or stick to clock. Our experience of political leaders is also same, while honest politician (?) is indifferent to development projects to be undertaking in his/her constituency, corrupt leader is keen on having more and more projects. "Corrupt" word need not be strictly used in rupee term; it can be misuse of power or breach of trust, like a minister sanctioning more projects in his own constituency (overlooking interest of whole state or country), some time even overruling technical committee reports. Such leaders, though criticized at national level are highly popular in their state

or constituency and get re-elected. In Japan (in 1970s when rise of China was not on horizon), a much progressive and highly admirable country, time to time prime ministers have resigned on corruption charges (Lockheed scandal etc.).

Variant of above query – Is it due to corruption etc incompetent person or inferior goods are purchased? Not sure. But, it can be surely said that due to operation of rule of scarcity, favor giver has choice to favor to one of the many equals (for job or contract etc.). Take the case of "Bofors Gun" corruption case; it has showcased its capability in Kargil war. (In fact this controversy is arisen only because, our state policy prohibits any middle man in defense contract, but many other nations allow it. It leaves a question -Who is correct or which policy is better?)

If corruption is not the reason for our backwardness or lack of progress, what is it? May be less corruption in society is the reason. To understand it better, let us recite one old story. There was a poor "Gadariya" (person who takes care of grazing animals), taking rest below a tree, and his 2-3 cows grazing the ground around him. A progressive passersby commented, why you are idling, do some more work (take care of more cows of others etc). Gadariya, asked then what will happen? The person replied "You will have more money to spend and comfort of life". This way cycle of question-answer went on for a while, passerby always motivating him for more and more work, for more wealth and comfort, and Gadariya questioning then what. At one stage passersby said, you will have lots of cow and those will be supervised by many workers under you and you will enjoy quietly sleeping under tree. Gadariya replied I am sleeping right now like that, then why do I take additional trouble? Probably, our majority of people do have this sentiment. Other way, majority of our society are not incentivized by "Money" or are irrational persons.

As said in the opening, in spite of all the above justification we all hate/despise "Corruption" and wish it should be eradicated from our society, but we find it is spreading like cancer.

What is cause and what is remedy? Cause is our increasing emphasis on only one "frame of reference" or only "one yard stick" of success or failure of a person or group. It is the possession of WEALTH. And so a professor helps students by leaking question papers and earns money, because without money he has no status in today's society. To remedy it we must go back to our old way of life, equal emphasis on five types of "Purusharth ( activity)" by individual in whole life, a balance of "Dharm (ethics/ knowledge), Arth (prosperity by labor ), Kam (leisure) and Moksha ( a work for post life or society)". Further proper segregation and recognition of contribution by four types of people based on nature of their work

commensurate to their competence - “Chaturvarn System”- “Brahman (Knowledge seeker/ giver), Kashtriya (Protector), Vaishya (Trader/Industriest) and Kshudra (service provider)” by society (not by birth but activity undertaken). In that old system, even though “Brahman” was poor (because not motivated by money), recognizing his contribution to future general advancement of society (being knowledge/research provider), he was otherwise compensated by placing him highest in society hierarchy, above even “Kashatriya (protector or political master) and “Vaishya (Exchange facilitator and wealthiest one). These systems need review and adaption in requisite “Frame of reference” to recognize different groups/people so as to have balanced progress of society.

To move forward, for words like nepotism, regionalism etc, as space is insufficient; I will not go for their justification etc. (as done for corruption). They also seem to be wrong only when “frame of reference” used is “Nationalism”. Many of vices seen from “Nationalism” are not bad at all if seen from frame of reference of “Family” or “Region”. Equally, many of virtues seen from “Nationalism” may be equally bad if seen from frame of reference of “Individual” “Family”, “Region” or “Internationalism” (Rabindra Nath Tagore a strong proponent of this even during independence struggle).

Now some examples of narrative used through “Nationalism” frame examples and its follies. If demand of Gold is high, and a trader brings in Gold in country in spite of prohibition, he is labeled “Smuggler” but if for the same reason (or with mala-fide intention and for a consideration) finance minister allows import of gold he is labeled most progressive and liberal. Similarly, there was a trade between Lahore and Amritsar, before 1947, but same is now labeled “smuggling” due to political partition. (Taking example from sociology, seemingly increased evil of premarital sex is due to change in age of marriage, shift in frame of reference, rather than change of attitude towards sex by individual.) Dispute between Tamilnadu and Karanataka states over Kaveri river water is seen bad, waste of precious water resources and we blame it on concept of narrow regionalism and wish both states give up their respective stand in national interest. Such comments are also common when a community oppose a development project to protect its interest. But same verdict is not given to dispute between India and Bangla Desh over “Teesta River”. In post Indo-Pak partition, independence of India was meaningless being fragmented

into 565 princely states, each with a freedom of choice. It was a big challenge to manage such a large number of stake holders together with many more political analysts, social activists and persons, each with their conflicting and/or divided interests. Each of them had their own frame of reference. Despite such a wide diversity, merger of these states into territory of Indian Union was a great achievement and everyone is proud of it. In the process many diplomatic channels operated and promises made some of them were reviewed, changed and accepted. The frame of reference was the national interest. Unless the frame of reference is rightly communicated any program howsoever good in the national interests is prone to resistance and bears risk of being projected anarchic. One such example was family planning programme of Government of India in 1970. An important lesson to draw is about subjectivity in frame of reference, across different stake holders and need to be resolved through proper communication for a generally acceptable solution.

Seen in above context, today our problem is “Nation”, which, though is one of the many types of organizations (family, region, continent, and world etc), has become too powerful (because of political power) – omniscient, omnipotent and bestowed with quality like GOD of having no fault. There is complete, asymmetry in power of different organizations as against Nation. For example, Road Tax is to be paid by “citizen” to “Nation-State” for construction and maintenance of road but if road is not maintained or for that reason if some accident happens there is no remedy available to citizen to claim compensation from the “Nation-State”.

To conclude, if we wish to have true republic, wish to solve problem like, Naxal and/or J & K, we need to change this imbalance of power. First, accept that as stated in the beginning, if there is problem, it has some base and justification and inherently nothing is bad. Try to understand it from proper frame of reference in an unbiased manner and exercise full honesty to solve it objectively. Let all frame of reference (perception) be given due importance. Accept that “Nation” is aggregate of “Individual”, “Family”, “Society” and “State”, and fulfilling the aspiration of all these or to say co-existence of all these with “Nation” will make nation strong. Let us accept there are hundred and Thirty Crore aspirants is a reality and so are the frame of references, just not one.



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## कुंभ: भारतीय संस्कृति का अनुपम प्रतिमान

चारु येवतीकर

भारत प्राचीन एवं अर्वाचीन संस्कृतियों की संगम स्थली है जहां एक ओर हम अंतरिक्ष में ऊंची छलांग लगा रहे हैं वहीं विशाल कुंभ मेलों के आयोजन हमें अपनी प्राचीन जड़ों से जुड़ने की अनुभूति करवाते हैं। जब भी एक स्थाऊन पर एकत्रित सर्वाधिक जन समुदाय उल्लेख होता है तब सबसे पहला नाम कुंभ मेले का ही आता है, आखिर कुंभ में ऐसा क्या है? कुंभ पर्व का आरंभ अज्ञात है पर स्थानों का चयन ज्ञात है। आइए जानने का प्रयास करते हैं।

स्मृति और श्रुति के इस देश में आलेखों का अभाव तथ्यों से परे अनेक किवंदतियों को जन्म देता रहा है। सर्वप्रथम आयोजन कब, कहां, किसने और कैसे किया इसकी कोई निश्चित जानकारी नहीं है; उपलब्ध जानकारी के अनुसार इसका उल्लेख पहली बार राजा हर्षवर्धन (590-647) के काल में आता है जहां उन्हें कुंभ के मेले में दान करते हुए बताया गया है। जहां तक स्थाण का प्रश्न है उसका उत्तर इस घटना में निहित है कि मृत्यु से भयभीत सुर और असुर अमरत्व की चाह में एकत्रित होकर क्षीरसागर का विलोडन करते हैं सागर मंथन की जटिल प्रक्रिया में अनेक रत्नों का प्रादुर्भाव होता है और अंत में प्रकट होता है एक कुंभ जो कि अमृत से सराबोर है। मंथन की प्रक्रिया में सहभागी होने से सुर और असुर दोनों ही उस अमृत के बराबर भागीदार थे परंतु विष्णु की चतुराई से अमृत केवल देवों को मिला और असुर उससे वंचित रह गए।

अमृत से सराबोर उस कुंभ को लेकर जब देवता पलायन करते हैं तो उसकी कुछ बूंदें इस जंबूद्वीप के चार स्थलों पर छलकीं जो कालांतर में पावन तीर्थस्थानों में सम्मिलित हो गए, ये स्थान हैं- हरिद्वार, प्रयाग राज, अवंतिका और नाशिक।

जल जीवन का आधार है इसीलिए सारी सभ्यताएँ नदियों के आंगन में ही पल्लवित हुईं। प्रकृतिपूजक आर्यों ने नदियों की आराधना की। दो या दो से अधिक नदियों की मिलन स्थली को पवित्र माना गया। यूँ तो भारत में पर्वों की श्रृंखला बनी हुई है पर कुंभ सर्वाधिक लंबा चलने वाला पर्व है। यहां से लौटते हुए भक्त अपने हृदय में आनन्द के छोटे-छोटे कुंभ लेकर जाते हैं और अगले कुंभ में पुन आने का निश्चय करते हैं।

कुंभ का पौराणिक एवं ज्योतिषीय महत्त्व है। आइए पहले पौराणिक महत्त्व के बारे में जानते हैं। इसे लेकर कुछ कहानियाँ प्रचलित हैं: प्रथम कहानी के अनुसार दुर्वासा ऋषि इंद्र को एक माला पहनाते हैं, इंद्र उस माला को अपने ऐरावत नाम के हाथी को पहना देता है इससे कुपित होकर दुर्वासा ऋषि देवों को श्राप देते हैं फलस्वरूप देवी-देवता युद्ध में असुरों से पराजित होते हैं और विष्णु की शरण में जाते हैं। विष्णु उन्हें अमृत प्राप्ति के लिए असुरों के साथ मिलकर क्षीरसागर मंथन करने की सलाह देते हैं। अमरत्व की चाह घोर शत्रु सुर और असुर दोनों को समीप लेकर आती है और क्षीरसागर का मंथन आरंभ होता है; उस प्रक्रिया में अनेक रत्नों का प्रादुर्भाव होता है और अंत में धन्वसंतरि एक कुंभ लेकर प्रकट होते हैं। कुंभ कलश को कहते हैं। उस कुंभ में अमरत्व का रस पड़ा हुआ था, अमृत पाने के लिए सुर और असुरों में छीना-झपटी होने लगती है तब विष्णु के संकेत पर इंद्रपुत्र जयंत उस कुंभ को लेकर

वहां से पलायन करते हैं तब बृहस्पति, सूर्य, चंद्र और शनि उनकी सहायता करते हैं, असुर उनका पीछा करते हैं। 12 दिनों तक देव और दानवों में युद्ध होता रहा, उस समय जिन 4 स्थानों पर अमृत की बूंदें छलकी थी वहां कुंभ मेले का आयोजन किया जाता है। अमृत कलश पर अधिकार जमाने के लिए 12 दिन तक सुर असुर युद्ध हुआ। देवताओं के 12 दिन मनुष्य के 12 वर्ष के बराबर होते हैं अतः कुल 12 कुंभ मनाए जाते हैं। इनमें चार का आयोजन पृथ्वी पर और आठ का देवलोक में होता है।

दूसरी कथा अनुसार जब धन्व तंरि अमृत-कलश लेकर क्षीरसागर में से अवतरित हुए तो सुर और असुर दोनों ही उस कुंभ पर अधिकार पाने की लालसा में युद्धरत हो गए तब विष्णु के आदेश पर गरुड़ उस कलश को लेकर उड़ गए असुरों ने गरुड़ का पीछा किया तब बृहस्पति, सूर्य, चंद्र और शनि उस कलश की रक्षा की।

एक अन्य कथानुसार कश्यप ऋषि की पत्नियों कद्रु और विनीता में सूर्य के रथ के अश्वों के रंग को लेकर विवाद हुआ। **कद्रु के नागपुत्रों द्वारा अश्वों को ढाक दिया गया जिसके कारण कद्रु को विनीता की दासी बनना पड़ा। इस दासत्व से मुक्त होने के लिए कद्रु को अमृतकुंभ की व्यवस्था करने को कहा गया।** कद्रु के पुत्र गरुड़ नागलोक से अमृत कुंभ लेकर आते हैं तब इंद्र गरुड़ पर चार बार आक्रमण करते हैं और जिन चारों स्थानों पर अमृत की बूंदें छलक गईं वहां कुंभ मेले का आयोजन किया जाता रहा है।

कुंभ का खगोलीय महत्त्व: ज्योतिषीय गणना के क्रम में कुंभ का आयोजन चार प्रकार से माना गया है-

- 1- बृहस्पति के कुंभ राशि में तथा सूर्य के मेष राशि में प्रविष्ट होने पर हरिद्वार के गंगा तट पर कुंभ पर्व का आयोजन होता है।
- 2- बृहस्पति के मेष राशि चक्र में प्रविष्ट होने तथा सूर्य और चन्द्र के मकर राशि में प्रविष्ट होने पर अमावस्या के दिन प्रयागराज में त्रिवेणी संगम पर कुंभ पर्व का आयोजन होता है।
- 3- बृहस्पति और सूर्य के सिंह राशि में प्रवेश होने पर नाशिक में गोदावरी तट पर कुंभ पर्व का आयोजन होता है।
- 4- बृहस्पति के सिंह राशि में तथा सूर्य के मेष राशि में प्रवेश होने पर उज्जैन न में क्षिप्रा तट पर कुंभ पर्व का आयोजन होता है।

एक मान्यता के अनुसार गुरु का अपनी राशियों का एक चक्र 12 वर्ष में पूर्ण होता है अतः 12 वर्ष पश्चात कुंभ मनाया जाता है। 6 वर्ष पश्चात मनाए जाने वाले कुंभ को अर्धकुंभ कहते हैं हरिद्वार और नाशिक में अर्ध कुंभ भी मनाया जाता है जो प्रत्येक 3 वर्ष पश्चात आता है। अमृत की बूंदें जिन नदियों में गिरी उनके नाम हैं- गंगा, गोदावरी और शिप्रा। कुंभ स्नाजन विशेष मंगलकारी माना जाता है। इस दिन नदियों में स्नान करने से आत्मा को उच्च लोक की प्राप्ति सहजता से हो जाती है।

**वाकई कुंभ का महत्त्व सदियों से चला आ रहा है और सदियों आगे भी** चलता रहेगा। कुंभ में स्नान, दान और सत्संग का विशेष महत्त्व है। वैसे तो श्रद्धा तथा आस्था के नाम पर हमारे सभी तीर्थक्षेत्रों में पंडों की दादागिरी से आम जनता परेशान होती है परंतु कुंभ के इस महापर्व में कर्मकांड का उतना महत्त्व नहीं है जितना नदी में डुबकी लगाने का माना जाता है। कुंभ के आयोजन में नदी में डुबकी लगाने से पापों का क्षय होता है। इसीलिए एक विशेष तिथि पर नदियों के संगम स्थल पर डुबकी लगाने के लिए लाखों लोग दूर दूर से चले आते हैं। अब तो विदेशी सैलानी भी बड़ी क्षुब्ध से इनमें सहभागी होते हैं। पाप मुक्ति का यह आनंद कहें या मोक्ष की प्राप्ति कहें श्रद्धालु भक्ति भाव से यह कर्म करते हैं और अत्यधिक आनंदित होते हैं। कुंभ में अनेकों साधु, संत, विद्वानों का आगमन होता है, जिनके सत्संग से मन और आत्मा शांत हो जाते हैं। यह तन मन और आत्मा की शुद्धि का पर्व है। यह आश्चर्य की बात है कि बिना किसी निमंत्रण के लाखों लोग स्वयं कुंभ में आते हैं और जो एक अत्यंत ही अनुशासित श्रद्धालुओं का जमघट है जो कि विश्व के किसी अन्य स्थान पर दुर्लभ है।

