GYAN VIGYAN SARITA:शिक्षा

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

9th Quarterly, of e-Bulletin dt 2nd Oct, of the Publication

3rd Annual Issue : Educational Perspective

Stabilized IOMS on A-VIEW With Support of Amrita University (July'2018)

Aspiring to Connect Copassionte Persons to Complement Efforts of Grooming Competence To Compete Among Unprivileged Children Through IOMS

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

5th Node: 4th Learning Centre (Smart Class Room)

4th Node: 3rd Learning Centre (Smart Class Room)

3rd Node: 2nd Learning Centre (Smart Class Room)

6th Node: 5th Learning Centre (Smart Class Room)

Web-enabled Cloud Environment for IOMS

2nd Node: 1st Learning Centre (Smart Class Room)

1st Node Mentoring Centre

ITA:शिक्षा

-political initiative to esponsibility (PSR) 2nd Oct'17

2nd Annual e-Bulletin (Oct'17)

SUBODH पत्रिका

1st Annual e-Bulletin (Sept'16)

SPECIAL ANNUAL ON Teacher's

CONTENTS:
• From Chairman's Desk
• About Subodh Foundation

RKM School, Sithanagram, APImplemented IOMS (Aug'2016)

Every Possible Efforts Made to Reach Schools With Insufficient

Using Available IT Resources to Upgrade Into Interactive Online Mentoring (May'2016)

SUBODH FOUNDATION
Groom Competence To Compete
Personal Social Responsibility

E-Bulletin Monthly Publication

SUBODH पत्रिका

Bulletin No. X/XV, dt 02/10/2015; Issue No.1

Start e-Bulletin (Oct'15)

Sarthak Prayash adopted the Seed

And the ourney Started in Chalk-N-Talk Mode

(May'2012)

From Immemorable Time Seed of PSR Was Growing

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

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Aim at the Best, but...

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

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

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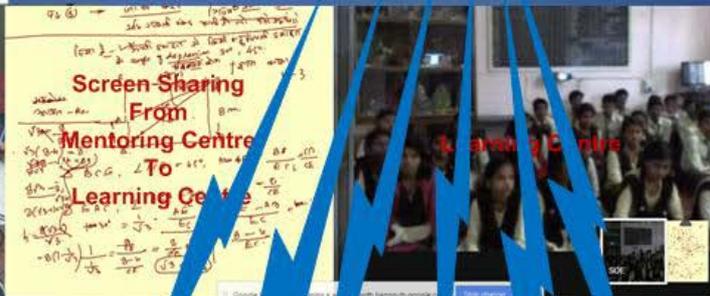
Specification: These were practiced independently, based on ground level operating experience and need of optimizing the cost on the initiative. This is essential to utilize financial resources, considered scarce, for benefitting more number of students at more number of centers and mentoring centers.

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

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

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

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

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

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

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

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

शैक्षणिक तौर तरीकों में बदलाव का दौर

किसी नयी चीज को सिखाना और सीखना एक सुखद अहसास होता है। फिर क्या बात है कि आजकल स्कूलों और कालेजों में जो बच्चे पढ़ने जाते हैं, वे सीखने के प्रति लापरवाह दिखायी देते हैं, अथवा सीखते वक्त तनाव में होते हैं? क्या कारण है कि बच्चे स्कूल जाने से बचना चाहते हैं?

प्राचीन शिक्षा प्रणाली में माता-पिता अथवा अभिभावक के लिये अच्छे गुरूकुल और अच्छे गुरू की तलाश एक जरूरी कार्य हुआ करता था। राजा तक अपने बच्चों को अच्छे गुरू को सौंप कर निश्चिंत हो जाया करते थे। पंचतंत्र की कहानियों का ताना-बाना राजकुमारों की शिक्षा को ध्यान में रखकर विष्णुशर्मा ने बुना, प्राकृतिक वस्तुओं का शिक्षा देने में उपयोग किया, और एक सशक्त शिक्षा प्रणाली का निर्माण किया। आज भी उनकी कहानियां प्रासंगिक हैं और शिक्षा के लिये उपयोगी हैं।

शिक्षा दो कारणों से दी जाती है। एक : जानकारी के लिये और दूसरी : परीक्षा पास करने के लिये। शिक्षाशास्त्री हर्बर्ट स्पेंसर के अनुसार 'बच्चों को कम से कम बतलाना चाहिये, उन्हें अधिक से अधिक स्वतः ज्ञान द्वारा सीखना चाहिये। महात्मा गांधी ने बेसिक शिक्षा के लिये 'वर्धा योजना' के नाम से बुनियादी शिक्षा की बात की थी। उनका विश्वास था कि जबतक छात्र हाथ से काम नहीं करता है, तबतक उसे श्रम का महत्व नहीं ज्ञात होता है।

सैद्धांतिक ज्ञान, मनुष्य को अहंकारी और निष्क्रिय बना देता है। आज की शिक्षा पद्धति से पनपा उच्च वर्ग कोई काम स्वयं नहीं करना चाहता है, वह दूसरों पर आश्रित होता जा रहा है, और अपने हाथ से काम करने में उसे हीनता का अनुभव होता है।

आज का दौर तकनीक का युग है। बच्चे हों अथवा बड़े, सभी कंप्यूटर और इंटरनेट का प्रयोग कर कई चीजें समय से पहले आसानी से सीख जा रहे हैं। आज के दौर के अध्यापक को यह ध्यान रखना होगा कि वह जो कुछ आज कक्षा में पढ़ा रहा है, कहीं बच्चे वह सब घर से पढ़कर अथवा कंप्यूटर के माध्यम से जानकर पहले से तैयार तो नहीं हैं? शिक्षक को यह भी समझना होगा कि आज के बच्चों के माता-पिता सामान्यतया काफी पढ़े लिखे व ज्ञानवान हैं, कहीं उन्होंने अपने बच्चों को सबकुछ बता तो नहीं रखा है? अगर ऐसा है तब उसे अपनी सिखाने की विधि को और अधिक तराशना होगा जिससे वह इतनी रूचिकर और अलग हो कि बच्चे उसकी कक्षाओं में खिंचते चले आयें।

शिक्षक को मानसिक रूप से स्वस्थ और ज्ञान की दृष्टि से परिपक्व होना चाहिये। यह देखा गया है कि शिक्षक ज्ञान की दृष्टि से जितना अधिक मजबूत होता है, उसमें उतना ही अधिक आत्मविश्वास भरा होता है। एक अच्छा शिक्षक सदैव अपने चारों ओर खुशनुमा माहौल बनाये रखता है। उसका मुखमंडल शांत और ओजमयी दिखायी देता है। जिस प्रकार खौलते पानी में हम अपनी शक्ल ठीक से नहीं देख पाते हैं, ठीक उसी प्रकार शिक्षक जब मानसिक रूप से तनाव की दशा में होता है, अथवा बच्चे कक्षा में अनियंत्रित अथवा पढ़ने के प्रति अनिच्छुक होते हैं, तब उनको कुछ भी सिखाना आसान नहीं होता है।

अब्राहम लिंकन अमेरिका के राष्ट्रपति रहे। उन्होंने अमेरिका से दास प्रथा खत्म किया था। अब्राहम लिंकन ने अपने पुत्र के शिक्षक को एक पत्र लिखा था। इस पत्र में उन्होंने शिक्षक को बताया था कि उनके पुत्र को क्या क्या सिखाना उपयोगी हो सकता है? अपने पत्र में वे शिक्षक से अनुरोध करते हैं कि वह उनके पुत्र को यह सिखायें कि हर बुरे आदमी के पास भी अच्छा हृदय होता है। वह दूसरों से जलन की भावना अपने मन में न लाये, उसे किताबें पढ़ने में रूचि जगे, पर साथ ही साथ उसे आकाश में उड़ते पक्षियों को, धूप में हरे-भरे मैदानों में, खिले फूलों पर, मंडराती तितलियों को निहारने की भी आदत रहे। उसे खुद पर विश्वास करना आना चाहिये और दूसरों पर भी विश्वास होना चाहिये। यह पत्र अगर हम ध्यान से पढ़ें तो वह हमें एक उत्तम शिक्षा प्रणाली की ओर ले जाता है।

आज के कुछ बुद्धिजीवियों को प्राचीन धरोहरों में केवल कमी दीखती है। वे न तो अपनी संस्कृति के बारे में जानकारी की तथ्यपरक खोज करते हैं, और न अपने पूर्वजों के ज्ञान भंडार की कद्र करते हैं। सच तो यह है कि विश्व की हर संस्कृति और सभ्यता की धरोहरें विज्ञान और ज्ञान से भरी पड़ी हैं। वे कपोल कल्पना अथवा किस्से भर नहीं हैं। आवश्यकता है कि हम उनमें अपने को लगाकर खोज करें और उनमें छिपी बातों को समझें। यह धरती तब भी थी, जब न्यूटन ने गुरूत्वाकर्षण के नियमों की खोज नहीं की थी। पक्षी तब भी उड़ते थे, जब राइटब्रदर्स ने उड़ने वाला विमान नहीं बनाया था। फिर कैसे यह विश्वास नहीं किया जा सकता है कि गुरूत्वाकर्षण का सिद्धांत और उडने की तरकीब पुराने लोग नहीं जानते रहे होंगे?

आज आवश्यकता है कि पहले अच्छे शिक्षकों का विकास किया जाये। बहुत से शिक्षक पुस्तकीय ज्ञान के अभिमान में तो डूबे रहते हैं पर वे आज की बदलती दुनिया में हो रहे अपने अपने विषयों में आये नयापन को नहीं सीख पाते हैं। कुछ डिग्रियां

बटोर लेने से व्यक्ति ज्ञानी नहीं हो जाता है। गणित से मास्टर डिग्री अथवा पीएचडी करने से वह गणितज्ञ नहीं हो जाता है और न ही भौतिक शास्त्र से एमएससी करके वह भौतिक विज्ञानी हो जाता है। रामानुजन अथवा न्यूटन केवल डिग्री लेने से नहीं बना जा सकता है। खुद पढ़ना और पढ़ाने के लिये योग्य बनना, दोनों अलग अलग बातें हैं।

छात्र अपने शिक्षक को बड़े ध्यान से देखते हैं। उससे जुड़े हर पहलू उनकी आंखों में रहता है। हो सकता है कि शिक्षक जो बताये, उसके विद्यार्थी वह सबकुछ न जान पायें, पर जिस तरह से शिक्षक दीखता है और व्यवहार करता है, उसे उसके विद्यार्थी कभी नहीं भूलते हैं। अच्छा शिक्षक वह है जो सीखने वालों के प्रश्नों को सम्मान दे, ध्यान से दूसरों की बातों को सुने, और हर हाल में सीखने वालों की जिज्ञासा को शांत करे। अच्छी शिक्षा वह है जिसमें हर सीखने वाला, शिक्षक के लिये एक मानक इकाई बन जाये।

वह दिन दूर नहीं है कि कल दुनिया में क्या होगा, इसका निर्धारण शिक्षा प्रणाली से होगा। व्यापार का नियम है कि हम जहां निवेश करते हैं, वहां के लोगों को उसका फायदा होता है। फिर शिक्षा जगत में अगर हम अच्छा बनाने की दिशा में निवेश करेंगे तो इसका फायदा क्यों नहीं होगा?

आज की वर्तमान शिक्षा प्रणाली में समय का सही सदुपयोग करना हम नहीं सिखा पा रहे हैं। सही समय पर, सही चीजों का प्रयोग न करना, हमें इंसानी प्रकृति से दूर कर रहा है। सृष्टि के हर प्राणी के लिये प्रकृति ने ऊपरी और निचली सीमा तय कर रखी है, जिसके अंदर वह जीता है और मरता है। पर इसका अपवाद शिक्षक है, जिसके लिये ऊपरी सीमा तय नहीं है क्योंकि वह तो बना ही है दूसरों में छिपी प्रतिभाओं को ढूंढकर तराशने के लिये।

वह शिक्षा व्यवस्था प्रभावी होती है जो ऐसी हो कि जो अभिभावक भारी भरकम फीस का बोझ न उठा सकें, उनके भी बच्चे अच्छी तरह से, अच्छे विद्यालय में, अच्छे शिक्षक से, अच्छे वातावरण में, प्रभावी शिक्षा पा सकें। शिक्षा आसान से आसान तरीकों से दी जानी चाहिये। आज शिक्षक के लिये शिक्षा देना एक चुनौती भरा काम हो गया है क्योंकि सीखने वालों के पास वे संसाधन ज्यादा हो गये हैं जिनसे उनकी एकाग्रता बाधित हो रही है।

शिक्षा में तकनीक का प्रयोग विषय को रूचिकर बनाने के लिये आज की आवश्यकता हो गया है। जैसे अगर बच्चे को इंद्रधनुष

समझाना है तो उसे दो तरीके से समझाया जा सकता है। एक तरीका है कि उसे वास्तविक इंद्रधनुष बनते समय दिखाया जाये और दूसरा तरीका है कि कंप्यूटर का प्रयोग कर इंद्रधनुष का बनना कक्षा में दिखाया जाये। जब बच्चा ऐसा देखेगा तो वह कभी भी इंद्रधनुष से जुड़े तथ्यों को भुला नहीं पायेगा।

हर शिक्षक को यह जानना चाहिये कि उसका छात्र क्या कर सकता है, और क्या नहीं कर सकता है? उसे क्या कठिन लगता है, और उसके समझने में कहां परेशानी आती है? कक्षा में बच्चों का अनुशासित न होना, शिक्षकों के लिये एक बडी चुनौती होती जा रही है। शिक्षक का बहुमूल्य समय उन्हें शांत करने में व्यर्थ हो जा रहा है। कक्षाओं में उच्छृंखलता बढ रही है। अगर बच्चा अनुशासित हो जाये तो बहुत सी चीजें वह खुद सीख सकता है।

सुकरात एक महान शिक्षक थे। उनका मानना था कि प्रश्नकर्ता से ही प्रश्न पूछ कर ऐसा उत्तर निकलवाया जाये कि वह सही हो। ओलंपिक स्वर्ण विजेता जोहान ओलाव कास का कहना है कि जो लोग यह मानते हैं कि बच्चे खेल से पढ नहीं सकते हैं, वे गलत हैं। खेल बच्चों को एक दूसरे से प्रतिस्पर्धा करना तो सिखाते ही हैं, साथ ही साथ, समय का सही इस्तेमाल करना, नेतृत्व क्षमता विकसित करना, सही संवाद करना, और एक साथ कई काम सलीके से करना भी सिखाते हैं।

ज्ञानविज्ञानसरिता परिवार द्वारा शुरू किया गया आनलाइन पढाई का तरीका भविष्य में एक कारगर तरीका सिद्ध हो सकता है क्योंकि इसमें हर विद्यार्थी शिक्षक के लिये एक मानक रहता है, और अपने शिक्षक से सीधा जुड़ा रहता है। कक्षा छोटी होती है जो सीखने के लिये और प्रतिस्पर्धा के लिये अत्यंत प्रभावी होती है। भीड़ भरी कक्षाओं में कुछ विद्यार्थियों के खो जाने का डर हमेशा बना रहता है।

अर्ल्ब आइंस्टीन ने सच ही कहा था कि उनमे कोई विशिष्ट प्रतिभा नहीं है बल्कि जूनून की हद तक जानने की उत्सुकता भर है। अगर आज का शिक्षक बच्चों में यही जूनून पैदा कर दे तो हमारा भारत फिर से ज्ञान के संसार में विश्व गुरु अवश्य हो जायेगा। ज्ञान विज्ञान सरिता परिवार इसी दिशा में प्रयत्न शील है।

वार्षिक अंक के पाठकों को ज्ञान विज्ञान सरिता परिवार की तरफ से कोटि कोटि बधाई।

Coordinator's View

Relevance of IOMS in Socio-Economic Stability

Educational pursuit with development has become highly competitive. Everyone dreams of a good position of power, influence and wealth. But, pre-requisite to reach such a position are certain qualities, and certain ways. Among this, the most common way is education. But, is education common to all? This question from Right to Education (RTE) Act 2009 perspective has assertive answer. But, next question that comes up is, why are there heavy dropouts after class 8th? Why linguistic and numerical abilities of a common student are is in question? Why is there wide disparity among a student from elite families and that of a labourer, farmer or tribal families? Introspection of these questions would lead to a common answer that wide disparity in competence among children lead to a wide disparity in society. Sociologically any society that has a wide disparity would lead to a state of socio-economic instability and thus jeopardize basic sense of security and welfare, a fundamental right, stipulated in bold letters in constitution, and that would remain far from ground reality. This effect is in proportion to cultural tolerance and inversely proportional to the level of awareness created by education. These questions and stipulations are to our society at large and elite section of society in specific.

*In this context and state of socio-technological dynamics, various educational models have been evolved, and one of them is **Interactive Online Mentoring Sessions (IOMS).** Keeping in view the above and ground level experiences, relevance of IOMS, to cater to large section of society that comprises of under-/un-privileged families, is being analyzed.*

With the growth of technology various models of education have been evolved viz distance learning, video lectures, varying in difference of degree of interaction from One-to-One to One–to-Many. Each model with certain variance is pursued by many institutes. IOMS has evolved through Chalk-N-Talk into a live session on cloud based A-VIEW (Amrita Virtual Interactive E-learning World)platform made available by Amrita University, Coimbatore. This platform has been developed by the university in association with IIT Bombay, under a MHRD project. It is aimed at providing connectivity across passionate teachers and students spread across the country, who are otherwise not connected. It has many features that can be tuned for low bandwidth operation. This makes video output fare enough, after all high quality HD videos is considered to be a luxury in the application constrained by resources. In this platform audio-visual connectivity with whiteboard is possible between a teacher (called Mentoring Centre) and multiple nodes (called Learning Centers). Presently limitation of lucidity in use of whiteboard lucidity is circumvented with annotation software. Each of the node can have as many students as available space and audio system can support, but ideally upto 30 students per node is considered reasonable. Likewise, number of nodes can be as many as bandwidth permits, but limiting to Five nodes per mentor is considered reasonable to maintain quality of learning and attention to

students spread across learning nodes, during IOMS within human limits of. Initially, at each center one teacher, preferably of the subject, is required to coordinate at each Learning Center. These are not the limitations of IOMS, rather an opportunity to senior citizens among elite section of society and other working professionals, who are passionate to mentor, to discharge their Personal Social Responsibility.(PSR), as well as groom local teachers as torch bearer. By any scale IOMS is sub-optimal to Chalk-N-Talk. But, educational strategist and leaders cannot evade basic question – **i)** do they have enough teachers to reach out to students in tribal, rural, and sub-urban areas?; even urban areas are no way much better, **ii)** do they have sufficient infrastructure at schools in these areas? Taking a premise that infrastructure becomes available, **iii)** are there required number of teachers available, or can they be created to comply with an administrative order or policy decision? Again with a belief in job creation capability of the government, next questions that arise in first place are- **a)** do the teachers like to stay in their place of posting and give required time to mentor the students both in school and outside the school hours? **b)** are these teachers passionate about their role?

Such a situation generally lands the decision makers in a state of complacence, and an obvious escape is with a counter-question - what more can they do?

This is where IOMS becomes relevant. It is a process of socio-economic reform through education by way of integration of persons with different competences and in different degree. Elites, who are capable of making a difference, are required to take a step forward to collectively complement each other in a manner like matching boundaries while solving jig-saw puzzle. This game is no more confined to children; rather it is a real-life proposition for everyone right from home to place of work. Blaming system is a very easy escape route; changing route is real leadership challenge and ought to be accepted by incumbents in responsible positions, sooner or later. Then why to delay?

Another crucial question is - how is it different from other models? This is like questioning spirituality, which cannot be realized without living in it. Having sustained the model for more than Two years, rather bettered it, in a non-organizational, non-remunerative, non-commercial and non-political manner we can vouch for it with certain facts viz. - **a) it is feasible** as long as seamless internet connectivity is available, **b) it is economical** by way of using available infrastructure, with a marginal infrastructure. It does not require any exclusive and customized expensive equipment; as needed in most of such models. This makes it possible to make an immediate start with just addition of an off-the-shelf web-camera above the screen, if not available, **c) it is sustainable** since IT infrastructure has been on constant upgrade since last few decades with stooping prices, **d) it supports coexistence** with local setup at school with collectively complementing by mentors remotely placed, **e) its financial model** is Zero-Fund-&-Zero-Asset (ZFZA) require support of equipment acquisition and its upkeep at Learning Centers by individually or collectively by governmental, social, corporate or agencies engaged in social welfare, **f) it is aimed at reinforcing** the local teaching resource with due consideration of their constraints, **g) association of local teachers** in the IOMS would help to create their growth, and of the system like a chain reaction.

Association of local teacher as a coordinator is helpful to bridge learning gaps between remote mentor and students. This again gives rise to another question why should an experienced and renowned teacher function as coordinator? Answer to this question is obviously a NOT, but nothing stops such a passionate teacher to collectively complement the IOMS by coming forward to get integrated as a mentor to benefit students in a wider perspective. It

would be realized that IOMS is a much better and live proposition than creating videos, running coaching or tuitions. Live nature of IOMS, despite its impersonal character creates a highly personal bondage between mentor and students. It is effective enough to overcome the advantage of readymade videos and ppts though extempore explanation to questions and doubts of students, emulating a real-time learning environment that exits in an interactive class room. This enhances effectiveness of time and effort of a mentor by way of a deeper and wider penetration to reach out to those students who do not have access to videos, coaching and tuitions. Moreover, videos are unilaterally static in nature, ppts are quasi-static and coaching and tuitions are tainted with commercial tag, while IOMS is dynamic. Though free web-resource is flooded with pre-recorded lecture on any topic, problems of remote students are - what to view? where to start? what next?

IOMS suffers from only one disadvantage that it is non-remunerative and non-commercial. Social and corporate houses, exponent of social welfare, and government are called upon to support needs of teachers who are in the midst of their family life, and provide operational and infrastructure upgradation to senior citizens, as and when needed, on ZFZA basis. This kind of socio-political involvement would certainly turn this isolated initiative, of a few stray persons desperately hunting for an opportunity to mentor, into a socio-political movement of a welfare state.

IOMS has no latent objectives; it is just a name used in the beginning to convey its characteristics. The whole model is freely disseminated on the web. It is open to all to change the name or philosophy in action; it is neither a brand nor proprietary. It provides freedom to all to know, add, modify, change, delete or even takeaway and use it in a manner deemed fit. We have only one request to the takers that kindly maintain the spirit behind it, but please do not commercialize it.

In mentoring there is nothing absolute or ultimate. This skill, like any other, is evolved by an individual, gradually. Moreover, none is born with skill; it is acquired and enriched continuously ever since one starst interacting. Further, every elite person has capability to mentor students who are on different scale of learning. IOMS is just a platform for integration, not competition, of the skill among mentor; the ultimate aim is to collectively impart the

best to the target students right from the place of stay, crucial for senior citizens. This is not possible in isolation despite richness of either competence or infrastructure. Infrastructure is a means and not an end. Infrastructural issues can be circumvented with passage of time once beginning is made. It requires strong will and conviction of purpose to think beyond self with a passion to mentor. This passion comes from inspiration and not motivation, the latter is a manifestation of subjectivity, while the earlier is totally objective with human sensitivity.

IOMS is much beyond just a system; it is a process for replication, and, therefore, it is essential to emphasize crucial role of passion in mentoring. Passion of a person remains with him till last, all that changes is capacity to perform, which declines with age. This is where young professional and those elite turning into senior citizen can join the stream. This is the age and stage when one can effectively discharge PSR. This way they can gradually relieve the older senior citizens from the load of mentoring and derive satisfaction of having done justice to the family, and carry on the tradition.. This is a potential opportunity to evolve a legacy to be proud of for the descendent family members in particular, and society in general.

Presently IOMS is operating on an extremely narrow domain to infuse conceptual clarity in Mathematics, Physics and Chemistry for students of class 9ᵗʰ and 10ᵗʰ, and supporting them in class 11ᵗʰ and 12ᵗʰ. In it many innovative methods like group dynamics, inculcating values, stimulating out-of-box imagination, mentor-teacher collaboration, administrative ownership of the learning center by the school, interaction of mentor with parents to an extent that it is a virtual गुरु-कुल (Guru-Kul) culture, These approaches have been evolved, pursued and tested satisfactorily over last six years. Once more persons with diversity in expertise join, the domain of IOMS in geography, subjects, classes and academic levels will automatically expand.

Each one of us has to bring in and usher this social reform in education. It is in an evolution of process and not a product for sale. None howsoever omniscient, omnipotent and omnipresent can bring in desired change in isolation, unless everyone works for it collectively with PSR.

There are many ambitious programmes launched by NGOs, corporate houses under CSR, government. Recently, there was a news in TOI dated 30ᵗʰ Oct'18,

New Delhi Edition (page 1 and 11) about upgradation of 2697 Test Practice Centers for JEE and NEET, in rural and sub-urban areas, planned to start from September 8, 2018 . These centers are expected to be upgraded into Teaching Centers from May 2019 and will be available to students free of cost. A pre-requisite for successful implementation of these centers is to resolve questions referred to above. On Teachers' Day we did appeal to elite audience of this e-Bulletin to please connect us with decision makers for an audience on IOMS. In parallel, this proposition is also being moved to MHRD.

Brain storming in the this Third Annual Special Issue on "Educational Perspective" , in the form of an article brings forth awareness and appreciation of this imitative among senior citizens and elites. We need to evolve, without losing any more time, a collective wisdom which is capable of providing a momentum to the initiative. This needs to be done with professional, moral and intellectual honesty to bring in the desired reform.

But, at times one encounters a million dollar question to choose between professional, moral and intellectual honesty, and apparent financial dishonesty. The social awareness and RTI makes each decision prone to multiple interpretation of decision and raise allegations of integrity and financial interests. It is important to understand that every logical, analytical, technical and economical decision is governed under constraints and risks; these are probabilistic in nature. This is an occupational hazard and each incumbent in decision making position has to have a conviction and courage to live with professional, moral and intellectual honesty. All the same tirade of found guilty is totally personal and consequences are so stringent that real honest persons circumvents risk of taking decision. This is the biggest socio-political challenge which society in general and nation in particular has to conquer.

It is our belief that an individual or a brand is not important in a society living in a wide disparity. Need of the hour is a welfare state which eradicates disparity and promotes spirit of PSR and an environment conducive to collectively complementing each other. Education is one such critical area which requires less resources but more of inspired passions and collective wisdom to supports veracity of a stable socio-economic reform.

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

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

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

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

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

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

- i. Garner support of elite persons to act as coordinators at the Learning Centre.
- c. **Participator** –
  - i. As a Mentor,
  - ii. As Coordinator,
  - iii. Operational support
  - iv. E-Bulletin and Website promotion for increasing its depth and width across target students

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

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

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

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

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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

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

- This place is not where they will be taught how to score marks and get higher ranks, but to conceptualize and visualize subject matter in their real life so that it becomes intuitive.

- This place is not to aim at solutions but inculcate competence to analyze a problem and evolve solution.

- This place does not extend selective and personalized attention, rather an opportunity to become a part of which is focused on learning and problem solving ability collectively.

- This place provides an opportunity to find students above and below one's own level of learning. Thus students develop not in isolation but learn from better ones and associate in problem solving to those who need help. This group dynamics while create a team spirit, an essential attribute of personality, while one learns more by teaching others.

- This place has strategically chosen Online Mentoring, so that those who are unprivileged can gather at one point and those who can facilitate learning of such students by creating, necessary IT setup. A separate **Mentor's Manual** is being developed to support the cause.

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

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ये क्या ढूँढता हूँ

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मधुकर पान्डेय

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सियासत के बाज़ारों में उसूल ढूँढता हूँ,
बहुत ही नादाँ हूँ, ये क्या ढूँढता हूँ।

मज़हबों के इन जुनूनी मेलों में, सुकून ढूँढता हूँ,
बहुत ही नादाँ हूँ, ये क्या ढूँढता हूँ।

जिधर देखिए आदमी ही आदमी है
चलती-फिरती इन लाशों में, मैं रूह ढूँढता हूँ
बहुत ही नादाँ हूँ ये क्या ढूँढता हूँ।

यूं तो इस ज़मीं पर हर शख़्श है आलिम फ़ाज़िल
पर आदमियों की बस्ती में इंसानियत ढूँढता हूँ,
बहुत ही नादाँ हूँ ये क्या ढूँढता हूँ।

कवि प्रचार माध्यम के क्षेत्र में लगभग चार दशक से कार्यरत हैं तत्कालीन सिनेमा से लेकर नवीनतम तकनीकी पर आधारित सामूहिक प्रचार माध्यमों में कार्यरत रहकर प्रमुख संस्थानों जैसे ज़ी नेटवर्क,हिंदुजा ग्रुप , रिलायंस कम्युनिकेशन में जिम्मेदार पदों पर रहकर अनेक न्यूज़ और धार्मिक चैनल के सीईओ , एडिटर-इन-चीफ रहे हैं| वर्तमान मैं वे सामूहिक प्रचार माध्यमों के सलहाकार हैं| कविता लेखन उनकी रूचि है |

E-mail ID: madhukarpanday@gmail.com

Train Your Brain To Achieve What You Perceive

Pramod Mishra

Brain understands two things – Pleasure and Pain. What does that mean? That means, to align your brain with goal or outcome, give command in terms of pleasure or pain. If the pleasure or pain associated with your goal is specific, exciting and significant enough, brain will definitely help you to achieve it. To me, we are actually product of our mind (here brain is hardware part and mind is software - which gives command to brain). We do what our mind likes and directs us to do. Imagine that your mind is agreed to listen to your plan and agreeing to it, accepting it and taking responsibility to help you to move in that direction. Yes, it is possible and doable. For that we need to train our brain.

Let us visualize it in a short story below of a boy from a remote village.

Gopal'sfather, a farmer, was earning about Rs 15000 annually (not monthly!)for a family of five.While Gopal's 10ᵗʰ board exam result was appreciated and celebrated by family and friends, he was wondering, what next? Usual answer was to pursuefurther studies in nearby school/colleges and then prepare for SSC examinations to get a job, otherwise, support father in cultivating meager ancestral land. In one hand, it was pain to do go work in the farm but gain or pleasure of getting clerical job was not significant and exciting enough.

After few days, he heard news that, some Akhilesh of another remote village who had secured a rank in IIT JEE. While his maternal uncle and brother were narrating the gain of getting selected in IIT JEE, Gopal's mind found it to be significant and exciting. He enquired many questions, they could answer a few. But, one thing was very clear to Gopal's mind was that, if he get this, he will enjoy life to its fullest. He can take care of his family and can marry to a beautiful girl of a rich family and many more! These are normal imaginations of a person at that age and stage, who has lived in scarcity.

Now, Gopal's mind has got specific, significant and exciting goal. Mind took responsibility to help him in achieving this goal. Every moment, his brain was able to visualize the gain.Whether, day or night, morning or evening, week days or weekend, celebration or festival.The visualization was so strong that his brain was ready for all associated pains. His room was filled with "IIT" cutouts. With every change in "days for IIT JEE ....", Gopal was finding himself more prepared. His brain was getting trained!

Gopal was studying in a nearby town but he was not visiting home. Even though, electricity supply was merely for few hours but the twin sharing room of 10'x10' had hardly seen the darkness. Why? Because his brain was trained and ready for all pains for ultimate gain -"a rank in IIT"! Thereafter, there was no looking back, yet he holds roots intact.....

Author is a graduate from IIT Roorkee in Electrical Engineering. He has lead various national and international assignments. Received many appreciation and awards like shining star, platinum star among others for his distinguished contribution. With 15+ years of experience, he is presently heading an important department at BSES (Reliance Infra).

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Opportinty is missed by most people because it is dressed in overalls and looks likes work

-Thomson A Edison

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A Journey Starting From A Village….

Dr. Ambarisha Mishra

Few students/aspirants walked a more improbable path to a destination of desires and satisfaction. Some fortunate aspirants start their journey from a village based school to a career position of national importance. Author, born in a farming and landlord family based in a village named Saraunda in Mau District of Uttar Pradesh state of India, considers him to be one of the fortunate one. He is currently working as Assistant Professor in Electrical Engineering Department of NIT Patna. His father is a school teacher and mother is a housewife, with one younger brother. He was raised in a joint family with many cousins. Before 2000; during schooling there was none who could impress upon him importance of education, neither in society nor in his family, being of a farming background. Only his father, despite being in a small village had a bit of understanding of the importance of good and quality education in coming future. He could envisage a competition based education and job opportunities. After completing XIIᵗʰ most of his classmates left education either by choice or economic condition of family and started searching for some basic jobs or opted other ways. In the family he had not seen any employment option, other than a school teacher. He came across a state entrance exam 2003 for his state UP without knowing any visibility in respect options and career path ahead of him. Without any coaching or any guidance he got a reasonably good rank based on self study. Next was the biggest question in his life that- what to do next? Should he pursue education in engineering course or go for a coaching or a competition based jobs.

There was no idea about streams in engineering. Till then he had seen either seen Junior Engineers of electricity boards or from construction field, they used to visit his village in jeep, with people thronging around him with requests for solving their problems. But, anyway by god grace luckily got admission in engineering college in Lucknow in Electrical Engineering branch. After reaching to college in the state capital, coming from a deep rural village background he faced multiple problem right from switching to pure Hindi for normal communication, coming from his Bhojpuri language that he was comfortable with. In academics switching over from right through in Hindi medium all subjects, to English complicated the problem of learning at different professional course. Sudden change of educational environment

from school where a thick bondage between teacher and taught, even beyond school, exists to a formal relation confined into time slot of scheduled period created a psychological issues.

During First Semester examination, he always prayed to God to just pass in English subject, anyway. Throughout his education he was neither a topper nor among very much studious students. In facing challenges of a sudden change of environment, the only respite was a foundation of conceptual clarity imparted by teachers at school and self-study. Moreover, understanding of English was enough to cope up maths, science and engg subjects. This landed him in second semester with 73.3%. This was a big booster as much as further learning of engineering is predominantly mathematical, and role of English language in academic performance was limited. Nevertheless, realization of weakness in English language was made up with slow-and-steady efforts.

It was only after completion of his first year, it was learnt that IIITs and NITs are coveted institutes for engineering. His contemporary students had this awareness right in school and were focused towards these studies with specialized guidance. With these realities he completed B.Tech in Electrical Engineering. There was no thought, even in dream, to pursue higher studies. But, seeing classmates from urban background preparing for GATE, one of the most reputed examination, mob psychology influenced him to take-up the test in 2007. But, in absence of awareness for All India Competition and being a mediocre students, he was not confidence of qualifying it in first attempt. But, ability of a rural student to work hard despite adversaries surprisingly, he walked out with 1347 All India Rank. This result landed him in a no-looking-back mode.

He decided to undergo higher education in reputed institutes in the country and got admission in M.Tech course at NIT Kurukshetra. Like any other national institutes, he was one among students coming from all over India, and so were the faculties at the institute. This was an excellent opportunity to realize importance of good education and catch up with opportunities to god in the society. Just after admission in M.Tech he decided to go for PhD instead of a job. His, supported his resolve saying that "if you want to study complete it first, thereafter he will be on a job

to lead his life and family responsibilities". This made him to forego opportunities of campus-placements, and instead aim at Ph.D. This pursuit from overseas was a distant dream due to family constraints. Accordingly, he applied for admission in PhD only in IITs, most reputed institutes in the country. Finally, he got admission in IIT Roorkee. There he met some great and passionate teachers like Professor Pramod Agarwal and became fan of the teacher . During course work, an essential requirement for Ph.D. he developed keen interest in subjects reading and used to attend additional classes of undergraduate or postgraduate in subjects of interest.

At IIT it was bigger field to interact and explore with students comings from every corner of country, with different mother tongue, social and cultural background. It was an opportunity to befriend persons with non-Hindi mother tongue. With them common communication medium was English. It helped him to improve his speaking and communication skill in English. He was the youngest research scholar in the department. Due to lack of experience and being young he was an open to all and remained a jolly and naughty person. There, he met some research scholars very senior in age; one of them was elder even to his father; a person passionate and dedicated about his work. They used to stop him from any immature and wrong indulgence and decision. This was an opportunity to learn some hard facts of life at a very early stage. At IIT, he also got opportunity to handle administrative responsibilities as a Hostel Warden.

While, his parents were happy with admission in IIT, but his friends in the village had an obvious question - why is he still studying? Is he not able to pass his engineering course in more than 10 years? It was difficult for him to explain villagers that he was into a higher education which was beyond capacity of visualization for the villagers. A person who was not able to communicate properly even in had become fluent in English and a confident communicator.

During PhD he got a chance to go to Singapore in an International Conference, from Singapore he made phone to some of his friends from the village. They broadcasted with pride of having talked to me at Singapore. It elated my parents enjoying high respect among villagers in and around.

With some circumstantial disturbances he completed his PhD in Electrical Engineering from IIT Roorkee. Now, it was again a crucial time to settle in professional career by selecting appropriate opportunity. With the time he started his carrier as a teaching faculty in a private engineering college. But, there he was not finding the resources required for research and future growth. With the time there was family pressure for getting married, which getting delayed in the family context. Parents, in village started exploring alliance, with an expectation of a suitable match in educational and the professional level. While working in a private university he got married in November,2017 to Garima Dubey (M.Tech). But, pursuit for a job in a brand institute for a professional satisfaction remained active. Recently, in July 2018 he got selected Assistant Professor, Electrical Engineering Department, at National Institute of Technology (NIT), Patna. It is has been a satisfying journey and a matter of pride for the village-folk.

In all his educational journey of about 10-12 years he was occasionally visiting his village and always thought of what more good can be done there. He was always in contact with his village friends without thinking of his current position in job, because that give him satisfaction when going home meeting all them. He is a emotional person and due to that he connects with people with heart and he care & respect each relation as much as possible.

Summary: *Starting point of a journey is not a matter of choice. Choosing a forward path is one's own prerogative. But, pursuit of the chosen path, without regrets, requires consistency, continuity and last but not the least, human respect towards all, with a firm belief that* **'Every end is new beginning...**

Author, in the biographic article, has disseminated his journey starting from a village into a national level institute.

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LEARNING NEVER ENDS

Swatee Karve

It is a well known fact that many things in our life are beyond our control, and one such thing is your birth. You never know where you will be born, and, what kind of upbringing you would receive in the house that you are born in. I must say, I was very lucky in both these aspects of life !

I was born in a family, whose head was active in fight for freedom. My father and uncle [father's brother] were involved in freedom fight against the British rule, and it was my mother, who was required to look after the rest of the family comprising of 5 children [3 sons & 2 daughters] in hardship.

I was born in 1951 after independence .My father decided to shift from Pune to Wardha, a district place near Sevagram {Mahatma Gandhi Ashram} as my father was hurt and upset due to partition .He started his own business of books and maps. He was a news reporter for the Times of India as well.

He was a very disciplined person and a man of principles. We were brought up in an atmosphere, where honesty and love for country was very very important. My mother was a very hard working and patient lady. She was a house wife, who followed my father's principles.

I was trained under my father and teachers' guidance. Weekly visit to Sevagram Ashram for social service added strength of conviction and a focus from my childhood. Values of life were induced from childhood and I was also told stories of Swami Vivekanand, Ravindranath Tagore, Abraham Lincoln, Mahatma Gandhi and so many others, who became my idols.

After completing my schooling at Wardha, I pursued my graduation in architecture. It was in line with my interest in photography and drawing. In those days it was a very new subject, especially for ladies; but my father with wide vision was highly supportive and used to say that "you should see the horizon and work hard to reach the top" And used to motivate saying, "There is always a room at the top".

I took admission in Vishweshrayya Regional College of Engineering (now V.N.I.I.T Nagpur). It is a very big campus and had lots of engineering branches, along with department of Architecture. We were only three girls amongst a total intake of 30 which posed us natural difficulties to accommodate in new atmosphere. My passion drawing and photography helped me in visualization a needs for pursuing studies in architecture.

After completing B.Arch, in 1974 I got an opportunity to get a wider exposure at Madras under Arch. R Chakrapani, winner of design competition for Matru -Mandir proposed at Auroville. In those days a new township called Auroville was under planning and execution. One year's association and and then for three months at Auroville with a team of French architects. This opportunity created new dimension to learn French. After my return to Nagpur and then came back to Nagpur, priority for parents to marry their daughter, entered me into matrimonial alliance with Arch. Mr.Prakash Karve. He had been my classmate at V.R.C.E.. Thus started our family life with our professional career , he was practicing architecture at Jabalpur, and I joined a semi-government department Nagar Sudhar Nyas, Jabalpur now known as Jabalpur Devlopement Auhority. Prakash had planned many complexes including cinema halls, schools, commercial and residential. He was on panel of consultant, valuer to many reputed organizations, in almost all the towns in Madhya Pradesh.

I was working on development plan which grew into a role of a town planner. Initially, as a lady, working in the field and establish competence, in such an organization was tough. Slowly, sincere efforts could garner confidence necessary for growth. In this pursuit echo of message of my father remained inspiring.

The year 1987 was an important in my career when I was selected for a special training programme on "Management of Urban Development" at university of Birmingham [U.K.]. It was under Colombo Plan, organized by British Government and Indian institute of town planning. It was a Residential course lasting three months in U.K., and one month case study in India .

OH! On one hand, it was a great chance for me, but, on the other hand as a mother of two small children[(son aged 7 and daughter aged 9), leaving family behind was a big problem. But, my mother and husband supported me and the challenge was accepted. This is the strength of a joint family.

I still remember the way British Council had welcomed us at HEATROW airport when our group landed at London. The group was settled in Birmingham university and the Course started. I was the only Architect in a group comprising of administrator, engineers, and town planners. It was a thrill to attend classes 13 years after graduation. Communication in those days was ail-mail and it used to take for information to reach from one end to the other. It was first international experience, and that too as a pure vegetarian to adjust into different food

and cold weather. Yet, people around were very friendly and helpful.

About the Course : The course started with lectures and site visits. Course material and group discussions kept us very busy and the daily routine was quite hectic .This was a good experience and we could learn many new things in those three months. Objective of the course was to train managers to work efficiently, and improve managerial skill and to improve effectiveness of the organization.

The course emphasized on appreciating the urban problems, all the elements of planning cycle and also the human resource management and information system. The motivation techniques and discipline needed to work in the group were explained to develop effectiveness in the organization. Last but not the least, skill which is very important is to co ordinate urban issues and encouraging **community participation** and resource distribution.

Project Management :   The key elements of the project cycle and to appreciate their relevance for management action was the basis of the management viz. (1) Identification, (2) Formation, (3) Design, (4) Appraisal, (5) Negotiation, (6) Organization, (7) Implementation, (8) Commissioning, (9) Transition and (10) Evaluation.

Planning Process : Every planner has to divide the objective into 3 stages - (1) Physical schedule, (2) Financial schedule, and (3) Resource schedule. It is important to divide the whole work and make a sequence with associated needs of planning for which is achieved using tools like bar chart and flow diagram.

Following are the universal issues which one has to face in every urban development project :   (1) congestion of land /shortage, (2) Speculation in land dealing, (3) Land development problems, (4) Change of land use {This   means planned and unplanned areas ,agriculture to non agriculture ,and commercial, residential ,and, last but not the least, and (5) Land acquisition. These are very challenging and time taking job and involve complex issues like fixation of compensation, development and maintenance. Apart from these issues, high rate of population, growth and poverty is also a challenge.

There are many   stake holders and from different fields viz. land owners, rural urban land less, government agencies, funding agencies, local bodies, politicians, NGOs, voluntary organizations, land developers and contractors, authorized and unauthorized colonizers ,cantonment board, etc. Any decision creates conflict of interest among concerned individuals, and thus corruption breeds in; this is also a very intricate problem. Despite all these actors require attention and co ordination

In addition compliance of statutory provisions viz. town and country planning act , zoning regulations , subdivision, slum clearance board , land pooling, land related capital gain etc. These require careful attention and avoidance of nob-conformance.

There are taxes, like property tax, building bye laws ground rent, urban act, environment act, all such complex policies are in existence which have to be tackled delicately to achieve positive result without any hassles.

The aforesaid international exposures were a great learning. It changed my vision and perspective the complexities of the urban development were analyzed in a very systematic way and developed the skill to deal with the issues.

Another opportunity struck me in 2004 under USAI when I had an opportunity to attend for city managers. This training was regarding solid waste management and traffic and transportation, an issue which is assuming greater attention with growing urbanization in India. In addition to training on traffic operation system, importance of signage, traffic signals, public awareness programs were discussed through site visits and literature. It also emphasized upon public participation and implementation methodology to enhance effectiveness at change.

Secondly, solid waste management system adopted in USA gave us detail information about water supply, water treatment plants and results achieved were simply unbelievable .The segregation of minerals, water and the quantum of manure produced were to such a great extent that it was a source of revenue. Production of electricity through litche was also was too high. The safety of the people and the contamination of water due to this land fill sites were taken proper care. During execution of projects upholding interest of the country and for the people was distinctly perceivable.

Dissemination of learning during these trainings was made in the form of many project proposals for Jabalpur city. Proposals were made for Jabalpur and the presentation was given by me on behalf of the Municipal corporation. It was realized that there is a solution to every problem. All that is important is to create public awareness and thereby invoke public participation, a sound technical knowledge and suitable as much as feasible polices. Systematic back office effors help greatly to realize the plans. .

As a tourist also I visited many countries. I realized that, despite many environmental odds viz. snow, heavy rains, storms, deserts, these countries are developing very fast and beautifully. This is the results of technically well planed, tourist friendly and nature loving perspective.

Our country is having good climate, and good number of people to work, technical know-how. Despite, why we are lacking behind ? I feel that lack of will power, love for country, perfection approach and hard work. What we need to develop a WORK CULTURE which can elevate our country's image .

Nature has given us resources in abundance, it is up to us how we preserve it to make it beautiful, lovable and livable.

Honesty and love for job are the key words need to be always remembered and an openness to learn **as learning never ends ….**

Author's biographic article throws challenges, opportunities, passion and vision of an architect, and that too for a lady who chose the profession nearly 6 decades ago. She retired in 2011 as Chief Architect from MP Govt. She has authored couple of books, and is passionate about social welfare and especially senior Citizens

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"**Imagination** is more important than **knowledge**.

For **knowledge is limited**, whereas **imagination** embraces the entire world,

stimulating progress, giving birth to evolution."

- **Albert Einstein**

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Reversing A Downward Trend In Education

Madhu Bala Nath

On August 4, 2001, Snigdha Sen reported in the Times of India that in a school in New Delhi, a class monitor tried to discipline his classmate for climbing the window by kicking him in the groin. Four days later, the child died in a hospital apparently because of this injury. After interviewing a number of teachers and students she clearly concluded that there was a huge propensity among children to be violent because both the home and the school have failed to address the base instincts in children which tend to show up as the children reach adolescence. One of the key causes was an overburdened family and an overburdened school system. "There is a hidden frustration therefore that is translating and transmitting into aggression in families and in schools. Aggression has become an expression that gives way to their emotions," Snigdha wrote.

Seven years later, on February 13, 2008, Emily Wax from the Washington Post Foreign Service reported about two fatal shootings and a stabbing in Indian schools that had rattled parents and teachers there, forcing India to confront an issue it had previously known mainly through TV news footage from the United States. Ms Wax continues, "while school violence remains rare in India, three attacks since December 2008 have led to calls for increased security in schools and for broader control of the more than 32 million guns in civilian hands in India. Television images of terrified children crying in hallways after bloody student-on-student attacks have helped drive the concern. What really was the incident all about? An eighth-grader stabbed an 11th-grader in the shoulder and chest at Central School No. 1, a government school in New Delhi, and the victim, a boy named Rahul, said he was only trying to break up a fight. "Some kids were fighting and I just went there to stop them. Suddenly one of them . . . turned around and stabbed me even before I could realize," said Rahul, wrapped in gauze bandage, on the NDTV news channel.

"I think we now know that this has reached a critical point and we can't wait for the next act to start helping our kids," said Sameer Malhotra, head of psychiatry at Fortis Hospital, one of the capital's best medical centres. Malhotra is starting anger management workshops in schools focusing on the difference between assertion and aggression. "I think it's time to go deep and start talking to the students about what is disturbing them and the right way to handle it," Malhotra said. "We live in a different world today and sometimes the human touch is lacking. We are losing our empathy and need to have more moral-based education in Indian schools."

After all this diagnosis, did the violence come down? **Did we bring in education in moral values? Did we multiply anger management efforts in our schools? We did not.** Ten years later, rather disturbingly, by 2017, violence in schools was happening unabated. Here are a few instances of highly unfortunate events in Indian schools. 7-year-old Pradyuman Thakur was found with his throat slit in the toilet of Ryan International school, Gurgaon. A Lucknow teacher mercilessly slapped a class 3 student 40 times. The child apparently fell unconscious from the beating. The reason for her rage was that he didn't respond to an attendance call. A student of Stepping Stone Intermediate College in UP was brutally beaten up by a teacher after the class monitor snitched him out for talking. He was beaten with a duster, despite protests that he was already weak, and it resulted in a fracture to his right hand**.** In Bengaluru, 14 year old Raunak Banerjee, a class IX student from Baldwin Boys School, committed suicide after being bullied by a fellow student while travelling in a private van rented for school transportation. Raunak, who was described as a "sensitive child," was apparently humiliated by being taunted in front of his peers. The bully was named in a suicide note left by the victim before he jumped to his death from the 10ᵗʰ story of his apartment building**.** The list goes on.

But what does this mean for the future of the education system in India? It definitely means and implies that education will be riddled with fear and we all know that the development of the cognitive is difficult in an environment that is not safe and secure. Is the Indian government doing anything to mitigate this challenge? The policy and legal framework to make our children secure in schools is very much in place. The Protection of Children from Sexual Offences Act (POSCO) defines different forms of sexual abuse, including sexual harassment and pornography. It deems a sexual assault to be "aggravated" under certain

circumstances, such as when the abused child is mentally ill or when the abuse is committed by a person in a position of trust or authority like a family member, police officer, teacher, or doctor. The Act also provides for mandatory reporting of sexual offences. This casts a legal duty upon a person who has knowledge that a child has been sexually abused to report the offence; if he fails to do so, he may be punished with six months' imprisonment and/ or a fine. The Juvenile Justice Act, was in place placing the state's commitment to ensure justice; The Juvenile Justice (Care and Protection of Children) Act, 2000 (repealed and replaced in 2015) made it mandatory for a child welfare committee to be set up in each district, with the powers of a first-class judicial magistrate. The committees are tasked with looking into the care, protection, development and rehabilitation of children. The directives from key government departments are in place, the State Commission for Child Rights had issued guidelines to ensure safety, the Central Board of Education had directed that schools set up committees to prevent bullying and harassment, thousands of teachers have been trained and yet we as parents were in terror and fear – fear and terror of what? Of sending our children to schools!!

More than 30,000 of our teachers are trained every year in Delhi, and a module on child abuse has been prepared by the government on how to recognise tell-tale signs of this abuse? when and how to intervene? and how to prevent it," said Soumya Gupta, the director of education." The Delhi Commission for Protection of Child Rights (DCPCR) set out a few guidelines in 2013, including an order for every institution to put in place a Child Protection Policy. The biggest problem is that nobody is monitoring it. There is no compliance that is being ensured. As a result, according to the National Crime Records Bureau (NCRB), 8,800 cases were filed under the POCSO Act, the law dealing with sexual assault on children. On an average, that is at least one case registered every hour. In 94.8% of the cases, the children identified a "known person" as their attacker. . The NCRB does not classify cases on the basis of where alleged assaults took place but given that children spend approximately eight hours a day in school or in transit to school, the probability that they were attacked there is high. Some of the most prominent cases of child abuse in recent years have taken place at schools.

This happening is extremely telling of the fact that the seriousness of violent behaviour is not fully internalised by the functionaries and duty bearers of the education system in India. Supporting and promoting such behaviour is indicative of a lack of information, knowledge and commitment to the principles of good citizenship. But giving the benefit of the doubt to all concerned we should concede that such responses are not intentional and so it is not too late to begin coordinated approaches that remove ignorance and misinformation so that a mass of critical change agents stands ready to make a difference in creating responsible citizens through value education and character building in schools. The teachers have a critical role to play to reverse the downward trend that came in public view as early as in 2001! The time is now.

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Education is the manifestation of perfection already in men. It is pitable that the existing system of education did not enable a person to stand on his own feet, nor did it teach him self-confidence and self-respect.

- Swami Vivekananda

A Perspective On Education

V.K. Tripathi

Many people have passed in the world who reached great spiritual heights without going to school. Lord Buddha attained self realization in the forest. Prophet Mohammad was revealed Quran in the cave and the field of action. So was the Bible to Jesus Christ. Kabir gained enlightenment through weaving. Parents of many of us were illiterate but they were matchless in wisdom and truthfulness. Despite this, in the pursuit of understanding the nation and the world, learning technical skills, developing analytical and mathematical ability, the school and college education is helpful. Today the education is not accessible to a majority of boys and girls, it is expensive and admissions are competition based. Still, whatever school is available to us, we get our wards admitted into it. Schools up to 8ᵗʰ grade you will get within 3-4 km. For IX and X grades you may have to go up to 8-10 km.

In most schools regular teachers are only a few and school runs only for short while. Transport is also an issue. The parents of children and school village panchayats must build, without delay, movement for this, to have one regular teacher for every 40 students, six hours of teaching per day, monthly tests to be held and evaluated, and school (or a group of 2-3 schools) to have a bus/ van to transport students living far. Taking teacher's salary at Rs. 40,000 per month, the government must spend per child Rs. 1000 on salary head, Rs. 200 transport, Rs. 100 mid day meal, Rs. 300 other expenses (library, accounts, computer, games, electricity, water, repair etc.) The onetime cost of buildings, classrooms, blackboards, tables, chairs is separate which may be around Rs. 5-7 thousand per enrolment strength, besides the cost of land. With all this preparation, government should open the schools. 70 % people of the country do not have the capacity to bear this much expense (Rs. 20,000 per student per year), hence under the Right to Free and Compulsory Education Act, the government must bear these expenses and make clear allocations in the budget.

The private schools that are providing education at Rs. 100-400 per month are able to do so by paying meagre sum, Rs. 1500-4000 per month to their teachers. According to government ruling these schools admit 25% poor students. Their tuition is paid by the State. However, the government must pay the tuition of these children at the rate of expenditure per child it bears in a government school, so that the teachers in these schools can get at least one fourth the salary of a regular teacher. The private schools giving good education at low tuition for the last ten years must be given the grant-in-aid status (where teachers' salaries come from the government while other expenses are met by the management) so that children do not have to pay tuition and teachers get full salary. The teachers who have experience but do not possess B.Ed. or equivalent degree, should not be removed, but sent for training. In states like Kerela, where grant-in-aid schools are more, the level of education is better. Hence, the percentage of students going to grant-in-aid schools in the country, that at present is 9%, must be raised to 30%. The Gram Panchayats and Municipal Corporations should build campaign for it.

Dark Shadow on Education : A dark shadow is looming large on our education. It is heard that in several states curriculum and school ambience are being loaded with lessons and activities that inject separatism and hatred. Hatred commits double sin – insults the innocent and gives the perpetrator a false sense of superiority. Essence of education is to understand the nature live a life of sustainable coexistence.

We must be careful about history as well. After all what is history? It is to learn how our ancestors lived their life, what were the means of livelihood, what were the systems of education, security, and justice, how were peoples' relations with each other and their conduct (culture), how agriculture, science, technology and cottage industries developed, how the struggles and movements for freedom developed, etc. It is also to take lesson from the history in respect of Dos and Don'ts. The period of kings has been long, hence details of feudal system of governance may be given but details about the ruling class, rather than the king, is more relevant. Since the interference of state in the villages was less, a major focus of history must be on how was the life of the people? how were the relations of farmers with the market, money lender and the state? how was the caste system and social structure? how did the religion come to the hut of the poor?, how did the people of different religions lived together with oneness for centuries? how did the sufi-saint

movement continue for 700 years? Passing judgments on kings without these consideration is unfair. By this, one doesn't harm the kings, as their ashes and bones have vanished into the soil, but humiliate the present day contemporary masses. This is unjust.

There is much to learn from the nonviolent struggle for freedom. The meek and uneducated masses of the country stood up against imperialism through the doctrine of Satyagraha. Mahatma Gandhi was the architect of Satyagraha (civil disobedience), a unique instrument that enabled a tiny percentage of Indian population in South Africa to rise against color discrimination perpetrated by the colonial regime. In India, people built the consciousness for freedom, equality and democracy and defied the mightiest regime on the Earth..

Science Education : Science is the study of cause - effect relationship, exploration of laws of nature, and the application of these laws to real life. Understanding of science builds through experimentation, observation and inference. It may seem that scientific knowledge is too vast, but if we study it systematically we can comprehend it with ease and feel its fascination at every step. For physicists, a good starting point is Newton's laws of motion. If we develop a feel for quantities like displacement, velocity, force, momentum, angular momentum, torque and energy, we can touch the vastness and beauty of these laws. Oscillations and waves is another topic that encompasses several fields of science. Read a good book on these topics and solve the problems given at the end of the chapter. Each problem will bring you excitement and revelation. It will also generate an urge for the next step. My experience is that most of the common people have the ability to learn science. The best learning comes through teaching, hence developing skills of teaching and sharing whatever one has learnt may strive to build a humane society.

The author is a retired Professor in Physics Department of IIT Delhi . His specialization is in Plasma Physics. He is Founder-Chairman of SADBHAV Mission and author of a famous book People-Centric Nationalism. He is an exponent of Gandhian Philosophy, and has dedicated large part of his retirement life to social welfare.

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हमारा पंचवर्षीय प्रवास

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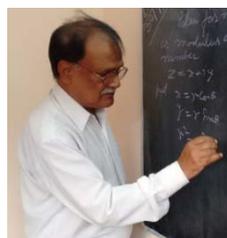
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पारम्परिक शैक्षणिक मार्दर्शन से प्रारम्भ कर आज हम तकनीकी-विकास के सहारे मूलभूत प्रासंगिकता को आगे बढ़ने में संलग्न हैं..

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

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Knowledge And Education

Prof. G.L Asawa

Education can be defined as the process of training of one's head as well as heart so that one equips oneself to effectively deal with different circumstances, people, or challenges that come across in one's life. Education seeks knowledge, information, and skills required for fulfilling one's need, and contribute to the well-being of the society, or country or the world with modesty keeping oneself happy as well as contended, besides being able to earn enough for oneself and one's dependents.

There is difference between knowledge and education. Mere acquisition of knowledge is not having acquired education. The first step in the acquisition of wisdom or learning is silence, the second listening, the third memorising, the fourth practicing, and lastly the fifth is teaching others. For example, having been taught to follow traffic rules or about preservation of environment and ecology is mere knowledge acquisition. It is only after memorising, practising these at all times and also making others learn about the traffic rules or environment and ecology preservation. True education is the training of mind and the heart both.

Swami Vivekanand's question is still relevant: The education which does not help the common mass of people to equip themselves for the struggle of life, which does not bring out strength of character, a spirit of philanthropy, and the courage of a lion – is it worth the name?

The first lesson on education received by any human being is from his (or her) mother and, thereafter, father and other family members. To a child, prior to going to school, his mother and the father are the know-all kind of persons. Whatever he sees, observes, experiences, in his family and is being told by his family members imprint almost permanently in his mind. This period is, therefore, very important in shaping the mind and personality of the child. To bring the long-desired changes in the society or country like treating women with respect, complying with national laws, having empathy towards senior citizens, differently-abled individuals etc., this part of one's education needs improvement and targeting, therefore.

But, soon after the child enters a school, the previous perceptions start changing and the teacher becomes know-all kind of person. Therefore, the role of teacher becomes very vital in shaping tomorrow's generation. A teacher can even erase the imprints in the mind of a child that the child had because of the informal education he received earlier through his family members. This continues till about the completion of middle or secondary school after which the child, rightly, starts questioning the teacher as well. This desirable characteristic of questioning could be imparted even earlier if the child had been brought up in an enlightened family.

The purpose of any educational institution is to impart education which will enable the education seeker to meet life's situations in a socially-acceptable, environmentally-sustainable, and desirable manner. Unfortunately, due to so many ills of the existing administrative, social, and political systems in our country, imparting of education appears a mere profession to give the education seeker a piece of paper which is a certificate or a degree to be used later for any kind of employment irrespective of his/her aptitude or capability.

Our Government schools in remote villages are, infrastructure-wise, ill-equipped and also inadequately staffed. With these inadequacies, it is, therefore, impossible to expect from such schools any meaningful outcome. It will be better if the government improves the conditions of our primary, middle and secondary schools to such a level that no student would ever need any further coaching to compete successfully. Now-a-days, without strong base of fundamental knowledge, the coaching centres are too ending up in telling the students how to pass the competitive examinations instead of making them learn the subject.

An ideal school should have good infrastructure and equipped with audio-visual facilities. It should be student-centred and have new as well as veteran teachers who must groom or mentor new teachers to take their place in times to come, besides a pro-active and responsive administrative and managerial staff all of whom working in tandem and, thus, creating an environment conducive for the overall development of all its students to their full potential. Teacher plays the most important role in educating a child. An ideal teacher not only knows well his subject and art of teaching but also has a disciplined and engaging personality who can be emulated by the students for their own as well as society's good.

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Making A Beginning…

Hari Prakash Biyani

Introduction with Gyan Vigyan Sarita (GVS), a non-government organizational initiative of a small group of Four persons, passionately dedicated to socio-economic reform through education was delightful in the first instance. I can say it, the beginning of a new thought. It will be unjust if I do not remember Shri Shreekant who follows Sahajayoga meditation. Normally, trust levels amongst Sahajayogies across the globe is very strong like own brothers. Hence, when the GVS initiation was introduced by him, I was impressed very much because sincere efforts are being put in, to impart free of cost education to the deprived children who cannot afford paying hefty Tuition/Coaching Fees.

We contacted the coordinator over phone and shared our wish to start his online education at Ranchi. He became ready to start SOS. We requested him to visit Ranchi in person. After some reluctance, he finally agreed and next tenth day he was at Ranchi. We engaged few Girls and Boys from students team as host to the coordinator, arranged his stay at college campus (this resulted in commissioning of Guest House which was not commissioned for last five years). This created homely atmosphere amongst academicians of college & students with the guest.

We had two options, first to start at our residence, and the second to start at State Government MSME Tool Room which is an Industrial Training Centre and a Diploma college with excellent discipline. There are approximately 600 students including girls and boys and day scholars as well as Boarders (both girls and boys). Most of the students are from different villages of Jharkhand and are either tribal or having tribal influence. Such children are very innocent; they join after passing class tenth.

We decided to start from option two, that is State Govt Tool Room. All trials were done between Tatisilwai of Ranchi and Class room of the coordinator. The internet speed was a big issue in the beginning but the guidance of Chief G.M. of BSNL Jharkhand & Bihar helped us to apply to get BSNL's 100mbps line with Optic fibre cable. We hope to get the connection by the end of September.