कुंभकोणम का उल्लेख किए बिना कुंभ महापर्व अधूरा है। तमिलनाडु के तंजावुर जिले के कुंभकोणम में भी प्रति 12 वर्ष पश्चात कुंभ का आयोजन होता है वास्तव में देखा जाए तो सागर से कुंभ के मेले की दूरी अधिक है पर कुंभकोणम सागर के समीप है अतः माना जाता है कि समुद्र मंथन के पश्चात देवता पलायन करते हैं तब कुंभकोणम में विश्राम करते हैं और वहां के महामाहम के तालाब में अमृत की बूंदें छलक जाती है इसीलिए कुंभकोणम में यह पर्व मनाया जाता है। पुराणों के अनुसार जल-प्रलय के समय ब्रह्मानिर्मित अमृत कलश कुंभकोणम में आकर ठहर गया था जिसे शिवजी ने तीर मार कर छोड़ दिया फलस्वरूप वहां के महामाहम सरोवर में अमृत भर गया। महामाहम पर्व के दिन गंगा, यमुना, सरस्वती, सरयू, नर्मदा, सिंधु, कावेरी, महानदी आदि नदियों के पावन स्रोत महामाहम सरोवर में प्रकट होते हैं लाखों तीर्थयात्री यहां स्नान का पुण्य कमाते हैं सागर से समीप होने के कारण संभवतः प्रथम कुंभ को यहां रखा गया होगा। दक्षिण भारत में मनाया जाने वाला यह

एकमात्र कुंभ है। दुर्भाग्यवश उत्तर भारतीयों को इसका इतना ज्ञान ना होने की वजह से इस कुंभ में उनकी उपस्थिति कम होती है।

**आध्यात्मिक महत्त्व** - आदि शंकराचार्य (सामान्य काल 788-828) द्वारा शास्त्रार्थ के महत्त्व को प्रतिपादित किया गया है। कुंभ का उल्लेख अखाड़ों के उल्लेख के बिना अधूरा है। अखाड़ा अखंड शब्द का अपभ्रंश है। शंकराचार्य ने सनातन धर्म की रक्षा हेतु साधुओं के संघों का निर्माण किया था जिसे अखाड़े के नाम से जाना जाता है। विशाल देश के जनमानस ने अपनी धार्मिक परंपराओं को अक्षुण्ण रखने के लिए विभिन्न अखाड़ों की स्थापना की थी। इन अखाड़ों के सदस्य शस्त्र और शास्त्र दोनों में पारंगत होते हैं अखाड़ों में जैसे नागा साधुओं एक का समुदाय होता है वैसे ही वैष्णव, उदासीन अखाड़ों की भी पूरी सेना होती है। शाही स्नान के समय अखाड़े बड़े ठाट बाट के साथ अपनी शस्त्र कला का प्रदर्शन करते हुए जुलूस में सम्मिलित होते हैं और अपने अपने क्रमानुसार नदी में स्नान करते हैं। कुंभ के महात्म्य को इसमें भाग लिए बिना समझना संभव नहीं है।

यह सच है कि वर्तमान युग में कुंभ मेलों का आयोजन शांतिपूर्ण होता है परंतु एक कटू सत्य यह है कि मध्ययुगीन कुंभ मेलों का इतिहास हिंसा से भरा हुआ है। शाही स्नान के समय प्रथम स्नान के अधिकार को लेकर अपनी श्रेष्ठता और अधिकार के मद में अखाड़ों में आपस में हिंसक लड़ाइयाँ होती रही हैं जिनकी परिणति हजारों साधुओं और श्रद्धालुओं की हत्या में हुई थी, जिससे यह सत्य भी उदघाटित होता है कि केवल तन का चोला बदलने से वीतरागी नहीं हुआ जा सकता, इसके लिए मन की मुक्ति भी आवश्यक है।

संयुक्त राष्ट्र के शैक्षिक, वैज्ञानिक और सांस्कृतिक संगठन द्वारा कुंभ के आयोजन को मानवता की सांस्कृतिक विरासत के रूप में मान्यता दी गई है और भारतीय तीर्थयात्रियों को दुनिया की सबसे बड़ी शांतिपूर्ण सभा के रूप में मान्यता दी है जो हमारे लिए निःसंदेह गौरव की बात है। कुंभ मेला श्रद्धा, विश्वास, सौहार्द और संस्कृतियों के मिलन का पर्व है। यह तन, मन और आत्मा के शुचिकरण का प्रयास है शताब्दियों से कुंभ का आकर्षण बिना किसी आमंत्रण के हिंदू धर्मावलंबियों को दुनिया के कोने-कोने से खींच कर लाता है।

इकबाल ने क्या खूब कहा है “रोम मिस्त्र यूनान सब मिट गए जहां से, कुछ बात है कि हस्ती मिटती नहीं हमारी।” वाकई कुंभ का महत्त्व सदियों से चला आ रहा है और सदियों तक चलता रहेगा। यह भारत की सांस्कृतिक विरासत का अनुपम प्रतिमान है।



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## Life is too precious..... (Original Poem)

*We may spend it casually  
We may spend on self seriously,  
We may live for our beloved ones,  
Life is too precious.....*

*What will live on?  
Not the charity through alms,  
Nor by giving them gifts,  
Nor the homes for shelter-less.  
Time spent on deprived ones.*

*A legacy of sensible sensitivity  
To sufferings of deprived ones,  
Grooming in them competence  
To compete with esteem no less.*

*Oh God! Grant me courage face the storm  
With wisdom and sensitivity,  
Oh God! Let my children grow  
With that legacy of universal fraternity.  
Life is too precious.....*

## जीवन बहुत अमूल्य है..... (हिंदी अनुवाद )

जियें सदा सहजता से  
या अपने में मस्त रहें,  
या दें अपने प्यारों को  
जीवन बहुत अमूल्य है.....

क्या रह जायेगा जीवन में ?  
ना महारूमों को दानधर्म,  
ना उनको उपहार,  
ना ही घर बेघर का  
बस समय साथ असमर्थ का .

मिले विरासत सहिष्णुता की  
रहे ध्यान उनकी तकलीफों का,  
ज्ञान मिले हक तौर उन्हें भी  
बढ़ें गर्व से, मन पर बोझ नहीं .

हे ईश्वर! देना शक्ति हमें , जूझें इन चक्रावातों से  
रहे साथ सदा संवेदन और विवेक,  
हे ईश्वर! हों बच्चें विकसित  
मिले उन्हें विश्व-बंधुत्व विरासित.  
जीवन बहुत अमूल्य है.....

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

Albert Einstein

—00—

***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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## The Defense Speech ("Apology") of Socrates\*

Manuel Velasquez

*Socrates' relentless and, to some people, infuriating questioning of his fellow citizens eventually led to his death. Shortly after the scene described in Euthyphro, Meletus and others indicted Socrates and brought him to trial. In his brilliant work The Apology, Plato summarized the speech Socrates delivered in his defense. The speech is especially fascinating because it provides a summary of Socrates' life and of his devotion to philosophical questioning. Socrates is standing in court, facing the jury composed of five hundred Athenian citizens who have just heard the testimony of his accusers, who charge him with corrupting the youth of Athens and with not believing in the gods of the state:*

*[From The Apology of Socrates, translated (and much abridged) by Manuel Velasquez (copyright 1987); for a full translation, by Benjamin Jowett, see [Jowett Translation](#).--J.G.]*

I do not know, my fellow Athenians, how you were affected by my accusers whom you just heard. But they spoke so persuasively they almost made me forget who I was. Yet they hardly uttered a word of truth.

But many of you are thinking, "Then what is the origin of these accusations, Socrates?" That is a fair question. Let me explain their origins— Some of you know my good friend Chaerephon. Before he died he went to Delphi and asked the religious oracle there to tell him who the wisest man in the world was. The oracle answered that there was no man wiser than Socrates.

When I learned this, I asked myself, "What can the god's oracle mean?" For I knew I had no wisdom. After thinking it over for a long time, I decided that I had to find a man wiser than myself so I could go back to the god's oracle with this evidence. So I went to see a politician who was famous for his wisdom. But when I questioned him, I realized he really was not wise, although many people—he especially—thought he was. So I tried to explain to him that although he thought himself wise, he really was not. But all that happened was that he came to hate me. And so did many of his supporters who overheard us. So I left him, thinking to myself as I left that although neither of us really knew anything about what is noble and good, still I was better off. For he knows nothing, and thinks that he knows, while I neither know nor think that I know. And in this I think I have a slight advantage.

Then I went to another person who had even greater pretensions to wisdom. The result was exactly the same: I made another enemy. In this way I went to one man after another and made more and more enemies. I felt bad about this and it frightened me. But I was compelled to do it because I felt that investigating god's oracle came first. I said to myself, I must go to everyone who seems to be wise so I can find out what the oracle meant.

My hearers imagine that I myself possess the wisdom which I find lacking in others. But the truth is, Men of Athens, that only god is wise. And by his oracle he wanted

to show us that the wisdom of men is worth little or nothing. It is as if he was telling us, "The wisest man is the one who, like Socrates, knows that his wisdom is in truth worth nothing." And so I go about the world obedient to god. I search and question the wisdom of anyone who seems to be wise. And if he is not wise, then to clarify the meaning of the oracle I show him that he is not wise. My occupation completely absorbs me and I have no time for anything else. My devotion to the god has reduced me to utter poverty.

There is something more. Young men of the richer classes, who do not have much to do, follow me around of their own accord. They like to hear pretenders exposed. And sometimes they imitate me by examining others themselves. They quickly discover that there are plenty of people who think they know something but who really know nothing at all. Then those people also get angry at me. "This damnable Socrates is misleading our youth!" they say. And if somebody asks them, "How? What evil things does he do or teach them?" they cannot say.

But in order not to appear at a loss, these people repeat the charges used against all philosophers: that we teach obscure things up in the clouds, that we teach atheism, and that we make the worst views appear to be the best. For people do not like to admit that their pretensions to knowledge have been exposed. And that, fellow Athenians, is the origin of the prejudices against me.

But some of you will ask, "Don't you regret what you did since now it might mean your death?" To these I answer, "You are mistaken. A good man should not calculate his chances of living or dying. He should only ask himself whether he is doing right or wrong—whether his inner self is that of a good man or of an evil one."

And if you say to me, "Socrates, we will let you go free but only on condition that you stop your questioning," then I will reply, "Men of Athens, I honor and love you. But I must obey god rather than you, and while I have life and strength I will never stop doing philosophy." For my

aim is to persuade you all, young and old alike, not to think about your lives or your properties, but first and foremost to care about your inner self. I tell you that wealth does not make you good within, but that from inner goodness comes wealth and every other benefit to man. This is my teaching, and if it corrupts youth, then I suppose I am their corrupter.

Well, my fellow Athenians, you must now decide whether to acquit me or not. But whichever you do, understand that I will never change my ways, not even if I have to die many times. To talk daily about what makes us good, and to question myself and others, is the greatest thing man can do. For the unexamined life is not worth living.

[At this point Socrates rested his case. The jury debated among themselves and then, in a split vote, they reached their final verdict.]

Men of Athens, you have condemned me to death. To those of you who are my friends and who voted to acquit me let me say that death may be a good thing. Either it is a state of nothingness and utter unconsciousness, or, as some people say, it is merely a migration from this world to another. If it is complete unconsciousness—like a sleep undisturbed even by dreams—then death will be an

unspeakable gain. And if it is a journey to another world where all the dead live, then it will also be a great good. For then I can continue my search into true and false knowledge: In the next world, as in this one, I can continue questioning the great people of the past to find out who is wise and who merely pretends to be. So do not be saddened by death. No evil can happen to a good man either in this life or in death.

Well, the hour of departure has arrived, and we must each go our ways. I to die, and you to live. Which is better only god knows.

### Closing Comment by Velasquez

Again, Socrates' speech provides a remarkable example of what philosophy is. Philosophy is the quest for wisdom: an unrelenting devotion to uncover the truth about what matters most in one's life. This quest is undertaken in the conviction that a life based on an easy, uncritical acceptance of conventional beliefs is an empty life. As Socrates puts it, "The unexamined life is not worth living." Philosophy is a quest that is difficult, not only because it requires hard thinking but also because it sometimes requires taking positions that are not shared by those around us.

*\* This material is based on Velasquez, *Philosophy: A Text with Readings*, 10th edition. It essentially duplicates pp. 22-23 of the Custom Edition textbook for PHIL 120 that was used in Spring 2009. (1/25/09)—[Dr. Garrett](#)*

*Note by Dr. Garrett: I have provided study questions for this version of the Defense Speech as well as the longer version. (Note added February 7, 2011)*

**Source:** [http://people.wku.edu/jan.garrett/103/Apol\\_Velasq\\_Tr.htm](http://people.wku.edu/jan.garrett/103/Apol_Velasq_Tr.htm).

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***They are only saints or prophets who can keep forgiving evils. Anyone who supports and/or camouflages inactions or evils of others, on pretext of divinity or any other excuse is an accomplice in the evil. Such persons are against cause of the larger good and are opposed to the passionately committed selfless mission.***

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

*- John Adams*

## LIFE AND LIVING

**Ms.T.Saraswathi**

One of the most important questions facing us today is the fundamental thought, how to live and earn a livelihood.'? Let's turn to the youth, the future of the nation. The months of MARCH and APRIL. It is examination time, exam phobia, anxious waiting for results, entrance exams, depression, stress and tension. Life is chaotic. The air around is full of hectic activity. It's almost a do or die 'situation. Online applications, erratic servers, unreliable networks, deadlines to be met, all of which result in hectic activity and frayed tempers. Add to this the blistering heat of summer. Life was not always like this. Summer meant holidays, helping in household activities, making pickles, eating mangoes, playing games, honing skills art and craft all recreational activities. Life was simple.

Life today has undergone a sea change. It is one continuous round of study, study, study. A mad race for jobs, reservations, government jobs, blue collar jobs, hefty pay packages, higher studies and so on. No time for anything. What exactly are we doing? Are we happy? Obviously no. How can we solve this problem?

Let us ask ourselves.....

“What is this life, if full of care,

We have no time to stand and stare?”

The youth in schools and colleges are subjected to pressure, discrimination and unhealthy competition. It is not the education system that is bad. It is the superimposition of the exaggerated value of ranks and marks and a false notion that a particular degree or certificate is the gateway to success that has to be eschewed. What is required is the right attitude to life and living.

It is essential to observe and appreciate the infinite beauty and glory of nature. The stars in the sky, the

setting sun, the gentle breeze, the majestic mountains, the hilly terrains, the gurgling brooks, the flowing waters, the green fields and orchards are all an integral part of the universe that we live in. If we can observe this external beauty we will automatically experience an inner transformation that moulds and shapes the character.

It is an accepted fact that every human being desires happiness. Happiness comes from within, not from material objects like wealth and possessions. Thus a student must learn to use his creative faculty and find joy in the process of learning. It is the atmosphere of freedom and exposure that is of the greatest consequence in learning. This will automatically lead to higher levels of concentration, a better grasp of the subject and a sense of fulfilment that erases stress and worry.

It is in this scenario that an individual learns to be at peace not only with one's own self, but also with the world. He learns to look within and discovers the fountain head of joy that enables him to use his power of discrimination. There are thousands of engineers searching for jobs. What one has to understand is that the problem is not that of unemployment, but one of understanding one's own skill set.

If we look into our backyards, there will be opportunities galore to find avenues to earn a livelihood. What is required is a return to our inner selves. It is not formal education alone that is of great value. Real knowledge is free and is easily available. What is required is the right attitude and the determination to cultivate the right *samskara* or inherent tendency to DO GOOD and BE GOOD. Learn to relax. Work to the best of your ability with love and dedication. Life is to be lived and enjoyed.

“Do what you love, love what you do, and with all your heart give yourself to it.” — Roy T. Bennett, The Light in the Heart



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## ADMISSION TO UNDER GRADUATE MEDICAL COURSES

**Prof. SB Dhar**

There are many ways for the admissions to the Medical Colleges in India. There are two types of Medical Colleges:

- (a) The Government Medical Colleges, and
- (b) The Private Medical Colleges.

On March 23, 2018, the Ministry of Health and Family Welfare (MoHFW) informed the Lok Sabha that a total of 30,455 seats in State-run Institutions and 36,165 seats in Private Medical Colleges in the country are available for MBBS admissions while about 2,930 seats in State-run Institutes and 24,130 seats in Private Dental Colleges in India are available in BDS programmes.

The admission to the Government Medical Colleges is done through NEET. NEET (National Eligibility Cum Entrance Test) UG is conducted by the NTA (National Testing Agency) from this year 2019. This Test was being conducted by the CBSE (Central Board of Secondary Education) till 2018.

NEET (UG) is applicable for admission to MBBS/BDS Courses in India in Medical/Dental Colleges run with the approval of Medical Council of India/Dental Council of India under the Ministry of Health and Family Welfare, Government of India.

Applicability of Score to Some other Courses:

- (a) NEET score is also applicable for other streams like Agriculture, Indian Medicine, Para-medical and Veterinary.
- (b) NEET is also applicable for AYUSH degrees namely BAMS, BNYS, BUMS, BSMS, and BHMS.