In operational theme, we have difference of views with GVS which believes that SINCE THEY DO NOT CHARGE ANYTHING, WE CAN'T CHARGE ANYTHING. Our humble submission was that emotions are good in worldly systems but MATERIALISTIC NEEDS ARE EQUALLY IMPORTANT TO MAKE SUCCESS STORIES. Hence, we suggested that one agreement in local language and English should be signed with all students taking advantage of this FREE OF COST support system stating that the student need not pay anything today but, when he/she grows in life and becomes a success story he/she will contribute to this charity system or similar other systems which we hope in due course a pool of all such Free of cost systems in this world. It will generate opportunities to underprivileged to get similar opportunity to grow. We agreed in the last and salute the GVS for such honorary services and we assured the coordinator that we shall not take any direct or indirect advantages out of this support system. It was happily agreed to from inner core of the heart.

Our next concern was that many of our learned senior persons in society in the age group of the Coordinator and myself are sitting at home with treasure of knowledge and their own children have shifted to some other cities or countries and now these Elderly persons have no scope of sharing their love with Children as the present Education system even do not allow colleges, at least Govt Schools and Colleges to use these persons as academicians. Hence, it is time to promote this online education in a massive manner and every elderly person should get opportunity as being done by team members of GVS. No doubt, it is their own creation, but a path has been paved for others to choose and follow together.

With folded hands we pray the Creator of this Universe to please bless all those who want to contribute to the society, to the administration to encourage such efforts and also bless all those children who are not able to buy education in exchange of money which is in limited hands. Let the whole world prosper, let every soul enjoy the love of sharing and accepting. The readers may venture visiting www.sahajayoga.org which has promoted us to cooperate with special group of persons like GVS, with core of our heart without any selfishness.

Author is an accomplished person based at Ranchi. He has retired from family business and enjoying the love and harmony of a big joint family and thus available for any similar work to pay back to the society which has given immense to us.

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Education For Masses, A Dream To Be Realised For A Better, Empowered India

Rashmi S. Mehta

We all hear our PM talking often about the demographic dividend that India possesses and 2030 onwards India will be the only country in the world, having large proportion of youngsters in its total population. Does having large number of young population ensures prosperity and appropriateeconomic occupations to fulfil the basic needs of these masses? On the contrary any country with such large population of youth, who do not have any skill or not trained suitably for the contemporary jobs or entrepreneurship faces as a consequence anarchy and unrest.

Are we able to educate (not in terms of degrees etc.) these masses in real sense, do they possess some of the essential skills to be economically productive and responsible citizen? If India has to transform from a developing country to a developed country then it needs to produce youngsters to be highly skilled and having capabilities in diverse areas such as science and technology, design, finance, commerce, agriculture as well as in fine arts,culture and humanities. We need to nurture workforce, whichis disciplined, hardworking, honest, innovative and creative as well as able to think critically, logically and analytically. The pace with which technology is advancing and changing in 21ˢᵗ Century requires very high quality knowledge and technology personnel who would be able use these technologies such as robotics/ automation, artificial intelligence, machine learning, big data, internet of things, block chain etc.Future will be very different from the present scenario in 2018. Many jobs and occupations will become extinct in future.

These are the serious challenges India faces today, solutions are not that easy to find, far from the sight, needs to be introspected and it requires drastic changes and complete overhauling of our education system. Overall budget allocated to education and research has to be increased to trigger desired transformation.

If we talk of the education scenario in our country in terms of Primary, Secondary and Higher secondary Education, then it seems in pathetic state. Although there are big schemes like" **SarvaShikshaAbhiyan", "Right to Education"**etc. giving more emphasis to enrolment in schoolsrather than the teaching standards and learning outcomes. It is estimated that over 3 million children in the country are still out of school, and of those in school, the 53 percent are at least three years behind expected learning levels.. Thus all the above schemes have improved the overall enrolment in primary and mid primary levels. There are more girls and marginalized children coming to school but they don't stay, they don't learn, and they don't complete. Systemfailed miserably to reach the desired learning outcomes such as proficiency in basic language reading, writing and articulation and mathematical skills such as simple addition, subtraction, multiplication as well as division at lower primary level.

Here, we are not taking into consideration, small population of children coming from very elite, rich background who have access to best schools and educational institutions and those coming from upper middle class and middle class where parents are aware and sacrifice their comforts to educate their wards in best possible institutions. It is the vast majority of children coming from lower middle class and poor families in rural, semi urban as well as urban settings, where parents are illiterate and aware, do not have access to quality education and schooling.

Malaise lies in the dismal performance exhibited by state run schools where as per ASER (Annual Status of Education Report) major hurdle is lower teacher attendance and poor learning outcomes. Even if teachers are teaching regularly, they turn out to be less effective because of lack of accountability, content knowledge and poor professional development of teachers. Most ofgovernment's education budget is utilised in payment of salaries to the teachers, forget about need to have proper infrastructure and basic facilities. Dismal state of affair in state schools and teacher's absenteeism gave birth to very large number of private schools in urban and rural areas. Even poor, illiterate parents prefer to send their children to these schools in comparison to state run schools where accountability and dedication of teachers towards the profession is highly questionable. Teacher's content knowledge and

delivery is very poor and absenteeism is another big challenge for the authorities. This does not imply that condition in private schools is satisfactory, because of very low salary given to the teachers, qualityof teachers is not up to the mark here also and except regularity, teaching standards are below the mark. Apart from sending children to these schools, parents have to spend lots of money on private coaching or tuitions. Sometimes the teachers who do not teach in school teach very well in private tuitions.

Above scenario in the field of basic education would hamper the India's desire to develop and grow at higher rate. To become a developed country India needs institutions doing high degree of research and inventions in the field of science and technology and need scientists and researchers of high calibre.However Science education in India remained totally theoretical and information oriented instead of students learning by doing, observing, inferring etc.

In nutshell we are not able to provide quality education to masses, not emphasising on the facilities ,resources and infrastructure which require huge amount of money and focussing only on the improvement in teaching standards and learning outcomes some of the following suggestions must be implemented on urgent basis such as-

Continuous mandatory training to the teachers and its evaluation

- Continuous, comprehensive throughout the calendar year, training of teaching methodology and pedagogy to the teachers by faculties who are well worse with content and modern methods.Demonstration of classroom delivery by the experts on some of the topics chosen from the syllabus in all the subjects at lower and primary levels.
- Continuous evaluation of transaction and delivery by the teacher in the classrooms with necessary remedial mechanism and handholding.
- Training for the adequate use and designing of appropriate teaching aids as well as technology to make teaching more interesting and holistic thus resulting in better metacognitive understanding and comprehension by the students.

- Project and enquiry based education instead of traditional chalk and talk methodDemonstration, teaching with the help of models and experiments and encouraging students to explore, design models and experiments on their own as well engaging them in research.
- Training the teachers with regards to modern educational theories such as Theory of Multiple Intelligence, Learning styles, working of left and right brain and what should be done for understanding in depth as well as Memory Techniques so that memorising and recalling is improved.
- Creating platforms and groups with the help of technology where there can be free exchange of ideas, sharing of good practices among the teachers.
- Help of retired teachers, educationists and senior citizen can be sought on regular basis. They can motivate, mentor and provide the support.

Continuous comprehensive evaluation of students' progress with regards to learning outcomes

- Continuous evaluation of students learning and subsequent diagnostic mechanism to improve their understanding and performance.
- Instead of students learning the content by memorising, emphasis should be on their understanding in applying the knowledge to their day to day life as well as practical and hands on learning. It is observed that students from rural areas are better at hands onpractical learning than those from urban areas.
- Use of technology, electronic and social media to enhance the reach, understanding, learning and for better connectivity and results. Sharing of good practices among the teachers.
- Paradigm shift from delivering instructions to learning out comes, that is emphasis on student's real learning rather than that on teaching.Making students independent lifelong learners by making them responsible for their learning.
- Designing the curriculum and co-curricular activities for the holistic development of the

students such that all the 4D's i.e. Physical, Mental, Social and Spiritual development take place in a subtle way.

- Emphasis on life skills, physical and mental fitness and soft skills such as proficiency in reading, writing, and articulation etc. in day today activitiesinside and outside school.
- Training of basic essential skills such as carpentry, plumbing, simple electricalrepairing as well as gardening, cookingetcwill help them more hands on practical individuals.
- Giving opportunity to be good in sports, music, dance, art and craft will make them innovative, creative happy souls who will in long run become active, energetic, enthusiastic citizen of their motherland.

Receiving quality education is right of children at all the levels, all the stake holders such as government, authorities schools,principals and teachers as well as society as large have to work together to bring fundamental change in the system resulting in improved education scenario.

Our society is divided in to classes, parents from elite and upper middle class provide all possible opportunities for their wards to succeed and do well in life. However it is mandatory for the society, country to provide equal opportunity to children from lower strata. Countries march forward on the path of development, happiness only when there is equal opportunity for everyone. With timely, proper planning, implementation and involvement of community as a whole it is possible to achieve the goals, it is possible to achieve this dream of equality and better educated society giving opportunity to everyone to excel, realise potential to fullest and remain happy.

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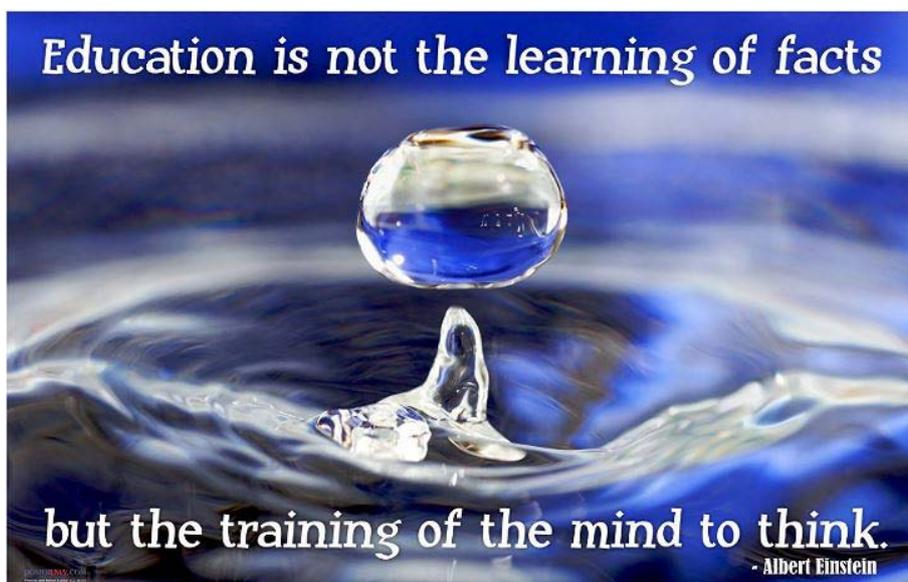
Reality Behind Our Educational System

Ms.T.Saraswathi & Dr.T.Hemavathi

It has become a regular feature to say that the colonial system of education or rather the educational system introduced by the British is responsible for all the ills in the country and the present level of unemployability in the country. While it is true that all institutions are not producing employable graduates, the reasons are multifarious.

It is an accepted fact that real education should enable one to stand on ones' own feet. However, where does education really commence? It should be at the home. The parents are the first teachers. Instilling values like honesty, compassion, generosity and discipline are of crucial importance in character building. Storytelling, games , simple household chores like putting away the toys, keeping the place neat and clean should become a part and parcel of everyday life to inculcate a sense of responsibility. The child should be familiar with stories of moral value even before entering the portals of the school.The festivals and holidays in the Indian calendar are meant to understand the culture of the nation. They need not be celebrated in schools and colleges on working days. Instead the students can be encouraged to speak or create posters about these festivals. Today these days are dedicated more to consumerism and enjoyment rather than observing the spirit behind the festival.

The second area of concern is the schools. The dichotomy of the Public versus Private sector, poor infrastructure, high fees, long distances, no proper transport facilities, and the rigidity of the curriculum inhibit the learning and teaching process. The spirit of joy and freedom, so vital for growth, is conspicuous by its absence. Lack of qualified teachers, the contract system that breeds inequality, the interference of Managements in the process of teaching and classroom management are added factors that dilute the system. Education in the Private sector barring a few examples is a money making enterprise with children locked in classrooms and parents wanting marks and freedom from monitoring their children. It is this abdication of responsibility that is corroding society. The home is also a Guru Kul.

Primary education should be free and compulsory in both Public and Private sectors. Use technology to the hilt. Bring out the creativity. If required bring in any person who has a passion to teach. Pay them equally. Make education interesting. Give the child a fishing rod, not a fish. Creativity and understanding will come to the fore.

The same is the case with higher education.The youngsters in their teens are caught between the devil and the deep sea. The desire to be unique and the inability to cope up with the curriculum, the problems of adjustment, scholarships, limited access to libraries, ill equipped laboratories, and lack of healthy relations between the teacher and the taught result in confused and chaotic growth where the majority end up with degrees, the value of which is not even equivalent to the paper on which it is printed. Smartphones are used for selfies and texting, not to search for knowledge.

The remedy to this situation lies in the hands of parents, teachers, society and the administration. Parents should take greater responsibility in ensuring that the children are enjoying their studies. Mid-day meals should be coupled with integrated learning and teaching. Technology should be harnessed to improve the levels of teaching and making learning more fun and creative. Digital classrooms will not solve the problem. Technology equipped teachers, interactive classrooms, free digital platforms for educators, roping in eminent teachers and ensuring equal pay for equal work will go a long way in improving standards. There are hundreds of eminent retired professionals, talented homemakers, service minded volunteers who will contribute both time and energy to lend a helping hand. The need of the hour is the proper and effective use of technology. Ban smartphones in colleges, but ensure that assignments are submitted online. Check for

plagiarism and instil the concept of honesty and originality.

Many of the evils in society will be eliminated if we can expose the youth to the best through a study of the lives of great people both living and in the past. It should be done when they are young and at an impressionable age either orally or throughtechnology. The audio visual medium can become a game changer. Quality education, even if it is basic if imparted at the primary level, will strengthen character and personality.

Give merit based scholarships. Introduce vocational skill development courses. Give certificates based on practical experience. Involve them in Community Service. The certificate then becomes secondary to their competence and experience. They become better human beings. Churn them out from the laboratories of the Colleges and Universities, carpenters, plumbers, electricians, mechanics, drivers, musicians, painters, managers, entrepreneurs, scientists, historians, economists and artists who are world class in their own field. It is not a herculean task. Free the portals of education to those who are passionate, committed, qualified and talented.

It is easy to criticise but hard to introspect. Why are our youngsters flying away for higher education? Why are parents anxious to send the children away? Why are so many poor children taking study loans and failing in the greener pastures? Unfulfilled dreams of parents, confused choices by the youth, misdirected goals and a false sense of prestige are some factors that are responsible for this unhappy situation.

Our greatest scientists, mathematicians and writers lived and studied here. The fault lies within us, not in the system. We have succeeded and are succeeding and have to succeed in spite of the system. The concept of Dignity of Labour has to be understood, facilitated and applied in its proper sense. The key to this is literacy and awareness. Values not degrees will stand the test of time.We as a nation have to realise that 'Work is Worship.'

The writers, sisters, are experienced teachers at Rajamahendravaram, with more than four decades of teaching experience and are presently engaged in handling online classes for Soft Skills and Life Skills at Ramakrishna Mission and TKR Academy of Art, Culture and Communication.

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

- John F. Kennedy

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Boundary As A Social Problem

Prof. Ramesh Chandra

The origin of mathematics is a philosophy. It deals with the study of the shapes, size and situation of an object. The success of mathematics lies in the fact that, it is applied in the several branches of natural and non-natural science.

The most important application of mathematics in a subject field is the study of the dependence of an object on the other object. This property is governed by theory of calculus. It is most common use of the mathematics in a subject field.

The fundamental property behind the formulation of calculus is based on mathematical definition of the boundary. Here, we would like to explain to a common man that why the formulation of boundary is so important in our daily life.

Let us consider two adjacent plots, land area, A and B. The two plots belong to two different persons. Further, let us consider that the plot A is on the left side of the plot B. The owner of the plot A constructs a boundary in his plot to differentiate his plot A from the plot B. This boundary is called as the right boundary of the plot A. This boundary may also be called let boundary of the plot B. The reason that why this boundary is called left boundary of plot B is that, whatever be the small distance one moves from plot A towards plot B, it lands him on the plot B. In language of mathematics this property defines the right boundary of the plot B inspite of the fact that , the owner of the plot B has neither constructed the boundary nor the boundary is situated in his plot.

In future, if owner of the plot A wants to reconstruct his boundary in his plot, and it is objected by the owner of the plot B saying that the boundary is also left boundary of his plot B and hence it should not be reconstructed without his permission. The solution of the problem may not be provided by the mathematics at least and is according to the definition of the boundary.

In fact, the owner of the plot B, mathematically, is in a privileged position. Decision on the ownership of the boundary is a social problem. The owner of the plot A may claim relief in respect of his ownership of the boundary, but not from a mathematician, while department of justice may entertain the claim. *Mathematics dwells into a problem with total objectivity, and thus sets aside subjectivity, if any, for other to interpret and resolve.*

Author retired in 2012, as a professor after having his entire career in academics. He did post-doctoral research in the field of **Theory of Relativity** at Konstanz University, Germany under an Academic Exchange Programme. He also attended International School of Gravitation and Cosmology in 1982 at Italy. He was a visiting fellow at TIFR in 1985. He was recognized by UNESCOo as **Physicist of a Developing Country** in 1987. He is passionate to groom competence in mathematics among unprivileged children. He was deeply associated with this initiative in its formative stage in Chalk-N-Talk mode

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Way To SUCCESS Through SIMPLICITY

Anand Agasty

What is **Success?** The simplest definition of Success, according to the English Oxford Dictionary is – *"the accomplishment of an aim or purpose"*. However, **Success cannot be defined in one sentence**, but instead it is comprised of many aspects. Moreover, the **Success** has different meanings for different people at different times. Even **Failure** can be a **Success**! But , it is a matter of curiosity, how the Failure can become a success? The simple answer is: : The failure becomes success **When we learn from it.**

Swamy Sivananda has been a Hindu spiritual teacher and a proponent of Yoga and Vedanata. He says **"Put your Heart, Mind, Intellect and Soul into even your smallest acts. This is the secret of Success."**.

Celestine Chua   is a writer and founder of PersonalExcellence.co. Se believes that *"Success is 99% Attitude and 1% Aptitude"*.

Dale Harbison Carnegie was an American writer. He has said that *"You never achieve Success unless you like what you are doing."*

According to Wil Ros **"Success is not counted by how high you have climbed, but by how many people you have brought with you."**.

Maclom X says that *"If you have no Critics, you'll likely have no Success."*.

Robert Collier, an American author of metaphysical books of 20ᵗʰ century used to say that "*Success is the sum of small efforts, repeated day in and day out."*

When we talk about a "successful" person, we're typically talking about someone who's got billions in his bank account, someone who's authored multiple bestsellers, someone who's a world-wide fame in sports, or maybe someone who's in charge of an entire nation. But, if you ask people, who fit the conventional definition of a successful individual, many will tell you that those achievements aren't what make them feel accomplished.

Sir Richard Branson, founder of the Virgin Group and a **Billionaire,** equates success with personal fulfilment. In his opinion, *"true success should be measured by how happy you are."*

Spiritual teacher Deepak Chopra believes success is a matter of constant growth. According to him, *"Success in life could be defined as the continued expansion of happiness and the progressive realization of worthy goals."*

Inventor Thomas Edison, holder of over 1000 patents, recognized that success is a grind. So naturally, his definition of success is equally ambitious: *"Success is 1% inspiration, 99% perspiration."*

Billionaire John Paul DeJoria sees success as working hard — all the time. He believes *"Success isn't how much money you have. Success is not what your position is. Success is how well you do what you do when nobody else is looking."*

So we find that different people have different ways of defining and accepting Success and that is why their ways of executing things are different. Looking at these sayings we can clearly understand that success is not some complex thing, but it is a very simple concept that everyone can understand and achieve in their own life easily.

Everyone wants Success. But how can we assure ourselves about the Success? This article is meant for '**Way to Success through Simplicity**'. *Simplicity is the state or quality of being simple*. How we can identify whether a person is *simple*? There are many facets of simplicity, and therefore, of being simple -is it by physical appearance, or talking, or eating habits, or character, or nature, or what? There are many examples of successful great personalities (like Swamy Vivekananda, Mahatma Gandhi, Dr. A.P.J. Abdul Kalam, Dr. Rajendra Prasad, Lal Bahadur Shastri, Albert Einstein, Abraham Lincoln, Nelson Mandela, Mother Teresa, and many more) who lived their lives in a simple way. But, did all of them have same common simplicity?

Swami Vivekananda (earlier name Narendranath Datta) was an Indian Hindu monk, who was a key figure in the introduction of the Indian philosophies of 'Vedanta' and 'Yoga' to the Western world. He is perhaps best known for his speech which began, "Sisters and brothers of America ...," in which he introduced Hinduism at the Parliament of the World's Religions in Chicago in 1893. Although he lived a very simple life throughout, his *very simple salutation* to people as *"Sisters and brothers of America ...,"* made him world famous and successful in his that particular Mission.

Mahatma Gandhi (full name Mohandas Karamchand Gandhi), our Father of Nation, was an Indian activist who was the leader of the Indian independence movement against British rule. Employing nonviolent civil disobedience, Gandhiji led India to independence and inspired movements for civil rights and freedom across the world. Simple dressing, simple eating habits and simple nature made him world famous and successful in his endeavours.

Dr. A.P.J. Abdul Kalam, also known as the *Missile Man of India* for his work on the development of ballistic missile and launch vehicle technology, was a scientist who served as the 11th President of India. During his presidential term also, Dr. Kalam lived a sober life and after leaving office, he became a visiting professor at the IIMs, IIITs and IISc located at various places. In May 2012, Kalam launched a

programme for the youth of India called the *What Can I Give Movement*, with a central theme of defeating corruption.

How they could have achieved such greatness/success through simplicity? Although they belong to different fields of activities, certain characteristics/qualities of simplicity appear to be common in them.

In my opinion, firstly, they lived a sober and simple life (didn't prefer a lavish/highly comfortable life, even after reaching such great positions). Secondly, they worked for the goodness of the entire society (and not just for their own interests i.e. they were not selfish). Thirdly, they had sound belief in the Supreme Power, called GOD, because of which they could think of the entire society as one big family (*Vasudhaiva Kutumbakam*). Fourth, they interacted and communicated with people irrespective of their wealth, literacy or social status. Fifth, they believed in a society based on morals and ethics. All these characteristics/ qualities are really simple in nature.

There may be some more common qualities within them. However, there may be certain human characteristics/qualities which were exclusive to their own individuality. Thus, there has to be an in-depth meaning of and power behind the concept of *Simplicity*. Let's try to explore that hidden treasure.

Considering the basic and simplest definition of Success as – *"the accomplishment of an aim or purpose"* we can think of some uniform approach for achieving it. Here are certain human characteristics/qualities which are simple in nature and if adopted properly and sincerely, are likely to lead to Success. These have been effectively and successfully implemented by me during my career.

If you already have any project/goal working upon, then also follow these steps. Else, decide on a proper realistic and achievable goal/project, preferably from *'your inherent field of interest'*. This is very important, because working on a goal of non-interested field may lead to utter distress.

➢ The project/goal may be a small or a big one (just passing one examination, or getting a Doctorate Degree, or completing a Project, or even leading a Team/Nation), and can be short term or long term. If the project/goal is very big and long term, then split it into smaller ones of short spells each. Remember-

"Rome wasn't built in a Day, but they worked on it Every Day."

➢ Assess your own strengths and weaknesses and decide how to utilize your capabilities. Consider/reconsider these at any stage of execution. It is very easy- note down the merits and demerits of individual activity and continue, if merits are more, else follow alternatives. This will help in choosing a different/alternate approach, if required.

➢ Initiate the efforts, *especially in a planned way.* It is said that- *"Well begin, half done"*. Follow standardized methodology.

➢ Share your intellect and experience. We can achieve excellence (and ultimately success) through knowledge sharing, as it helps in keeping pace with and usage of new advancements.

➢ Take absolute interest in your deliberations and devote fully. Act logically and try to have alternatives, in case mid-results are different than the ones expected. If possible, introduce new concepts and strategies during execution. Main objective- *keep on trying*.

➢ Be positive means always be optimistic, self-confident and energetic which will help in having positive attitude in negative situations also. However, don't get over confident on success and disheartened on failure.

➢ Finally, two most important deeds to do. Never hesitate to apologize and say sorry, if needed. And always be thankful to one or all, who have directly or indirectly assisted you during execution. These simple acts by heart can do marvels.

This way, the **Simplicity** can lead to **Success,** if the concepts/acts enumerated above are implemented in true perspective and without ego.

To utilize the power of simplicity, *'BE SIMPLE'* to achieve **Success**, that is-

Begin **E**fforts **S**hare your **I**deas and knowledge **M**aster your **P**lanning for **L**ogical **E**xecution.Finally remember,

कोई चले, चले, न चले, हम तो चल पड़े।

मंजिल की जिसको धुन हो, उसे कांरवा से क्या॥

मैं तो अकेला ही चला था मगर।

हमसफर मिलते गए और कांरवा बढ़ता गया ॥

Author is M.Sc. (Geology)'79 from Jabalpur University. He served in Geological Survey, GOI, as a Geologist for more than 37 years. He retired a director (Geology) in Dec'2017. He is a successful person, as a son, as a brother, as a father, a friend and last but not the least a husband.

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No Wringing of Hands

Mrs. M.V.Poornima Rao

I had just concluded my lesson and the final bell rang. My twelfth class was filing out of the classroom. Suddenly, one of my students darted out of the line and trampled a bit of chalk that had accidently fallen down during my teaching. Before I could recover he was out. Nevertheless I stopped him to check. He had neither reasons to justify his act nor the remorse of having committed it. After all it is a small bit of chalk and why is she making it an issue, was his attitude! But the incident left me intriguing....

May more such incidents leave me in the same state – Young boys and girls on two wheelers overtaking you on the wrong side, parking their vehicles in an awkward obstructing manner, their patience running out before the traffic signal turns green, the road rage that we witness every other day, the simmering communal porridge being catered by the political class to be devoured by the youth, the dwindling respect towards both man and material, and the list goes on. A big WHY? glares down at me seeking answers from both a parent and a teacher. Have we as a system failed to inculcate values in our upcoming generation? If we do not pay heed to the warning bells with growing intensity, the answer is 'Yes'.

What then is the solution? Education of course! We may claim that we are doing our job of bringing up and educating our youth by teaching them Physics, Mathematics. Chemistry, Commerce, Languages and so on. But, unfortunately we are touching them superficially and not daring to delve deeper. Education cannot be restricted to eight periods of schooling followed by three hours of coaching (in most cases) in the daily routine of an adolescent student. With their surge of hormones and easy availability of electronic gadgets they are adrift without a rudder in the vast ocean of information. We cannot blame nor punish the hapless student for his arrogant behavior without an introspective analysis of ourselves. We need to rethink of the values we are weaving into our parenting and teaching. There is an urgent need to upgrade both these skills, since technology has fast forwarded at a tremendous rate.

The upper middle class parenting has evolved over the past few years into 'Indulgent Parenting'. No sooner the child places a demand, it is fulfilled. The earnest parents are ready to compensate for the scanty time they spend with them with lavish pocket money and e – gadgets. This is breeding a new generation of value-averse youth. Expensive shoes and jeans arrive home at the click of a button. How can they understand that a cobbler and a tailor have toiled hard to put them together? So a trampled bit of chalk does not merit any discussion!

It is argued that 85% of the global population is good and wants to be good. Only 15% is manipulative and devious. As parents and teachers it is important to maintain the 85% good factor and not allow it to decline. There are no readymade solutions and strategies at this juncture. Each one of us evolves by her or his instincts the best deal for the children. Leading by example, while allowing them to emulate creatively, would be the most efficacious way. We need to bring them closer to Nature. She is the best teacher. Even involving them in small daily chores can work wonders. But, no gender bias please! We need to deliberately confront them with difficult situations. It is not a cake walk all the time! We need to say a firm 'No' too. 'Everything I desire cannot be mine' – this thought should sink into them. It will make them stronger in adversities, teaching them to compromise wisely and at the same time be benevolent towards another's success. We need to teach them the difference between 'aspire' and 'desire'.

Our youth needs us to steer them. Let us not wring our hands in despair but join them together with new resolve. As a parenting and teaching community, let us take a pledge to nurture and protect values in the tiny buds under our umbrella. Only then can we lean back to watch a plant with healthy blooms.

Author is a a PGT in Physics, at the Christ Church Boys' Senior Secondary School, Jabalpur. She has been in the teaching profession for last 3-1/2 decades. Her UG and PG degrees were from the Mysore University and B.Ed from the Annamalai University. Along with teaching Physics, she evinces a keen interest in training her students for debating competitions

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Higher Education In Modern Perspective

Prof. Neha Sharma

In recent years, a major change has been observed in the mindset of the students starting their college education. Due to YouTube and NPTEL, and other digital resources available now a days, the students assume that the faculty are just the content passers. They give least importance to the classes, hoping that everything is available outside the class, in the present day digital world. This has resulted in the mass bunking of classes, or even if they are present in the class, its merely for the sake of attendance. This attitude has shown a drastic change of behavior of the students, towards the faculty, towards their college mates, and as a good human being. It is felt that the overall connectivity of the students with the teachers, among the students, and with the society is slowly disappearing. But as we all know, that man is a social animal, one cannot progress on its own alone. The children need to understand that enormous information and knowledge is one aspect of life that can be downloaded, but overall personality development is another aspect which cannot be downloaded, but can be only sought by interacting positively with the society.

It is seen that a lot of students never realize how to get the most out of college, and what a college education can really be. Unless they have this realization, college education cannot have positive effect on their learning outcomes. It is the responsibility of the institutions to bring out the maximum potential of the student. Despite various orientation programs many students fail to achieve great height due to the lack of adapting to change.

First, let us understand that there are two main end goals of college education. (i) Education: gaining knowledge and skills for productive careers, and (ii) Self growth: developing interests, friendships, associations, hobbies, etc which help in leading a happier and richer life. A high quality higher education institute (HEI) should provide good support for both.

For assessing the capability of the HEIs, or one of its departments, to deliver high quality education, there are some well understood parameters. Some of the key ones are given here. These are the parameters which are advised for parents and students to look at for making a decision. Importance of most of these is self evident, and many of these are also given in the World Bank framework for World Class Universities.

Selecting a College for Admission :At the time of admissions for higher education, most students have multiple choices of higher educational institutions (HEIs – colleges, universities, institutes) for admission. Finally, of course, the student has to get admitted in one HEI and study there. For most students and their parents, this is a hard choice – which HEI to chose from the colleges, universities, institutions where the student can get admitted. This note points out some parameters that can be used for assessing an HEI (or a department).

- Faculty Quality and Qualifications: This is undoubtedly the single most important parameter that decides the quality of education in an HEI. World over, the best Universities indeed have the most qualified faculty. In India also, you will see the same pattern – places like IITs, IISc, some IIITs, some ISERs, etc, which are known to be the best places for education, have the most qualified faculty. By qualifications of faculty I mean – highest degree obtained (PhD, Masters, or lesser), and from where the degree was earned. While higher qualifications are clearly desired in faculty, the second factor is also very important – an Engineering institute that has faculty with PhDs from reputed universities of the world, or from places like IITs/IISc, clearly has superior faculty than a college that may have PhDs from other institutions.

- Faculty Student Ratio: This is clearly the next important parameter – an HEI which has lower S/F ratio is likely to be better for learning and education, as it allows more faculty time per student and only with manageable ratio can faculty spend time with students for projects etc. In many US universities, about 20:1 is a standard ratio that they try to maintain – some lower ranked universities may have ratios as high as 35:1 or more, and some of the League and other top universities may have lower ratios. In older IITs, the ratio is about 15:1.

- Infrastructure: The quality of infrastructure is another important parameter – clearly for education delivery, quality of classes, libraries, labs, etc. is important. But even other infrastructure – facilities for faculty, quality of student hostels and facilities, quality of sports and other facilities for extra curricular activities, etc. matter as they have indirect impact on education.

- Quality of the academic program: All good HEIs spend a lot of time designing their programs. First important factor here is the structure and layout of the program – the courses the program and the nature and variety, and the degree of flexibility it provides to students to chose their courses. The second aspect is very important and can be assessed by the number of electives a student can take in the program and the number of choices offered for electives. Weaker HEIs will have fewer electives, and fewer choices for them, as electives require a larger range of courses to be taught.

- Delivery of academics: Getting a good program on paper is not too hard – programs of the best of HEIs are available on the internet. It is, of course, the delivery of the program that matters the most. Quality of delivery is decided, first and foremost, by the quality of faculty. However, there are some other indicators – e.g. the level and nature of work a student has to do in the courses. If the student has to spend minimal effort and that is mostly around taking tests/exams, you can be sure that the delivery of courses is weak. Good delivery of courses requires students to put in effort outside the class in assignments, projects, labs, term papers, presentations, etc. Learning happens largely when students are asked to apply the concepts covered in lectures in the assignments/labs/projects... Learning without due effort is a myth – effort and practice is essential for learning and developing skills.

- Administration, leadership, culture: Administration and leadership impact the overall functioning hugely – good administration and leadership will ensure that the HEI continues to improve and keep addressing issues that may come up. Seriousness with which academics is taken, how students are supported, are students' feedback on programs and courses taken, etc. are all important cultural aspects that have impact on the quality of education.

For assessing the quality of an HEI for supporting self development, one should look at the breadth and flexibility in the curriculum – does the curriculum include courses other than main subject courses, and does it provide flexibility and choice to take a variety of courses including those that may help more in self development. For example, one can look at if there are course on humanities, social sciences, music, art, etc, and if it is possible for students to do independent study, independent projects, etc to pursue their interests. For students who may be interested in research, one should look at if there are provisions for UG students to undertake research.

Other important factors that affect the self growth dimension are the level of extra curricular activities (which may get reflected in the variety of student clubs), infrastructure (the quality of infrastructure to support the extra curricular activities) and support (e.g. is there sufficient budget) for such activities.

While these are main factors that affect the quality of education, another way to assess the quality of education and overall development of students is to examine what the graduates of the HEI do after graduation, and how well the alumni of the HEI are doing. Opportunities after graduation include – placements after graduation (quality of placements, median offer, etc), higher education opportunities (how many students get these opportunities and where), and entrepreneurship.

Once a good institute has been opted for, another important issue that needs to be addressed is that whether this choice is pursued properly or not. A proper guidance and caretaking is needed throughout the degree course, without which the whole efforts may go in vain.

First Year of College may be Critical for Success : The first semester and year can often be the most defining year of a students' college education, and the performance in first year often reflects the level at which the student is likely to perform academically in the rest of his/her program. First year of the program is when the students are settling in their new life at a university/college with the freedom and responsibility that comes with it – a life very different from that in school which is far more structured and defined by the teachers, school discipline, uniform, parental oversight, etc. It seems that the students define their approach to college life and academics in the first year and often develop habits, discipline, and balance (or lack of it) which is likely to stay with them for the rest of the program.

One clear insight is that first semester (and the first year) can be extremely critical to a student's success in the program. Therefore, to help students succeed in the program, it is important to provide good support to them in their first semester (year) – not just for academics but also for developing good habits and discipline. This implies that the systems we have for later year students, may not be well suited for students in their first year, who require closer monitoring and more support and counseling.

....To say that, the incoming students should be extra cautious and alert when starting their higher education program – while a student must explore new ideas, build new bonds, try new activities, pursue non-academic interests, engage in deep discussions in

the canteen, etc, he/she must not lose sight of academics, as that is the primary purpose of entering a university. Students must develop sound habits and a good discipline and balance in their first year – the habits and discipline developed in first year is likely to persist through the rest of their program; laxity in the first year may make it harder to make up in later years.

As For Institutions, special measures must be taken to handle students in their first year – they are just transitioning from school to college and support must be provided so they can develop a proper balance and discipline to handle college life. From the session 2018-19, induction programs for the new students entering in first year of Engineering college, made compulsory as per AICTE guidelines, have been started, where issues like this are discussed with them by counselors, senior students, and other professionals. And we have started a program of monitoring first year students more carefully in the key courses and provide extra support where needed.

Hopefully these changes in higher education, in modern perspective, will help in grooming the college students, not only in the form of successful professionals, but also in the form of good citizens, for whom the country can always be proud of.

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INVITATION FOR CONTRIBUTION OF ARTICLES

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

We will be pleased have your association in taking forward path our plans as under-
  ➢ ***With the start of Second year of operation, we have reached to 8ᵗʰ Quarterly e-Bulletin
    Gyan-Vigyan Sarita: शिक्षा .***
  ➢ ***Theme of the 1ˢᵗ Supplement to Third Annual Issue, 9ᵗʰ Quarterly e-Bulletin, dated
    November 1, 2018 is Science for Peace and Sustainability to commemomerate World
    Science Day for Peace and Development commomerated on 10tth November..***
  ➢ ***And this cycle of monthly supplement sandwitching consecutive Quarterly e-Bulletin
    Gyan-Vigyan Sarita: शिक्षा is aimed to continue endlessly***

We believe that this monthly supplements to quarterly periodicity of e-Bulletins shall make it possible for our esteemed contributors to make contribution rich in content, diversity and based on their ground level work and/or experiences.

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CHANGE

Jaishree Bhandari

"Change is constant" everyone looked at me as I said this. We were in staff room and discussion was going on the hot topic of all the times CHANGE. Most of my co-teachers seemed to be little disappointed with kinds of changes we were facing in the teaching profession.

I am a mother of two daughters and had been associated with young children as a teacher since 4-5 years now. Each day of life, since the birth of my elder daughter, has been a learning experience. I had to constantly keep myself updated with new gadgets, technology and methods of teaching in order to fulfill new age demands. That could be a reason for my positive attitude towards the CHANGE. Soon the bell rang and we left for our classes. Me and one of my co-teacher were walking down the stairs to reach to our classes. Suddenly she told me about a child who had been asking her one question every day, how do we earn money? She asked me to talk to the child and find out what the matter was. She left the child with me in a free period. She was a 4-5 years old girl. I started to play with her and then asked her what she wanted to know. She asked me without hesitating, " Ma'am, how do we earn money?" I asked her, "what are you going to do with money? Do you want to buy a doll, toy, puzzle or something else?" And to my surprise she didn't want to buy any these. She was only interested to know that how people can earn money. I asked her what she wanted to become when she is grown up. She clearly told me that she wanted to become a police officer but they don't earn much. So she wanted to become someone who can earn two lacs rupees a month. Now I was shocked! I went on inquiring why she mentioned that particular figure. I got to know that her mother often tells her that she has to work hard and earn in lacs to live in this world. Thanks to her tiny imagination which stopped her at two. I somehow managed to convince her that it is important to become a good human being and then only we can achieve our goals.

This incident shook me and my belief that change is constant and good for humanity. I always used to believe that our generation is smart, intelligent and technology savvy. We have potential of changing the world. Women are managing home and office simultaneously. Gentlemen are also taking care of kids and home besides their offices. Everything seems to be so perfect; people are enjoying their lives. You can check on Instagram and Facebook. People are attending motivational seminars; so many motivational messages float through our mobile phones every day. Such awareness about physical and mental health than ever before! And end result.....? We are more stressed but would not accept it. We have become more socialized with increasing number of friends and family members but don't open our hearts in front of them. It is on one end with a feeling of insecurity, by being judged. We keep accumulating these toxins within ourselves and it erupts in front of innocent children like this.

Yes, change is constant, eternal and mandatory. We need to change our lifestyle from superficial to a natural one. Socialization on media is not bad as long as it does not jeopardize one-o-one connect, a necessity for human sensitivity. We are humans and imperfect by nature; we need not to have a perfect life. Moreover, perfection is relative, circumstantial and contextual, therefore, what seems perfect to me, may not be perfect according to you. We need to set our own priorities and lead life accordingly; we need not try to adopt someone else's lifestyle. Nevertheless, needs of correction whenever it is realized, its pursuit is preparedness for making life happier, a **CHANGE.**

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Human Skills In A Technological World

Rajas Pandey

As a student of engineering, I was often left pondering the nature of innovation. What drives technology? What is the purpose of technology? Upon reflection, I realized that the basic aim of any technological innovation is to make human lives better. When I looked around in my college, I found all conversations among the students to be related to technical questions. All of them are some of the best in the world at Math and Engineering. But the thing I found missing significantly was even a basic understanding of the human society, and the nature of its problems. I found myself wondering whether this was the correct direction for developing our society. Can students who completely disconnect themselves from the subjects and issues dealing with the society, and rather proudly, *actually* solve the problems of the society?

This line of argument is gaining popularity among the elite businesses and entrepreneurs. A venture capitalist Scott Hartley, in his book *The Fuzzy and the Techie: Why the liberal arts will rule the digital world*, writes how it's the graduates of liberal arts who are the driving-force behind most of the technological innovations today. He argues that as technology is impacting more people than ever before, the ethical and philosophical considerations of innovation are becoming extremely important. Thus, it is the people who possess a deep understanding of the human society, therefore, vital soft skills needed for business and communications who can bring context to innovation. His most important conclusion is that, with algorithms automating most jobs, it is this human knowledge that will command most value to the society in the future.

Most top Engineering universities realize this and require students to take some courses in Humanities and Social Sciences in order to sensitize them to the real problems facing the society. However, for most students, they just become a mandatory requirement to clear the credits. They do not realize the philosophy behind offering such courses, or the bigger picture of how this knowledge impacts their technical development.

I feel this is because there is a general trend in the Indian society which considers these subjects or issues to be the domains of less smart people. Parent from a young age encourage their children to focus on their sciences and maths, as they believe it will offer them job opportunities in the future. While this is true and important, the students are only able to develop half of their personalities. Students too feel the subjects of Social Sciences are just to be learnt to clear course requirement, with no projection or relevance for them, particularly if they are inclined towards technology.

I argue that this thinking will be counter-productive for the students. They might be competent in technical aspects of things, but will be sub-par innovators. More generally, they will remain less complete students. There is a reason the school curriculum in India mandates the study of subjects like history, political science and economics till secondary school. The students of that age group need to be made to understand the impact of these ideas. The role of parents also becomes critical, as in most cases, parents emphasize focus on more technical subjects even at the expense of this learning.

This line of argument is beautifully exemplified in the recent questioning of Facebook founder Mark Zuckerberg before the US Congress. Zuckerberg epitomizes the dream of every techie. But, Facebook has today become more than just a technology marvel. It impacts human society in many ways, right from influencing social and political discourse to the ethical aspects of data and the idea of privacy in a connected world. In the Congress questioning, Zuckerberg showed an alarming

lack of understanding of these dynamics. This was perceived by many as dangerous, particularly because Facebook is a technology that impacts our day to day lives so much today. This only emphasizes how technological innovation isolated of human understanding can harm the society.

In light of all this, I feel it is essential for Indian students to understand the value of liberal arts subjects in their lives and the society. For engineering graduates, it becomes even more important that they understand the ethics and philosophy of their work, and how their technology might impact the society in general. The courses of engineering should also emphasize the broader economic, political, and cultural aspects when discussing technology. It is a necessity in the present times, and more so the future. This sensitivity is what will distinguish humans from machines in the future.

So, next time when you advise your teenager to study maths and related subjects, ask them to study a bit of history too!

At this point I wish to share my personal experience that because of excessive pressure exerted on the students by parents and teachers that they become myopic in their goals. They fail to see the bigger pictures. I was fortunate to be a learner in the initiative about a decade ago, when concept of Gyan Vgyan Sarita (GVS) was completely in an abstract form. It emphasized upon joy of learning maths-science with beauty of surroundings and human instincts to satiate curiosity; not just to clear exams. This stayed with me, and I was able to look at every subject I studied through the lens of curiosity. I am proud to say that, while I was one of the initial of GVS initiative, to see this initiative grow and blossom and aspiring to touch many students, spread across, is deeply heartening and highly motivating.

The author is a final year student of dual degree, B.Tech. (Computer Science) and MS (Economics) ,at Birla Institute of Technology and Science(BITS), Pilani.. He has a deep interest in the study Social Sciences since a young age.

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Nothing is more important than education,

because nowhere are our stakes higher;

our future depends on the quality of education of our children today.

- Arnold Schwarzenegger

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Looking At Education Differently

Pallavi Garg

What is Education? Is it about Maths, Physcis…..etc or something beyond that? Is it about getting good marks or a job? Or is it about understanding or analyzing a concept deeply? What is good parenting? How can parents make their kids responsible human beings?. These are the questions that I was also once struggling with, but now I am hopefully in a much clearer state of mind.

Thanks to**Prakriti**, my kids' school. Their motto is "Love for Learning". I have learned that every child has something "unique". There is no age for learning, one learns during his/her whole life and that is the secret for growing in our lives. Education is about cultivating the "love for learning", "life skills", "work ethics","emotional development", "imagining", "strengthening of thinking process", "self awareness", "sensitivity towards nature and environment", "learning from nature", "strengthening of the senses", "dealing with success and failure". Every child can learn anything and everything, the only difference is in method that suits to the individual.

Home is every child's first school, butcare must be taken not to do over-parenting. Children learn a lot from nature and peers so exposure to both is very important for their learning. Exposure to creative and child friendly environment is also important. Communicating thoughts clearly and expressing emotions freely is the basic building block towards a strong relation between parents and children.

In purposeful learning, it is important to understand the children, their needs and the learning method that work well for them while maintaining their "inner peace". Some learn by listening, some by doing and some by seeing. That some do well in conventional type of learning. But whoever does not do well with that kind of learning requires a different kind of learning method. A normal child of elite parents is intelligent and can learn anything and everything, that too more than academics. But, in true school is a place where a healthy child is accepted as is. It provides an expressive environment which allows every child to manifest its responses to the observations freely; it helps in development of children. Academics is important, but only to a certain level.

If child has learnt to observe and respond to the observations, with an analysis of how and why, they tend to grow with a strong foundations. Such children can confidently face challenges that they may encounter in unforeseen circumstances. These traits are important for every child, with his own uniqueness and inner space, to be able to standup confidently in this world, which is full of competition. They can make their own path and can withstand any ups and downs that come in their way. This is my journey, learning and understanding with ***Prakriti School***.

Author is graduate in Electronics and Communication Engineering. Presently she is managing home and parenting Two kids. Her hobby is sketching and painting. Currently she has associated as volunteer as a Art Facilitator at Prakriti School.

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Integrated Education for Unprivileged

Palash Kumar Ghosh

"Knowledge is power. Information is liberating. Education is the premise of progress, in every society, and in every family" -Kofi Annan

When an experienced person is considering retirement it is very sad. When it happens, all his carefully acquired knowledge goes to a cold store; it decays very fast into obsolescence and thus deprives society of its utility. This is happening in our society due to lack of integrated infrastructure in education system. Usually, s/he may not be interested in sharing knowledge and may be leading own life for survival, without any interaction development of career for others. It is a truth that it takes lot of painstaking efforts to acquire, during one's working tenure, techniques, process, methods etc. If one utilizes part of his/her time, which was not possible during professional career due to occupational pressures to share with underprivileged students, jobseekers it will be of immense help in improving their career graph. This will help to create a culture of coexistence, an invincible strength of our society. If we remember our success/failure and share these basics to illuminate light bulbs and yield some "aha's" along with the way of integration of our knowledge and technology, it will really be helpful in bridging socio-economic disparity and in turn to improve social order, mutual trust and harmony. Small idea can change the way of thinking. Little contribution can enhance our way of working, as well as of others. It needs to be remembered that that 'common sense is not so common'. Knowing is not enough unless it is deployed in helping others or applying it somewhere? An experienced person cannot and should not remain complacent with his/her accomplishments. Knowledge needs to be disseminated to influence others and to make chain of distribution for education. It is true that ". But, if every beginner is required to learn by making mistakes and causing damage to social order, which may at times be irreparable, It is equally true that "Work is the best school, Experience is the best Teacher". Nevertheless, it would not be wrong to say that educated and experienced lot of society is selfish and wishes to relish misery of others, who did not have opportunity of education and learning as available to them.

Doing the right things has become the thought of old days. The scenario has been changed. It's time to move on along with situations to assimilate changes in technology, economics, human expectations and abilities. A smaller training for trainer is also required for integration.

We should have some love, affection, emotion for our society's underprivileged, and this should be given to them freely.

"All of us are prisoners of our own socialization. The lenses through which we perceive the world are colored by our own ideology, experiences, and established management practices" - C.K. Prahalad.

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अंदाज ए बयां

अतिथि- तुम कब जाओगे..मात्र फिल्म नहीं , एक हकीकत!!

समीर लाल 'समीर'

कहते हैं कि दर्द अपनों संग बांट लेने से कम हो जाता है, सो बांट ले रहे हैं वरना बांटने जैसा कुछ है नहीं.

कुछ माह पूर्व भारत से फोन आया था. उस तरफ से आवाज आई कि कैसे हैं भाई साहब..ठीक थे सो बता दिया कि ठीक हैं. उसने बताया कि वो भारत में मेरे पड़ोस वाले शर्मा जी का भतीजा है और कनाडा आ रहा है तीन चार दिन रह कर चला जायेगा फिर चार महिने बाद परिवार को लेकर आयेगा. कोई आश्चर्य नहीं हुआ. अधिकतर लोग ऐसा ही करते हैं. फिर शर्मा जी तो पुराने मित्र ठहरे हमारे तो औपचारिकतावश हमने इनसे कह दिया कि अब तीन चार दिन के लिए कहाँ भटकोगे. घर पर ही रुक जाओ. उसने भी उतनी ही औपचारिकतावश थोड़ा सकुचाते हुए बात मान ली. कहता था कि आपकी बात नहीं मानूँगा तो चाचा जी गुस्सा हो जायेंगे. सिर्फ आपको ही जानता हूँ कनाडा में.

फिर अन्य बातों के बाद उसने कहा कि आपके घर तक आऊँगा कैसे? उनके कनाडा पहुँचने का दिन रविवार था तो हमने कह दिया कि एयरपोर्ट पर हम आ जायेंगे आपको लेने. बहुत खुश हो गया वह , उसकी बाँछे खिल गई. यूँ भी ऐसे न जाने कितने मेहमानों को एयरपोर्ट से ला चुका हूँ जिनसे पहली बार एयरपोर्ट पर ही मिला हूँ...अब उसकी बारी थी- पूछने लगा कि आपके लिए कुछ लाना है क्या भाई साहब या भाभी से पूछ लिजिये   , उनके लिए कुछ लाना हो तो. अब क्या कहते- कह दिया कि नहीं, कुछ विशेष तो नहीं चाहिये. सोचा कि दिल्ली से डोडा मिठाई और ड्यूटी फ्री से बॉटल तो खुद ही लोग समझ कर ले आते हैं, उससे ज्यादा क्या बोलना. हमेशा ही तो गेस्ट आते हैं. कभी बोलना कहाँ पड़ता, अपने आप ही लेते आते हैं बेचारे....सो फोन बन्द और हमारा इन्तजार शुरु रविवार का.

ईमेल से उसने फोटो और अपनी फ्लाईट वगैरह बता दी थी , तो रविवार को उसे एयरपोर्ट पर देखते ही पहचान गये.एयरपोर्ट से बाहर निकलते ही साकेत (यही नाम है उसका) ठंड से कांपने लगा. मैंने उससे कहा कि गर्म जैकेट निकाल लो अपने सामान से. ठंड बहुत है.

वो कहने लगा कि दिल्ली में तो बहुत गर्मी थी और यहाँ इतनी ठंड का अंदाजा नहीं था.. तो गरम कपड़े लाया ही नहीं है. खैर्.कार में हीटिंग तेज कर दी. सोचा कि कल उसे बाजार लेते जायेंगे तो खरीद लेगा.

घर पहुँचते ही उसने भाभी जी को पैर छूकर और सुन्दर बता कर प्रसन्न कर दिया. बातूनी ऐसा कि पूछो मत!! लगातार बात करता जाये. एक बार जो शुरु हुआ तो बन्द होने का नाम ही नहीं ले रहा था..तुरंत घुलमिल गया. भाभी जी मैं प्याज काट देता हूँ. मैं चिकन बना देता हूँ और न जाने क्या क्या..प्याज तो क्या कटवाते मगर

उस चक्कर में चिकन तुरंत बनाना पड़ा क्यूँकि पत्नी ने तो शर्मा जी सुनकर शाकाहारी भोजन बनाया था.

उनको कमरा दिखा दिया गया. बाथरुम दिखा दिया. नहाने घुसा तो पूरे एक घंटे नहाता रहा और जब वो निकला तो मुझे लगा कि शैम्पू और बॉडी वाश से मानो नहाया न हो , पी गया हो. एकदम नई नई बोतलों में आधे से भी ज्यादा समाप्त. मेहमानों के बाथरुम में वैसे भी नया ही रखा जाता है. शैविंग क्रीम भी बंदे ने तबीयत से लगाई और ऑफ्टर शेव से तो जैसे डुबकी लगा कर निकला हो. पूरा बाथरुम गमक रहा था. खुद से मेरे ड्रेसिंग रुम में आकर परफ्यूम लगा लिया वो भी वो वाला जो मैं खुद भी महंगा होने के कारण कभी कभार पार्टी आदि में जाने के लिए इस्तेमाल करता हूँ.

फिर टहलते हुए पहुँच गया मेरे बार तक. अरे वाह, आप तो बहुत शौकीन हैं भाई साहब. कौन कौन सी रखे हैं ? और बस, ब्लैक लेबल की बोतल उठाकर प्रसन्नता से गिलास बनाने लगा. मुझसे भी पूछा कि आपके लिए भी बनाऊँ बनाना तो था ही हाँ कर दी. फ्रिज से बरफ, सोडा निकाल कर शुरु हो गये.

यहाँ वैसे भी ड्रिंक्स के साथ ज्यादा स्नैकिंग की आदत नहीं होती मगर अब वो- भाभी जी, जरा दो चार अंडे की भुर्जी बना दिजिये तो मजा ही आ जाये. क्या बढ़िया खाना महक रहा है. इतनी खुशबू से ही पता लग रहा है कि आप बहुत अच्छा खाना बनाती है और फिर भाई साहब की काया तो खुद गवाही दे रही है कि आप कितना लजीज बनाती होंगी. ये लो बात बात में हमें मोटा भी बोल गया.

उधर उनकी भाभी जी अपनी तारीफ सुनकर भरपूर प्रसन्न. कौन महिला न होगी भला. खूब रच कर अंडे की भुर्जी बनी. तब तक उन्हें ड्रिंक्स के साथ भारत में पकोड़े खाते थे भी याद आ गया सो वो भी मांग बैठे. प्याज , मिरची, पालक के पत्ते की भजिया तली गई.

शाम ७ बजे से पीना शुरु किया तो रात ग्यारह बज गये. हम तो दो से ज्यादा पी नहीं पाते मगर वो मोर्चा संभाले रहे जब तक की बोतल में बस हमारे अगले दिन के लिए दो ही पैग न बचे रह गये.

तब खाना खाया गया. तारीफ कर करके भरपूर खाया. पत्नी ने भी तारीफ सुन सुन कर घी लगा लगा कर गरम गरम रोटियाँ खिलाई. तब वो सोने चले.

अगले दिन की मैने छुट्टी ली हुई थी. जब तक मैं सो कर उठा वो ठंड में ही बाहर टहलने निकल गया था. मैने सोचा कि इतनी ठंड में कैसे निकल पाया होगा बेचारा मगर वो लौटा तो मेरा ब्रेण्ड न्यू खास पार्टियों के लिए खरीदा स्पेशल जैकेट पहने था. साथ में ही

मेरी गरम टोपी, और दस्ताने भी पहने हुए थे. आते ही पूछा भाभी कैसा लग रहा हूँ? भाई साहब मोटे दिखते जरुर हैं मगर उनका जैकेट देखिये मुझे कितना फिट आया है. खुद को मोटा तो वो कहने से रहा.

फिर नाश्ता- भाभी जी , बस, अंडा पराठे बना दो तो मजा आ जाये. साथ में दूध कार्नफ्लेक्स. फिर मैंने उससे पूछा कि बाजार चलें. कुछ तुमको खरीदना हो तो खरीद लो. मुझे लग रहा था कि जैकेट परफ्यूम वगैरह तो खरीदना होगा ही उसे. मगर वो कहाँ जाने वाले. कहने लगा कि अब दो दिन को तो हैं मात्र. क्या खरीदें क्या बेचें. यूँ भी यहाँ सब इतना मंहगा होता है कि हम यहाँ खरीदने लगे तो दीवाला ही निकल जायेगा.

रात देर हो गई थी तो उम्मीद थी सुबह बैग वगैरह खोलेगा- तब मिठाई ड्रिंक वगैरह निकालेगा. मगर सुबह क्या दिन भर खाते , हमारे साथ जगह जगह घूमते शाम हो गई कहीं कॉफी पी गई तो कहीं बर्गर तो कभी आईसक्रीम मगर उनका पर्स नहीं निकला- उस पर से तुर्रा यह कि कितना मँहगा है हम तो बर्बाद हुए जा रहे हैं. दुनिया में दाम खर्चने की बजाय मात्र सुनकर बर्बाद होते उस पहले शक्स को देखा. उस पर से तारीफ भी करते जाये कि आप लोगों ने भारत की संस्कृति को बचा कर रखा है यहाँ भी. मेहमान को तो पे ही नहीं करने देते. अरे , करोगे, जब न करने देंगे कि छीन कर पे कर दें??

रात वोडका की बोतल उठा ली कि रोज स्कॉच पीना ठीक नहीं. आज वोदका पीते हैं. मैंने तो वो ही बची स्कॉच के दो पैग किनारे कर लिए. और इन्होंने पुनः पूरी श्रृद्धा और लगन से बोतल खत्म करते हुए दो पैग हमारे लिए छोड़ दिये. कभी हरी मटर तल कर तो कभी कोफ्ता तो कभी मटन कबाब- जैसे कि मेनु घर से

बनाकर निकला हो- डिमांड और तारीफ कर कर बनवाता रहा और छक कर खाता रहा.

अगले दिन मेरे बाथरुम से आकर शैम्पू भी ले गया कि वहाँ खत्म हो गया है.

चार दिन चार महिने से गुजरे. चौथे दिन मन तो किया कि बस से एयरपोर्ट भेज दूँ मगर जैकेट मेरी पहने था. सोचा कि एयरपोर्ट में घुसने के बाद तो जरुरत रहेगी नहीं तो लौटा देगा वरना गई जैकेट हाथ से. चलते चलते मफलर भी लपेट लिया जो पत्नी ने शादी की सालगिरह पर मुझे दिया था. दस्ताने और टोपी तो खैर पहने ही था मेरी वाली. पत्नी उसके लिए गिफ्ट खरीद लाई थी. उसे भी कार में रख हम दोनों चल पड़े उसे छोड़ने.

एयरपोर्ट पर सामान चैक इन कराया. चरण स्पर्श - वंदन और ये चले साकेत जी. हमें ठगे से उनको जाते देखते रहे और दूर तक नजर आती रही मेरी वो प्यारी जैकेट. छोड़ कर लौटने लगे तो देखा कि गिफ्ट तो पत्नी ने उसे दिया ही नहीं. हाथ में ही पैकेट थामी थी.

मैंने पूछा तो बता रही थी कि सोचा था कि अगर जैकेट और मफलर वापस दे जायेगा तो ही दूँगी. मैं भी उसकी होशियारी पर प्रसन्नता जाहिर करने के सिवाय क्या करता. कुछ तो बचा. मुझे मालूम है जब भारत जाऊँगा-तब भी उसका पर्स जब्त ही रहेगा कि भाई साहब अब आपके डालर के सामने हम क्या निकालें. यूँ भी हम बाहर से आये हैं, हमें पे थोड़े न करने देंगे.

विदेश में रहने वालों के लिए यह मंजर बहुत आम है- यहाँ वो आयें तो अतिथि और हम वहाँ जायें तो डॉलर कमाने वाले!! दोनों तरफ से लूजर और यूँ भी अपनीजमीन से तो लूजर हैं ही!!!

लोकप्रिय चिट्ठाकार समीर लाल व्यवसाय से चार्टर्ड एकाउंटैंट हैं। आजकल वे कैनेडा में रहते हैं। उन्होंने कहानी लिखना पाँचवीं कक्षा में ही शुरु कर दिया था। आप कविता , ग़ज़ल, 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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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

—00—

Ayurveda- Health Care

PRAKRITI

Dr Sangeeta Pahuja

In Ayurveda Prakriti represents the physical and mental constitution of an Individual. A state of disease occurs whenever there is a deviation from the normal constitution of a person. According to Ayurveda Prakriti or Constitution is formed at the union of sperm and ovum inside the womb. Predominance of three Doshas, five Elements and three Gunas at the time of fertilization of ovum determine our physical and mental traits. Different individuals have different combinations of these Doshas and Gunas and hence each individual has a unique Prakriti. People residing in different environment are affected by the environment and body try to maintain a balance with the environment.

Imbalance of Doshas causes deviation from Prakriti causes disease which is called Vikriti. The Tridoshas are (1) Vata, (b) Pitta and (3) Kapha. Likewise, Five Elements are (1) Aakash, (2) Vyau, (3) Agni, (4) Jal and (5) Prithvi, while, Triguna are (1) Satva, (2) Raja and (3) Tama. And are paired as under –

Doshas	Basic Elements	Gunas
Vata	Vayu and Akash	Raja
Pitta	Agni and Jal	Satva
Kapha	Prithvi and Jal	Tama

Types of Prakriti are – (a) Sharirik (Physical) and (b) Mansik (Mental)

Sharirik Prakriti is classified into seven types based on combination of Doshas – (1) Vata, (2) Pitta, (3) Kapha, (4) Vata-Pitta, (5) Pitta-Kapha, (6) Kapha-Vvata and (7) Tridoshas

Based on three Gunas Mansik prakriti is classified into three types – (a) Satvik, (b) Rajsik, and (c) Tamsik

Characteristics of different types of Prakriti are Traits and Body size and are classified as (a) Vata(Thin and lean), (b) Pitta(Medium) and (c) Kapha(well built).

(1) Accordingly, **weight** of persons with predominance of the Dosha are : (a) Vata- they have less weight and gain weight with difficulty, (b) Pitta – they are medium and easily lose and gain weight, and (c) Kapha – they are overweight and difficult to lose weight.

(2) As regards **complexion** its dependence on Dosha are : (a) Vata – they are dark, blackish, (b) Pitta – they are pink to red, and (c) Kapha - they are glowing white). Skin type are based on

(3) Correlation of **Skin type** to Dosha are : (a) Vata - dry,rough, (b) Pitta – Soft and more sweating, (c) Kapha –Moist.

(4) Whereas, **Hair colour** is related to Dosha as : (a) Vata -pale brown), (b) Pitta - red or brown, and (c) Kapha – black.

(5) **Hair appearance** in respect its grasping power is related to Dosha as : (a) Vata - Thin and Dry, (b) Pitta- grey and baldness, and (c) Kapha -silky, curly and dense.

(6) Where as **Pulse rate** per minute goes with Dosha as : (a) Vata – fast in the range of 80-100, (b) Pitta – in the range of 70-80, and Kapha- in the range of 60-70.

(7) **Bowel movements** with Dosha is : (a) Vata-Irregular, (b) Pitta – fast, (c) Kapha –Moderate.

(8) Relevance **of characteristic** of **Nails** to Dosha is : (a) Vata -blackish, small, brittle, (b) Pitta - Reddish, small, (c) Kapha -pinkish, big, smooth.

(9) **Size and colour of teeth** of a person relate to Dosha as : (a) Vata -Very big or very small, (b) Pitta -medium sized, yellowish, and (c) Kapha - Pinkish, big, smooth.