***But NEET Score is NOT applicable for the Institutions established through an Act of Parliament i.e. AIIMS (All India Institute Of Medical Sciences) and JIPMER (Jawaharlal Institute of Postgraduate Medical Education and Research).***

### ***Scope of NTA***

The responsibility of the NTA is limited to conduct of the entrance examination, declaration of result and providing All India Rank to the Directorate General Health Services, Government of India for the counseling for 15% All India Quota Seats.

More than 14 lakh students register for this test every year.

The eligibility to appear in the NEET starts after passing class 12 or in the year appearing for such exam.

This year the Test was held on **May 05, 2019**, in more than 140 cities in India.

The new website which was launched by NTA for the NEET 2019 exam is ***ntaneet.nic.in***

The **Result** is expected to be announced on Jun 05, 2019, exactly one month after exam. Candidates who obtain qualifying cut off marks will be able to participate in counseling for admission.

### ***Some Important Facts:***

- (a) The Test has a single paper in the language that has been selected by candidate at the time of filling application form.
- (b) It comprises of **180 MCQ (Multiple Choice Questions)** with 4 options each having single correct answer. Questions are on Physics, Chemistry, Biology (Botany and Zoology). Candidates need to mark answers using ball point pen in OMR sheet that is provided to them in exam hall.
- (c) The duration of NEET 2019: **3 hours**.
- (d) **The Question Paper is framed in 11 Languages : Assamese, Bengali, English, Gujarati, Hindi, Kannada, Marathi, Oriya, Tamil, Telugu, and Urdu.**

Those who select English as choice of language get question paper in English language only but those who opt for Hindi or any other language get test booklet in that language and English.

- (a) The question paper covers the syllabus of Class XI and XII both in Physics, Chemistry and Biology.
- (b) The Candidate must have completed 17 years of age at the time of admission, or should complete the minimum age on or before 31st December 2019.

Upper age limit for NTA NEET 2019 is 25 years as on the date of exam. There is a relaxation of 5 years for candidates who belong to SC / ST / OBC / PWD category.

- (a) Candidates can be Indian Nationals, Non Resident Indians (NRIs), Overseas Citizen of India (OCIs), Persons with Indian Origin (PIOs) & Foreign Nationals.
- (b) It is an offline examination.
- (c) Each Correct answer gets (+4) marks and each wrong answer (-1) mark.

### **Cut Off**

- (a) 50th Percentile in NEET 2019 exam is necessary in the same year as admission.



- (b) Candidates who belong to SC, ST, OBC categories must get 40th percentile.
- (c) Candidates who are PWD need to get 45th percentile in order to qualify.
- (d) Basis of determining percentile shall be highest marks obtained in All India Merit List of NEET for MBBS/BDS admission.

If there are not enough number of candidates in a category that have secured minimum marks as per qualifying cut off marks that are calculated on basis of percentile given above, then NTA may lower cut offs.

**Earlier to 2019, the NEET was called the All India Pre-Medical Test (AIPMT).**

***The offered courses:***

- (a) MBBS (Bachelor of Medicine and Bachelor of Surgery)

Duration: 5 and half years inclusive of 1 year rotatory internship.

- (b) BDS (Bachelor of Dental Surgery)

Duration: 5 years inclusive of 1 year rotatory internship.

***NEET counseling***

- (a) There is all India Quota of 15% (Government Seats) including AFMC, ESI, BHU, AMU, & DU.

*AFMC aspirants will be required to appear for a second stage Screening Test conducted by AFMC in addition to NEET. Counseling for AFMC will be done by Medical Counseling Committee and not by AFMC.*

*Counseling for ESIC Medical College, Aligarh Muslim University and Delhi University will also be done by MCC only.*

- (b) There is State Quota of 85% (Government Seats)
- (c) The allotment of MBBS/BDS seats in Deemed/Central Universities Medical/Dental colleges will be allotted to the candidates through online counseling committee MCC, Directorate General of Health Services DGHS, Ministry of Health and Family Welfare Government of India.

***AIIMS (All India Institute of Medical Sciences)***

Candidates who seek admission to MBBS courses in the AIIMS (All India Institute of Medical Sciences) across the country must check the AIIMS MBBS 2019 eligibility criteria on its official website: **[aiimsexam.org](http://aiimsexam.org)**

The prospectus of AIIMS MBBS 2019 has been released mentioning the eligibility conditions. AIIMS MBBS eligibility criteria 2019 cover parameters like age,

academic qualification, minimum qualifying marks and others. As per the AIIMS 2019 eligibility criteria, the minimum qualifying percentage to be secured by PwD candidates is 45%, which earlier was 50%.

The admission test is held in 155 cities for 800 Indians and 7 overseas students.

***AIIMS MBBS 2019*** was conducted on May 25 and 26, for admission to a total of 1,207 MBBS seats offered at 15 AIIMS institutes located in *New Delhi, Bhopal, Bhubaneswar, Guntur, Jodhpur, Nagpur, Patna, Raipur, Rishikesh, Gorakhpur, Raebareli, Kalyani, Bathinda, Deogarh and Bibinagar (Telangana).*

***The result is to be declared on 12<sup>th</sup> June.***

***Eligibility Criteria:***

- (a) Candidates must have attained the age of 17 years as on December 31, 2019
- (b) The candidates should have passed Class 12 under the 10+2 scheme/senior school certificate examination (CBSE) or Intermediate Science or an equivalent examination from a recognized University/Board from any state with English, Physics, Chemistry and Biology as the main subject.
- (c) Candidates who appeared for Class 10+2 board examination in the year 2019 are also eligible to apply for the medical entrance examination.
- (d) Candidates who have or are appearing at the qualifying examination with English, Physics, Chemistry and Biology and expect to pass the examination with the following qualifying percentile are eligible for the test:  
General and OBC candidates: 60%  
SC/ST candidates: 50%  
PwD candidates: 45%
- (e) Candidates of Indian nationals, Overseas Citizens of India (OCIs), Non-Resident Indians (NRIs), Persons of Indian Origin (PIOs) and Foreign Nationals are also eligible to apply for AIIMS MBBS.

- (f) **For Foreign Nationals:** Apart from the total seats, 7 seats are reserved for foreign nationals in AIIMS, New Delhi only. Such aspirants will be nominated by the Government of India and must have obtained a minimum of 50% marks in aggregate in English, Physics, Chemistry and Biology in their Immediate

Science or an equivalent examination to be eligible for admission to MBBS course in AIIMS institute.

#### Exam Pattern

- (a) **There will be 200 MCQ and Reason-Assertion type from Physics, Chemistry, Biology, General Knowledge, Aptitude and Logical Thinking. Physics (60), Chemistry (60), Biology (60), GK (10), Aptitude (10).**
- (b) **One mark for each correct answer and minus one third for each wrong answer.**
- (c) **It is CBT (Computer Based Test) in online mode.**
- (d) Exam timing is morning session: 9.00 to 12.30 Noon and Evening session: 3PM to 6.30PM.
- (e) Syllabus is class XI and XII standard.
- (f) In the 15 AIIMS institutes, the standardized reservation policy will be followed under which 7.5% for ST candidates, 15% for SC aspirants and 27% for OBC students.

#### JIPMER

Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry (JIPMER) with intake of 150

seats, under Government of India since the year 1956, is one of the leading Medical Institutions of our country.

JIPMER has started its JIPMER Karaikal campus, from the academic session 2016-17 with yearly intake of 50 students.

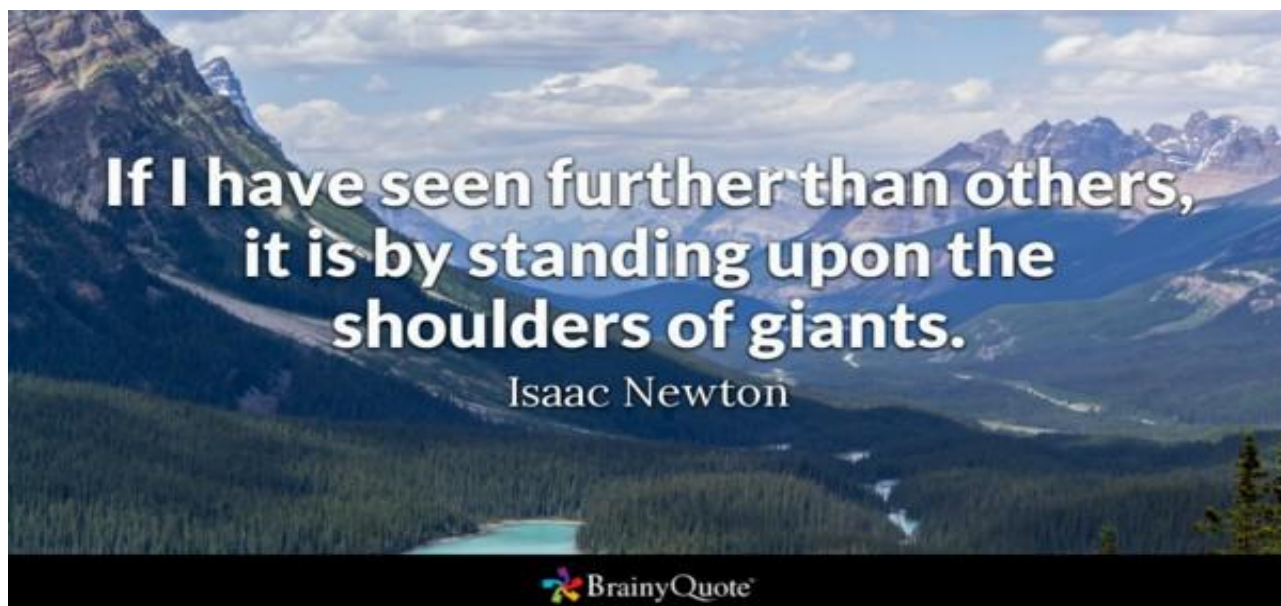
Its official website is [www.jipmer.puducherry.gov.in/](http://www.jipmer.puducherry.gov.in/)  
[www.jipmer.edu.in](http://www.jipmer.edu.in)

#### Salient Features of Entrance Examination:

- (a) It is conducted through a Computer Based Test (CBT) Online Mode only.
- (b) It is scheduled to be held on Sunday, 02<sup>nd</sup> JUNE, 2019.
- (c) The duration of the examination shall be 2½ hours (Two hours and Thirty minutes).
- (d) Morning Shift/First shift : 10:00 AM to 12:30 PM  
Afternoon Shift/Second shift: 03:00 PM to 05:30 PM
- (e) There will be 200 Questions 60 Questions each from Physics, Chemistry and Biology. 10 Questions each from English Language & Comprehension and Logical Reasoning.
- (f) Language of Paper is English Only.
- (g) Each correct answer is awarded (+4) marks and each wrong answer is given (-1) mark.

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

**—00—**



## पानी बचाओ ....

मृणालिनी घुळे

पानी बचाओ पानी  
पानी जो बह चला है  
माना कि जिंदगानी  
पानी का बुलबुला है।

पानी है जैसे अमृत  
पानी बिना न जीवन  
सोचो जरा अगर हो  
पानी बगैर सावन।

पानी की बूँद से ही  
जीवन का सिलसिला है  
पानी बचाओ पानी  
पानी जो बह चला है।

धरती का ज़र्रा ज़र्रा  
पानी बिना अपूरा  
या जड हो या हो चेतन  
पानी बिना अधूरा

पानी बिना समझ लो  
जीवन ये खोखला है  
पानी बचाओ पानी  
पानी जो बह चला है।



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

## बचपन की वो गर्मी....

डॉ. संगीता पाहुजा

बचपन की वो गर्मी,  
जिसका अर्थ था सिर्फ गर्मी की छुट्टियाँ।  
तन-मन में भर जाता उल्लास  
करके छुट्टियों का अहसास।

अनगिनत योजनाएं बनती  
नाना-नानी, दादा-दादी से मिलने की।  
मटके का वो ठंडा पानी, छाछ,  
मट्ठा, लाल-गुलाबी शर्बत  
और आम रसका मीठा पेय  
तृप्त कर देता देह।

अजब सा मिलता सुकून,  
पेड़ों की ठंडी छाया,  
में पड़ती फीकी सब माया।

खेल कूद में, लाड-प्यार में,  
कब बीत जाती छुट्टियाँ,  
न होता अहसास।

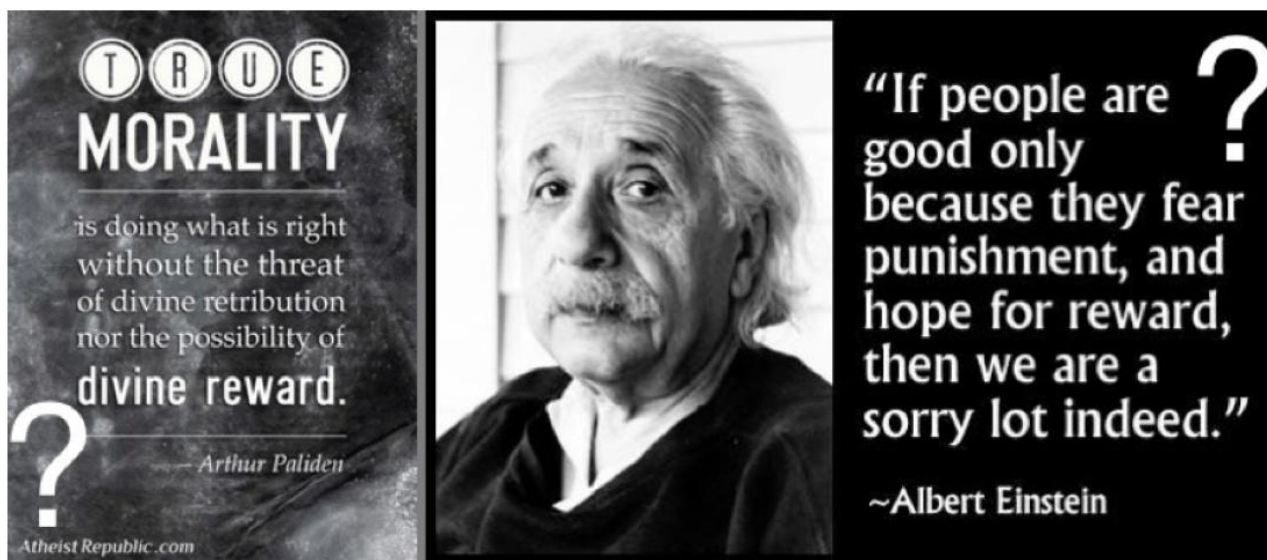
फिर याद आता, विद्यालय की छुट्टियों का  
गृह कार्य का इतिहास।  
दीदी, भइया, सब जुट जाते,  
लेकर गृहकार्य पंजिका,  
मन ही मन करते,  
अगली छुट्टियों का अहसास।



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 रुचि है।  
संपर्क: मो. क्र.- 9953967901,  
ई-मेल : sangeeta.pahuja3@gmail.com

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



## 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.*

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**Kumud Bala**

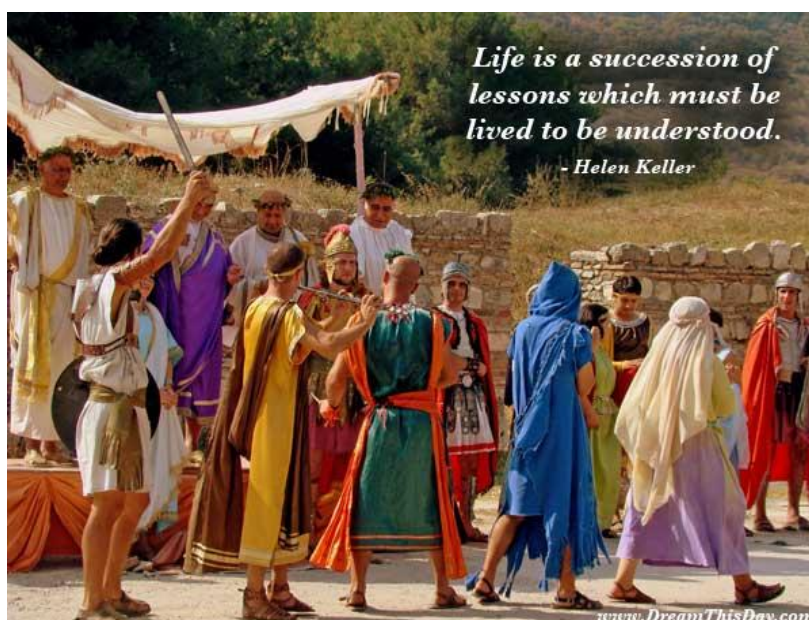
1. (A)	2. (B)	3. (A)	4. (C)	5. (B)	6. (A)	7. (C)	8. (C)	9. (C)	10. (B)
11. (C)	12. (B)	13. (B)	14. (A)	15. (A)	16. (D)	17. (A)	18. (A)	19. (C)	20. (B)
21. (D)	22. (B)	23. (C)	24. (C)	25. (B)	26. (C)	27. (B)	-	-	-

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**Prof. S.B. Dhar**

[illegible]

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## It's Not Just A CLOWN

Chyanis Tiwari

It is a bright morning. The sun is shining lightly on the trees. Birds and insects are singing. Drops of water are dropping from the leaves. Smell of the nature moves everywhere around that place. There is a small wooden house in the forest. From the overall style, this house is probably going to be a woman's house. If anyone sees this house, they would think that the person who lived here is really lucky because of the beautiful nature which is surrounding the house.