(10) **Pace of performing work** individuals is related to Dosha as : (a) Vata - fast, (b) Pitta - Medium, Energetic, (c) Kapha- Slow, steady

(11) Whereas, **Mental ability** of a person predominance of Dosha as : (a) Vata - Quick, Restless, (b) Pitta – Intellect, and (c) Kapha – Calm, Stable.

(12) But**, dependence of Memory** on Dosha is : (a) Vata -Short term bad, grasp quickly and forget quickly, (b) Pitta- Good memory and gasp quickly, (c) Kapha - Long term best, grasps late but retains for longer time.

(13) **Sleep pattern** of individuals with Dosha are related as : (a) Vata – Interrupted, (b) Pitta – Moderate, (c) Kapha- Sleepy,Lazy.

(14) **Intolerance** of a person depends upon weather condition and its correlation to Dosha is : (a) Vata – when cold, (b) Pitta – when hot, (c) Kapha – when moist.

(15) **Reaction** of a person under adverse situations is dependent on predominance of Dosha as : (a) Vata Anxiety, Irritability, (b) Pitta –Aggressive, (c) Kapha – Calm.

(16) Likewise, **Mood** of a person is regulated by Dosha as : (a) Vata - Changes quickly, (b) Pitta - Changes slowly, (c) Kapha –Stable.

(17) **Eating habits** of a person are dependent upon Dosha as : (a) Vata - Eat fast, (b) Pitta – Moderate, (c) Kapha - Chew food properly.

(18) **Hunger** of a person depends upon state of Dosha as : (a) Vata - Irregular , (b) Pitta - Sudden hunger pangs, (c) Kapha - Can skip any meal easily.

(19) **Body Temperature** varies with Dosha as : (a) Vata - Less than normal, (b) Pitta - More than normal, and (c) Kapha – Normal.

(20) **Strength of Joints** with Dosha depends as : (a) Vata – Weak, (b) Pitta – Healthy, (c) Kapha -Heavy weight bearing.

(21) **Quality of voice** is related to Dosha as : (a) Vata - Rough with broken words, (b) Pitta - Fast and commanding, (c) Kapha –soft.

(22) **Dreams** of person depends on state of Dosha as : (a) Vata - Sky,wind, flying objects, (b) Pitta - Fire, light, violence, (c) Kapha - water, pool, garden, good relationship.

(23) **Social Relations** pattern with Dosha as : (a)Vata - Makes less friends, (b) Pitta - Good number of friends, (c) Kapha - Love to socialize.

(24) **Wealth management** of a person depends on state of Dosha as : (a) Vata - Spend without thinking much, (b) Pitta - Saves money, spend only worthy things, (c) Kapha - prefer savings.

(25) **Walking pace** of a person is regulated with Dosha as : (a) Vata – Quick, (b) Pitta – Average, (c) Kapha –Slow

(26) **Communication skills** of a person on conditions of Dosha is : (a) Vata - Fast, Irrelevant talk, (b) Pitta - Good speaker (c) Kapha - Authoritative, firm.

(27) **Emotions** of a person depend on predominance of Dosha as : (a) Vata – Enthusiastic, (b) Pitta – Warm and angry, (c) Kapha - Calm and affectionate.

(28) Likewise, **Mind** of a person depends on state of Dosha as (a) Vata - Quick, adaptable, (b) Pitta - Penetrating and critical, (c) Kapha - Sslow and lethargic.

The type of food one eats increases or Decreases the Doshas in the body and causes related diseases. Following the right diet and lifestyle according your Prakriti helps to maintain the balance between Tridoshas and leads to good health.

Know Ayurveda, Follow Ayurveda and Stay Healthy.

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Take care of your thoughts,

For they are formed and moulded by our thoughts.

Those whose minds are shaped by selfless thoughts,

Give jot when they speak or act.

Joy follows them like a shad,

that never leaves them.

- Gautama Buddha

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पथिक की कलम से

नारी

अभयानंद पाठक 'पथिक'

मेरे जेहन में काफी अर्से से एक सवाल उठता रहा है कि आखिर महिलाओं को वस्तु की तरह हर उत्सव, पर्व, त्यौहार, जलसा या अन्य सरकारी ,एवं अर्ध-सरकारी कार्यक्रमों में क्यों दर्शाया जाता है? क्या वे पुरुष की तरह ईश्वर की सर्वश्रेष्ठ कृति नहीं हैं, या इस जगत में जीवों पर आधिपत्य जमाना सिर्फ पुरुष वर्ग का अधिकार है ? नारी उनके द्वारा इंगित पथ की मात्र अनुचरी है ? इत्यादि -इत्यादि प्रश्न अनुत्तरित मेरे दिल में एक कसक पैदा कर चुके थे|मित्रों से, समाज के पुरोधाओं से , विद्वान कहे जाने वाले लोगों से , नेत्रियों से, न जाने किन-किन लोगों के समक्ष अपनी यह जिज्ञासा प्रकट क र चुका था , लेकिन मिला कुछ नहीं, अनुत्तरित ही रहा मेरा प्रश्न !

महिलों को जागृत करने , उन्हें पुरुष वर्ग के समक्ष लाने , उनके तथाकथित अधिकार दिलाने संस्थाओं के पुराधाओं से मिला , उत्तर कोई खास नहीं |सब जगह स्वयं को ऊंचा दर्शाने का प्रयास ही नजर आया | थक हा र कर जब मैं अनमन्यस्क इधर-उधर देख रहा था तभी मेरी नजर प्रकृति की छटाओं पर पड़ी और तब लगा कि शायद मेरे प्रश्न का संभावित उत्तर अब मिलाने ही वाला है |प्रकृति की छटा, उसका सुन्दरतम रूप जो समभाव करती हुई बिना किसी भेदभाव के जीवोत्थान के लिए अनवरत प्रयास रहती है|लेकिन यह भी उतना ही सत्य है कि अगर कहीं से उसका दोहन हुआ तो फलाफल करने वाले को इसका मूल्य चुकाना ही पड़ता है | प्रकृति में समावेश जल, वायु , पेड़-पौधे , जीव-अजीव, जो भी हैं , वे सभी सम्यक रूप से ईश्वरीय संरचना का समुचित संरक्षण , उसके उत्थान एवं संवर्ध न का पूरा-पूरा ख्याल करते हुए निरंतर इस धरती को गरिमामय बनाये रखने में सक्रिय हैं | जब कभी भी प्रकृति को असंतुलित करने का प्रयास किया गया तो यह प्रचंड अट्टाहास के साथ प्रलयंकारी रूप धारण कर लेती है और तब सभी जीव -अजीव, जड़-चेतन इसकी चपेट में आ जाते हैं | प्रकृति के यह दोनों रूप अपने आप में महत्वपूर्ण हैं|

प्रकृतिस्वरूप नारी भी प्रकृति की तरह जन्म देती है , पालन करती है, सेवा करती है, अपनी कृति को खुशहाल रखने के लिए वह सब कार्य करने को उद्यत रहती है , लेकिन जब उस पर कुठाराघात होता है, उसके अस्तित्व पर वार होता है, उसकी अस्मिता पर प्रहार होता है, तब वह विक्राल रूप धारण करती है जो प्रकृति करती है |

तब वह संहार की तरफ बढ़ती है और जो भी उसके समक्ष दिखता है उसका संहार करती हुई अपने कृत्य द्वारा विनाश का कारण बनती है | आर्यावर्त में पूर्व में ऐसी न जाने कितनी अनगिनत घटनाएं घटित हो चुकी हैं , जो कि आज प्रमाणस्वरूप हमारे समक्ष हैं | आज फिर भी हम इन दोनों प्रकृति और नारी को उसके प्रचंड रूप धारण करने को बाध्य करने में लगे हैं | संभवतः अपने विनाश का रास्ता स्वयं प्रशस्त कर रहे हैं | आज हमें पूर्व की स्थितियों का बारीकी से मंथन करने एवं उससे अपने भविष्य को अबाध रूप से उत्तरोत्तर विकास की तरफ ले जाने का क्रम जारी रखने की जरूरत है, नहीं तो विकल्प सामने है | विनाश रुक नहीं सकता | : वैसे विकास की अंतिम परिणति विनाश ही है और अगर हम यह मान चुके हैं कि हम कुछ भी कर सकने में सक्षम हैं तो यह विनाश का पहला चरण है और पूर्ण विनाश अवश्यम्भावी है|उसे कोई नहीं रोक सकता | हाँ इतना अवश्य है कि पूर्ण विनाश के पश्चात पुनः विकास का रास्ता प्रशस्त होना है | जैसे कुम्हार मिटटी के बर्तन बनाता है और टूट जाता है तो पुनः उसको मिटटी का रूप देकर नए सिरे से बर्तन बनाता है | सचेत होने की आवश्यकता है, विकास या विनाश , हम क्या चाहते है, समझ-बूझकर चुनने का समय आ गया है|

प्रकृति में जड़ता के अहसास ने ही शायद हमारे -उसके साथ के वर्तमान व्यवहार को नियंत्रित किया है | हमें सोचना होगा , समझना होगा और असलियत से रू-ब-रू होना होगा |साथ ही उसी अनुरूप व्यवहार भी करना होगा और तब हम देख सकेंगे कि प्रकृति जड़ नहीं चेतन है या यों कहें कि चैतन्य है और नारी तो स्वयं प्रकृति स्वरूपा है | अतः उसके अन्तर्मन को समझना होगा , परखना होगा और जिस दिन हम इसे समझ जायेंगे वह हम सबके लिए एक नया दिन होगा और प्रकृति एवं इसका नारी -रूप सचमुच हमारी जिंदगी को खुशियों से भर देगा | तब हम सचमुच पूरे जीवन , अपने यौवन को संजोए रख पाने में समर्थ हो सकेंगे | आज मेरे मूल प्रश्न का उत्तर स्वयंमेव मुझे प्राप्त हुआ और समझ में यह बात आई कि नारी को उत्सवों, जलसों या यो कहें की अपनी ताकत , सम्पन्नता दिखने एवं इस क्रम में लोगों को रिझाने का सिलसिला पूर्व के पुरुष -नारी के सामंजस्य का विकृत रूप ही है|

लेखक का जन्म बिहार के बक्सर जिले के एक ग्राम में हुआ | वहीं से उन्होंने प्राथमिक एवं हायर से\सेकेंडरी की शिक्षा उत्तीर्ण की | तदोपरांत, संत कोलम्बस महाविद्यालय हजारीबाग से अर्थशास्र में सनातक की परीक्षा पास की |तत्पश्चात ,जेवियर समाज सेवा संस्थान राँची से कर्मिक व्यवस्था एवं ओधोगिक सबंध में स्नातकोत्तर हुए और उन्होंने कर्म्स पदाधिकारी के पद पर , कोल इंडिया लिमिटेड धनबाद में सेवा आरंभ की.सेवाकाल के प्राथमिक वर्षों में रांची विश्वविद्यालय से विधि स्नातक की परीक्षा भी उत्तीर्ण कीऔर विभिन्न पदों पर कार्य करते हुएवे सन 2011 में सेवानिर्मित महाप्रबंधक के पद से भारत कोकिंग कोल इंडिया लिमिटेड,धनबाद से लिया| सामाजिक विषयों पर आध्यात्मिक चिंतन एवं लेखन उनकी रूचि है | आपको भारतीय राजभाषा विकास संस्थान देहरादून द्वारा **भारतेंदु राजभाषा साहित्य शिरोमणि** से , अक्टूबर 2009 में, सम्मानित किया गया|

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सुर - ताल

नाद ब्रम्ह

डॉ श्रीकांत एवं सौ. अनुराधा अगस्ती

ब्रम्हांड के प्रत्येक पिंड का अपना स्वभाव है , अपनी प्रकृति है। सौर मण्डल के ग्रहों को ही लें , सभी ग्रह अपनी-अपनी प्रकृति और स्वभाव के कारण जाने जाते हैं। सभी ऋतुओं का अपना अलग-अलग स्वभाव है। दिन-रात्रि के 24 घंटो को देखे तो सभी की अलग-अलग प्रकृति होती है। संसार के सभी प्राणियों का, जीव-जंतुओं का, वनस्पतियों का और अन्य सभी भौतिक-अभौतिक तत्वों का अपना-अपना स्वभाव होता है। इस धरती पर असंख्य मनुष्य हैं लेकिन प्रत्येक मनुष्य की अलग-अलग प्रकृति और स्वभाव है।

इसी प्रकार यदि हम संगीत का अध्ययन करे तो पाऐंगे कि संगीत की समस्त विधाओं का एवं समस्त वाद्य यंत्रो का अलग-अलग स्वभाव एवं प्रकृति होती है। चाहे वह तंत्री वाद्य हो , सुथिर वाद्य हो या अवनद्य वाद्य। कुछ वाद्य श्रृंगार रस प्रधान होते हैं तो कुछ गंभीर प्रकृति के। कुछ करूण रस की उत्पत्ति करते हैं तो कुछ शांत रस की अभिव्यक्ति करते हैं। इसी प्रकार इनसे निकलने वाले स्वरों की और बोलों की भी अपनी प्रकृति होती है , उनका प्रभाव होता है। इस आधार पर यह कहा जा सकता है कि प्रत्येक ध्वनि की या वास्तव में "नाद" की अपनी प्रकृति होती है , अपना स्वभाव होता है। यह नाद ही है जो हमें ब्रम्हांड की अनेक क्रियाओं को समझने में मदद करता है।

वैसे तो नाद का शाब्दिक अर्थ है- शब्द , ध्वनि या आवाज़ , लेकिन आध्यात्म क्षेत्र में नाद को ब्रम्हस्वरूप माना गया है। इसे शब्द ब्रम्ह , नाद ब्रम्ह कहकर सम्बोधित किया गया है। योग उपनिषद में कहा गया है कि नाद से बड़ा कोई देव नहीं , नादानुसंधान से बड़ी कोई पूजा नहीं , नादोपासना से बड़ा कोई कर्म नहीं और नाद के बिना कोई ज्ञान नहीं। जब अकेले नाद में इतना सामर्थ्य है तो नाद के समुच्चय 'संगीत' में कितनी शक्ति होगी इसका सहज अनुमान लगाया जा सकता है।

नाद को ब्रम्ह कहा गया है यह कोई अलंकारिक अभिव्यक्ति नहीं है बल्कि इसके पीछे बहुत बड़ा वैज्ञानिक आधार है। आमतौर पर बातचीत करने में नाद की आंदोलन संख्या अनियमित होती है अत: कोई विशेष प्रभाव उत्पन्न नहीं कर पाती लेकिन यही नाद जब निश्चित आंदोलन संख्या के साथ स्वर में होता है तो वह वैदिक मंत्रो की ऋचाऐं बन जाता है।

इतिहास में अनेक प्रमाण हैं जिसमें वैदिक मंत्रो का प्रयोग मनुष्य यश , कीर्ति, आरोग्य, वैभव, इत्यादि के लिए सदियों से करता आ रहा है। यही सिद्धांत संगीत पर भी लागू होता है , जब नाद का प्रयोग निश्चित स्वरों के साथ क्रमबद्ध तरीके से किसी राग में किया जाता है तो वह किसी ऋतु , प्रहर या अन्य किसी भाव का आभास कराता है। इससे नाद की शक्ति , उसकी प्रकृति और उसके वैज्ञानिक प्रभाव का प्रतिपादन होता है।

हमारी वैदिक संस्कृति में भक्ति और संगीत का अटूट सम्बंध है या हम यों कह सकते हैं कि हमारी वैदिक संस्कृति में संगीत केवल भक्ति के लिए ही था। प्राचीन काल या वैदिक काल एक ऐसी सभ्यता का प्रतीक था जब व्यक्ति की चेतना में सत्वगुण अधिक प्रभावशाली था एवं इतिहास बताता है कि आज हम जिन कार्यों के लिए उपकरणों पर निर्भर रहते हैं , उस समय वे लोग अपनी चेतना के स्तर पर ही उन कार्यों को कर लिया करते थे। यह एक ऐसी सभ्यता थी जो भूतल पर ही स्वर्ग का आनंद लिया करती थी।

जैसे प्रत्येक देश की अपनी सभ्यता एवं संस्कृति होती है , वैसे ही हमारे देश भारत की भी अपनी सभ्यता एवं संस्कृति है , जो विविध रूपों जैसे वेद , पुराण, साहित्य, शिक्षा, धर्म, आध्यात्म, संगीत, नाट्य, चित्रकला, शिल्पकला, इत्यादि में व्यक्त हुई है। हमारे देश में संगीत का इतिहास बहुत पुराना है। प्राचीन काल में तो संगीत को ईश्वरोपासना का सर्वश्रेष्ठ साधन माना जाता था। देवी-देवताओं की स्तुति के लिए जो गीत संगीत गाया बजाया करते थे उन्हें "गंधर्व" कहा जाता था जिसका आधार है 'गंधर्व वेद', जो सामवेद का उपवेद कहलाता है। एक ऐसा वेद जिसमें प्रकृति के नियमों पर आधारित संगीत है। यह एक ऐसी साधना है जो साधक को चेतना के उस स्तर पर ले जाती है जहां प्रकृति उसकी इच्छानुसार कार्य करने लगती है।

भारतीय शास्त्रीय संगीत में सजीवता है और मेरी समझ में इस सजीवता का एक मुख्य कारण यह है कि हमारे जितने भी वाद्य यंत्र हैं वे प्रकृति के ऐसे अंशो से बने हैं जो कभी न कभी सजीव (जीवित) थे। कोई भी वाद्य यंत्र ले , चाहे वह पखावज़ हो , बांसुरी हो, वीणा हो , सितार हो, या तबला हो , इनमें कभी सजीव रहे प्राणी या वनस्पति का कोई न कोई अंश , जैसे काष्ठ , चमड़ा,

दंत, या बाल (केश) के रूप में अवश्य मिलेगा। सजीवता का दूसरा बड़ा कारण है इसका प्रकृति के नियमों से बंधा होना जो इसे ज्यादा प्रभावशाली बनाता है।

प्रत्येक राग के गाने-बजाने का समय सिद्धांत है। भोर की बेला में गाए-बजाए जाने वाले राग अलग हैं   , सुबह के समय के अलग हैं, शाम एवं रात के राग भी अलग हैं। वैसे ही संधीकाल के समय के राग भी बिल्कुल अलग हैं। बसंत ऋतु के राग अलग है, वर्षा ऋतु के राग अलग हैं। यह सब इतना वैज्ञानिक है कि उस राग में लगने वाले स्वर आपको उस समय का

आभास कराते हैं। वैज्ञानिक शोधों व्दारा यह सिद्ध हो चुका है कि शास्त्रीय संगीत के सम्पर्क में रहने वाले मनुष्य तो क्या पेड़-पौधे भी अधिक स्वस्थ रहतें हैं। संगीत की इस शक्ति को पहचानकर ही कुछ लोग आजकल संगीत व्दारा चिकित्सा कर रहे हैं।

अत: आज की आवश्यकता यह है   कि हम सभी, विशेषकर युवा पीढ़ी, शास्त्रीय संगीत रूपी "नाद ब्रम्ह" की इस अभूतपूर्व शक्ति को जाने और इसे नित्य अपनाएं।   इससे जीवन में अनुशासन के साथ-साथ शांति एवं आनंद भी प्राप्त होगा।

लेखक दम्पत्ति लगभग तीन दशक से महर्षि शिक्षा संस्थान के संगीत विभाग में अपनी सेवाएं प्रदत्त कर रहे हैं। उन्होंने अमेरिका के कई स्थानों पर संगीत समारोहों में अपनी कला का प्रदर्शन किया एवं व्याख्यान दिये।
• लेखक B.Sc., M.Music एवं Ph.D. (तबला) हैं, एवं संस्थान में संयुक्त संचालक पद पर कार्यरत है ।
• लेखिका MA. (संगीत) हैं एवं संस्थान के संगीत वद्यालय में शिक्षिका हैं।
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Education is a social process.
Education is growth.
Education is not a preparation for life;
education is life itself.

- John Dewey

www.DreamThisDay.com

बड़ा ही शुभ दिन है -

<div align="right">

मृणालिनी घुले
</div>

बड़ा ही शुभ दिन है
दिन दो अक्तूबर,
इस दिन चमके दो तारे
भारत के अंबर पर ।
मोहनदास गांधी थे एक
जो बापू कहलाये
दुजे लाल बहादुर थे
जो सबके मन को भाये।
एक ने अपने यत्नों से
 देश को आजादी दिलाई
और दूजे ने बहादुरी से
थी आजादी बचाई।
एक अहिंसा के बल पर
अंग्रेज़ों से लड़ गया
दूजा देश बचे दुश्मन से
इस ज़िद पर ही अड़ गया।
कहा एक ने सदा अहिंसा
और सत्य की राह चलो,
दूजे ने दे दिया मंत्र
जय जवान जय किसान कहो।
इन दोनों विभूतियों को
कभी नहीं बिसराना तुम
इनके निर्देशित राहों पर
चल कर सदा दिखाना तुम।

यह जीवन अनमोल -

<div align="right">

डॉ. संगीता पाहुजा
</div>

मनुष्य होने का समझो मोल
व्यर्थ ना जाए यह जीवन अनमोल।

सदा रहें सकारात्मकता से भरपूर
परिश्रम,कामयाबी और
सफलताओं की भावनाओ से परिपूर्ण

ना हावी हो कभी
नकारात्मकता इस मन पर
चाहे आयें मुश्किलें कितनी भी हर ओर।

चुनौती बनाओ हर मुश्किल को
आदत बनाओ हर सफलता को।
दूर करो सकारात्मक विचारो से
तन और मन की हर दुविधा को।

पास ना आए कोई भी
 असफलता और अकेलेपन का भाव।
नहीं अकेला कोई भी इस जग में
सबके साथ है प्रभु का आशीर्वाद अनमोल।
समझो इस जीवन का मोल
व्यर्थ ना जाए यह जीवन अनमोल।

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

IOMS LEARNING CENTER
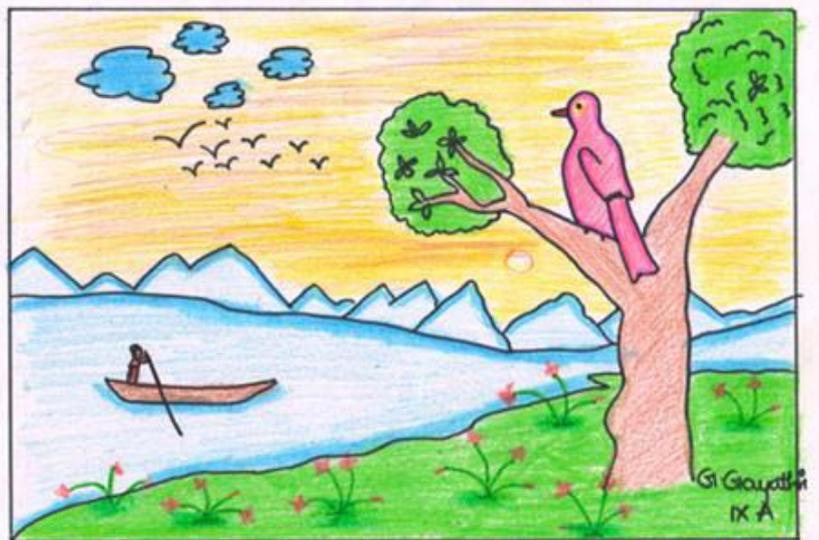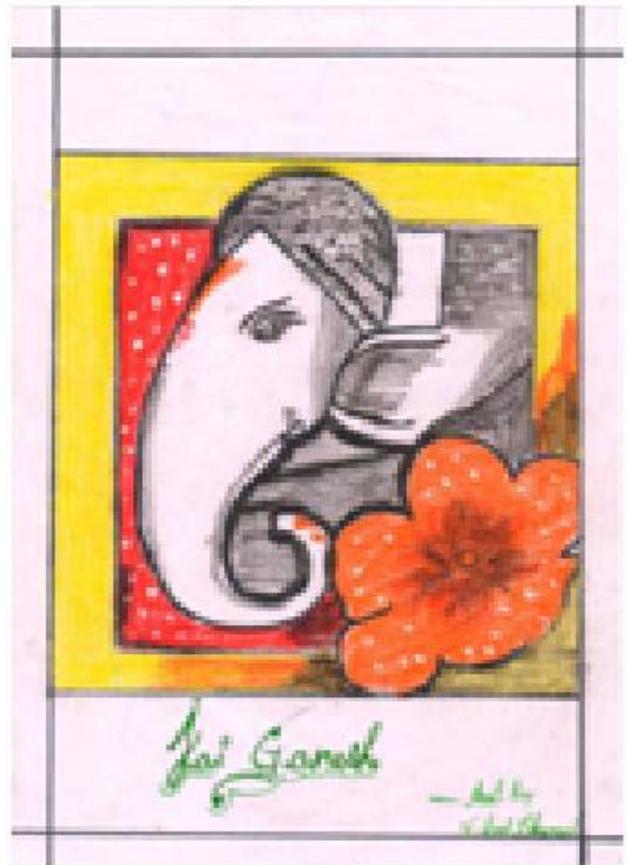
Creativity of Students at Ramakrishna Mission School, Sithanagram, A.P.

Sports Planet

In sports planet everybody play sports. This planet is known for sports. They play all kind of sports example - lawn tennis, Table tennis, Football, Basketball, Cricket, Chess etc. There are no train's but only planes. They live in bungalows & mansions. There are museums of sports and some of studies and others. There are books of sports and some of studies. There are sports items and stationary and some jewelleries. The famous sports are Chess, Football, Tennis.

Football Tennis

Amity International School
Noida Sec-44, Class-I-H
-Aryaman Dwivedi

The Proudest Parents

K. S. S. Vishnu Priya

Once upon a time, in a small country, people decided to investigate what it was that parents really liked the most. A competition was organised. It used the latest invention of professor Crank-Shafte: the Gladometer.

To date, the Gladometer is the only instrument ever built that is capable of measuring joy and happiness.

So, one by one, the children demonstrated their own particular talents to their parents. And the Gladometer faithfully measured their parents' reactions. One boy turned up with a trained pig; the pig sang and danced. A girl came and played the violin like an angel, and an intelligent boy came and read his very big book. The parent's happiness was plain to see.

Finally, a boy came to the Gladometer carrying nothing. Nor did he know how to do anything. When the organisers asked him what he was going to do, he simply said: "I am very obedient."

This said, the machine measured such a high reading that it began violently vibrating, and finally exploded. The boy who had done nothing won all the prizes that day, for solving the mystery of what pleases parents the most.

Ref: https://freestoriesforkids.com/audiostories/american-english/proudest-parents-short-audio-story-narrated-american-english

The presenter is a students of Class 9ᵗʰ, at Ramakrishna Mission School, Sithanagram, AP. She is attending IOMS sessions hosted by the school.

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ANSWER: CROSSWORD PUZZLE Sept'18: Engineers' Day

Prof. S.B. Dhar

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30
1D																2C	O	M	M	U	N	3I	T	Y					
A																						R							
4M	O	5K	S	H	A	G	U	N	D	A	M											R							
S		A																				I							
A		R		6F																		G							
N		N		I																		A							
D		A		F		7B																T							
B		T		T		R																I							
8V	E	R	S	A	T	I	L	E	M	I	N	D	S						9M	A	N	O	F	V	A	L	U	E	S
I		K				N																N							
D		A				D																							
G		A														10B	L	O	C	K	S	Y	S	T	E	M			
E																													
S				11K	H	A	D	A	K	V	A	S	L	A															
N																									12T				
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13B	H	A	R	A	T	R	A	T	N	A															E				
R																14P	R	O	F	E	S	S	I	O	N	A	L	S	
15A	C	T	U	A	L	P	R	O	D	U	C	T	S												T				
E																									Y				
		16K	R	I	S	H	N	A	R	A	J	A	S	A	G	A	R	A											

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A Student's Perspective On Education

Riya Choudhary

"Education is the movement from darkness to light."

It is a general belief that whatever we learn in our classes, schools, colleges, tuitions, etc is education. But is it so narrow? Is it so limited? No. We get a lot of information in our schools, colleges etc and we do need such information to get educated. We live in the Intellectual Information age and "Education" is a much wider term which involves all of it.

True Meaning of Education: Education is a combination of Intellectual Education and Value-Based Education, where the first influences heads and the second influences hearts. In fact, education that does not train or influences hearts can be dangerous. Education that builds fundamental traits of character- such as honesty, compassion, courage, persistence and responsibility- is absolutely essential.

I strongly believe that our society needs more of value based education than academic education. A person who is morally educated will be more successful than a morally bankrupt person with excellent grades.

For Example: We all will prefer to go to the second most qualified surgeon in town who has character, than go to the most qualified surgeon who lacks character.

True education is training of both heart and head. It is better to be uneducated rather than ill-educated. An uneducated thief will only steal the goods from the train but an ill-educated may steal the entire train.

We need to compete for knowledge and wisdom and not for grades. One could have good grades and degree and still not learn much. The real problem behind this is People confusing education with memorizing of facts.

Knowledge is not the Ultimate Power but a Potential Power : What is the difference between a person who cannot read and a person who can read but does not read? No difference! Therefore, it is said that knowledge is a potential power and it is not helpful until it is acted upon. It is just like- It does not matter how much we eat but how much we digest. Our minds are like muscles that can stretch or shrink. It all depends on how much or how little we exercise them.

Forms of Education : Education takes many forms. It is not just grades or degrees but also include:

- Cultivating our strength
- Learning Self Discipline
- Listening
- Eagerness to Learn
- Developing Characteristics leading to success

Conclusion

In a nutshell, educated persons are those who choose wisely and courageously under any circumstances. If they choose between wisdom over foolishness, good over bad, virtue over vulgarities, regardless of the academic degrees they have, then they are educated. Educated people recognize their limitations but focus on their strengths.

Author is a student of B.Com (final) Taxation group in St. Aloysius College, Jabalpur. She is a part of College Assembly, regularly as a host/ motivator.

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No Words Can Truly Tell

Varaha Mihira Group

With a special gift for learning
And with a heart that deeply cares,
You add a lot of love
To everything you share,
And even though
You mean a lot,
You'll never know how much,
For you helped
To change the world
Through every life you touched.

You sparked the creativity
In the students whom you taught,
And helped them strive for goals
That could not be bought,
You are such a special teacher
That no words can truly tell
However much you're valued

Left to Right : Jayavardhan Reddy P, Venkatesh kumar T, Kamalesh N, Sai Venkata Ganesh J,
Back side   Sai Rahul T, Twinkle Mokshagna A

This poem, by a group of students of class 10ᵗʰ, was composed on the occasion of Teachers' Day'2018. These students are from Ramkrishna Mission School, Sithanagram, AP. It has been attending Interactive Online Mentoring Sessions (IOMS) since Aug'2017. Formation of group of students, invoking inter-group and intra-group interaction is an integral part of strategy in IOMS to induce group-dynamics among students. In this pursuit, teachers at schools have also played an important role.

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Answers to Science Quiz : Sept'18

Kumud Bala

1. (b)	2. (c)	3. (d)	4. (b)	5. (c)	6. (b)	7. (d)	8. (b)	9. (a)	10. (b)
11. (c)	12. (d)	13. (c)	14. (b)	15. (b)	16. (a)	17. (c)	18. (d)	19. (a)	20. (d)
21. (b)	22. (a)	23. (c)	24. (b)	25. (a)	26.(d)	27.(d)	28.(b)	-	-

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Teachers' Day

G.V.S. MEGHANA

It is said that nothing is there to compare from the teaching profession. It is the noblest profession in the world. 5th of September has been dedicated to the teaching profession by celebrating this day as Teachers' Day all through the India. It is celebrated every year to commemorate the birth anniversary of earlier India President, Dr. Sarvapalli Radhakrishnan as well as to honour the teachers. The birth anniversary day of our earlier president has been dedicated to highlight the nobility of the teaching profession as well as contributions of our teachers in the society and country development.