Nina Payton, a 30-year-old woman, who is still lying in bed comfortably, immediately woke up when she heard the alarm sound.

"It's still cold." She complained a little about the weather condition before walking to the living room. She sat on the soft sofa and read her favorite novel. She wants this moment to be quiet so she can relax.

Suddenly, her peaceful moment was destroyed by the ringing sound of her phone. She was really exhausted. If she could choose, she wouldn't pick up that phone. But it's her job, she has to pick it up or she would be fired.

"How's going, Andy", She asked. Andy, her colleague, is a good-humored person unlike her who is usually impassible.

"Good. How's your summer vacation? Do you have a full rest?" Andy questioned.

"It's always cold here. But yes, I do relax enough."

"Hmm...That's nice", He must have something for sure. He shouldn't be calling just because of this.

"Hey, Andy! Do you have anything to say? I don't think you call because of this."

"Erm... to be honest, I think we have a little big problem around here. Can you come?" Andy spoke truthfully with guilt "I know you feel desperate but everything is so chaos here. We really need your help."

Nina sighs before saying "Wait for me at the police office. I'm going."

She quickly dressed, picked up her police badge and didn't forget to pick her gun. She sat in her black Toyota Camry car and drove to the office.

Like Andy said, everything here is chaotic. Police officers were walking in and out. There was a woman crying loudly in front of the policeman.

"Oh. You're here!" Andy waved at Nina. He leads her to the office room. Nina sat down on the chair at the desk and Andy went to pick up the file for her.

"What happened to that woman who's crying in front of Mark?" Nina asked in doubt.

"It's a serious murder case. Her daughter disappeared without a trace and we found her daughter's death body at her best friend's house." Andy answered while finding the file on the shelves.

"We can't even trust our best friends nowadays." Nina said.

"Found it!" Andy shouted up with joy. "Here is the latest case. Everyone agreed to let you do this case."

"Why me?" Nina asked

"Because, you are the most experienced person for this case" Andy responded while giving a file to Nina. "Why don't you take a look at the file first?"

Nina received the file from Andy. She turned the page over and over until she suddenly stopped at the photo. She was shocked by what she saw in the photo.

"This is exactly same as what happened 5 years ago...", Nina said while looking at the photo.

"Yes, it is. So, do you need any partner, like in particular? You know, it's a serious case." Andy asked so he could find a partner for Nina.

"I think I have one in my mind. I would ask him by myself. He's not the one who accept these requests easily." Nina told Andy and walked out to the car.

Nina picked up her phone from the pocket. She constantly moved the screen in contact and stopped at one name. She called him. Suddenly, someone answered the phone.

"Hello?" the middle-aged voice came through the call.

"Can we meet, Detective Archer?" Nina asked.

"Excuse me, who is it I'm talking to?" Archer asked.

"It's me, Nina Payton" Nina answered him.

"Oh. It's you. Can't believe you're calling me. Is there anything wrong? Or some kind of serious case that you need my help?" Archer asked.

"Let's just have a talk. Meet me at the June's 10.30"

"Wait. That's just 10 minutes from now."

"You better be fast..." Nina said before cutting the phone call.

At the June's café.

“Hey there.” Archer walked to the table and sat down. He is a tall middle-aged man who has a brown hair and blue eyes.

“You’re 4 minutes late.” Nina reprehended.

“Sorry for lateness. Can we focus on the thing now?” Archer said.

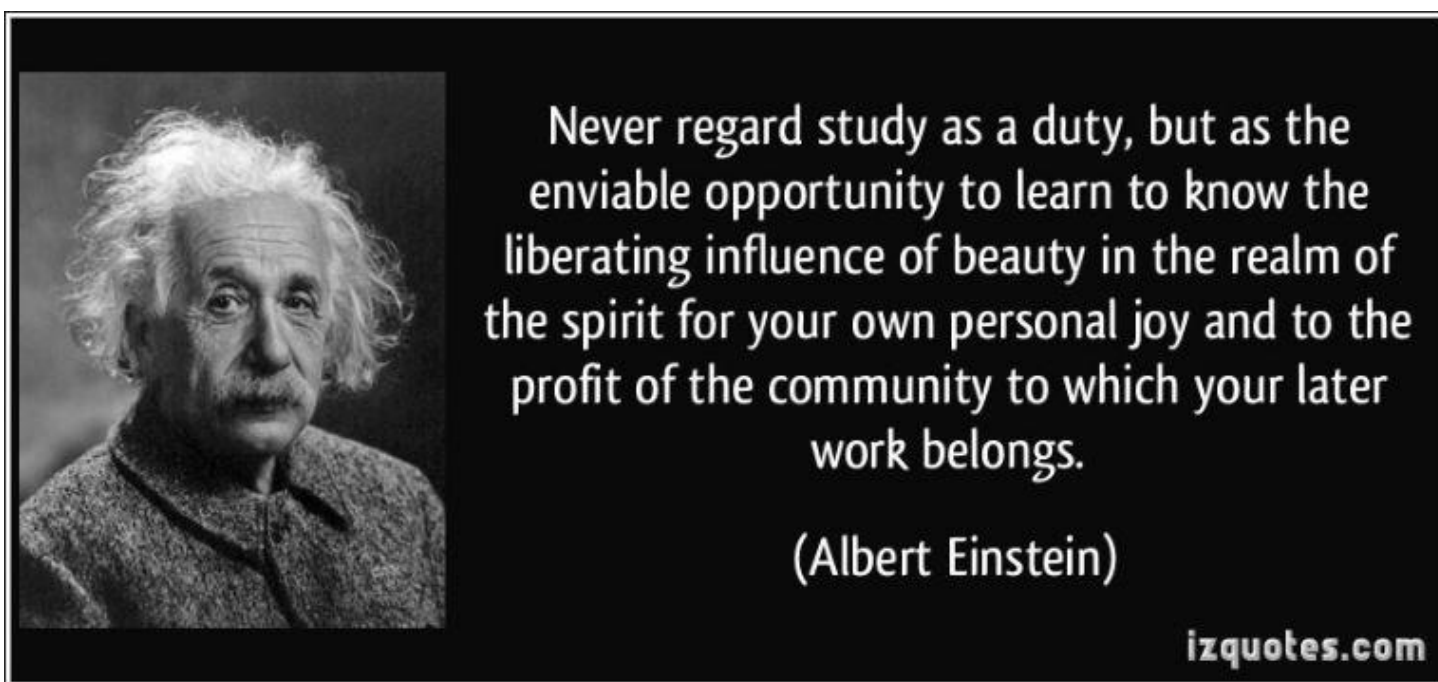
“Of course. Here.” Nina gave the file to Archer.

“Hmm... Clowns?” Archer said in surprise on his face.



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

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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*

# LET'S DO SOME PROBLEMS IN MATHEMATICS-X

Prof. SB Dhar

The questions selected in this article are very easy but simultaneously very typical too. These questions can be solved in many ways. One of the solutions is given here. The readers should try to solve them without seeing the solutions. I am sure; the readers will find some new methods.

## 1. Sum: $1+2+3+4+5+\dots$ upto $\infty$ .

**Solution:** It is a divergent series. A divergent series is a series whose sum does not reach a finite value. To sum such series, we use the method of averages.

$$\text{Let } S = 1+2+3+4+\dots \text{ upto } \infty \quad \dots(i)$$

$$\text{Let } S_1 = 1-1+1-1+1-1+\dots \text{ upto } \infty \quad \dots(ii)$$

$$S_1 = 0, \quad \text{if the number of terms are even}$$

$$S_1 = +1, \quad \text{if the number of terms are odd}$$

It means  $S_1$  lies between 0 and +1.

$$\text{For convenience, we can take } S_1 = \frac{0+1}{2} = \frac{1}{2} \quad \dots(iii)$$

$$\text{Now let } S_2 = 1-2+3-4+5-\dots \quad \dots(iv)$$

$$S_2 = 1-2+3-4+5-\dots \quad \dots(v)$$

(by shifting one term to the right)

$$\text{On adding both (iv) and (v) } 2S_2 = 1-1+1-1+1-\dots = \frac{1}{2},$$

$$\text{Therefore, } S_2 = \frac{1}{4} \text{ From (i)-(iv) we get,}$$

$$S - S_2 = (1+2+3+4+\dots \text{ upto } \infty) - (1-2+3-4+5-\dots \text{ upto } \infty)$$

$$= 2(2+4+6+\dots \text{ upto } \infty) = 4(1+2+3+\dots \text{ upto } \infty)$$

$$= 4S \Rightarrow S - 4S = S_2 \Rightarrow -3S = S_2 = \frac{1}{4} \Rightarrow S = -\frac{1}{12}$$

## 2. Show that:

$$\frac{1}{x+a_1} + \frac{a_1}{(x+a_1)(x+a_2)} + \frac{a_1 a_2}{(x+a_1)(x+a_2)(x+a_3)} + \dots \text{ upto } n \text{ terms}$$

$$= \frac{1}{x} - \frac{1}{x \left(1 + \frac{x}{a_1}\right) \left(1 + \frac{x}{a_2}\right) \left(1 + \frac{x}{a_3}\right) \dots \left(1 + \frac{x}{a_n}\right)}$$

**Solution:** The first term can be written as –

$$\frac{1}{x+a_1} = \frac{1}{x} - \left\{ \frac{1}{x} - \frac{1}{x+a_1} \right\} = \frac{1}{x} - \frac{a_1}{x(x+a_1)}$$

The sum of the first two terms can be written as –

$$\frac{1}{x+a_1} + \frac{a_1}{(x+a_1)(x+a_2)} = \left\{ \frac{1}{x} - \frac{a_1}{x(x+a_1)} \right\} + \frac{a_1}{(x+a_1)(x+a_2)}$$

$$= \frac{1}{x} - \frac{a_1 a_2}{x(x+a_1)(x+a_2)}$$

Similarly, the sum of three terms can be written as –

$$\frac{1}{x} - \frac{a_1 a_2 a_3}{x(x+a_1)(x+a_2)(x+a_3)}$$

Accordingly, the sum to  $n$  terms can be written as –

$$\frac{1}{x} - \frac{a_1 a_2 a_3 \dots a_{n-1} a_n}{x(x+a_1)(x+a_2)(x+a_3) \dots (x+a_n)} = \frac{1}{x} - \frac{1}{x \left(1 + \frac{x}{a_1}\right) \left(1 + \frac{x}{a_2}\right) \left(1 + \frac{x}{a_3}\right) \dots \left(1 + \frac{x}{a_n}\right)}$$

## 3. Show that: $(1+x)(1+x^2)(1+x^3)(1+x^4) \dots = \frac{1}{(1-x)(1-x^3)(1-x^5)(1-x^7) \dots}$

**Solution:** We know that  $\frac{1-x^{2n}}{1-x^n} = 1+x^n$

$$\text{For } n=1, \quad 1+x = \frac{1-x^2}{1-x} \quad \dots(i)$$

$$\text{For } n=2, \quad 1+x^2 = \frac{1-x^4}{1-x^2} \quad \dots(ii)$$

$$\text{For } n=3, \quad 1+x^3 = \frac{1-x^6}{1-x^3} \quad \dots(iii)$$

$$\text{For } n=4, \quad 1+x^4 = \frac{1-x^8}{1-x^4} \quad \dots(iv)$$

On multiplying (i),(ii),(iii),(iv) and so on, we get

$$(1+x)(1+x^2)(1+x^3)(1+x^4) \dots$$

$$= \frac{1-x^2}{1-x} \cdot \frac{1-x^4}{1-x^2} \cdot \frac{1-x^6}{1-x^3} \cdot \frac{1-x^8}{1-x^4} \dots = \frac{1}{(1-x)(1-x^3)(1-x^5)(1-x^7) \dots}$$

As all the even powered terms of Denominator get cancelled from the equal terms in Numerator.

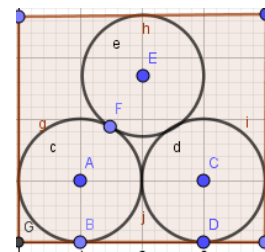
## 4. Prove that $0.999999 \dots = 1$

**Solution:** Let  $x = 0.999999 \dots$  (i)

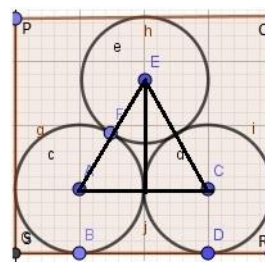
$$\text{Hence, } 10x = 9.99999 \dots \quad (ii)$$

$$\text{From (ii)-(i) we get } 9x = 9.00000 \dots \Rightarrow x = 1$$

## 5. Find the area of the rectangle that has three identical circles of radius $r$ , as shown in the figure.



**Solution:** Let A, C and E be the centres of the equal circles or radius  $r$  in the rectangle.





In rectangle PQRS length of side PQ =  $r+r+r+r=4r$   
 The width of the rectangle QR =  $r+EJ$ , where  
 $EJ = \sqrt{(EC)^2 - (JC)^2} = \sqrt{(2r)^2 - r^2} = \sqrt{3r^2} = \sqrt{3}r$   
 Therefore area of the rectangle = PQ. QR =  
 $(4r)(2r+\sqrt{3}r) = 4(2+\sqrt{3})r^2$

6. Find a real number  $n$  such that  $(n+1)! + (n+2)! = (n)! \times 440$ . Also find the sum of the digits of the number.

**Solution:** Given that  $(n+1)! + (n+2)! = (n)! \times 440$

$$\Rightarrow (n+1).(n)! + (n+2)(n+1).(n)! = (n)! \cdot 440$$

$$\Rightarrow (n+1) + (n+2)(n+1) = 440$$

$$\Rightarrow n^2 + 4n - 437 = 0$$

$$\Rightarrow n = \frac{-4 \pm \sqrt{16 + 1748}}{2} = \frac{-4 \pm \sqrt{1764}}{2} = \frac{-4 \pm 42}{2} = \frac{-46}{2} \text{ or } \frac{38}{2}$$

But,  $n$  cannot be negative, hence  $n=19$

7. A large cake is to be distributed among guests such that the first guest gets 1% of the cake. Then the second guest gets 2% of the remaining cake. Then the third guest gets the 3% of the remaining cake. This process is continued until the last guest gets the 100% of the remaining cake. Which guest gets the largest part of the cake?

**Solution:** Let the cake be equal to 100.

First guest gets  $\frac{1}{100}$  and the remaining part is  $\frac{99}{100}$ .

Second guest gets  $\frac{99}{100} \times \frac{2}{100}$  and the remaining part is

$$\frac{99}{100} \times \frac{98}{100}$$

Third guest gets  $\frac{99}{100} \times \frac{98}{100} \times \frac{3}{100}$  and the remaining part is

$$\frac{99}{100} \times \frac{98}{100} \times \frac{97}{100}$$

Similarly,  $k^{\text{th}}$  guest gets  $G_k = \frac{99}{100} \times \frac{98}{100} \times \frac{97}{100} \times \dots \times \frac{k}{100-k}$   
 and the remaining part is  $\frac{99}{100} \times \frac{98}{100} \times \frac{97}{100} \times \dots \times \frac{100-k}{100}$

On simplification we get  $G_k = \frac{99!}{(100-k)!} \times \frac{k}{100^k}$

If we generalize this formula for  $(k+1)^{\text{th}}$  guest  $G_{k+1} = \frac{99!}{(100-k-1)!} \times \frac{k+1}{100^{k+1}} = \frac{99!}{(99-k)!} \times \frac{k+1}{100^{k+1}}$

$$\text{Therefore, } \frac{G_{k+1}}{G_k} = \frac{99!}{(99-k)!} \times \frac{k+1}{100^{k+1}} \times \frac{(100-k)!}{99!} \times \frac{100^k}{k}$$

$$= \frac{k+1}{100} \times \frac{(100-k)}{k} \Rightarrow \frac{k+1}{100} \times \frac{(100-k)}{k} \geq 1$$

$\Rightarrow k^2 + k \leq 100$  For  $k=1,2,3,4,\dots,9$ , this equation remains true and for  $=10$ , it becomes False. Hence the 10<sup>th</sup> Guest gets the largest part.

8. Simplify:

$$\frac{(10^4+324)(22^4+324)(34^4+324)(46^4+324)(58^4+324)}{(4^4+324)(16^4+324)(28^4+324)(40^4+324)(52^4+324)}$$

**Solution:** Let us write the first term of the Numerator  $10^4 + 324 = 10^4 + 4(81) = 10^4 + 4(3^4)$

Each term is of the form  $a^4 + 4b^4$

Use Identity:  $a^4 + 4b^4 = (a^2 + 2b^2 - 2ab)(a^2 + 2b^2 + 2ab)$   
 In the question,  $a$  is changing but  $b=3$  is constant. So, generalize the formula!

$$\begin{aligned} x^4 + 4(3^4) &= (x^2 + 2 \cdot 3^2 - 2 \cdot x \cdot 3)(x^2 + 2 \cdot 3^2 + 2 \cdot x \cdot 3) \\ &= (x^2 + 2 \cdot 3^2 - 2 \cdot x \cdot 3)(x^2 + 2 \cdot 3^2 + 2 \cdot x \cdot 3) \\ &= (x^2 + 18 - 6x)(x^2 + 18 + 6x) \\ &= \{x(x - 6) + 18\}\{x(x + 6) + 18\} \end{aligned}$$

If we put  $x=10$ , the first term is found and so on..  
 $\frac{(10^4+324)}{(4^4+324)} = \frac{\{10(10-6)+18\}\{10(10+6)+18\}}{\{4(4-6)+18\}\{4(4+6)+18\}} = \frac{\{10(10+6)+18\}}{\{4(4-6)+18\}}$   
 The first term of Numerator and the last term of Denominator are cancelled. In the last, the only remaining un-cancelled terms are the last term of the last term in the Numerator and the first term of the Denominator.

$$= \frac{\{58(58+6)+18\}}{\{4(4-6)+18\}} = \frac{\{58(64)+18\}}{10} = \frac{3730}{10} = 373$$

9. If  $2019 + (n)!$  is a square number, where  $n$  is a positive integer, then find all the possible values of  $n$ .

**Solution:**

We know that  $1^2 = 4(0) + 1$ ,  $2^2 = 4(1) + 0$ ,  $3^2 = 4(2) + 1$ ,  $4^2 = 4(4) + 0$ ,  $5^2 = 4(6) + 1$ ,  $6^2 = 4(9) + 0$   
 And so on...  $2019 = 504(4) + 3 \Rightarrow 2019$  is of the form  $(4n+3)$ ,  $4!$ ,  $5!$ ,  $6!$ , .... All are multiples of 4 hence for  $n \geq 4$   $2019 + (n)! = 4k+3+4m$  for some positive integer  $m$ . And  $2019 + (n)! = 4(k+m) + 3$ .

$2019 + (n)!$  cannot be square for all  $n \geq 4$ .

Therefore, only three values are possible for  $n=1,2,3$   
 $2019 + (1)! = 2020$  is not a square  $2019 + (2)! = 2021$  is not a square  $2019 + (3)! = 2025$  is a square of 45.  
 Therefore  $n=3$  is the only solution.

10. Find the value of  $\sqrt[3]{8 + 3\sqrt{21}} + \sqrt[3]{8 - 3\sqrt{21}}$

**Solution:** Let  $a = 8 + 3\sqrt{21}$ ,  $b = 8 - 3\sqrt{21}$

$$\begin{aligned} \text{Use identity } \left(a^{\frac{1}{3}} + b^{\frac{1}{3}}\right)^3 &= (a+b) + 3\sqrt[3]{a^2b} \left(a^{\frac{1}{3}} + b^{\frac{1}{3}}\right) \\ &= (16) + 3\sqrt[3]{ab} \left(a^{\frac{1}{3}} + b^{\frac{1}{3}}\right) \\ &= 16 + 3\sqrt[3]{64 - 9(21)} \left(a^{\frac{1}{3}} + b^{\frac{1}{3}}\right) \\ &= 16 + 3\sqrt[3]{-125} \left(a^{\frac{1}{3}} + b^{\frac{1}{3}}\right) \\ &= 16 + 3(-5)(a+b) = 16 - 15 \left(a^{\frac{1}{3}} + b^{\frac{1}{3}}\right) \end{aligned}$$

$$\text{Let } \left(a^{\frac{1}{3}} + b^{\frac{1}{3}}\right) = x, \text{ then } x^3 + 15x - 16 = 0$$

$$\Rightarrow (x-1)(x^2+x+16) = 0$$

$$\Rightarrow x = 1$$

11. Find the value of

$$\sqrt{1 + 2\sqrt{1 + 3\sqrt{1 + 4\sqrt{1 + \dots}}}}$$

$$\text{Solution: } 3 = \sqrt{9} = \sqrt{1+8} = \sqrt{1+2 \cdot 4} = \sqrt{1+2\sqrt{16}}$$

$$= \sqrt{1+2\sqrt{1+15}} = \sqrt{1+2\sqrt{1+3 \cdot 5}}$$

$$= \sqrt{1+2\sqrt{1+3\sqrt{25}}} = \sqrt{1+2\sqrt{1+3\sqrt{1+24}}}$$

$$= \sqrt{1+2\sqrt{1+3\sqrt{1+4 \cdot 6}}}$$

$$= \sqrt{1+2\sqrt{1+3\sqrt{1+4\sqrt{36}}} = \dots..$$

12. Solve for x:

$$x = 1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \dots}}}$$

Solution:

$$x = 1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \dots}}} = 1 + \frac{1}{x}$$

$$x^2 - x - 1 = 0$$

$$x = \frac{1 \pm \sqrt{1+4}}{2}$$

Since all terms are positive, hence x will be positive.

$$x = \frac{1+\sqrt{5}}{2}$$

$$13. \text{ Solve: } x = 10\sqrt{10\sqrt{10\sqrt{10} \dots}}$$

Soution:

$$x = 10\sqrt{10\sqrt{10\sqrt{10} \dots}} = 10^{1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\dots \text{upto } \infty}$$

$$= 10^{\frac{1}{1-\frac{1}{2}}} = 10^2 = 100$$

$$14. \text{ Solve: } x^{x^{x^{x^{\dots}}}} = 2$$

Solution:

$$x^{x^{x^{x^{\dots}}}} = 2 \Rightarrow x^2 = 2 \Rightarrow x = \sqrt{2}$$

15. Is it possible to write the 11 whole numbers from 1985 to 1995 in some order so that the 44-digit number is a prime number?

Solution: 1985 1986 1987 1988 1989 1990 1991 1992  
1993 1994 1995

This number is divisible by 11. It can be checked by using the divisibility Rule by 11.

Divisibility Rule by 11: (Sum of digits at odd places) – (sum of digits at even places) should be divisible by 11.  
Sum of the digits at RED places  
= (1+8+1+8+1+8+1+8+1+9+1+9+1+9+1+9+1+9+1+9)  
= 105

Sum of the digits at BLACK places  
= (9+5+9+6+9+7+9+8+9+9+9+0+9+1+9+2+9+3+9+4+9+5) = 149

The difference is = 105-149 = - 44.

It is divisible by 11, hence the 44-digit number is not a prime. Even if the year digits are arranged in any manner, the places of even and odd digits will not change.



The author, 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.

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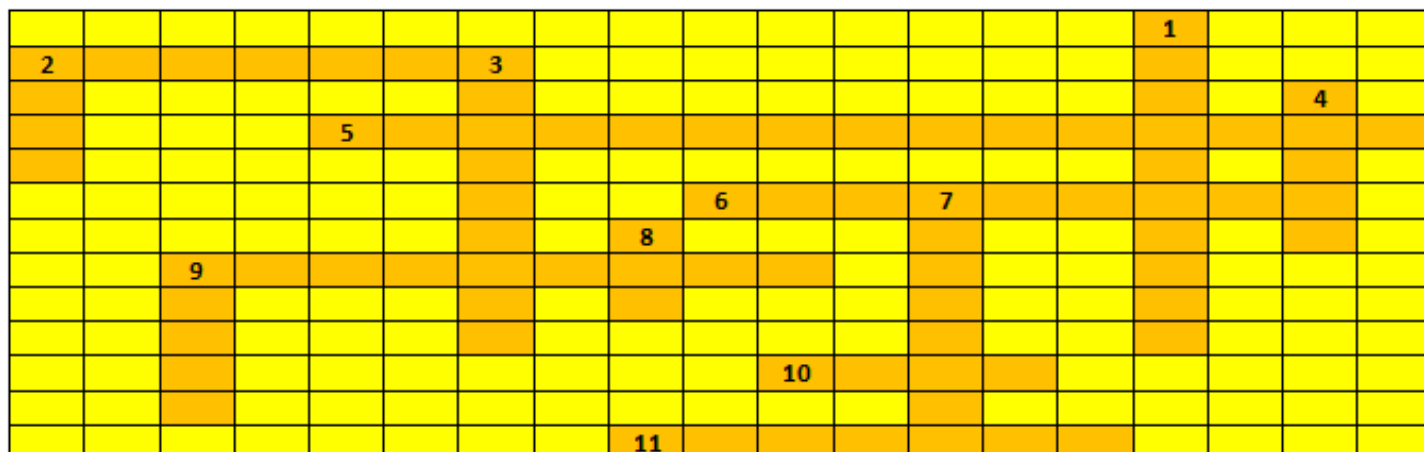
—00—

*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**

## CROSSWORD PUZZLE June'19 : ETIQUETTES OF INDIA

Prof. SB Dhar



Across		Down	
2	National Anthem written originally in	1	Sea that borders India
5	Government type of India	2	Most Indians avoid eating
6	Food is often eaten with which Hand	3	Ethnic make-up of India
9	Informal name of film Industry of India	4	Primary language that is spoken by most of Indians
10	Number of main castes structure that divides India	7	Religion of India that has no single founder
11	Traditional greeting word	8	Sacred animal of India
		9	Source of determination of caste

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

—00—

*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*

—00—

## **Understanding Calorimetry and Thermodynamics**

*Beginning of inferential analysis of observations in Kinetic Theory of Gases (KTG), a part of chapter on Heat application of the concepts is a logical consequence of the journey in the physics. Calorimetry and Thermodynamics are the two important chapter. Accordingly, in this set of questions, problems are taken up with their illustrations.*

Any understanding of theory is useful in problem solving only when it is followed by rigorous practice in solving problems of verities involving various concepts. In this connection there are various test books and question banks available at book stores. Yet books by Resnick-Halliday-&-Krane and H.C. Verma are placed at first choice for a systematic growth of excellence. This choice is not by any other consideration except that the authors have formulated problems so nicely that taking any of two books would give a good spectrum of problems are graded with increasing complexity, as one proceeds with them. They involve different concepts on the chapter and integration of concepts studied earlier. As against this questions from various examination and competitions are abrupt and at the level of competition being targeted. It is, therefore, appropriate to practice such questions only when problems from such text books have been practiced.

It may not be out of context to place on record that *solving any toughest problem is simpler than formulating a problem*. In light of this efforts of the authors in writing book and supplementing it with question bank is highly revered. In view of this, in the supplement to Mentors' Manual while preference is given to the books, question bank in the book by H.C. Verma, has been taken to start with. It covers Objective Questions (both SCQ and MCQ) together with exercises. Going forward this is being supplemented with questions from other sources also.

It is a common experience that the web resource has been so much enriched that it is just a matter of posing a problem and solution is available either free or some on price. Here, it is pertinent to emphasize that web resource is meant to reach students who are not able to connect the solution provider. While, students from deprived section of society may find it difficult to always make sense with the available web solution. In view of this question banks are supplemented with illustrations. The illustrations are tend to start from first principle, to the possible extent, with special note wherever necessary. This is expected to be useful who never had an opportunity to be attached to passionate mentors. Since each illustration is handled as an independent difficulty of a student or user repetition of steps is unavoidable. This is in line with the objective of this to reach out to students who are otherwise disconnected and struggling in their journey of excellence.

Students are advised to revise basics before attempting question bank. It is advised to attempt them under examination conditions to gain proficiency in terms of

accuracy and speed. In case of mismatch of answers, students are advised to retry problems after revisiting concepts. Despite, if difficulty exists the illustrations may be referred and then problem may be attempted independently. After successfully attempting question bank, students may like to refer to illustrations for appreciating nuances of concepts.

Elaboration of concepts and calculations at times might be found too trivial. Yet students are advised to start with it. Gradually as students attain proficiency in applying concepts and handling long calculations crisp steps and calculations will evolve automatically without being conscious of it. As regards brilliant students, teachers and professionals may like to pick up random illustrations or those of problems encountered with mismatch of answers. They would find the approach in illustrations worth refreshing the concepts for themselves. In case they wish to add value to illustrations by ambiguities, if found, typographical

Practicing of problems at times involves numerical skills and handling of data in different system of units. This requires care and clarity of variables and their units for correctness and speed; it is a necessity for success in examination. It is also advised that during solution, students stick to one system of units, preferably SI, and convert the given data into it wherever necessary. It facilitates burden of remembering standard values in different system of units. This approach may take some extra efforts, yet it would certainly avert possibility of errors. Loss of an error is much bigger due to negative marking.

A small group of passionate persons are engaged in this initiative to mentor unprivileged children so as to groom competence to compete among them. This is driven with a sense of Personal Social Responsibility (PSR). It is a non-organizational, non-remunerative, non-commercial and non-political manner. Teachers, mentors, students and professionals who can collectively complement the efforts to the extent it is possible and it suits to their passion, experience, expertise and convenience, are gratefully welcomed.

Typical problems and illustrations are brought for a ready reference, while a question bank with answers and illustrations is being uploaded on the our website separately



## ILLUSTRATIONS OF TYPICAL QUESTIONS ON Calorimetry and Thermodynamics

### (Set 3, on Chapter 2: Heat and Thermodynamics, Mentors' Manual)

*In the spirit of concept of mean speed of gaseous molecules, here solutions are being deliberately called illustration. There could be multiple ways of solving problem, and solution provider chooses one of them, with a presumption that its user has prior knowledge on selection of a particular way leading to the solution. Experience of mentoring unprivileged students has revealed that whatever and whichever way is told to the target students, they tend to remember it. This jeopardizes basic philosophy of reasoning in an out-of-box manner. Therefore, in illustrations below reasoning of the choice of concept, equations and their solutions is advanced from the basics. Every-time taking illustration of basic concepts from first principle is not feasible. However, a reader who has read the Mentors' Manual or a textbook would find it easy to sail into the reasoning behind a solution, if not elaborated in illustrations. Same method is adopted in illustrations of question bank, with a belief that mentor and students in isolated locations would not find it easy to evolve methodology of problem solving in an intuitive manner, without either carrying burden of formulae or end results or take shortest route to solve a problem under examination conditions.*

**Question 1:** Four  $2\text{cm} \times 2\text{cm} \times 2\text{cm}$  ice cubes are taken out from a refrigerator and put in 200 ml of a drink at  $10^\circ\text{C}$ .

- Find the temperature of the drink when thermal equilibrium is attained in it.
- If the ice cubes do not melt completely, find the amount melted. Assume that no heat is lost to the outside of the drink and the container has negligible heat capacity.

Given that density of the ice is  $900 \text{ kg.m}^{-3}$ , density of the drink is  $1000 \text{ kg.m}^{-3}$ , specific heat capacity of the drink is  $4200 \text{ J.kg}^{-1}\text{K}^{-1}$  and latent heat of fusion of ice is  $3.4 \times 10^5 \text{ J.kg}^{-1}$ .

**Illustration:** Mass of each ice cubes, as per given data, is  $m_c = V_c \times \rho_c = (8 \times 10^{-6}) \times 900 = 7.2 \times 10^{-3} \text{ kg}$ . Therefore, mass of four ice cubes is  $m_{c-4} = 4 \times 7.2 \times 10^{-3} = 28.8 \times 10^{-3} \text{ kg}$ . Mass of drink, as per given data is  $m_d = V_d \times \rho_c = (200 \times 10^{-6}) \times 1000 = 200 \times 10^{-3} \text{ kg}$ . At thermal equilibrium there are two possible condition – (a) Ice cubes take heat from the drink first to melt, and then continue to gain heat till thermal equilibrium of the mixture is attained at temperature  $T$  such that  $0 < T < 10^\circ\text{C}$ , (b) Part of the ice cubes take heat from the drink to melt till temperature of mixture reaches  $0^\circ\text{C}$ . Beyond that there will be no transfer of heat as per Zeroth Law of Thermodynamics as both liquid mixture and ice are at  $0^\circ\text{C}$ .