Dr. Sarvapalli Radhakrishnan was a great teacher who had spent around 40 years of his life in the teaching profession. He was well known about all the roles and contributions of the teachers in students' life. So, he was the first person who thought about teachers and requested his birthday means 5th of September to be celebrated as the Teachers' Day every year. He was born on 5th of September in 1888 and started his career as a philosophy teacher by entering to the teaching profession at his 21 at Presidency College, Chennai in 1909.

He taught philosophy in many famous universities of India as well as abroad like University of Chennai, Kolkata, Mysore, Banares, Oxford (London), etc. Because of his committed dedication towards the teaching profession, he was appointed as the Chairman of University Grants Commission in 1949 in order to recognise his valuable services.

5th of September was started celebrating as the teachers day from 1962. After serving the nation for a long period of time through his great services, Sarvapalli Radhakrishnan passed away in 1975 on 17th of April.

Teachers are like real potters who not only give our life a shape, but also enable to lit like a lamp forever after dispelling the darkness from all across the world, so that, our nation can be enlightened with lots of bright lamps. Therefore, the nation pays homage and respect to all the teachers in the country. We can nothing give our teachers in return to their great job however; we should respect them always and say thanks. We should take a pledge to heartily respect and honour our teachers in our daily lives as without a good teacher we all are incomplete in this world.

Author is a student of Class 10th at Ramkrishna Mission High School, Sitanagram, Distt. Guntur, AP. She is a regular student of IOMS being held at the school. Shehas been attending IOMS at school since class 9ᵗʰ.

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—00—

MY TEACHER

N. Kamalesh

A teacher is the precious gift from God to us. A teacher is like a God as God is the builder of whole universe. However a teacher is considered to be the builder of a good nation. Teachers are very prestigious people in the society who take responsibility to raise the mind status and living standard of the common people through their magic of teaching. Parents have lots of expectations from the teachers of their kids. The role of teachers varies from classroom to playground and from student to student. A teacher is very important in the life of everyone who is supposed to be performing different tasks in our life.

Before coming to the classroom, a good teacher ensures his/her goals of education on daily basis. Every teacher has different qualities of teaching their students. They vary in their knowledge, skills, and attitudes in teaching specific subjects. They try their best and do all efforts in helping us to achieve our goals in life. School life is considered as the best time of everyone's life as this is the time when everyone learns basic things about life and different subjects. All of us set our goals in the school time which decides the development of our nation. Each and every student gets open their mind in the school time and enhances their skills and knowledge by participating in the co-curricular activities such as sports, games, quizzes, group discussion, debates, essay writing, speech recitation, excursion, tours, field trips and many more.

Good teachers are also the best friends of their students who help them in deciding true path in their life. There are many teachers in any school or college but only one of them becomes favourite of any student. Teachers set our goals of education through their collective roles of unique teaching and learning process. Our teachers motivate us to always work in harmony. Our teachers understand the problems of us and deal with us in both ways personally and professionally. They teach us to have positive attitude towards life. A good teacher is one who only gives his/her students but nothing accepts whole life instead he/she become happy with the success of students. A best teacher is the one who provides a best model of future generation to his/her nation. Proper education is the only way to remove social issues, corruption, etc from the nation which ultimately lead to the real growth and development of a nation.

Teachers' Day, recently celebrated on 5th September, is a very special occasion for everyone especially for the teachers and students. It is celebrated by the students every year on 5th of September to honour their teachers. 5th of September has been declared as the Teachers' day in India. Our earlier President, Dr. Sarvepalli Radhakrishnan was born on 5th of September so Teacher's Day in India is being celebrated on his birthday because of his love and affection towards teaching profession. He was a great believer of education and highly famous as the scholar, diplomat, teacher and President of India.

We should realize the necessity and value of our teachers in our lives and celebrate Teachers' Day every year to pay them homage for great job. Teachers are more than our parents who mold our mind towards success. They become happy and get their success in life only if their dedicated students go ahead and spread teachers name all over the world through their activities. We should follow all good lessons in our life taught by our teachers.

'Our life cannot be cherished without teachers.'

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GROWING WITH CONCEPTS - Mathematics

LET'S DO SOME PROBLEMS IN MATHEMATICS-II

Prof. SB Dhar

This article deals with problems from the section Permutations and Combinations of **Algebra**. It may be assumed that these problems will be useful for the students who are either studying in 10+2 (Intermediate) Classes or aspiring for the prestigious Entrance Examination - JEE (Main) or IIT- Advanced.

1. **The number of 5-digits numbers that are divisible by 4, with digits from the set {1,2,3,4,5} where repetition of digits is allowed is-**

   (a) 625   (b) 20   (c) 5   (d) 120

   Solution:

   The numbers are divisible by 4 if their last two digits are divisible by 4. So, the last two digits should be (12) or (24) or (32) or (44) or (52) from the given set.

   Total number of numbers = 5x5x5x5x5=625. Hence option (a) is the correct option.

2. **Let P be a matrix of order 3 x 3 such that all the entries in it are from the set {-1,0,1}. The maximum possible value of determinant P is-**

   (a) 2   (b) 4   (c) 4   (d) 8

   Solution: $\begin{vmatrix} 1 & 1 & 1 \\ -1 & 1 & 1 \\ 1 & -1 & 1 \end{vmatrix} = 4$

3. **A man X has 7 friends, 4 of them are ladies and 3 are men. His wife Y also has 7 friends, 3 of them are ladies and 4 are men. Let X and Y have no common friends. The total numer of ways in which X and Y together can throw a party inviting 3 ladies and 3 men so that 3 friend of each of X and Y are in the party is –**

   (a)468   (b)469   (c)484   (d)485

   Solution:
   Option(4)

Possible pairs with given sets are -

X(4L 3M)	Y(3L 4M)
3L 0M	0L3M
2L 1M	1L 2M
1L 2M	2L 1M
0L 3M	3L 0M

Total No. of ways   =
$({}^4C_3.{}^3C_0).({}^3C_0.{}^4C_3) + ({}^4C_2.{}^3C_1).({}^3C_1.{}^4C_2).{}^4C_0)$
$+({}^4C_1.{}^3C_2).({}^3C_2.{}^4C_1) + ({}^4C_0.{}^3C_3).({}^3C_3$

4. **Let A and B be two sets containing four and two elements respectively. Then the number of subset of the set AxB each having at least three elements is –**

   (a)219   (b)256   (c)275   (d)510

   Solution: Set A has 4 elements. Set B has 2 elements. Number of elements in set AxB=4x2=8 . The number of subsets of AxB=2^8=256 .   The number of subsets having 0 elements=${}^8C_0$. The number of subsets having 1 elements=${}^8C_1$. The number of subsets having 2 elements=${}^8C_2$. The number of subsets having at least 3 elements=256-1-8-28=219

5. **The number of integers greater than 6000 than can be formed using digits 3,5,6,7 and 8 without repetition is –**

   (a)72   (b)120   (c)192   (d)216

   Solution: (c) is the correct option
   Case I: 5-digits number greater than 6000= 5x4x3x2x1=120

Case II: 4-digits number greater than 6000
=(at first place either of 6,7,8) 3 x (at second place
either of four digits out of 5) 4 x (at third place
either of the 3 digits) 3 x (at fourth place either of
the 2 digits)2   =72.
Hence, total numbers greater than 6000
=120+72=192

6. If 12 identical balls are to be placed in idenitical boxes then the number of ways one of the three boxes can have exactly 3 balls is –

(a) $^{12}C_3$ *(b)* $^{12}C_3.3!$ *(c)* 12^9 *(d)* $^{12}C_3.2^9$

Solution: Option (d) is the correct

7. If all the words with or without meaning having five letters formed using the letters of the world SMALL and arranged as in the dictionary, then the positon of the word SMALL is -

(a)46ᵗʰ   *(b)59ᵗʰ*   *(c)52ⁿᵈ*   *(d) 58ᵗʰ*

Solution:

A (LL MS)= $\dfrac{4!}{2!} = 12$

 L (AL MS)= $4! = 24$

M (ALLS) = $\dfrac{4!}{2!} = 12$

SA (MLL)= $\dfrac{3!}{2!} = 3$

SL (ALM)= $3! = 6$
TOTAL=12+24+12+3+6=57ᵗʰ
NEXT IS SMALL=57ᵗʰ +1=58ᵗʰ

8. The number of 3x3 matrices A with entries from {0,1,2} for which the sum of the diagonal entries of A'A is 5 is-

(a)135   *(b)198*   *(c)162*   *(d)126*

Solution: The correct option is (b)

Let the matix A=[kij] ,

Hence, the sum of diagonal entries $= \sum k_{ij}^{2}$ = 5,
kij are from the set {0,1,2} . Therefore total number
of matrices $= {}^{9}C_5 + {}^{9}C_1\, {}^{8}C_1$

9. Let S = {1,2,3,….,9}. For k =1, 2, 3, 4, 5, let N_k be the number of subsets of S, each containing five element out of which exactly k are odd. Then $N_1+N_2+N_3+N_4+N_5$ is -

(a)110   *(b)116*   *(c)126*   *(d)136*

Solution:
The correct option is (c)
There are only 4 even numbers in S. any subset of 5
elements of S will have atleast 1 odd numer=$^9C_5$

10. The total number of non-negative integral solutions to satisfy the equation x+y+z=10 is –

(a) $^{12}C_2$ *(b)* $^{10}C_3$

(c) $^{5}C_4$ *(d) None of these*

Solution:
The correct option is (d)
Formula is $^{11}C_1 + {}^{9}C_1 + {}^{7}C_1 + {}^{5}C_1 + {}^{3}C_1 + {}^{1}C_1 = 36$

11. Let n be the number of ways in which 5 boys and 5 girls can stand in a queue in such a way that all the girls stand consecutively in the queue. Let m be the number of ways in which 5 boys and 5 girls can stand in the queue in such a way that exactly four girls stand consecutively in the queue, then the ordered pair (m, n) is   -

(a)(5,1)   *(b)(5,4)*   *(c)(1,5)*   *(d)(4,5)*

Solution:
The correct option is (a)
n= number of ways in which 5 boys and 5 girls can
stand in a queue such that all the girls stand
consecutively = 6! 5! ,   because 5 girls together are
arranged with 5 boys.
m= the number of ways in which 5 boys and 5 grils
can stand in the queue in such a way that exactly
four girls stand consecutively   = $^{5}C_4$ (7!-6! 2) 4!=
5.5.6!4!

12. Three boys and two girls stand in a queue. If the number of boys ahead of every girl is at least one more than the number of girls ahead of her, then the total number of possible arrangements is –

(a)3   *(b)5*   *(c)10*   *(d)30*

Solution:

The correct option is (b).

There are two possibilities.

Either a girl will start the queue, or she will stand at the second place and will not take the last place as well.   So, the number of possible ways $= {}^{3}C_1 + {}^{2}C_1 = 5$

13. Let $n_1 < n_2 < n_3 < n_4 < n_5$ be positive integers such that $n_1 + n_2 + n_3 + n_4 + n_5 = 20$. Then the number of such distinct arrangements $(n_1, n_2, n_3, n_4, n_5)$ is-

(a)3   (b)5   (c)7   (d)120

Solution:

Let n_5 takes value for 10 to 6, the carry forward moves from 0 to 4 that can be arranged as-

1,2,3,4,10

1,2,3,5,9

1,2,3,6,8

1,2,4,5,8

1,2,4,6,7

1,3,4,5,7

2,3,4,5,6

14. A club consists of 6 women and 4 men. A team of 4 persons is to selected from the club including the selection of a captain from among these 4 persons for the team. If the team has to include at most One Man, then the number of ways of selecting the team is-

(a)90   (b)300   (c)380   (d)95

Solution:

Option (c) is the correct answer.

Case I: One man is selected, then number of ways
$= {}^{4}C_1 . {}^{6}C_3$

Case II: One man is not selected, then the number of ways $= {}^{6}C_4$ Captain can be selected in number of ways $= {}^{4}C_1$.

The total number of ways the team will be selected$= {}^{4}C_1 . {}^{6}C_3 \; {}^{4}C_1 + {}^{6}C_4 \; {}^{4}C_1$

Problem Of The Month:

The figure shows two shapes that fit together exactly. Each shape is formed by four semi circles of radius 1 units. Find the total shaded area.
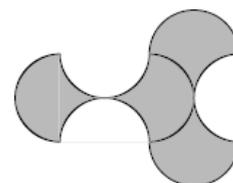
Dr S.B. Dhar, is **Editor of this Quartrerly e-Bulletin**. He is an eminent mentor, analyst and connoisseur of Mathematics from IIT for preparing aspirants of Competitive Examinations for Services & Admissions to different streams of study at Undergraduate and Graduate levels using formal methods of teaching shared with technological aids to keep learning at par with escalating standards of scholars and learners. He has authored numerous books of excellence.
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CROSSWORD PUZZLE October'18: GYAN VIGYAN SARITA

Prof. SB Dhar
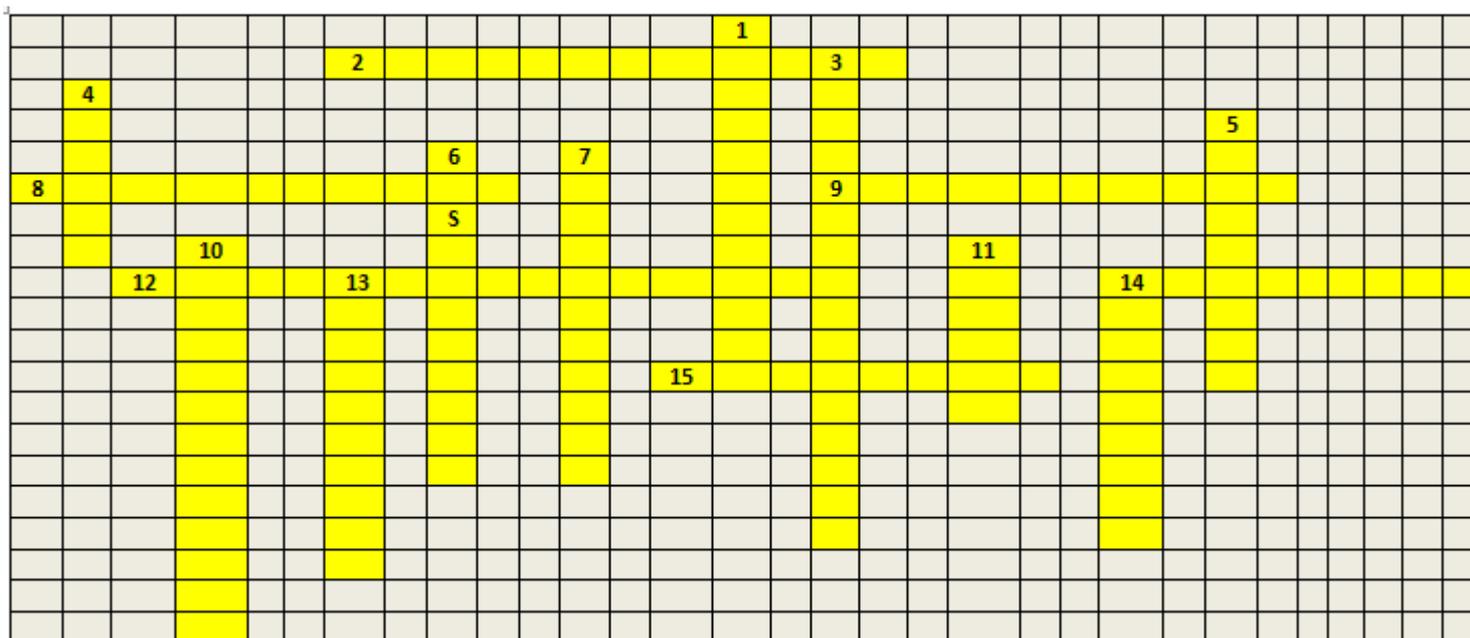
ACROSS

1 A of ZFZA denotes

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5 Continuous practice removes

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DOWN

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Growing with Concepts : Physics   *Code: Phy/MRB-1/O/002*

Solving Problems – Mechanics of Rigid Bodies
(Gravitation and Mechanical Properties of Matter)

Rigid bodies with their Center of Mass (COM), Moment of Inertia (MOI), do exert gravitational force on another rigid body. Determination of position of COM of a rigid body is based on principle of moment, which is product of constituent masses and distance from deemed point of rotation; MOI of a rigid body is moment on moment and is effective product of constituent masses and square of their distances from deemed point of rotation. But, force of gravitation is interaction of between Two rigid bodies and is proportional to their masses and inversely proportional to distance between their COMs. Nevertheless, Principle of gravitation remains an area of Mechanics of Rigid Bodies.

Inline with Question Bank **Phy/MRB-1/O/001,** included in e-Bulletin of t September 1, 2018, this part of objective questions covers portion of Gravitation and Mechanical Properties of Matter. Advantage of great work of creation of book Concept of Physics by Prof. H.C. Verma with set of questions provide a complete turnaround of the concepts has been taken. Illustrations of concepts to arrive at answer of each question have been made. Consideration behind evolving illustrations from first principles, to the extent possible, instead of straight answer, is that a remote student who did not have an opportunity to visualize concepts in real life, does not find difficulty in understanding the analysis.

While doing so it is our endeavour to groom competence to compete through Interactive Online Mentoring Sessions (IOMS) . These, question banks, supplement to Mentors' Manual, through our monthly e-Bulletin, progressively integrated as Free Web resource for students streamed in IOMS and those whom we are unable to integrate in this initiative. There might be teachers in remote areas who may like to integrate in this process and initiative, either to avail benefits or add a value, their gestures to complement collectively are gratefully welcome.

Answering objective questions, large in number with much shorter time, if not found easy, are generally attempted by students either by guess or imperfect intuition. This has been bothering academicians and examining bodies on credibility of such tests. On the contrary, constraints of setting subjective questions, their evaluation, and revaluation etc. are herculean tasks of execution and management, and possibility of any error, in the growing scale of aspirants makes the challenge tougher. While thought process of modifying test patterns are continuously on so as to enhance their credibility and efficacy on the ground. Nevertheless, objective test, whether on-paper, off-line or on-line appears to remain in place for quite some time, at least for First Level Screening.

Objective questions unless handled analytically, choice of answer goes wrong and it costs heavily in terms of negative marks. Moreover, there are questions which with lone mathematical considerations might go wrong, unless physics behind it is kept in mind. Therefore, illustrations have evolved to help in conditioning mind of students.

It, however, requires practice with clarity of concepts, patience and perseverance to develop an ability to analyze complex problems mentally and offer extempore solution. This is bound to lead to speed of analytical visualization and speedily choosing a right answer among the given options. In this connection Albert Einstein, who is known for his extraordinary mental ability,, his quote "*I have perspired more than inspired*" is highly inspiring.

Another, important method of developing high intuitive skill is *group dynamics*, where students discuss, problems and solutions attempted individually, in groups and try to clarify concepts. Only in case of disagreement they consult their mentor. It not only enhances collective wisdom but also helps to evolve individual ability and group synergy; both the traits are important attribute of a good personality. This group dynamics is being integrated in learning and mentoring methodology of IOMS.Possibility of inadvertent typographical errors is not ruled out. We would gratefully welcome suggestions for value addition and corrections, if needed.

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*Code: **Phy**/MRB-I/O/002*

Mechanics of Rigid Bodies : Objective Questions (Typical)

No of Questions: 60   **Time Allotted: $1\frac{1}{2}$ Hours**

All questions are compulsory

Q-1	The acceleration of moon with respect to earth is 0.0027 m.s^{-2} and the acceleration of an apple on earth's surface is about 10 m.s^2. Assume that the radius of the moon is one fourth of the earth's radius. If the moon is stopped for an instant and then released, it will fall towards the earth. Initial acceleration of moon towards the earth will be – (a) 10 m.s^{-2} (b) 0.0027 m.s^{-2} (c) 6.4 m.s^{-2} (d) 5.0 m.s^{-2}
Q-2	The acceleration of moon with respect to earth is 0.0027 m.s^{-2} and the acceleration of an apple on earth's surface is about 10 m.s^{-2}. Assume that the radius of the moon is one fourth of the earth's radius. If the moon is stopped for an instant and then released, it will fall towards the earth. Acceleration of moon towards the earth just before it strikes the earth will be – (a) 10 m.s^{-2} (b) 0.0027 m.s^{-2} (c) 6.4 m.s^{-2} (d) 5.0 m.s^{-2}
Q-3	Suppose, the acceleration due to gravity at the earth's surface is 10 m.s^{-2} and at the surface of the Mars it is 4.0 m.s^{-2}. A 60 kg passenger goes from earth to the Mars in a space ship with a constant velocity. Neglect, all other objects in the sky. Which curve of the figure best represents the weight (net gravitational force) of the passenger as a function of time – (a) A (b) B (c) C (d) D
Q-4	Consider a planet in some solar system which has mass double the mass of the earth and density equal to the average density of the earth. An object weighing W on the earth will weigh at the planet – (a) W (b) $2W$ (c) $\dfrac{W}{2}$ (d) $\sqrt[3]{2}W$
Q-5	If acceleration due to gravity at the surface of the earth is g. Work done in slowly lifting a body of mass m from earth's surface to a height R, radius of the earth, is – (a) $\dfrac{1}{2}mgR$ (b) $2mgR$ (c) mgR (d) $\dfrac{1}{4}mgR$
Q-6	A person brings a mass of 1 kg from infinity to a point A. Initially the mass is at rest but moves at a speed of 2 m$\cdot$s^{-1} as it reaches A. The work done by the person on the mass is -3 J. The potential at A is – (a) -3 J/kg (b) -2 J/kg (c) -5 J/kg (d) None of these
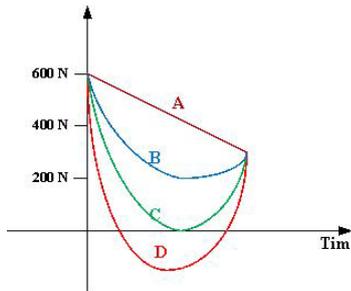
Q-7	Let V and E be the gravitational potential and field at a distance r from the unform spherical sphell. Consider the two statements :
	(A) The plot of V against r is discontinuous
	(B) The plot of E against r is discontinuous
	Then,
	(a) Both A and B are wrong (b) A is correct but B is wrong
	(c) B is correct but A is wrong (d) Both A and B are wrong
Q-8	Let V and E be the gravitational potential and field at a distance r from the unform solid spherical sphere. Consider the two statements :
	(C) The plot of V against r is discontinuous
	(D) The plot of E against r is discontinuous
	Then,
	(a) Both A and B are wrong (b) A is correct but B is wrong
	(c) B is correct but A is wrong (d) Both A and B are wrong
Q-9	Take effect of bulging of earth and its rotation in account. Consider the following statements –
	(A) There are points outside the earth where value of g is equal to its value at the equator
	(B) There are points outside the earth where value of g is equal to its value at the poles
	Then,
	(a) Both A and B are wrong (b) A is correct but B is wrong
	(c) B is correct but A is wrong (d) Both A and B are wrong
Q-10	Time period of an earth satellite in circular orbit is independent of –
	(a) Mass of the satellite (b) Radius of the orbit (c) Both of them (d) None of them
Q-11	The magnitude of gravitational potential energy of the moon-earth system is U with zero potential energy at infinite seperation. The kinetic energy of the moon with respect to the earth is K. Then,
	(a) $U < K$ (b) $U > K$ (c) $U = K$
Q-12	In the figure is shown elliptical path of a planet about the sun. The two shaded parts have equal area. If t_1 and t_2 be the time taken by the planet to go through from a to b and from c to d, espectively, then,
	(a) $t_1 < t_2$ (b) $t_1 = t_2$
	(c) $t_1 > t_2$ (d) Information is insufficient deduce retationship
Q-13	A person sitting in a chair in a satellite feels weightless because –
	(a) The earth does not attract the object in a satellite
	(b) The normal force by chair on the person balances the earth's attraction
	(c) The normal force is zero
	(d) The person in satellite is not attracted
Q-14	A body is suspnded from a string balance kept in a satellite. The reading of the balance is W_1 when the satellite goes in an orbit of radius R and is W_2 when it goes in an orbit of radius $2R$. Then,
	(a) $W_1 = W_2$ (b) $W_1 < W_2$ (c) $W_1 > W_2$ (d) $W_1 \neq W_2$
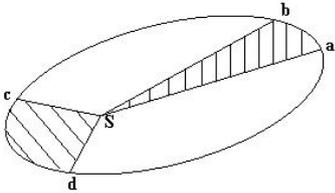
Q-15	The kinetic energy needed to project a body of mass m from earth's surface to infinity is –
	(a) $\dfrac{1}{4}mgR$ (b) $\dfrac{1}{2}mgR$ (c) mgR (d) $2mgR$
Q-16	A particle is kept at rest at a distance R, earth's radius, above the earth's surface. The maximum speed with which it should be projected so that it does not return is
	(a) $\sqrt{\dfrac{GM}{4R}}$ (b) $\sqrt{\dfrac{GM}{2R}}$ (c) $\sqrt{\dfrac{GM}{R}}$ (d) $\sqrt{\dfrac{2GM}{R}}$
Q-17	A satellite is orbitting the earth close to its surface to just escape from the earth. The escape speed from earth is v_e. Its speed with respect to the satellite will be –
	(a) Less than v_e (b) More than v_e (b) Equal to v_e (d) Depend upon direction of projection
Q-18	If V and E be the gravitational potential and field at a point. It is possible to have –
	(a) $V = 0$ and $E = 0$ (b) $V = 0$ and $E \neq 0$ (c) $V \neq 0$ and $E = 0$ (d) $V \neq 0$ and $E \neq 0$
Q-19	Inside a uniform spherical shell –
	(a) The gravitational potential is Zero (b) The gravitational field is Zero (c) The gravitational potential is same everywhere (d) The gravitational field is same everywhere
Q-20	A uniform spherical shell gradually shrinks maintainig its shape. Gravitational potential at the centre –
	(a) Increases (b) Decreases (c) Remains constant (d) Oscillates
Q-21	Consider a planet moving in an elliptical orbit round the sun. The wok done on the planet by the gravitational force on the sun is – (a) Zero in any small part of the orbit (b) Zero in some part of the orbit (c) Zero in one complete revolution (d) Zero in no part of the motion
Q-22	If radius of the earth were to shrink by one percent, its mass remaining same, the acceleration due to gravity on the earth's surface would – (a) Decrease (b) Remain Unchanged (c) Increase (d) be zero
Q-23	Two satellites A and B move round the earth in the same orbit. The mass of B is Twice the mass of A. Then, (a) Speed of A and B are equal (b) The potential energy of earth with A is same as that of earth with B (c) The kinetic energy of A and B are equal (d) The total energy of earth with A is same as that of earth with B

Q-24	Which of the following quantities remain constant in a planetory motion (consider elliptical orbits) as seen from the sun? (a) Speed (b) Angular speed (c) Kinetic energy (d) Angular momentum
Q-25	A rope 1 cm in diameter breaks if the tension in it exceeds 500 N. The maximum tension that may be given to a similar rope of diameter 2 cm is – (a) 500 N (b) 250 N (c) 1000 N (d) 2000 N
Q-26	The breaking stress of a wire depends on – (a) Material of wire (b) Length of wire (c) Radius of wire (d) Shape of cross-section of wire
Q-27	A wire can sustain the weight of 20 kg before breaking. If the wire is cut into two equal parts, each part can sustain a weight of – (a) 10 kg (b) 20 kg (c) 40 kg (d) 80 kg
Q-28	Two wires A and B are made of same material. The wire A has a length l and diameter d, while the wire B has a length $2l$ and diameter $\dfrac{d}{2}$. If the two wires are stretched by the same force, the alongation in A divided by the elongation in B is - (a) $\dfrac{1}{8}$ (b) $\dfrac{1}{4}$ (c) 4 (d) 8
Q-29	A wire elongates by 1.0 mm when load W is hanged from it. If this wire goes over a pulley and two weights W each are hung at its two ends, the elongation of the wire will be – (a) 0.5 mm (b) 1.0 mm (c) 2.0 mm (d) 4.0 mm
Q-30	A heavy uniform rod is hanging vertically from a fixed support. It is stretched by its own weight. The diameter of the rod is – (a) Smallest at the top and gradually increases down the rod (b) Largest at the top anf gradually decreases doewn the rod (c) Unifirm everywhere (d) Maximum in the middle
Q-31	When a metal wire is strethed by a load, the fractioanl change in volume $\dfrac{\Delta V}{V}$ is proportional to – (a) $\dfrac{\Delta l}{l}$ (b) $\left(\dfrac{\Delta l}{l}\right)^2$ (c) $\sqrt{\dfrac{\Delta l}{l}}$ (d) None of these

Q-32	Th length of a metal wire is l_1 when tension in it is T_1, and under tension T_2 its length is l_2. The natural length of the wire is – (a) $\dfrac{l_1 + l_2}{2}$ (b) $\sqrt{l_1 l_2}$ (c) $\dfrac{l_1 T_2 - l_2 T_1}{T_2 - T_1}$ (d) $\dfrac{l_1 T_2 + l_2 T_1}{T_2 + T_1}$
Q-33	A heavy mass is attached to a thin wire and is whirled in a vertical circle. The wire is most likely to break when – (a) The mass is at its higest point (b) The mass is at its lowest point (c) The wire is horizontal (d) The wire is at an angle $\cos^{-1}\left(\dfrac{1}{3}\right)$
Q-34	When a metal wire elongates by hanging a load on it, the gravitational potential energy is decreased. And – (a) This energy completely appears as increased kinetic energy of the block (b) This energy completely appears as increased elastic potential energy of the wire (c) This energy completely appears as heat (d) None of these
Q-35	By a surface of liquid we mean – (a) A geometrical plane like $x = 0$ (b) All molecules exposed to the atmosphere (c) A layer of thickness of the order 10^{-8} m (d) A layer of thickness of the order 10^{-4} m
Q-36	An ice cube is suspended in vacuum in a gravity-free hall. As the ice melts it will – (a) Retain ts cubical shape (b) Change its surface to spherical (c) Fall down on the floor of the hall (d) Fly up
Q-37	When water droplets merge to form a bigger drop – (a) Energy is liberated (b) Energy is absorbed (c) Energy is neither liberated nor absorbed (d) Energy may be iberated or absorbed depending on nature of the liquid
Q-38	The dimension $ML^{-1}T^{-2}$ can correspond to – (a) Moment of Force (b) Surface Tension (c) Modulus of elasticity (d) Coefficient of viscosity
Q-39	Air is pushed into a soap bubble of radius r to double its radius. If the surface tension of soap solution is S, the work done in the process is –