**Taking first the case (a) :** for analysis the heat balance equation will be heat gained by ice cubes and water created by melting is equal to heat lost by the drink. Accordingly,  $m_{c-4} \times L_f + m_{c-4} \times s_d \times T = m_d \times s_d \times (10 - T)$ . On substituting values from the given data we get that  $(28.8 \times 10^{-3}) \times (3.4 \times 10^5) + (28.8 \times 10^{-3}) \times (4.2 \times 10^3) \times T = (200 \times 10^{-3}) \times (4.2 \times 10^3) \times (10 - T)$ . It leads to  $97.92 \times 10^3 + 0.12 \times 10^3 \times T = 0.84 \times 10^3 \times (10 - T) \Rightarrow 97.92 + 0.12 \times T = 8.4 - 0.84 \times T \Rightarrow 0.96 \times T = 8.4 - 97.92$ . It further solves into  $0.96T = -89.52 \Rightarrow T = \frac{-89.52}{0.96} = -93.3^\circ\text{C}$ . This since leads to a (-)ve temperature of the mixture,

which is not possible since essential condition  $0 < T < 10^\circ\text{C}$  stated earlier is violated. **Thus it will lead to partial fusion of ice and temperature of mixture at equilibrium would be  $0^\circ\text{C}$ . This is part (a) of the answer.**

Extending the conclusion arrived at in case (a) to determine mass  $X$  of the ice that has melted as per case (b) and also desired in part (b) of the answer. In this case heat balance equation shall be

$X \times L_f = m_d \times s_d \times (10 - 0) \Rightarrow X = \frac{0.2 \times (4.2 \times 10^3) \times 10}{3.4 \times 10^5} = 2.47 \times 10^{-2} \text{ kg} = 24.7 \text{ g}$ . **Thus, considering SGs, the answer to part (b) is 25 g.**

**N.B.:** Two parts of this question can be split in two separte questions.

**Question 2:** A metal block of density  $6000 \text{ kg.m}^{-3}$  and mass  $1.2 \text{ kg}$  is suspended through a spring of spring-constant  $200 \text{ N/m}$ . The spring-block system is dipped in water kept in vessel. The water has a mass of  $260 \text{ g}$  and the block is at a height  $40 \text{ cm}$  above the bottom of the vessel. If the support to the spring is broken, what will be the rise in the temperature of the water. Specific heat capacity of the block is  $250 \text{ J.kg}^{-1}.\text{K}^{-1}$ . And that of water is  $4200 \text{ J.kg}^{-1}.\text{K}^{-1}$ . Heat capacities of the vessel and the spring are negligible.

**Illustration:** The metal block when suspended through a spring is in equilibrium such that

$$mg = T + F_B \Rightarrow T = mg - F_B = mg - (V\rho_w)g = mg - \left(\frac{m}{\rho_m}\rho_w\right)g = mg\left(1 - \frac{\rho_w}{\rho_m}\right). \quad \text{When}$$

spring breaks, the spring tension  $T$  which keep the block in equilibrium disappears and block starts descending in the water with resultant force , since density of block is greater than that of

water  $\rho_m > \rho_w$ . Work done by the block in descending to bottom is  $W = mg\left(1 - \frac{\rho_w}{\rho_m}\right) \times h$ . As

per Law of conservation of energy, this work done during fall of the body would be absorbed in increase of temperature of water and block such that  $\Delta H = (m \times s_m + m_w \times s_w) \times \Delta T$ . Here,

mass of water is ,  $m_w = (V\rho_w) = \left(\frac{m}{\rho_m}\rho_w\right)$ . Accordingly, heat gained is

$$\Delta H = \left(m \times s_m + \left(\frac{m}{\rho_m}\rho_w\right) \times s_w\right) \times \Delta T = m \left(\frac{s_m \times \rho_m + \rho_w \times s_w}{\rho_m}\right) \times \Delta T. \quad \text{As per law of conservation of energy}$$

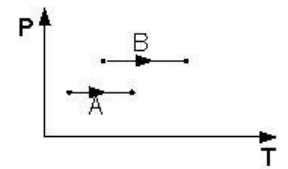
$$\Delta H = W \Rightarrow m \left(\frac{s_m \times \rho_m + \rho_w \times s_w}{\rho_m}\right) \times \Delta T = mg \left(1 - \frac{\rho_w}{\rho_m}\right) \times h \Rightarrow \Delta T = \frac{g \left(\frac{\rho_m - \rho_w}{\rho_m}\right) h}{\left(\frac{s_m \times \rho_m + \rho_w \times s_w}{\rho_m}\right)} = gh \left(\frac{\rho_m - \rho_w}{s_m \times \rho_m + \rho_w \times s_w}\right) \quad \text{On}$$

substituting the given data in the final algebraic form

$$\Delta T = 10 \times 0.4 \left(\frac{6000 - 1000}{250 \times 6000 + 4200 \times 1000}\right) = 4 \times \frac{5}{1500 + 4200} = 3.5 \times 10^{-3} \text{ } ^\circ\text{C}. \quad \text{Thus, answer is } 3.5 \times 10^{-3} \text{ } ^\circ\text{C}.$$

**N.B.:** Solving problem algebraically eliminates mass of metal block from final results. Nevertheless, it is useful if intermediate values are determined arithmetically to avoid algebraic statement, if considered helpful by student.

**Question 3:** Consider two processes A and B on a system as shown in the figure. The volumes in the initial states are the same in the two process, and volumes in the final states are also the same. Let  $\Delta W_1$  and  $\Delta W_2$  are the work done by the system in the processes A and B respectively.



(a)  $\Delta W_1 > \Delta W_2$       (b)  $\Delta W_1 = \Delta W_2$

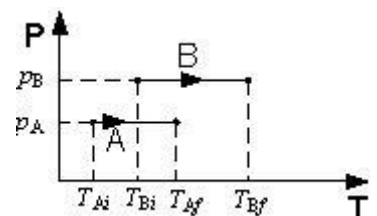
(c)  $\Delta W_1 < \Delta W_2$       (d) Nothing can be said about the relation between  $\Delta W_1$  and  $\Delta W_2$

**Illustration:** The question states that at initial states in two processes is  $v_{Ai} = v_{Bi}$  and at

final states in two processes is  $v_{Af} = v_{Bf}$ . In both the processes A and B pressures are

different yet constant  $p_A = \text{Constant}$  and  $p_B = \text{Constant}$ . Thus the two processes are

isobaric processes. Therefore, as per ideal gas equation  $pv = nRT$ , the effective



equation for the processes would be  $v = \frac{nRT}{p}$ . Therefore work done in process A is

$$\Delta W_1 = p_A \left( \frac{n_A R T_{Af}}{p_A} - \frac{n_A R T_{Ai}}{p_A} \right) = n_A R (T_{Af} - T_{Ai}) = n_A R \Delta T_A.$$
 Likewise in process B it would be

$$\Delta W_2 = n_B R (T_{Bf} - T_{Bi}) = n_B R \Delta T_B.$$
 Using these two equations  $\frac{\Delta W_1}{\Delta W_2} = \frac{n_A R \Delta T_A}{n_B R \Delta T_B} = \frac{n_A \Delta T_A}{n_B \Delta T_B}$ . Since, the two processes are

carried out on a system and hence  $n_A = n_B$  it leads to  $\frac{\Delta W_1}{\Delta W_2} = \frac{\Delta T_A}{\Delta T_B}$ . From figure it is evident that  $\Delta T_A < \Delta T_B \Rightarrow \frac{\Delta T_A}{\Delta T_B} < 1$

, therefore,  $\frac{\Delta W_1}{\Delta W_2} < 1 \Rightarrow \Delta W_1 < \Delta W_2$ . **From this analysis, correct answer is (c).**

**Question 4:** A 100 kg block is started with a speed of  $2.0 \text{ m.s}^{-1}$  on a long, rough belt kept fixed in a horizontal position. The coefficient of kinetic friction between the block and the belt is 0.20.

- Calculate the change in internal energy of the block-belt system as the block comes to a stop on the belt.
- Consider the situation from a frame of reference moving at  $2.0 \text{ m.s}^{-1}$  along the initial velocity of the block. As seen from this frame, the block is gently put on a moving belt and in due time the block starts moving with the belt at  $2.0 \text{ m.s}^{-1}$ . Calculate the increase in the kinetic energy of the block as it stops slipping past the belt.
- Find the work done in this frame by the external force holding the belt.

**Illustration:** As per law of friction frictional force between the block and the horizontal belt is  $f = \mu \times N = \mu \times (mg)$ . This frictional force would create a retardation on the block having initial velocity  $u = 2 \text{ m.s}^{-1}$ . Thus, retardation experienced by the block on the belt is  $a = -\frac{f}{m} = -\frac{\mu mg}{m} = -\mu g$ .

Initial kinetic energy of the block is  $KE_i = \frac{1}{2}mv^2 = \frac{1}{2} \times 100 \times 2^2 = 200 \text{ J}$ . Final kinetic energy of the block when it comes to rest is  $KE_f = 0 \text{ J}$ . Hence change in

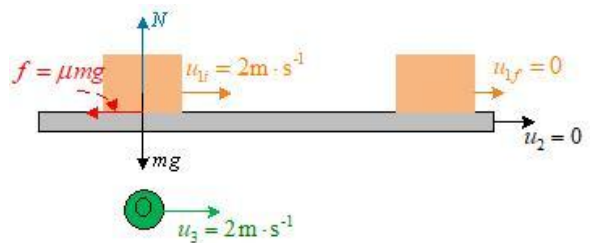
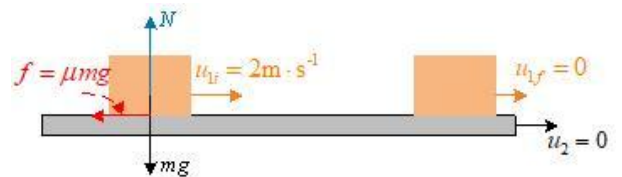
mechanical energy in case (a) is  $W_a = KE_f - KE_i = 0 - 200 = -200 \text{ J}$ . In the system no transfer of heat from an external source is stated and hence  $Q = 0$ . Accordingly as per FLT  $Q = 0 = W + \Delta U \Rightarrow \Delta U = -W = -(-200) = 200$ . **Thus change in internal energy of the block-belt system is 200 J. This form part (a) of the answer.**

In part (b) of the problem belt remains static and initially an observer and the block are moving in same direction with velocities  $u_{li} = u_3 = 2 \text{ m.s}^{-1}$ . Therefore, relative velocity of block w.r.t. observer  $v_{b-o-i} = v_{li} - v_3 = 2 - 2 = 0 \text{ m.s}^{-1}$ . As block is placed on the static belt, it exercises friction on the block and it reads to come at rest w.r.t. belt as in case (a). But, final velocity of block w.r.t. observer is  $v_{b-o-f} = v_{li} - v_3 = 0 - 2 = -2 \text{ m.s}^{-1}$ . Therefore, change in kinetic energy of the block w.r.t. observer in case (b) is

$$\Delta KE_b = \frac{1}{2}m(v_{b-o-f}^2 - v_{b-o-i}^2) = \frac{1}{2}100(2^2 - 0^2) = 200 \text{ J. Thus part}$$

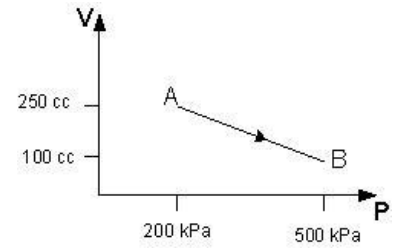
**(b) of the answer is 200 J increase in kinetic energy of the block.**

In part (c) it is desired to find work done by external force in holding the belt w.r.t. frame. The block, before being placed on the belt was having Zero relative velocity w.r.t. the observer. All the changes in energy occur when the block is



placed on the belt. Thus, sum of this energy would be provided by external force on the belt and it is  $W = U + \Delta KE_b = 200 + 200 = 400\text{J}$ . Thus, part (c) of the answer is 400 J.

**Question 5:** A gas is taken along the path AB as shown in the figure. If 70 cal of heat is extracted from the gas in the process, calculate the change in the internal energy of the system.



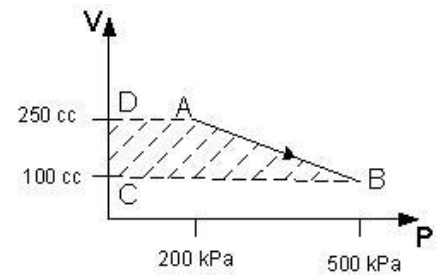
**Illustration:** As per FLT  $Q = W + \Delta U$  and as per Mechanical Equivalent of heat (J)  $Q = JH$ . Combining the the laws  $JH = W + \Delta U$ . In the process  $H = -70\text{cal}$  since heat is extracted from the gas in the process. Further, workdone in the process

$$W = \int_{v_b}^{v_a} p dv = \text{Area in the cycle ABCDA} = \frac{1}{2}(p_a + p_b) \times (v_b - v_a)$$
 Using given

$$\text{data } W = \frac{1}{2}((200 + 500) \times 10^3) \times ((100 - 250) \times 10^{-6}) = -52.5\text{J. Value of}$$

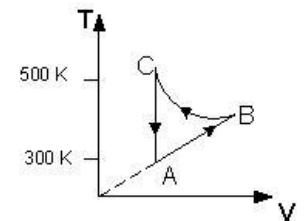
Mechanical Equivalent of heat is  $J = 4.2\text{J} \cdot \text{Cal}^{-1}$ . Using these values in the combined equation  $4.2 \times (-70) = -52.5 + \Delta U \Rightarrow \Delta U = -294 + 52.5 = -241.5\text{J}$ . Thus as per principles of SGs answer is -240 J

**N.B.:** Arithmetically area ABCDA is (+)ve but direction of process shall define sign of the value, in the intant case W is (-)ve.



**Question 6:** Consider the cyclic process ABCA shown in the figure performed on a sample of 2.0 mol of an ideal gas.

A total of 1200 J of heat is withdrawn from the sample in the process. Find the work done by the gas during the part BC.



**Illustration:** he process is cyclic and therefore there is no change in internal energy of the system as it return to original state after completing the process, hence  $\Delta U = 0$

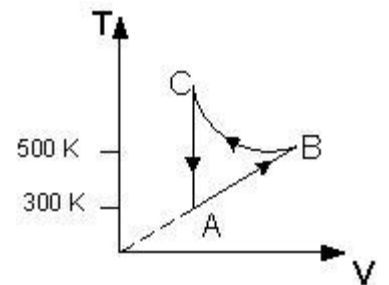
. As per FLT  $Q = W + \Delta U \Rightarrow Q = W$ , here given that  $Q = 1200\text{J}$  and hence

$W = 1200\text{J}$ . As regards cycle ABCA work done is  $W = W_{AB} + W_{BC} + W_{CA}$ . Taking each part separately –

(a) The cycle is shown in V-T diagram is on a constant pressure and part CA is  $\Delta v = 0 \Rightarrow W_{CA} = 0$

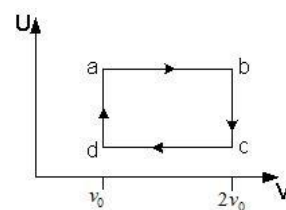
(b) Part AB of the cycle linear variation of V-T is also at constant pressure. In this part terminal temperatures  $T_A$  and  $T_B$  are defined but not the volume  $v_A$  and  $v_B$ . Therefore internal energy of the gas at any point, in this part can, be defined with IGE  $pv = nRT$ . Accordingly,  $W_{AB} = p\Delta v = nR\Delta T = nR(T_B - T_A)$ . Here  $n = 2\text{ mol}$  and universal gas constant  $R = 8.31$ . Accordingly,  $W_{AB} = 2 \times 8.31 \times (500 - 300) = 3324\text{J}$ .

Substituting values in equation of total work done  $-1200 = 3324 + W_{BC} + 0 \Rightarrow W_{BC} = -1200 - 3324 = -4524\text{J}$ . Thus, answer is -4524 J.





**Question 7:** In the figure is shown the variation in the internal energy  $U$  with volume  $V$  of 2.0 mol of an ideal gas in a cyclic process  $abca$ . The temperature of the gas at  $b$  and  $c$  are 500 K and 300 K respectively. Calculate the heat absorbed by the gas during the process.



**Illustration:** As per ideal gas equation  $U = pv = nRT$ , here  $n = 2.0$ , number of moles of gas

is constant for a sample of gas and  $R$  is Universal Gas constant. Accordingly,  $U \propto T$ . In the given cycle  $abca$  part  $ab$  and  $cd$  are at constant internal energy and therefore both these parts are isothermal processes. Further, IGE can be reformed

as  $p = \frac{nRT}{v}$  work done in a thermodynamic process is  $\Delta W = p\Delta v = \frac{nRT}{v}\Delta v \Rightarrow W_{rs} = nRT \int_{v_r}^{v_s} \frac{dv}{v} = nRT \ln \left( \frac{v_s}{v_r} \right)$ .

Accordingly, taking work in each part

(i) Part 'ab': work done is  $W_{ab} = nRT_b \log \left( \frac{v_b}{v_a} \right) = nRT_b \log \left( \frac{2v_0}{v_0} \right) = nRT_b \ln 2$ , given that  $T_b = 500$  K

(ii) Part 'bc': work done in this part  $W_{bc} = 0$ , since this is a constant volume process and therefore it does not involve any displacement, a necessary requirement for work

(iii) Part 'cd':  $W_{cd} = nRT_c \ln \left( \frac{v_d}{v_c} \right) = nRT_c \ln \left( \frac{v_0}{2v_0} \right) = -nRT_c \ln 2$ , given that  $T_c = 300$  K

(iv) Part 'da': work done in this part  $W_{da} = 0$ , since this is a constant volume process and therefore it does not involve any displacement, a necessary requirement for work

Thus total work done in the process is  $W = W_{ab} + W_{bc} + W_{cd} + W_{da}$ . Substituting the values derived above and then given data  $W = nRT_b \ln 2 + 0 - nRT_c \ln 2 + 0 = nR_b \ln 2 (T_b - T_c) \Rightarrow W = 2 \times 8.31 \times 0.693 \times (500 - 300) = 2303.5$  J. Here in the calculations natural log of 2 is  $\ln 2 = 0.693$  and has been used. **Thus, considering SGs, answer is 1200 J.**

**Question 8:** Figure shows a cylindrical tube of volume  $V$  with adiabatic wall containing ideal gas. The internal energy of this ideal gas is given by  $1.5 nRT$ . The tube is divided into two equal parts by a fixed diathermic wall. Initially the pressure and the temperature are  $p_1$  and  $T_1$  on the left and  $p_2$  and  $T_2$  on the right. The system is left for sufficient time so that the temperature becomes equal on the two sides.



- How much work has been done by the gas on the left part?
- Find the final pressures on the two sides.
- Find the final temperature.
- How much heat has flown from gas on the right to the gas on the left?

**Illustration:** Given that-

- the cylindrical tube has adiabatic walls, it implies that no heat will be dissipated into the environment.
- The tube is divided by a fixed wall
  - in two equal parts i.e.  $v_1 = v_2 = v$
  - the dividing wall is diathermic it implies heat transfer across the walls in both the directions.
- Internal energy of the gas (IEG)  $U = 1.5nRT$
- System is left to reach in thermal equilibrium say at temperature  $T$ .

Taking this data each part of the problem is being analysed –

**Part (a):** Since the dividing wall is fixed and hence there will be no change in volume hence work done by the gas in both the parts is zero. **Hence answer of part (a) is Zero.**

**Part (b & c):** Both these parts are interdependent and hence taken together. As per IGE,  $p_1 v = n_1 R T_1 \Rightarrow n_1 = \frac{p_1 v}{R T_1}$ , on

the similar lines  $n_2 = \frac{p_2 v}{R T_2}$ . On reaching the temperature  $T$ , pressure in left part would be

$p_{1f} = n_1 \times \frac{R T}{v} = \frac{p_1 v}{R T_1} \times \frac{R T}{v} = \frac{p_1 T}{T_1}$  and on similar lines  $p_{2f} = \frac{p_2 T}{T_2}$ . Here,  $T$  is unknown and is required to be determined in part (c) of the problem; it shall be determined from energy balance equation  $U = U_{1i} + U_{1i} = U_{1f} + U_{1f}$ . Taking each component separately -

$$(i) \quad U_{1i} = 1.5 \times p_1 \times v \quad (ii) \quad U_{2i} = 1.5 \times p_2 \times v \quad (iii) \quad U_{1f} = 1.5 \times p_{1f} \times v = 1.5 \times \frac{p_1 T}{T_1} \quad \text{and}$$

$$(iv) \quad U_{2f} = 1.5 \times p_{2f} \times v = 1.5 \times \frac{p_2 T}{T_2}. \text{ Using these values in energy balance equation we get-}$$

$$1.5 \times p_1 \times v + 1.5 \times p_2 \times v = 1.5 \times \frac{p_1 T}{T_1} \times v + 1.5 \times \frac{p_2 T}{T_2} \times v \Rightarrow p_1 + p_2 = \left( \frac{p_1}{T_1} + \frac{p_2}{T_2} \right) T \Rightarrow T = \frac{T_1 T_2 (p_1 + p_2)}{p_1 T_2 + p_2 T_1}, \quad \text{this is}$$

**part (c) of the answer.**

Using this value of equilibrium temperature, final pressure on left part is

$$p_{1f} = \frac{p_1 T}{T_1} = \frac{p_1}{T_1} \times \frac{T_1 T_2 (p_1 + p_2)}{p_1 T_2 + p_2 T_1} = \frac{p_1 T_2 (p_1 + p_2)}{p_1 T_2 + p_2 T_1} \quad \text{and} \quad \text{on the right part is}$$

$$p_{2f} = \frac{p_2 T}{T_2} = \frac{p_2}{T_2} \times \frac{T_1 T_2 (p_1 + p_2)}{p_1 T_2 + p_2 T_1} = \frac{p_2 T_1 (p_1 + p_2)}{p_1 T_2 + p_2 T_1}. \quad \text{This part (b) of the answer.}$$

Part (d) : Amount of heat flown from right part of the gas to the left part

$$U_{2i} - U_{2f} = 1.5 p_2 v - 1.5 p_{2f} v = 1.5 \times v \times (p_2 - p_{2f}) = 1.5 \times v \times \left( p_2 - \frac{p_2 T_1 (p_1 + p_2)}{p_1 T_2 + p_2 T_1} \right) = 1.5 \frac{p_1 p_2 (T_2 - T_1)}{p_1 T_2 + p_2 T_1} \quad \text{Since}$$

half volume of the tube  $v = \frac{V}{2}$ , using this value, transfer of energy is

$$\frac{3}{2} \times \frac{p_1 p_2 (T_2 - T_1)}{p_1 T_2 + p_2 T_1} \times v = \frac{3}{2} \times \frac{p_1 p_2 (T_2 - T_1)}{p_1 T_2 + p_2 T_1} \times \frac{V}{2} = \frac{3}{4} \times \frac{p_1 p_2 (T_2 - T_1) V}{p_1 T_2 + p_2 T_1}. \quad \text{This is part (d) of the answer.}$$

Taking  $p_1 T_2 + p_2 T_1 = \lambda$ , since it is repeating in **answers (b) to (d) the answers can be rewritten as -**

$$(b) \quad \frac{p_1 T_2 (p_1 + p_2)}{\lambda} \quad \text{on the left and on the right part} \quad \frac{p_2 T_1 (p_1 + p_2)}{\lambda}, \quad \text{taking } \lambda = p_1 T_2 + p_2 T_1$$

$$(c) \quad \frac{T_1 T_2 (p_1 + p_2)}{\lambda}$$

$$(d) \quad \frac{3 p_1 p_2 (T_2 - T_1) V}{4 \lambda}$$

—00—

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

**- John Adams**

## FACTORS AFFECTING CHEMICAL EQUILIBRIUM

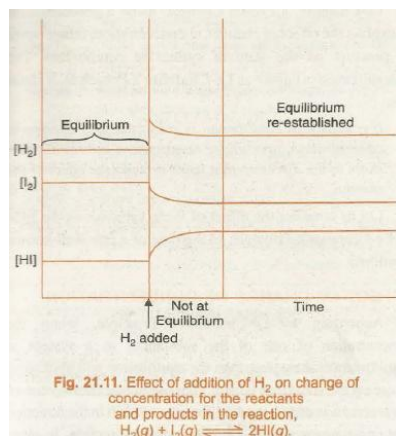
Kumud Bala

A system in equilibrium is affected by the following factors:

1. Change of concentration of any reactant or product
2. Change of temperature of the system
3. Change of pressure on the system
4. Addition of catalyst
5. Addition of some inert gas

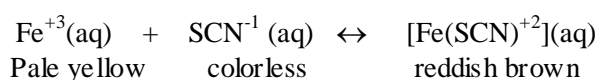
The effect of change of concentration, pressure and temperature is predicted with the help of a principle known as Le Chatelier's principle, after the name of a french chemist Le Chatelier in 1884. It states as follow: "If a system in equilibrium is subjected to a change of concentration, temperature or pressure, the equilibrium shifts in a direction that tends to undo the effect of the change imposed". Let us now discuss the effect of the various factors one by one.

**Effect of change of concentration:** Consider the reaction,  $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \leftrightarrow 2\text{HI}(\text{g})$ . If to the reaction mixture at equilibrium, more  $\text{H}_2$  or  $\text{I}_2$  is added, the equilibrium is re-established. The new concentration of the reactant added will be less than what it was after the addition but more than what it was before the addition. The concentration of the other reactants will decrease whereas that of the products will increase than the original concentration. The effect of adding  $\text{H}_2$  on the concentrations of all reactants and products is shown in figure.



Similarly, the effect of adding  $\text{HI}$  to the equilibrium mixture will be to shift equilibrium in the backward direction. In each case, the equilibrium is re-established after sometime.

**Laboratory experiment to study the effect of concentration:** The effect of change of concentration on a reaction in equilibrium can be very easily seen in the laboratory with the help of reaction,



i.e. if to the solution of a ferric salt (1 ml of 0.2M ferric nitrate solution, which is pale yellow in color), two drops of 0.002M KSCN solution (colorless) are added, a red color product is obtained due to the formation of ferric sulphocyanide complex ion whose intensity becomes constant after equilibrium is attained. Now, if to this solution, more of ferric salt solution or potassium sulphocyanide solution is added, the intensity of red color increases, showing the formation of more of  $[\text{Fe}(\text{SCN})^{+2}]$  ions. Again if to the solution, a small amount of potassium ferrosulphocyanide (capable of giving  $[\text{Fe}(\text{SCN})^{+2}]$  ions) is added, the intensity of red color decreases, showing that the equilibrium has shifted in the backward direction. The effect of change of concentration can also be predicted by comparing the reaction quotient with the equilibrium constant.

Let us consider the general reaction,  $\text{A} + \text{B} \leftrightarrow \text{C} + \text{D}$ .

$$K_c = \frac{[\text{C}][\text{D}]}{[\text{A}][\text{B}]} \text{ ----- (i)}$$

Suppose concentration of the reactants  $[\text{A}]$  or  $[\text{B}]$  is increased, we will write  $Q_c$  in place of  $K_c$ ,

$$Q_c = \frac{[\text{C}][\text{D}]}{[\text{A}][\text{B}]} \text{ ----- (ii)}$$

$Q_c$  will decrease and will become less than  $K_c$ . In order that equilibrium is re-established,  $Q_c$  will tend to increase till it becomes equal to  $K_c$ . This can happen only if  $[\text{A}]$  and  $[\text{B}]$  decrease and  $[\text{C}]$  and  $[\text{D}]$  increase, i.e. equilibrium will shift in the forward direction. Similarly, it can be seen that the effect of removal of product  $[\text{C}]$  or  $[\text{D}]$  shifts the equilibrium in the forward direction. This has a great significance in the industrial processes because if the product is recovered side by side, the equilibrium will shift in the forward direction to form more products. The removal of product is especially easy if it is a gas.

**Examples :**

- (i) In the manufacturing of  $\text{NH}_3$  by Haber's process,  $\text{NH}_3$  gas is liquefied and hence removed side by side from the reaction mixture.
- (ii) In the manufacturing of quick lime ( $\text{CaO}$ ) by decomposition of  $\text{CaCO}_3$ , the gaseous  $\text{CO}_2$  which is one of the products is allowed to escape. Looking at equation (ii), it may be noticed that continuous removal of the product keeps the value of  $Q_c$  less than  $K_c$ . As a result, the reaction continues to move in the forward direction.

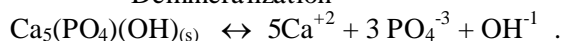
**Some examples from everyday life:**

- (i) Clothes dry quicker when there is a breeze or we keep on shaking it. This is because water vapour of

the nearly air are removed and cloth loses more water vapour to re-establish equilibrium with the surrounding air.

- (ii) We sweat more on a humid day but it evaporates when we sit under the fan. More sweating takes place because the surrounding air has large amount of water vapour and our skin cannot lose more to it. The fan removes the humid air and evaporation starts from the skin.
- (iii) Transport of oxygen by hemoglobin in blood: oxygen breathed in combines with the hemoglobin in the lungs according to the equilibrium  $\text{Hb (s)} + \text{O}_2 (\text{g}) \leftrightarrow \text{HbO}_2(\text{s})$ . When it reaches the tissues, the pressure of oxygen there is low. To readjust the equilibrium, oxyhemoglobin gives up oxygen. When it returns to lungs where the pressure of oxygen is high, more of oxyhemoglobin is formed.
- (iv) Removal of  $\text{CO}_2$  from tissues by blood:-  $\text{CO}_2(\text{g}) + \text{H}_2\text{O (l)} \leftrightarrow \text{H}_2\text{CO}_3 (\text{aq}) \leftrightarrow \text{H}^+ (\text{aq}) + \text{HCO}_3^{-1} (\text{aq})$ . As partial pressure of  $\text{CO}_2$  is high in the tissues,  $\text{CO}_2$  dissolves in the blood. In the lungs, as partial pressure of  $\text{CO}_2$  is low, it is released from the blood. (v) Tooth decay by sweets:- Our teeth are coated with an enamel of an insoluble substance known as hydroxypatite,  $\text{Ca}_5(\text{PO}_4)_3(\text{OH})$ . It exists in equilibrium with its ions as follows:-

Demineralization

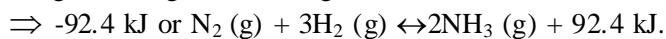
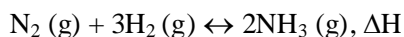


Remineralization

The forward reaction involving dissociation is demineralization and the backward reaction involving formation is called remineralisation. If we do not brush our teeth after eating sweets, the sugar gets fermented on the teeth to produce  $\text{H}^+$  ions which combine with the  $\text{OH}^{-1}$  ions shifting the equilibrium in the forward direction thereby causing tooth decay.

**Effect of change of temperature:** The change of temperature alters the state of equilibrium for only those reactions in which either heat is evolved (exothermic) or heat is absorbed (endothermic). In fact, every such reaction is made up of two opposing reactions. If the forward reaction is exothermic, the backward reaction will be endothermic and vice-versa. Examples:

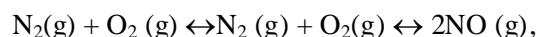
- (i) Consider the exothermic reaction:



Obviously, the forward reaction is exothermic whereas the backward reaction is endothermic. Now, if the temperature is increased, i.e. heat is supplied to the system, then according to Le Chatelier's

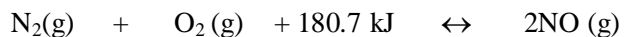
principle, the equilibrium will shift to the side that absorbs heat i.e. in the backward direction. Similarly, decrease in temperature will shift the equilibrium in the forward direction.

- (ii) Consider the endothermic reaction:



$$\Delta H = + 180.7 \text{ kJ or}$$

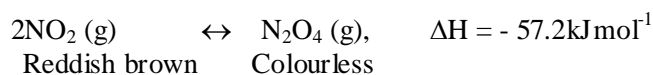
Endothermic



Exothermic

The increase of temperature will favour the forward reaction while the decrease in temperature will favour the backward reaction.

**Laboratory experiment to study the effect of temperature:** Let us consider the following equilibrium:



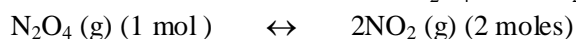
$\text{NO}_2$  gas may be prepared by adding copper turning to concentration nitric acid and then collected in two 5ml test tubes. Ensure the same intensity of brown colour in



both the test tube and then stopper them and seal them with araldite. Now, place one test tube in a beaker 1 containing freezing mixture. Place second test tube in beaker 2 which contains hot water at 363K (90°C). The tube in beaker 1 is almost colourless showing the presence of  $\text{N}_2\text{O}_4$ . The tube in beaker 2 has dark brown colour showing the presence of  $\text{NO}_2$ . Now, shift both the test tube in beaker 3, which contains water at room temperature, wait for some time. Both the tubes will acquire same intensity of colour.

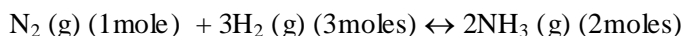
Thus, for the given exothermic reaction, the effect of increase of temperature (from 273 to 298K) is to shift equilibrium in the backward direction and decrease of temperature (from 363 to 298K) is to shift the equilibrium in the forward direction. Exothermic reactions are favoured by low temperature whereas endothermic reactions are favoured by high temperature.