	(a) $8\pi r^2 S$ (b) $12\pi r^2 S$ (c) $16\pi r^2 S$ (d) $24\pi r^2 S$
Q-40	If air is pushed in a soap bubble, the pressure in it – (a) Decreases (b) Increases (c) Remains same (d) becomes zero
Q-41	If two soap bubbles of different radii are connected by a tube, then – (a) Air flows from bigger bubble to the smaller bubble till the sizes become equal (b) Air flows from bigger bubble to the smaller bubble till the sizesare interchaged (c) Air flows from smaller bubble to bigger bubble (d) There is no flow of air
Q-42	A capillary of radius r, as shown in the figure, is dipped into water. If atmoshpheric pressure is P_0 then the pressure at point A is – (a) P_0 (b) $P_0 + \dfrac{2S}{r}$ (c) $P_0 - \dfrac{2S}{r}$ (d) $P_0 - \dfrac{4S}{r}$
Q-43	The excess pressure inside a soap bubble is twice the excess pressure inside a second soap bubble. Then ratio of volume of first bubble to that of second bubble is – (a) 4 (b) 2 (c) 1 (d) 0.125
Q-44	Which of the following curves may represent the relation between the rise of liquid in capillary by height h and radius r of the capillary ? (a) A (b) B (c) C (d) D
Q-45	Water rises in a capillary tube upto a length of 10 cm. If the tube is inclined at 45^0, the length of water risen in the tube will be – (a) 10 cm (b) $10\sqrt{2}$ cm (c) $\dfrac{10}{\sqrt{2}}$ (d) None of these
Q-46	A 20 cm long capillary tube is dipped in water. The water rises up to 8 cm. If the entire arrangement is put in a freely falling elevator, the length of water column in the capillary tube will be – (a) 8 cm (b) 6 cm (c) 10 cm (d) 20 cm
Q-47	Viscosity is a property of – (a) Liquid only (b) Solids only (c) Solid and liquid only (d) Liquid and gases only
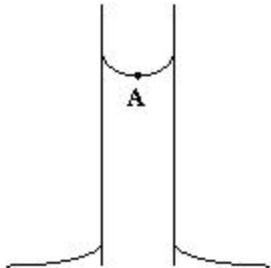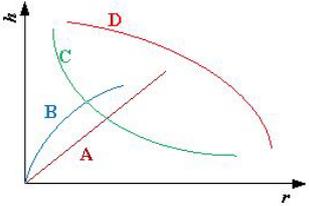
Q-48	The force of viscosity is –
	(a) Electromagnetic (b) Gravitational (c) Nuclear (d) Weak

Q-49	The viscous force F acting between two layers of a liquidhaving an area A is given by $\dfrac{F}{A} = -\eta \dfrac{dv}{dz}$. In this $\dfrac{F}{A}$ is called –
	(a) Pressure (b) Longitudinal stress (c) Tangential stress (d) Volume stress

Q-50	A rain drop falls near the surface of the earth with almost uniform velocity because –
	(a) Its weight is negligible (b) The force of surface tension balances its weight (c) The force of viscosity of air balances its weight (d) The drops are charged and atmoshperic electric field balances its weight

Q-51	A piece of wood is taken deep inside a long column of water and released. It will move up with –
	(a) A constant upward acceleration (b) A decreasing upward acceleration (c) A deceleration (d) A uniform velocity

Q-52	A solid sphere falls with a terminal velocity of 20 $\mathrm{m \cdot s^{-1}}$ in air. If it is allowed to fall in vacuum its terminal velocity will –
	(a) 20 $\mathrm{m \cdot s^{-1}}$ (b) Less than 20 $\mathrm{m \cdot s^{-1}}$ (c) More than 20 $\mathrm{m \cdot s^{-1}}$ (d) No termial velocity

Q-53	A spherical ball is dropped in a long column of a viscous liquid. The speed of the ball as a function of time may be best represented by curve –
	(a) A (b) B (c) C (d) D
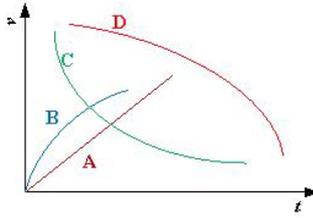
Q-54	A student plots graph from his readings on the dertmination of Young's Modulus of a metal wire but forgets to put the labels in the Figure shown below. The quantities on X and Y-axes may be respectively –
	(a) Weight hung and length increased (b) Stress applied and length increased (c) Stress applied and strain developed (d) .Length increased and weight hung

Q-55	The properties of a surface are different from those of the bulk liquid because the surface molecules – (a) Are smaller than other molecules (b) Acquire charge due to collision from air molecules (c) Find different type of molecule in their range of influence (d) Feel a net force in one direction
Q-56	The rise of a liquid in a capillary tube depends on – (a) Material of capillary (b) Length of the capillary (c) Outer radius of capillary (d) Inner radius of the tube
Q-57	The contact angle between a solid and a liquid is a property of – (a) The material of solid (b) The material of liquid (c) The shape of solid (d) The mass of the solid
Q-58	A liquid is contained in a vertical tube of semicircular cross-section as shown in the figure. The contact angle is zero. The surface tension on the curved part and that flat part are in ratio of – (a) 1:1 (b) 1:2 (c) $\pi : 2$ (d) $2 : \pi$
Q-59	When capillary tube is dipped into a liquid, the liquid neither rises nor falls in the capillary. Then – (a) Surface tension of the liquid must be zero (b) Contact angle must be 90^0 (c) Surface tension may be zero (d) Contact angle may be 90^0
Q-60	A solid sphere moves at a terminal velocity of $20\,\mathrm{m\cdot s^{-1}}$ in air at a place where $g = 9.8\,\mathrm{m\cdot s^{-2}}$. The sphere is taken in a gravity free hall having air at the same atmospheric pressure and pushed down at a speed of $20\,\mathrm{m\cdot s^{-1}}$. Then – (a) Its initial acceleration will be $g = 9.8\,\mathrm{m\cdot s^{-2}}$ downward (b) Its initial acceleration will be $g = 9.8\,\mathrm{m\cdot s^{-2}}$ upward (c) Magnitude of acceleration will decrease with passage of time (d) It will eventually stop
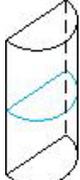
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Science in general and Physics in particular is not a subject to learn, but an area of observation and exploration by correlation, integration and analysis of repetitive nature, and then conclusion.
It is a real thrill, full of fun.
But, it can't be done in dicrete manner, it has to be done patiently, like climbing stair far a faster and purposeful journey.
This is where role of education come in; it is to streamline the process.

Code: Phy/NLM-II/S/001 Code: Phy/MRB-I/O/002

Mechanics of Rigid Bodies : <u>Answers</u> to Objective Questions (Typical)

Q-01	Q-02	Q-03	Q-04	Q-05	Q-06	Q-07	Q-08	Q-09	Q-10
b	c	c	d	a	c	c	d	b	a

Q-11	Q-12	Q-13	Q-14	Q-15	Q-16	Q-17	Q-18	Q-19	Q-20
b	b	c	a	c	c	d	All	b,c, d	b

Q-21	Q-22	Q-23	Q-24	Q-25	Q-26	Q-27	Q-28	Q-29	Q-30
b,c	c	a	d	d	a	b	a	b	a

Q-31	Q-32	Q-33	Q-34	Q-35	Q-36	Q-37	Q-38	Q-39	Q-40
a	c	b	d	c	b	a	c	d	a

Q-41	Q-42	Q-43	Q-44	Q-45	Q-46	Q-47	Q-48	Q-49	Q-50
c	c	d	c	b	d	d	a	c	c

Q-51	Q-52	Q-53	Q-54	Q-55	Q-56	Q-57	Q-58	Q-59	Q-60
b	d	b	All	c, d	a,b,d	a,b	c	c,d	b,c,d

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

– Albert Einstein

—00—

Growing with Concepts: Chemistry

GASEOUS STATE

<div align="right">Kumud Bala</div>

When the molecular force of attraction between the particles of a matter is minimum, the particles exist in a state known as gaseous state or a state of matter in which molecules are far away from each other and free to move in available space is called gaseous state.

Properties of gases: (a) they do not have definite shape and volume. (b) they assume volume and shape of the container. (c) gases have unlimited dispensability and high compressibility. (d) they have very low densities because of negligible intermolecular forces. (e) gases exert pressure on the wall of the container with perfectly elastic collisions. (f) they diffuse rapidly through each other to form homogeneous mixture against the electric, magnetic and gravitational field.

Parameters of gases:- The characteristics of gases are described in terms of four measurable parameters and it is also called as measurable properties of gases which are (a) mass (b) volume (c) pressure and (d) temperature.

(a) Mass (m)- The mass of a gas is denoted by 'm' which is related to the no. of moles 'n' therefore, n (no. of moles)$=\frac{m\,(mass\ in\ grams)}{M\,(molar\ mass)}$ so, m = n x M

(b) Volume (V) – (i) Gases occupy whole space available to them. The volume occupied by a gas is simply the volume of container in which it is filled. (ii) The volume of a gas is denoted by 'V' and it is measured in units of liters or cubic meters (m³) or cm³ or dm³ .   (1 liter= 1dm³ = 1000cm³ = 1000ml).

(c) Pressure (P)- It is the force acting per unit area. A confined gas exerts uniform pressure on the wall of its container in all the directions. The instrument used for the measurement of atmospheric pressure is called a barometer.   A
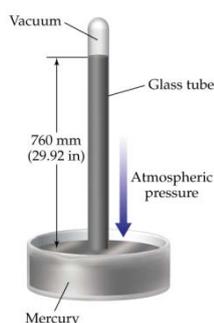
barometer (sometimes called a mercury barometer) is an inverted (upside-down) glass tube standing in a bath of mercury. Air pressure pushes down on the surface of the mercury, making some rise up in the tube. The greater the air pressure, the higher the mercury rises.. The height of the mercury column above the level of mercury in the dish is a measure of the atmospheric pressure at that place. Mercury is generally used as a liquid in barometers because of the following reasons:

(i) The height of the column in a barometer is inversely proportional to the density of the liquid i.e., less dense the liquid higher will be the column. Since mercury is very dense, it is best for barometers because it supports column of convenient height.

(ii) Mercury is not volatile at ordinary temperature and therefore, the pressure exerted by the vapours above the mercury column is very small and can be neglected.

The instrument used for the measurement of the pressure of a gas is called manometer. It simply consists of a U-shaped tube containing mercury, usually one limb of the tube is longer than the other. Two types of manometers are generally used, (i) those in which the longer limb is closed and (ii) those in which the longer limb is open. Closed limb manometer is used only for gases at pressure less than the atmospheric pressure. The open limb manometer is used for all other cases. In case the gas pressure is greater than atmospheric pressure, mercury stands at a higher level in the longer limb. In such a case, the difference in levels is added to the atmospheric pressure to get the pressure of the gas. As pressure is force per unit area, the pressure obtained in terms of the height of the mercury column can be converted into force per unit area as follows:
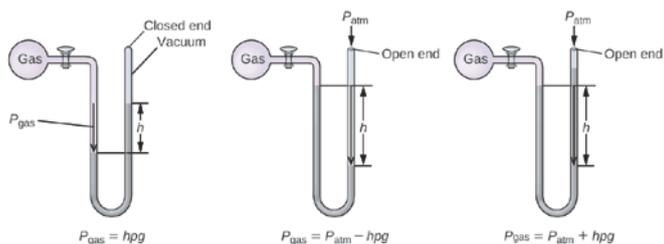
Suppose height of the mercury column = h cm, Area of cross-section of the tube = A cm² ,

∴ Volume of the mercury column = A x h cm³, If density of mercury at room temperature = d (g/cm³)

The mercury column= A x h x d ,

Pressure = force/area = $\frac{mass\ x\ acceleration}{area}$ = $\frac{mg}{area}$ = $\frac{A\ x\ h\ x\ d\ x\ g}{A}$ = hdg

A standard or normal atmospheric pressure is defined as the pressure exerted by a mercury column of 76 cm at 0°C, this is the pressure exerted by the atmosphere at sea level.

1 atm. = 76.0 cm of mercury (cm Hg) = 760 mm of mercury (mm Hg) =760 Torr

SI unit of pressure is Pascal (Pa). It is defined as the pressure exerted when a force of 1 Newton (1N) acts on 1m² area. $1Pa = 1Nm^{-2} = 1Kgm^{-1}s^{-2}$ for gases, this unit is too small.

Generally we express the pressure of the gas in terms of bar : $1bar = 100KPa = 10^5Pa$.

So   1atm. = 1.01325 bar = $1.01325 \times 10^5 Pa$ = 101.325KPa   or   1bar = 0.987atm.

1atm. ≅ $10^2 KPa = 10^5 Pa$ or Nm^{-2} .

Pressure exerted by a gas is due to kinetic energy (K.E= ½ mv²) of the gas molecules. K.E of the gas molecules increases, as the temperature is increased so pressure of a gas is directly proportional to temperature (P∝T).

(d) Temperature:- Temperature is a measure of the extent of hotness or coldness of a body. The temperature of a gas is denoted by T and it is measured in the unit of Kelvin (K).

K = °C +273.15,   °C = 5/9 (°F – 32),

°F = 9/ relate the four 5(°C) + 32 .

GAS LAWS: Laws which relate the four parameters of the gas are called gas laws.

1.   Boyle's Law (pressure- volume relationship)- In 1662, Robert Boyle studied the changes in volume of a gas by varying pressure at a constant temperature of a fixed amount of gas. He used 'J' shaped glass tube and trapped some air in the tip of the tube and measured the pressure exerted by the gas by noting the difference in height of the mercury in two arms of the tube (h). The pressure of the gas was increased by adding more mercury to the tube and volume of the gas became smaller. In this way, Boyle studied the relationship between the pressure and volume of a given mass of a gas at constant temperature. He stated that temperature remaining constant, the volume of a given mass of a gas is inversely proportional to its pressure. Mathematically, Boyle's law may be expressed as: volume is inversely proportional to pressure or V α 1/P for a given mass of a gas at constant temperature where V is the volume and P is pressure, or V= K (1/P)   or   PV = K at constant temperature, K= constant whose value depends upon the mass and temperature of the gas. Thus, Boyle's law may also be stated as fellow: temperature remaining constant, the product of pressure and volume of a given mass of a gas is constant. Thus, if P₁ and V₁ are initial pressure and volume of a gas and keeping the temperature
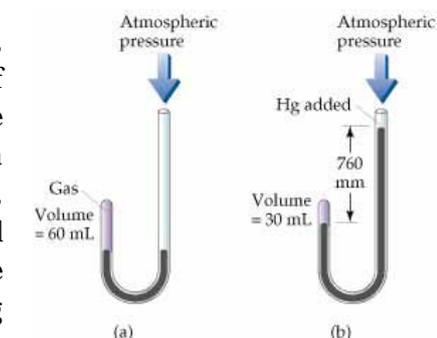
constant, if pressure is changed to P₂, then volume will be changed to V₂ such that $P_1V_1 = P_2V_2$ or $P_1/V_2 = P_2/V_1$.

This means that if the volume of the gas is double, the pressure will be reduced to one-half of its initial value and if volume is tripled, the pressure is lowered to one-third. Similarly, if pressure is made four times the volume is reduced to ¼ and so on.

Graphical representation – the law can be verified by plotting

(i) If the graph is plotted as P vs 1/V, a straight line passing through the origin is obtained.

(b) Graph of P against $\frac{1}{V}$
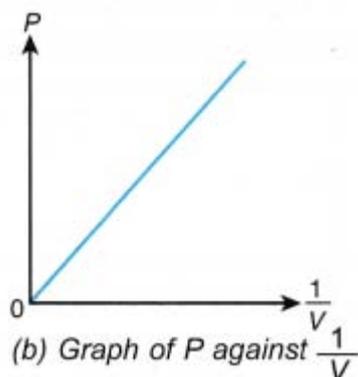
(ii) When the pressure of gas (P) is plotted against volume (V), by keeping 'V' along x-axis and 'P' along y-axis, we get a curve. The curve clearly shows that when volume is increased, pressure decreases and vice versa.
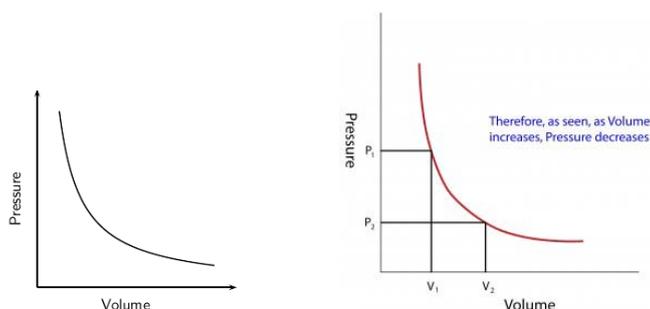
(iii) If the graph is plotted between the product of PV along y-axis and 'P' along x-axis, we get the horizontal line. This indicates that PV remain constant even if we change the pressure.
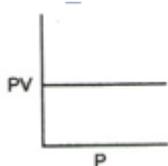
It may be noted that Boyle's law is obeyed only by a hypothetical gas called ideal gas. However, gases like nitrogen, oxygen, carbon
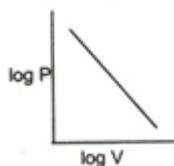
dioxide, ect., obey Boyle's law at low pressures and high temperatures behaving as ideal gases. At high pressure and low temperature, these gases do not obey Boyle's law. We know that density is mass per unit volume so that d= m/V . If we put the value of V in this equation, from Boyle's law equation, we obtain the relation as: d = m$\frac{P}{k}$ or[$\frac{m}{k}$] P = k'P; k' is another constant containg constant mass m and gas constant k.   This shows that at a constant temperature, pressure is directly proportional to the density of a fixed mass of the gas.

Practical significance of Boyle's law:- the Boyle's law proves a very important fact that the gases are compressible. When a given mass of gas is compressed by increasing the pressure, the same number of molecules occupy a smaller space. As a result, the gas becomes denser because mass per unit volume increases. For example, air at sea level is dense, but the density as well as pressure decreases with increase in altitude. At altitude, as the atmospheric pressure is low, the air is less dense. As a result, less oxygen is available for breathing. The person feels uneasiness, headache, slugglish feeling etc. This is called altitude sickness. That is why the mountaineers have to carry oxygen cylinders with them. Similary, interiors of jet aeroplanes which fly at very high altitude (about 10,000m) are artificially maintained at normal pressure to have proper oxygen for breathing. They are also equipped with emergency oxygen supply in case of pressure falls.

Question : while pumping air into a cycle tyre, a boy noticed that volume as well as pressure is increasing. Does Boyle's law fail here?

Answer: *the law is applicable only for a fixed mass of gas. As the boy fills air into the cycle tyre, he is adding more and more air into the tyre. Hence, he is increasing the mass of air inside the tyre and therefore, the law is not applicable.*

Numericals:

1. A gas occupies 200 ml at a pressure of 0.820 bar at 20°C. How much volume will it occupy when it is subjected to external pressure of 1.025 bar at the same temperature?

Solution: $P_1 = 0.820$ bar, $V_1 = 200$ ml, $P_2 = 1.025$ bar, $V_2 = ?$ Since temperature is constant, therefore, by applying Boyle's law, $P_1V_1 = P_2V_2$, $V_2 = \frac{P1V1}{P2} = \frac{0.820\ bar\ \times 200\ ml}{1.025\ bar} = 160$ ml .

2. A vessel of 120 ml capacity contains a certain amount of gas at 35°C and 1.2 bar pressure. The gas is transferred to another vessel of volume 180ml at 35°C. What would be its pressure?

Solution: Since temperature and amount of gas remains constant, threrefore, Boyle's law is applicable.

$P_1V_1 = P_2V_2$ $P_1 = 1.2$ bar , $P_2 = ?$, $V_1 = 120$ ml , $V_2 = 180$ ml ∴ $P_2 = \frac{P1V1}{V2} = \frac{1.2 \times 120}{180} = 0.8$ bar.

3. A gas occupies a volume of 250 ml at 745 mm Hg at 25°C. What additional pressure is required to reduce the gas volume to 200ml at the same temperature?

Solution: $P_1 = 745$ mmHg $P_2 = ?$ $V_1 = 250$ ml, $V_2 = 200$ ml.   Since temperature remains constant, therefore, by applying Boyle's law, $P_1V_1 = P_2V_2$ or $P_2 = \frac{P1V1}{V2} = \frac{745mmHg\ \times 250\ ml}{200\ ml} = 931.25$ mmHg

4. A balloon is filled with hydrogen at room temperature. It will burst if pressure exceeds 0.2 bar. If at 1 bar pressure the gas occupies 2.27L volume, Upto what volume can the balloon be expanded?

Solution: According to Boyle's law, at constant temperature, $P_1V_1 = P_2V_2$ If $P_1 = 1$ bar , $V_1 = 2.27$ L , $P_2 = 0.2$ bar , $V_2 = ?$ $V_2 = \frac{1bar\ \times 2.27\ L}{0.2bar} = 11.35$ L Since balloon bursts at 0.2 bar pressure, the volume of the balloon should be less than 11.35 L.

5. At a constant temperature, a gas occpies a volume of 200ml at a pressure of 0.720 bar. It is subjected to an external pressure of 0.900 bar. What is the resulting volume of the gas?

Solution: Applying Boyle's law, $P_1 = .720$ bar $V_1 = 200$ ml , $P_2 = .900$ bar , $V_2 = ?$ $V_2 = \frac{P1V1}{P2} = \frac{.720\ bar\ \times 200\ ml}{.900bar} = 160$ ml

Assignment

1. At constant temperature, the pressure of V ml of a dry gas was increased from 1atmosphere to 2 atmosphere. The new volume will be:
    (a) 2V   (b) V/2   (c) V²   (d) V/4

2. At high altitude, boiling point of water gets lowered because:
    (a) Temperature is low
    (b) Atmospheric pressure is low
    (c) Atmospheric pressure is high
    (d) None of these.

3. A gas occupies a volume of 250ml at 700 mmof Hg pressure and 25°C. What additional pressure is required to reduce the gas volume to its 4/5ᵗʰ value at the same temperature?
    (a) 225 mmHg   (b) 175 mmHg
     (c) 150 mmHg   (d) 265 mmHg

4. Two glass bulbs 'X' and 'Y' are connected by a very small tube having a stop cock. Bulb X had a volume of 100cm³ and contained the gas, while bulb Y was empty. On opening the stop cock, the pressure fell down by 60%. The volume of bulb 'Y' must be:
    (a) 150cm³   (b) 250 cm³
    (c) 100cm³   (d) 125cm³

5. If 1000ml of a gas A at 600 torr and 500ml of gas B at 800 torr are placed in a 2L flask, the final pressure will be:
    (a) 500 torr   (b) 1000 torr
    (c) 850 torr   (d) 200torr

6. For a given mass of a gas at constant temperature, if the volume V becomes four times, the pressure P will become:

(a) 4P   (b) P/4   (c) 2P   (d) 4P/T

7. At constant temperature, the pressure of Vml of a dry gas was increased from 1 atmosphere to 3 atmosphere. The new volume will be:

(a) 3V   (b) V/3   (c) V^3 (d) $2V^3$

ANSWERS

1. (b)
2. (b)
3. (b) [Hint- $V_1 = 250ml$, $P_1 = 700mmHg$, $V_2 = 250 \times 4/5 = 200ml$, $P_2 = ?$ $P_2 = \frac{250 \times 700}{200} = 875mmHg$, additional pressure required = $875 - 700 = 175mmHg$]
4. (a) [Hint] $P_1 = 1atm$. $P_2 = \frac{100}{1 \times 40} = 0.04atm$. (pressure decreased by 60%) $V_1 = 1000cm^3$, $V_2 = \frac{40}{1 \times 100} = 250cm^3$, volume of bulb $Y = 250 - 100 = 150cm^3$]
5. (a) [Hint- pressure of gasA in 2L flask, $P_1 = \frac{2000}{600 \times 1000} = 300torr$, pressure of gas B $= \frac{2000}{500 \times 800} = 200torr$, total pressure = $300 + 200 = 500$ torr.]
6. (b)
7. (b)

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

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

- Wilma Mankiller

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

- John Adams

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SCIENCE QUIZ October-2018

Kumud Bala

1. CO_2 can be easily liquefied and even solidified because:
    (a) It has weak force of attraction
    (b) It has comparatively more force of attraction than other gases
    (c) It has more intermolecular space
    (d) It is present in atmosphere.

2. Which of the following has highest kinetic energy:

    (a) Particles of ice at 0°C
    (b) Particles of water at 100°C
    (c) Particles of water at 0°C
    (d) Particles of steam at 100°C

3. Which one of the following sets of phenomena would increase on raising the temperature?
    (a) Diffusion, evaporation, compression of gases
    (b) Evaporation, compression of gases, solubility,
    (c) Evaporation, diffusion, expansion of gases
    (d) Evaporation, solubility, diffusion , compression of gases

4. The property to flow is unique to fluids, which one of the following statements is correct?
    (a) Only liquids are fluids
    (b) Only gases behave like fluids
    (c) Gases and solids behave like fluids
    (d) Gases and liquids behave like fluids.

5. A few substances are arranged in the increasing order of 'force of attraction' between their particles. Which one of the following represents a correct arrangement?
    (a) water, air, wind
    (b) air, sugar, oil
    (c) salt, juice, oil
    (d) oxygen, water, sugar

6. A diver is able to cut through water in a swimming pool. Which property of matter does this observation show?
    (a) Particles of matter are very small in size
    (b) Particles of matter are continuously moving
    (c) Particles of matter have spaces between them
    (d) Particles of matter have property of diffusion.

7. The chemical used as a fixer in photography is:
    (a) Sodium sulphate
    (b) Borax
    (c) Sodium thiosulphate
    (d) Ammonium sulphate

8. Nail polish remover contains :
    (a) Acetone   (b) Benzene
    (c) Acetic acid   (d) Petroleum ether

9. What is the mixture of potassium nitrate powder, charcoal and sulphur called?
    (a) Paint   (b) Glass
    (c) Gun powder   (d) Cement

10. Which chemical is used to produce artificial rain?
    (a) Sand   (b) Copper oxide
    (c) Silver iodide   (d) Silver nitrate.

11. The organ in the body which accumulates iodine is:
    (a) Spleen   (b) Pituitary gland
    (c) Thyroid gland   (d) None of these

12. Dual nature of matter was discovered by:
    (a) Einstein   (b) Bragg
    (c) Louis de Broglie   (d) Plank

13. Which of the following gases is not known as green house effect?
    (a) Methane
    (b) Carbon dioxide
    (c) Chlorofluorocarbons
    (d) Nitrous oxide

14. At what temperature are the readings of a centigrade and Fahrenheit thermometer the same?

(a) 40   (b) –40   (c) 100   (d) 0

15. Which type of glass is used in making lenses and prisms?

(a) Flint glass   (b) Pyrex glass

(c) Soft glass   (d) Jena glass

16. Which of the following formulae represent nitrate radical?

(a) NO_2^{-2} (b) NO_2^{-1} (c) NO_3^{-1} (d) N_3

17. Chemical formula of a compound is A_3B_2. The valency of A is:

(a) 5   (b) 4   (c) 2   (d) 3

18. Which of the following is a negatively charged monoatomic, monovalent ion/ radical?

(a) iodide   (b) hydrogen

(c) sulphate   (d) oxide

19. Which of the following radicals is monovalent?

(a) sulphide   (b) bicarbonate

(c) phosphate   (d) sulphate

20. The given equation, $Na + H_2SO_4 \rightarrow Na_2SO_4 + H_2$ is unbalanced. Which one of the following is a correct co-efficient of Na on its balanced equation?

(a) 1   (b) 3   (c) 4   (d) 2

21. In fireworks, the green flame is produced because of:

(a) PStassium   (b) Sodium

(c) Mercury   (d) Barium

22. What is the unit for measuring the pitch or frequency of sound?

(a) Decibel   (b) Hhertz

(c) Coulomb   (d) Ohm

23. How is the formation of a precipitate indicated in a chemical equation?

(a) By a downward arrow

(b) By an upward arrow

(c) By the letter 'g'

(d) By the letter 'p'

(Answers to this Science Quiz Oct'18 shall be provided in

1ˢᵗ Supplement to 9ᵗʰ Quarterly e-Bulletin dt. 1ˢᵗ Nov'18)

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

(Albert Einstein)

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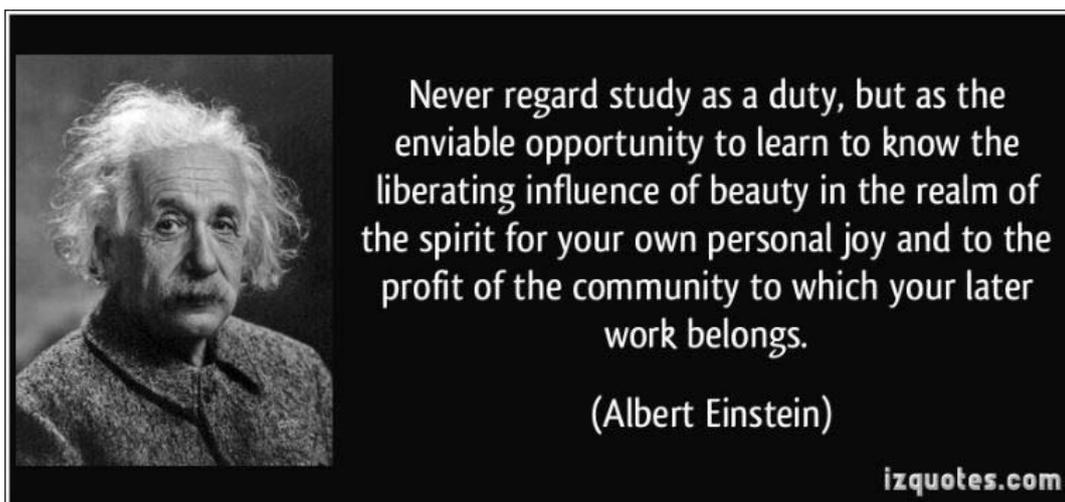
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Mechanics of Rigid Bodies : <u>Illustration</u> of Objective Questions (Typical)

I-1	When moon is revolving around earth two forces are acting on it. One is centripetal force due to gravity $F_{CP} = -\dfrac{GMm}{R_{m,e}^{2}} = ma\Big|_{a=\frac{GM}{R_{m,e}^{2}}}$. Here, M and m are mass of earth and moon, respectively and $R_{m,e}$ is distance between centre of earth and moon. Thus $a = 0.0027\,\text{m.s}^{-2}$. The other is centrifugal force $F_{CF} = mr\omega^{2} = m\dfrac{v^{2}}{R_{m,e}}$. During moion of moon an equilibrium exists ie. $F_{CP} + F_{CP} = 0$. If moon is stopped, $v = 0 \to F_{CF} = 0$. This disturbs the equlibrium and only force that acts on the moon is $F_{CP} = -ma$. Therefore, magnitude of initial acceleleration, **when moon is released will remain same as** $a = 0.0027\,\text{m.s}^{-2}$ **towards the earth,** since at that instant $R_{m,e}$ is same and thereafter it starts decreasing. Hence, ***answer is option (b).*** *N.B.: In this question value of g and the radius of the moon w.r.t. earth is not required to be used. It is only to confuse.*
I-2	Gravitational force between moon and earth when earth is just befire it strikes earth $F = \left(\dfrac{GM}{R^{2}}\right)m = am$. Here, $R = R_{e} + 0.25 \times R_{e} = 1.25 \times \left(6.37 \times 10^{6}\right)\text{m}$. And, $g = \dfrac{GM}{R_{e}^{2}}$, Accordingly, $\dfrac{a}{g} = \dfrac{\frac{GM}{R^{2}}}{\frac{GM}{R_{e}^{2}}} \to a = g\left(\dfrac{R_{e}}{R}\right)^{2}$. Therefore, $a = 10\left(\dfrac{1}{1.25}\right)^{2} = 6.4\,\text{m}\cdot\text{s}^{-2}$. Hence, ***answer is option (c)***
I-3	Acceleration due to gravity at surface of earth and Mars is specified, and mass of a passenger is $60\,\text{kg}$. Therefore, wight experienced by a person at any point shall be resultant acceleration, as shown in the figure shall be $\vec{a} = \vec{a}_{m} + \vec{a}_{e} = a_{m}\hat{r} - a_{e}\hat{r}$. $\vec{a}_{e} = -\dfrac{GM_{e}}{x^{2}}\hat{r}$ and $\vec{a}_{m} = \dfrac{GM_{m}}{(d-x)^{2}}\hat{r}$ and $a = |\vec{a}| = G\left|\dfrac{M_{m}}{(d-x)^{2}} - \dfrac{M_{e}}{x^{2}}\right|_{r_{e} \le x \le r_{m}}$. Thus $a \ge 0$, and $a = 0$ at $\dfrac{M_{m}}{(d-x)^{2}} - \dfrac{M_{e}}{x^{2}} = 0 \to \dfrac{M_{m}}{(d-x)^{2}} = \dfrac{M_{e}}{x^{2}}$ and so would be weight of the man $W = 60 \times a$. Thus it is only curve C which satisfies at start of journey – **a)** on earth's surface $W = 60 \times 10 = 600\,\text{N}$; **b)** As it moves with time towards the moon it per decreases as $a = G\left|\dfrac{M_{m}}{(d-x)^{2}} - \dfrac{M_{e}}{x^{2}}\right|_{r_{e} \le x \le r_{m}}$. Net acceleration a and so also weight $= 60 \times a$ becomes Zero at x which satisfies quadratic equation $(M_{e} - M_{m})x^{2} - 2dM_{e}x + M_{e}d^{2} = 0$; **c)** beyond this point again absolute value $a > 0$ till it reaches surface of the moon when $a_{m} = 4\,\text{m}\cdot\text{s}^{-2}$ and thus weight becomes $= 60 \times 4 = 240$ N. It is seen from the given ***curves C is only satisfying the three conclusion***, above. Hence, ***answer is option (c)***