**Effect of change of pressure:-** This factor has a significant role to play only in case of gaseous reactions and those to which proceed with a change in the number of moles. Consider the dissociation of  $\text{N}_2\text{O}_4$  into  $\text{NO}_2$ :





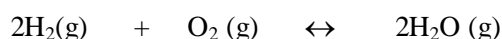
Another example of gaseous reaction involving formation of ammonia:



In this equilibrium reaction, the forward reaction occurs with decrease in the total number of moles. If the pressure on the system is increased, then according to Le Chatelier's principle, the equilibrium will shift in that direction in which decrease in the total number of moles takes place, i.e. in favour of formation of ammonia. Thus, higher the pressure, the better would be the yield of ammonia. Conversely, if the pressure on the system is decreased the equilibrium will shift in the backward direction in which increase in total number of mole occurs. In general, low pressure favours those reactions which are accompanied by increase in total number of moles and high pressure favours those reactions which take place with decrease in total number of moles. However, pressure has no effect on an equilibrium reaction which proceeds with any change in total number of moles.

**Effect of change in volume:** If the volume of a gaseous reaction is decreased, the pressure exerted by the molecules will increase. Thus, the effect of decrease of volume is equivalent to the effect of increase of pressure. As the effect of increase of pressure is to shift the equilibrium in the direction in which the number of moles decreases, hence the effect of decrease in volume will be to shift the equilibrium in the direction in which the number of moles decreases.

**Effect of adding catalyst on the equilibrium:** The addition of a catalyst does not disturb the equilibrium. However, it helps in the attainment of equilibrium quickly. For example:- The following equilibrium



is never attained under ordinary conditions. However, in the presence of a catalyst such as Platinized asbestos, the reaction proceeds quite fast and equilibrium is attained quickly. Further, the value of the equilibrium constant 298K is found to be same, i.e.  $1.2 \times 10^{40}$  (which is quite large) irrespective of the speed at which the equilibrium is attained. This is obviously due to the fact that the addition of catalyst increases the speeds of the forward reaction and the backward reaction to the same extent.

**Effect of adding an inert gas to a reaction in equilibrium:-** consider the dissociation equilibrium:  $\text{PCl}_5(\text{g}) \leftrightarrow \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$ . Applying the law of chemical equilibrium, we get  $K_c = \frac{[\text{PCl}_3][\text{Cl}_2]}{[\text{PCl}_5]}$ .

(a) if the reaction takes place at constant volume (i.e. in a closed vessel), addition of an inert gas (like  $\text{N}_2$ , He, Ar etc.) will not change the molar concentrations of the

reactants and products. Hence, the state of equilibrium will remain unaffected.

(b) If the reaction takes place at constant pressure, addition of the inert gas will increase the total volume. Hence, at equilibrium, the molar concentration of each of the reactants and products will decrease. Since, there are two concentration terms in the numerator and only one in the denominator, therefore  $K_c$  should decrease. But  $K_c$  is constant at constant temperature. Hence, to keep  $K_c$  constant, either  $[\text{PCl}_5]$  should decrease or  $[\text{PCl}_3]$  and  $[\text{Cl}_2]$  should increase. This can happen only if more of  $\text{PCl}_5$  dissociates to give  $\text{PCl}_3$  and  $\text{Cl}_2$ . Hence, the dissociation increases with the addition of an inert gas. To sum up: Addition of inert gas at constant volume has no effect on the state equilibrium whereas at constant pressure the equilibrium shifts towards large number of moles.

**Application of Le Chatelier Principle : To chemical equilibria:** Le Chatelier is very useful in predicting the conditions of temperature, pressure and concentration to get higher yield in certain industrial reactions. A few examples are given below:

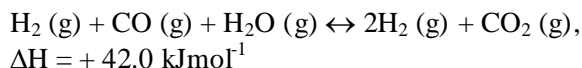
(i) Formation of ammonia (Haber's process)- The chemical equilibrium taking place in this process is  $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \leftrightarrow 2\text{NH}_3(\text{g})$ ,  $\Delta H = -92.4 \text{ kJmol}^{-1}$ .

**Effect of Temperature:** If the temperature is lowered, greater would be the yield of ammonia. However, if the temperature is kept low, the reaction will take a long time to attain equilibrium state. Therefore, a compromise is needed to make the process economical. Usually, an optimum temperature of 750K is employed. At this temperature, the yield of  $\text{NH}_3$ , of course, is less than that at a lower temperature. But from industry point of view, it is rather advisable to get a poorer yield than to waste time unnecessarily. Finely divided iron is used as catalyst to achieve the equilibrium rapidly and molybdenum (promoter) is used to increase the efficient of the catalyst.

**Effect of pressure:** Higher the pressure, greater would be the yield of ammonia. Usually a pressure of 200 atmospheres is employed.

**Effect of concentration:** According to Le Chatelier's Principle, an increase in the concentration of reactants ( $\text{N}_2 + \text{H}_2$ ) would shift the equilibrium in that direction in which the reactants are consumed, i.e. in the forward direction. Moreover,  $\text{NH}_3$  formed should be continuously removed by liquefaction so that equilibrium shifts in the forward direction.

- (ii) Bosch process for the manufacture of hydrogen:-In this process,  $H_2$  is produced from water, gas and steam according to the following equilibrium reaction:



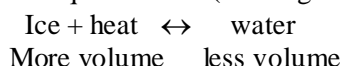
**Effect of temperature:** The forward reaction being endothermic is favoured by high temperature. Usually, a temperature of 673-723K is maintained.

**Effect of pressure:** Since there is no change in the total number of moles in this reversible reaction, pressure has no effect on this equilibrium reaction.

**Effect of concentration:** formation of  $CO_2$  and  $H_2$  is favoured by high concentration of water gas as well as steam.

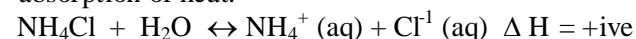
**To physical equilibria:** Le Chatelier's principle is equally applicable to physical equilibria as to chemical equilibria. Some applications of the Le Chatelier's principle to physical equilibria are discussed below:

- (i) Ice-water equilibrium:- (melting of ice)

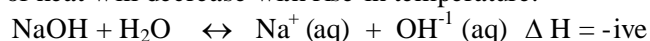


The change of ice into water is an endothermic, reversible process. The reaction involves decrease in volume. Hence, according to Le Chatelier's principle, on increasing the pressure on this system in equilibrium, the equilibrium tends to shift in a direction in which volume decreases i.e. change of ice into water, i.e. to the right. Since, change of ice into water is an endothermic reaction. On increasing the temperature, more of ice melts. The equilibrium shifts to the right.

- (ii) Dissolution of ammonium chloride in water:- Ammonium chloride dissolves in water with the absorption of heat.



According to Le Chatelier's principle, the solubility of ammonium chloride will rise in temperature. Thus, it may be concluded that the solubility of all substances which dissolve with absorption of heat will increase with rise in temperature. Sodium hydroxide dissolves in water with the evolution of heat. Therefore, the solubility of substances which dissolve with evolution of heat will decrease with rise in temperature.



## ASSINGMENT

- Consider the reaction  $CaCO_3(s) \leftrightarrow CaO(s) + CO_2(g)$  in closed container at equilibrium. What would be the effect of addition of  $CaCO_3$  on the equilibrium concentration of  $CO_2$ ?  
(A) Increase  
(B) Decrease  
(C) remains unaffected  
(D) Data is not sufficient to predict it.
- In the melting of ice, which one of the condition will be more favorable -----  
(A) High temperature and high pressure  
(B) Low temperature and low pressure  
(C) Low temperature and high pressure  
(D) High temperature and low pressure
- On adding inert gas to the equilibrium  $PCl_5(g) \leftrightarrow PCl_3(g) + Cl_2(g)$  at constant pressure. The degree of dissociation will remain -----  
(A) Unchanged (B) Decrease  
(C) Increased (D) None of these
- In the reaction  $N_2(g) + 3H_2(g) \leftrightarrow 2NH_3(g)$ , the forward reaction is exothermic and the backward reaction is endothermic. In order to produce more heat it is necessary -----  
(A) To add ammonia  
(B) To add  $N_2$  and  $H_2$   
(C) Increasing the concentration of  $N_2$ ,  $H_2$  and  $NH_3$  equally  
(D) None of these.
- The role of catalyst in reversible reaction is -----  
(A) To increase the rate of forward reaction  
(B) Decrease the rate after equilibrium  
(C) Allow equilibrium to be achieved quickly  
(D) None of these.
- Which of the following will shift the reaction  $PCl_5(g) + Cl_2(g) \leftrightarrow PCl_3(g)$  to the left side-----  
(A) Addition of  $PCl_5$   
(B) Increase in pressure  
(C) Decrease in temperature  
(D) Catalyst
- Which of the following equilibrium is not affected by pressure-----  
(A)  $N_2(g) + O_2(g) \leftrightarrow 2NO(g)$   
(B)  $2SO_2(g) + O_2(g) \leftrightarrow 2SO_3(g)$   
(C)  $2O_3(g) \leftrightarrow 3O_2(g)$   
(D)  $2NO_2(g) \leftrightarrow N_2O_4$

8. According to Le Chatelier's principle, an increase in the temperature of the following reaction  $\text{N}_2 + \text{O}_2 \leftrightarrow 2\text{NO} - 43200\text{cal}$  will  
 (A) Increase the yield of NO  
 (B) Decrease the yield of NO  
 (C) Not effect on the yield of NO  
 (D) Not help the reaction to proceed.
9. When a reversible reaction has reached the state of equilibrium -----  
 (A) The forward reaction stops  
 (B) The backward reaction stops  
 (C) The whole reaction stops  
 (D) The forward and backward reaction proceed with same speed
10. During thermal dissociation of gas, the vapour density -----  
 (A) Remain same  
 (B) Will be increased  
 (C) Will be decreased  
 (D) Sometimes increased sometimes decreases.
11. If little heat is added to ice liquid equilibrium in a sealed container -----  
 (A) Pressure will rise  
 (B) Pressure will fall  
 (C) Temperature will fall  
 (D) Temperature remain constant
12. Densities of diamond and graphite are 3.5 and 2.3g/ml respectively. Increase of pressure on the equilibrium  $\text{C}_{(\text{diamond})} \leftrightarrow \text{C}_{(\text{graphite})}$  -----  
 (A) Favours backward reaction  
 (B) Favours forward reaction  
 (C) Has no effect  
 (D) Nothing can be predicted.
13. For the reaction,  $\text{CO}(\text{g}) + \text{H}_2\text{O}(\text{g}) \leftrightarrow \text{CO}_2(\text{g}) + \text{H}_2(\text{g})$  at a given temperature, the equilibrium amount of  $\text{CO}_2(\text{g})$  can be increased by -----  
 (A) Adding a suitable catalyst  
 (B) Adding an inert gas  
 (C) Decreasing the volume of the container  
 (D) Increasing the amount of  $\text{CO}(\text{g})$
14. Consider the reaction equilibrium  $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \leftrightarrow 2\text{SO}_3(\text{g})$ ,  $\Delta H^\circ = -198\text{kJ}$ . On the basis of Le Chatelier's principle, the condition favorable for the forward reaction is -----  
 (A) Lowering the temperature and increasing the pressure  
 (B) Any value of temperature and pressure  
 (C) Lowering of temperature as well as pressure  
 (D) Increasing temperature as well as pressure.

## ANSWERS

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



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—00—

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

- Gautama Buddha

## SCIENCE QUIZ : June-2019

Kumud Bala

1. When plants of the same kind are grown and cultivated at one place on a large scale, it is called ----  
-----  
(A) Crop (B) Agricultural  
(C) Production (D) None of these
2. Damaged seeds would ----- on top of water.  
(A) Sink (B) Float  
(C) Healthy seed (D) None of these
3. The crop which are sown in the rainy season are called -----  
(A) Rabi crop (B) Kharif crop  
(C) Ploughing (D) Zayed crop
4. Wheat, gram, pea, mustard are which type of crops?  
(A) Rabi crops (B) Kharif crops  
(C) Summer crops (D) None of these
5. The process of loosening turning of the soil is called --  
-----  
(A) Cultivation (B) Tilling  
(C) Harvesting (D) Irrigation.
6. The substance obtained from the decomposition of plant or animal wastes is used as -----  
(A) Fertilizers (B) Organic manure  
(C) Nutrient (D) Microorganisms
7. Continuous growing of crops makes the soil poorer in certain nutrients. Therefore, farmers have to add manure to the fields to replenish the soil with nutrients. This process is called -----  
(A) Manuring (B) Sowing  
(C) Ploughing (D) Harvesting
8. The supply of water to crops at different interval is called -----  
(A) Irrigation (B) Harvesting  
(C) Crop-rotation (D) Manuring
9. Chemical substances which are rich in a particular nutrient are called -----  
(A) Manure (B) Fertilizer (C) Humus (D) Paddy
10. Name the tool used for tilling of soil.  
(A) Hoe (B) Plough (C) Khurpi (D) Sickle
11. Paddy can be grown in -----  
(A) Summer season (B) Autumn  
(C) Rainy season (D) Winter
12. Wheat can be grown in -----  
(A) Winter (B) Rainy season  
(C) Spring (D) Summer
13. Which of the following is a Rabi crop?  
(A) Paddy (B) Maize  
(C) Mustard (D) Soybeans
14. Sowing the seeds manually is known as -----  
(A) Ploughing (B) Broadcasting  
(C) Tilling (D) Transplantation
15. The method of transferring seedling from nursery to field is known as -----  
(A) Broadcasting (B) Transplantation  
(C) Crop-rotation (D) Harvesting
16. Leaving the agricultural land uncultivated for one or more seasons is known as -----  
(A) Field fallow (B) Crop-rotation  
(C) Manuring (D) Threshing
17. Chemicals which kill weeds are known as -----  
(A) Fertilizers (B) Pesticides  
(C) Weedicides (D) None of these
18. Cutting and gathering of crops after maturation is known as -----  
(A) Harvesting (B) Threshing  
(C) Broadcasting (D) Tilling
19. Which one of the following is a group of Rabi crops?  
(A) Paddy, groundnuts, pea, mustard  
(B) Wheat, pea, gram, mustard  
(C) Wheat, pea, paddy, cotton  
(D) Cotton, maize, groundnuts, paddy.
20. Leguminous plants help in the replenishment of the soil with -----  
(A) Potassium (B) Phosphorus  
(C) Sodium (D) Nitrogen
21. Consider the following statement about the use of large amount of fertilizers and pesticides –  
(a) They are useful and eco friendly  
(b) They destroy the soil fertility

- (c) They adversely affect the useful components from the soil  
(d) They turn the fields barren after sometime.
- The correct statements are:  
(A) a and b only (B) c and d only  
(C) a and d only (D) b, c, and d
22. Read the following statements:  
(a) Irrigation improves the soil texture  
(b) Plants can absorb nutrients mostly in dissolved form  
(c) Seeds require moisture for germination  
(d) Irrigation protects crops from both frost and hot air currents.
- Choose the combination of statements which justify the need to irrigate crops.  
(A) a and b (B) b and c  
(C) c and d (D) a and d
23. Read the following statements about organic manure-  
(a) It improves texture of soil  
(b) It provides humus to soil  
(c) It replenishes the soil with all the nutrients  
(d) It enhance the water holding capacity of the soil
- Select the combination of correct statements.  
(A) a, b, d (B) b, c, d  
(C) a, c, d (D) all the above
24. Separating grains from chaff is called -----  
(A) Winnowing (B) Threshing  
(C) Fallow (D) Harvesting
25. Seed drill is used to -----  
(A) Sow the seeds (B) Remove the weeds  
(C) Remove the pest (D) Mix manure in the soil
26. Weeds are the -----  
(A) Main crop  
(B) Insects and pests  
(C) Unwanted plants growing along the crop  
(D) Chemical substances.
27. Kharif crops are sown in -----  
(A) March to April (B) June to September  
(C) October to December (D) Any time
28. Which one of the following is a group of Kharif crop?  
(A) Paddy, maize, soybeans, cotton  
(B) Paddy, wheat, gram, groundnuts  
(C) Soybeans, cotton, gram, pea  
(D) Groundnuts, wheat, pea, linseed.
29. Combines are used for -----  
(A) Sowing of seeds  
(B) Harvesting the crop  
(C) Threshing  
(D) Harvesting and threshing both
30. 2-4D is a ----  
(A) Pesticides (B) Insecticides  
(C) Fungicides (D) Weedicides
31. Urea, ammonium sulphate, and super sulphate belong to -----  
(A) Fertilizers (B) Manure  
(C) Both (A) and (B) (D) None of these
32. For growing a crop, sufficient sunlight, ----- and ---  
----- from the soil are essential.  
(A) Manure, water  
(B) Water, nutrients  
(C) urea, water  
(D) manure, fertilizers

***(Answers to this Science Quiz shall be provided in Monthly e-Bulletin)***

**—00—**

***Education is not the answer to the question.***

***Education is the means to the answer to all questions.***

***- William Allin***



## 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 ...*