I-4	Let a planet has mass $M_p = 2M_e$, where M_p and M_e are mass of planet and earth, respecively. Average density of both the planet amd earth be ρ. It leads to $$\frac{M_p}{M_e} = 2 = \frac{V_p \rho}{V_e \rho} = \frac{V_p}{V_e} = \frac{\frac{4}{3}\pi R_p{}^3}{\frac{4}{3}\pi R_e{}^3} = \left(\frac{R_p}{R_e}\right)^3 \rightarrow R_p = \sqrt[3]{2}\,R_e.$$ Weight of an object on earth $W = \frac{GM_e m}{R_e{}^2}$ and its weight on the planet would be $W_p = \frac{GM_p m}{R_p{}^2}$, it leads to $$\frac{W_p}{W} = \frac{\frac{M_p}{R_p{}^2}}{\frac{M_e}{R_e{}^2}} = \left(\frac{M_p}{M_e}\right)\left(\frac{R_e}{R_p}\right)^2 \rightarrow 2\left(\frac{1}{\sqrt[3]{2}}\right)^2 = 2 \times 2^{-\frac{2}{3}} = 2^{\frac{1}{3}}.$$ Thus $W_p = \sqrt[3]{2}$, hence ***answer is option (d)***
I-5	Work done for radial displacement against gravity is $dW = \frac{GMm}{r^2}dr$, therefore total work done in the instant case is $$W = \int_R^{2R} dW = \int_R^{2R} \frac{GMm}{r^2} dr = GMm \int_R^{2R} \frac{1}{r^2} dr = GMm\left[-\frac{1}{r}\right]_R^{2R} = -GMm\left[\frac{1}{2R} - \frac{1}{R}\right] = \frac{1}{2}\left(\frac{GM}{R}\right)m = \frac{1}{2}\left(\frac{GM}{R^2}\right)mR.$$ It leads to $W = \frac{1}{2}mgR$, since $g = \frac{GM}{R^2}$. Thus, ***answer is option (a)***
I-6	Initial energy of the mass of 1 kg at infinity is brought to a point A at a distance a. Then as per principle of conservation of energy $E_A = E_\infty + W$. Here, is energy at point A is energy at infinity and $W = -3\,\text{J}$ work is done by the person. Also, $E_\infty = U_\infty + KE = 0 + 0\big|_{KE=0,u=0} = 0$. But, at point $E_A = U_A + \frac{1}{2}\times 1 \times 2^2 = U_A + 2$. Thus equating $E_A = 0 + (-3) = U_A + 2 \rightarrow U_A = -5 \rightarrow V_A = \frac{U_A}{m} = \frac{-5}{1} - 5\,\text{J/kg}$. Hence, ***answer is option (c).*** **Explaination**: Change in gravitational potential energy in moving an object from it's initial displacement r_1 and is final displacement is r_2 is negative of work done by conservative forces. It is mathematically expressed as $$\Delta U = U_2 - U_1 = \int_{r_1}^{r_2} dU = -\int_{r_1}^{r_2} dW = \int_{r_1}^{r_2} \frac{Gm_1 m_2}{r^2} dr = Gm_1 m_2\left[-\frac{1}{r}\right]_{r_1}^{r_2} = Gm_1 m_2\left[\frac{1}{r_2} - \frac{1}{r_1}\right].$$ Change in potential has to have a reference. Infinity is the best reference at which relative position of other objects become insignificant. Therefore, taking $r_2 \rightarrow \infty$ potential energy of an object of mass m_2 at r_1 from mass m_1 is $$U_{r_1} = Gm_1 m_2\left[\frac{1}{\infty} - \frac{1}{r_1}\right] = -\frac{Gm_1 m_2}{r_1}.$$ Accordingly, potential, i.e. potential energy per unit mass is $V_{r_1} = -\frac{Gm_1}{r_1}$. It is to be noted that for a mass m gravitational potential energy and gravitational potential at infinity due to any mass is $U_\infty = -\frac{GMm}{\infty} = 0$, and $V_\infty = -\frac{GM}{\infty} = 0$; while on the surface of the earth $U_e = -\frac{GMm}{R_e}$, and $V_e = -\frac{GM}{R_e}$, here M and R_e arhe mass and radius of earth. But, in work energy computation, potential energy on surface of earth is considered to be Zero, and as object is

raised above the surface $\Delta U = -\int\limits_{R}^{R+h} dW = \int\limits_{r_1}^{r_2} \frac{Gm_1 m_2}{(R+h)^2} dh$, it can be seen in Three regions – **a)** $h << R$, **b)**

$h >> R$ and **c)** $h > R$

In **region (a):** i.e. near earth's surface, $\Delta U == \int\limits_{R}^{R+h} \frac{GMm}{R^2(1+\delta)^2} dh \Big|_{\delta=\frac{h}{R}\to 0} = \left(\frac{GM}{R^2}\right) m \int\limits_{R}^{R=h} dh = mg[h]_R^{R+h} = mgh$.

In **region (b):** i.e. far away from earth $h >> R$, potential energy acquired by the object is enough to liberate

from gravitational force of the earth is $\Delta U = \int\limits_{1}^{\infty} \frac{GMm}{R^2(1+\delta)^2}(Rd\delta)\Big|_{\delta=\frac{h}{R}\to\infty} = \left(\frac{GM}{R}\right) m \int\limits_{1}^{\infty} \frac{1}{(1+\delta)^2} d\delta$. It leads to

change in potential energy $\Delta U = \left(\frac{GM}{R}\right) m \left[-\frac{1}{1+\delta}\right]_0^{\infty} = \frac{GMm}{R}$.

In **region (c):** i.e. $\frac{h}{r}$ is significat and it is in-between the Two regions (a) and (b)

$\Delta U = \int\limits_{0}^{\frac{h}{R}} \frac{GMm}{R^2(1+\delta)^2}(Rd\delta)\Big|_{\delta=\frac{h}{R}} =$

$\left(\frac{GM}{R}\right) m \int\limits_{0}^{\frac{h}{R}} \frac{1}{(1+\delta)^2} d\delta = -\left(\frac{GM}{R}\right) m \left[\frac{1}{1+\delta}\right]_0^{\frac{h}{R}} = -\left(\frac{GM}{R}\right) m \left[\frac{1}{1+\frac{h}{R}} - 1\right] = \left(\frac{GM}{R}\right) m \left[1 - \frac{R}{R+h}\right] = GMm\left(\frac{1}{R} - \frac{1}{R+}\right)$

This mathematical formulation is similar to differene in potential energy taking a two point mass systems where
$r_1 = R$ and $r_2 = R+h$.
The only difference between in energy and gravitational potential is that –

a) Two Point mass system, potential energy at $r_2 \to \infty$ is $U_\infty \to 0$ and potential energy at any other point

at a distance r is $-\frac{GMm}{r}$ and potential is $-\frac{GM}{r}$. This –ve sign is attributed to the fact that object is

moved in the direction of gravitational force of the system of masses; a force conservative in nature.

Applying, this to earth-mass system potential energy at earth's surface shall be $-\frac{GMm}{R}$ ..

b) In earth-mass system since potential energy at earth's surface is considred to be zero. Since external

work is reqired to be done to move any object above earth's surface $U = GMm\left(\frac{1}{R} - \frac{1}{R+h}\right)$ hence

potential energy at any point above earth's surface is $U = GMm\left(\frac{1}{R} - \frac{1}{R+h}\right)$, and at infinity

$U = \frac{GMm}{R}$

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<td>c) (+) ve and (-) sign is attributed to direction of displacement w.r.t. forces acting on the object but difference in magnitude of potential between inifinity and earth's surface is same and it is $\dfrac{GMm}{R}$.</td>
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<td>I-7</td>
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Potential at any point at a distance from the given sphere is $V = -\dfrac{GM}{r}$ and field at the point $E = \dfrac{GM}{r^2}$. Inside the hollow sphere gravitational potential is constant and same at that the surface, whereas gravitational field is zero, and is shown in the figure. Testing both the propositions (A) and (B) –

  A. The $V - r$ curve at (A) is continuous in the range $[R, \infty]$. And inside hollow portion, gravitational field is Zero, and hence no work will have to be done to move a mass from one point to the other in the space. In turn the howwlw space is equi-potential, and it stays at the same value as it is on the surface i.e. $V = -\dfrac{GM}{a}$ l. Hence, statement (A) is incorrect.

  B. But, $E - r$ curve at (B) (A) at (A) would cease o t existHence both the propositions A & B for dicontinuous. Hence, statement (B) is correct.

Thus, with the above analysis ***answer is option (c)***

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<td>I-8</td>
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Potential at any point at a distance from the given sphere is $V = -\dfrac{GM}{r}$ and field at the point $E = \dfrac{GM}{r^2}$. Accordingly, while $V = f(r)$ **and** $E = f(r^2)$ **V and E are continuous outside sphere as shown in the figure; inside sphere**.

For verifying continuity, the fubctions shall have to be analyzed inside uniform solid sphere is $\rho = \dfrac{M}{\dfrac{4}{3}\pi a^3}$. Therefore, effective mass for computation of V and E is mass of the reduced sphere inside the point $m = \rho\left(\dfrac{4}{3}\pi r^3\right)$. Accordingly,

$V = \dfrac{Gm}{r} = \dfrac{G\left(\dfrac{M}{\dfrac{4}{3}\pi a^3}\right)\left(\dfrac{4}{3}\pi r^3\right)}{r} = \dfrac{GM}{a^3}r^2$. And $E = \dfrac{Gm}{r^2} = \dfrac{GM}{a^2}r$. Thus both $V = f(r^2)$ **and** $E = f(r)$ **are continuous inside the sphere.**

Hence, both the statements A & B for dicontinuous V and E are wrong. Hence **answer is option (d)**

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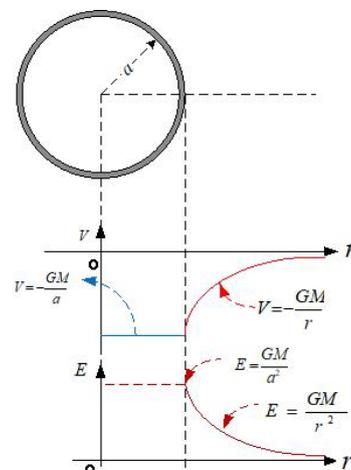
| I-9 | We know that $g = \dfrac{GM}{r^2}$ and rotation of earth about its axis through poles causes centrifugal force which is highest at the equatot and minimum at the polar region. This results in adjustment of the mass of the earth such that there is bulging at the equator and and distance of poles from centre of the earth reduces. Applying the formula of g, which consnsiders mass of the sphere of earth passingthrough the point with its centre at Centre of the earth. To test both the propositions A and B -
    A. Thus, for activing value of g same as that equator, the point shall have to be outside earth. **Thus (A) is correct.**
    B. The value of acceleration due to gravity at pole at other any point would require to penetrate inside earth to reach a distance equal to that of the pole. Hence, **(B) is wrong**
 The above conclusions match with only option (b) and
 Hence, *answer is option (b)* |

| I-10 | We know that a satellite in circular orbit centripetal force $F_{CF} = G\dfrac{Mm}{R^2}$ is in equilibrium with $F_{CF} = mR\omega^2 = mR(2\pi N)^2 = 4m\pi^2 R \dfrac{1}{T^2}$. Here, is M mass of earth, m is mass of satellite, R is radius f otbit i.e. distance between COM of earth and satellite, ω is angular velocity, N is number of revolutions per second, and T is the time period in secs. Thus in equilibrium $G\dfrac{Mm}{R^2} = 4m\pi^2 R \dfrac{1}{T^2} \rightarrow T = \sqrt{\dfrac{4\pi^2 R^3}{GM}}$. It is seen that in this exression of time period is dependent on R, but independent of mass os satellite m, since this term does not occur in the expression. Hence, *answer is option (a)* |

| I-11 | Here, is M mass of earth, m is mass of moon, R is radius of the otbit of moon. Then Potential energy of earth-moon system $U = G\dfrac{Mm}{R}$. Since, moon continues to revove in its orbit, Centripetal and centrifugal forces are in equilibrium. Thus $G\dfrac{Mm}{R^2} = m\dfrac{V_m^2}{R}$. Accordingly kinetic energy of the moon w.r.t. earth $K = \dfrac{1}{2}mV_2^2 = \dfrac{1}{2}G\dfrac{Mm}{R}$ **Thus,** $U > K$, and hence *answer is option (b)* |

| I-12 | As per Kepler's Second law radial of a planet sweeps equal area in equal time. Since, t_1 is time taken to sweep area of sector Scd and t_2 is time taken to sweep area of sector Sab. Given that areas Scd is equal to Sab, theefore $t_1 = t_2$ hence **answer is (b).** |

| I-13 | The weightless of satellite is due to radial equilibrium, else the person would tend to drift in direction of resultant radial force, and chair would exet a normal reaction.. This is precisely due to equlibrium between centripetal and centrifugal forces. Thus, *answer is option (c).* |

| I-14 | A body suspended in a satellite from spring balance is in equilibrium of radial forces, i.e. centripetal and centrifugal forces. Nevertheless, bodies inside satellite shall exert gravational force causing a reading is W_1 when the satellite goes in an orbit of radius R These conditions would prevail when the satellite is in the orbit of radius $2R$ and hence spring balance would measure W. Thus, *answer is option (a)* |

I-15	Gravitational potential energy of the earth particle system is $U = -\dfrac{GMm}{R} = -\dfrac{GM}{R^2}mR = -gmR$, since $g = \dfrac{GM}{R^2}$. When object is projected, at infinti $E_\infty = U_\infty + K_\infty = 0$. As per principle of conservation of energy, when particle is projected from eart's surface $E_S = U + K = E_\infty = 0$. Therefore, $K = -U = -(-gmR) = gmR$. Hence, ***answer is option (c).***
I-16	Potential Energy of a partilce a a distance R from earth's surface is at a distance $2R$ from the erath's surface and hene, $U_R = -\dfrac{GMm}{2R}$ since. While at earths surface it is $U_S = -\dfrac{GMm}{R}$. Th erefore, to ensure that object does not return kinetic energy to be imparted is such that $K + U_R = 0 \rightarrow \dfrac{1}{2}mV^2 = \dfrac{GMm}{2R} \rightarrow V = \sqrt{\dfrac{GM}{R}}$. Hence, ***answer is option (c).***
I-17	The escape velocity is in radial direction, i.e. in the direction opposite to gravitational field or vertical at the point of projection. Since satellite is orbiting and hence, velocity of its projection may not be in radial direction. Let the velocity be $\vec{V} = V\angle\theta$ where θ is the angle with the radial at the point of projection, and hence minimum velocity of projection must be $v_e = V\cos\theta$. Therefore, $V = \dfrac{v_e}{\cos\theta} = v_e\sec\theta$. Since, v_e is known V dependes upon angle θ. Hence, ***answer is option (d).***
I-18	Mathematically $V = -\dfrac{GM}{r}$ and $E = \dfrac{GMm}{r^2}$. With this let us examine each option, – (a) At $r = \infty$ nfinity, $V = 0$ and $E = 0$, hence, **option (a) is correct**. (b) $V = 0$ and is independent of mass of the object. But, mass of the object $m \rightarrow \infty$, like any other sallestial body viz Sun, and $E \neq 0$. Hence, this **option (b) is also correct** (c) At any other point such that $0 < r < \infty$, $V \neq 0$, but if mass of the object is very small, such that $m \rightarrow 0$, then $E = 0$ **option (c) is also corrct.** (d) For any position when both r and m are significant, $V \neq 0$ and $E \neq 0$ Hence, ***all options are correct.*** *N.B.: This s a multiple choice question and it does nor specify values of r and m and hence all possible values shall have to considered while arriving at answer. Therefore, examining data in question is extremely important*.
I-19	Potential at any point at a distance from the given sphere is $V = -\dfrac{GM}{r}$ and field at the point $E = \dfrac{GM}{r^2}$. Inside the hollow sphere gravitational potential is constant and same at that the surface, whereas gravitational field is zero, and is shown in the figure. Thus each option is beig analyzed – (a) Gravitational inside shell is same as that at its outer surface $V = \dfrac{GM}{a} \neq 0$. Hence, **option (a) is not correct**. (b) The spherical shell for gravitational field behaves like Farrady Cage, and net field at any point inside sphere is Zero. Hence, **option (b) is correct**. (c) From (a) above gravitational potential inside hollow sphere is unifrm. Hence, **option (c) is correct**. (d) From (b) above, gravitational field is unformly Zero and hence option (d) is correct.
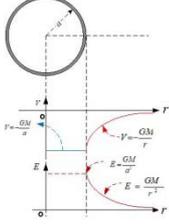
	Thus, with the above analysis *answer is (b), (c) and (d)*
I-20	Gravitational potential at any point $V = -\dfrac{GM}{r}$, centre of sphere represents zone where $r \to 0$. Now, as sphere shrinks volume of the sphere $V = \dfrac{4}{3}\pi a^3 \Big|_{a \to 0}$ Since mass of the sphere is fixed, density $\rho = \dfrac{M}{\frac{4}{3}\pi a^3} = \dfrac{3M}{4\pi} \cdot \dfrac{1}{a^3}$. Hence, $V \propto \dfrac{\rho\left(\frac{4}{3}\pi r^2\right)}{r} = \dfrac{\left(\frac{3M}{4\pi} \cdot \frac{1}{a^3}\right)\left(\frac{4}{3}\pi r^2\right)}{r} = \dfrac{r^2}{a^3}$ .and it increases in mahnitude, during shrinking, in inverse-cubic propotion. Since, expression of V has (-)ve sign and sign its real value decreases. Hence, gravitational potential decreases, thus *answer is option (b).*
I-21	Gravitational force is consrervative in nature and during displacement $dW = \left(\dfrac{GMm}{r^2}\hat{r}\right)\cdot\left(dx\hat{v}\right)$. This concept is used to analyze each option- **(a)** Only at vertices, point of orbit on major & minor axes, velocity of planet is perpendicular to graviational force and hence over equal portion of the oribit on either side of vertices $dW = 0$, but not in any small part. Hence, **option (a) is incorrect**. **(b)** From analysis at (a) above it is Zero in that part of the orbit which equally palced around verices $dW = 0$ and **hence option (b) is correct**. **(c)** In compete one revolution since displacement is Zero and hence $dW = 0$, **hence option (c) is correct** **(d)** From analysis at (b) above, this option (d) is incorrect Hence, *answer is option (b) and (c).*
I-22	As per law of gravitation force on an object of mass m on surface of the earth of mass M radius R is $F = \dfrac{GMm}{R^2}$, it leads to $g = \dfrac{GM}{R^2}$ but when radius of earth reduces to 0.99R, then $F' = \dfrac{GMm}{(0.99R)^2} \to g' = \dfrac{GM}{(0.99R)^2}$. Thus, $\dfrac{g}{g'} = \dfrac{\frac{GM}{R^2}}{\frac{GM}{(0.99R)^2}} \to \dfrac{g}{g'} = \dfrac{(0.99R)^2}{R^2} = (0.99)^2 < 1$. thus $g < g'$. Hence, *answer is option (c).*
I-23	For orbital motion centepetal force $F_{CP} = \dfrac{GMm}{r^2}$ and centrifugal force $F_{CF} = \dfrac{mV^2}{r}$ are in equilibrium . Therefore, for orbital motion $F_{CP} = F_{CF} \to \dfrac{GMm}{r^2} = \dfrac{mV^2}{r} \to \dfrac{GM}{r} = V^2$. Now each of the option is being analyzd here under – **(a)** Since, in orbital motion $\dfrac{GM}{r} = V^2$,. In this exprssion velocity oof satellite is independent of mass of sattelites. Hence, both satellites shall have same velocity $V = \sqrt{\dfrac{GM}{r}}$. Hence, **option (a) is correct**.

(b) Potential energy of earth w.r.t to satellite A of mass m is $V_{e,A} = -\dfrac{GMm}{R_{e,A}}$ and that w.r.t. satellite B of

mass $2m$ is $V_{e,B} = -\dfrac{GM(2m)}{R_{e,B}}$. In these expresseion denominator are equal i.e. $R_{e,A} = R_{e,B}$ but potential

energies would differene since masses of satellites are not equal. Hence, **option (b) is incorrect**.

(c) Kinetic energy $K = \dfrac{1}{2}mV^2$. Despite same velocity of both the satellites, their kinetic energies would be

different, because of their different masses; $K_A = \dfrac{1}{2}mV^2$ and $K_B = \dfrac{1}{2}(2m)V^2 = mV^2$. Hence, **option**

(c) is incorrect.

(d) Total energy of earth-planet system is $E_{e,A} = -\dfrac{GMm}{R_{e,A}} + \dfrac{1}{2}mV^2 = \dfrac{m}{2R_{e,A}}\left(R_{e,A} \cdot V^2 - 2GM\right)$ and

$E_{e,B} = -\dfrac{2GMm}{R_{e,A}} + mV^2 = \dfrac{m}{R_{e,A}}\left(R_{e,A} \cdot V^2 - 2GM\right)$, Thus, $E_{e,A} = \dfrac{1}{2}E_{e,B} \rightarrow E_{e,A} \neq E_{e,B}$.

Hence, *option (d) is incorrect*.

Hence, *answer is option (a)*

I-24	In planetary motion, since no external force acts on the planet during ellitical motion. Further, as per Kepler's Law each of the option is being analyzed – (a) Speed cannot remain constant when angular distance changes, **hence option (a) is incorrect** (b) Angular speed can not remain constant when radial distance changes, **hence option (b) is incorrect** (c) Kinetic energy cannot remain constant when speed of planet changes, **hence option (c) is incorrect** (d) Angular momentum shall remain constant in absenc of external force. Hence, **option (d) is correct**. *Answer is option (d).*
I-25	Tensile strength of rope of diameter 1 cm is 500 N and hence breaking stress at yield point is $\rho = \dfrac{\text{Force }(F)}{\text{Area }(A)} = \dfrac{500}{\pi \times 1^2} = \dfrac{500}{\pi}\,\text{N}\cdot\text{m}^{-2}$. Further, breaking stress is the property of material and hence breaking stress of rope of any diameter $F_r = \rho \times \left(\pi r^2\right)$. Thus, $F_1 = \rho \times \left(\pi 1^2\right) = 500\,\text{N}$ and $F_2 = \rho \times \left(\pi \times 2^2\right) = 4 \times F_1\,\text{N}$. Thus, $F_2 = 500 \times 4 = 2000\,\text{N}$. Hence, *answer is option (d).*
I-26	Breaking stress $\rho = \dfrac{\text{Force }(F)}{\text{Area }(A)}$ is charaterstic to material , and would increase linearly with area while it is independent of length of wire and shape of its cross-section. Hence, *answer is otion (a)*
I-27	Since breaking capacity (F) of a wire is based on $F = \rho \times A$, where ρ is breaking stress of wire and A is area of cross section of wire. When wire is cut into two equal parts, area of cross lection does not change and breaking capacity of each part shall remain same at 20kg. Hence, *answer is option (b)*
I-28	As per Hook's Law modulus of elasticity $Y = \dfrac{\text{Stress}}{\text{Strain}} = \dfrac{\frac{F}{A}}{\frac{\Delta l}{l}}$, thus $\Delta l = \left(\dfrac{F}{A}\right)\left(\dfrac{l}{Y}\right) = \dfrac{F}{Y}\left(\dfrac{l}{A}\right)$. Accordingly ratio

	of elongation in wire $\dfrac{\Delta l_A}{\Delta l_B} = \dfrac{\dfrac{l_A}{A_A}}{\dfrac{l_B}{A_B}} = \left(\dfrac{l_A}{A_A}\right)\left(\dfrac{A_B}{l_B}\right) = \left(\dfrac{l_A}{l_B}\right)\left(\dfrac{\pi r_B{}^2}{\pi r_A{}^2}\right) = \left(\dfrac{l_A}{l_B}\right)\left(\dfrac{r_B}{r_A}\right)^2 = \left(\dfrac{1}{2}\right)\left(\dfrac{\dfrac{1}{2}}{1}\right)^2 = \dfrac{1}{8}$. Hence, *answer is option (a).*
I-29	When a wire is hans a load W, it experiences force of W at load end and hanging end. The same wire when passes over a pulley with weight W at its both ends. Topologically, in both the conditions weight W causes alingation in wire. Hence, elongation Δl in both the cases shall remain same $= 0.1$ mm. Hence, *answer is option (b)*
I-30	Let mass of rod per unit length be ρ. A small element of length Δx is under consideration. In a state of free hanging, force exerted on this element is $F_x = \rho x g$. As per Hook's Law elongation in the element would be $\dfrac{\delta x}{\Delta x} = \left(\dfrac{F_x}{YA}\right) \rightarrow$. Since, volume of the element is $\Delta V = A\Delta x = \delta A \Delta x + A\delta x = 0 \rightarrow \delta A = -A\dfrac{\delta x}{\Delta x} = -A\dfrac{F_x}{YA} \rightarrow \delta A = = -\dfrac{F_x}{Y}$. Since, $F_x = \rho l\big|_{x=l}$ i.e. maximum at top, and (-)ve sign signifies reduction, and reduction in area would be maximum at the top and so would be diameter. The reduction would decrease as one takes the element down and Zero on bottom of the rod, it synonymous to approaching to Zero on number line from left. Thus diameter of rod would increase towards bottom of the rod. Hence, *answer is option (a).*
I-31	Volume of a rod is $V = Al$. Considereing area of wire A to be constant, when wire is stretched $V + \Delta V = A(l + \Delta l) \rightarrow \dfrac{V + \Delta V}{V} = \dfrac{A(l + \Delta l)}{Al} \rightarrow 1 + \dfrac{\Delta V}{V} = 1 + \dfrac{\Delta l}{l} \rightarrow \dfrac{\Delta V}{V} = \dfrac{\Delta l}{l}$. Hence, **answer is option (a).**
I-32	Let l, A be natural length, area of wire and , Y be Young's modulus of elasticity of material. And, $Y = \dfrac{\dfrac{T}{A}}{\dfrac{\Delta l}{l}} = \dfrac{T}{A} \times \dfrac{l}{\Delta l} \rightarrow \Delta l = \dfrac{Tl}{AY} \rightarrow l + \Delta l = kT$. Therefore, $l_1 = l + \Delta l_1 = l + kT_1$, accordingly, $l_2 = l + kT_2$. These two equations have two unknown l and k. Therefore, from first $\dfrac{l_1 - l}{T_1} = k$ Substituting it in second equation $l_2 = l + \left(\dfrac{l_1 - l}{T_1}\right)T_2 \rightarrow l_2 = l\left(1 - \dfrac{T_2}{T_1}\right) + l_1\left(\dfrac{T_2}{T_1}\right) \rightarrow l_2 - l_1\left(\dfrac{T_2}{T_1}\right) = l\left(\dfrac{T_1 - T_2}{T_1}\right) \rightarrow \dfrac{l_2 T_1 - l_1 T_2}{T_1}$. It leads to $l = \dfrac{l_2 T_1 - l_1 T_2}{T_1 - T_2} = \dfrac{l_1 T_2 - l_2 T_1}{T_2 - T_1}$. Hence, *answer is option (c).*
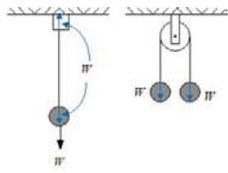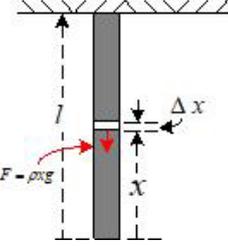
I-33	Let m be the mass of the object and r be length of thin wire, and the mass is whirled around with an angular velocity ω. Thus on any point during whirling two forces would act on the object, First is graviational force mg always vertically downward., and second force would be centrifugal force $mr\omega^2$, it is always radially outward. For Four points A,B,C and direction of forces is shown in the figure. It only at the lowest point A, forces are unidirectional and colinear. At all other points during whirling this condition does not exit. Therefore, maximum force that would act on wire during whirling is $T_{\max} = mg + mr\omega^2$. Thus, most likely position when wire breaks is lowest position. Hence, ***answer is option (b).***
I-34	Elongation l of metal wire of length L under uniform load creates change in potential energy of load $\Delta U = mg(-l) = -mgl$. While energy stored in the wire during elongation $$U_w = \int_0^l kx\,dx = \frac{1}{2}kl^2 = mg\left(\frac{0+l}{2}\right) = \frac{1}{2}mgl$$. In this process of elongation, as per conservation of energy $$\Delta U + U_w = \Delta E \rightarrow \Delta E = \Delta U + U_w = -mgl + \frac{1}{2}mgl = -\frac{1}{2}mgl \neq 0$$. Thus decrease in potential energy is not completely converted into either kinetic energy of block in option (a), nor potential energy of wire (b), nor as heat (c). Hence, ***answer is option (d).***
I-35	Surface of liquid represents that portion of the liquid where force on each molecule is completely imbalanced, and that is a layer of molecules having thickness equal to molecular spacing i.e. of the order of s 10^{-8} m. Hence, ***answer is option (c).***
I-36	An ice cube in vacuum in a gravity-free fall cause melting of ice not due to pressure, as per Le Chatlier's Pinciple (since volume of water is less than volume of ice of same). The melting can take place only due to heat absorption by ice cube at its surface. At verices of the cube, ratio of surface area to volume and in turn heat capacity is more than any where inside the cube and s maximum at the vertices. And moderate at the surface of the cobe tending to be minimum at the centre of each surface of th cube. Thus, rate of melting will be minimum at the centre of srface of the cube and tending to increase towards edges and maximum at the vertices. This will tend to change surface of he cube to spherical. Hence, ***answer is option (b).***
I-37	Surface energy of a liquid, as determined from wire frame experiment is $E = SA$ let there be two droplets of radius r_1 r, then each will have surface area $S_1 = 4\pi r_1^2$ and volume $V_1 = \frac{4}{3}\pi r_1^3$, then bigger drop formed by combining f two droplets shall be $V_2 = 2V_1 = 2 \times \frac{4}{3}\pi r_1^3 = \frac{4}{3}\pi r_2^3 \rightarrow r_2 = \sqrt[3]{2}\,r_1$, and surface area of the bigger drop shall be $S_2 = 4\pi r_2^2 = 4\pi (2)^{\frac{2}{3}} r_1^2$. Accordingly, pre- combining of the two drops, energy is $E_{pre} = 2 \times \left(4\pi r_1^2\right) \times S$ and post- combining the energy of bigger drop is $E_{post} = \left(4\pi r_2^2\right) \times S$. Accordingly, $$\frac{E_{post}}{E_{pre}} = \frac{\left(4\pi r_2^2\right) \times S}{2 \times \left(4\pi r_1^2\right) \times S} = \frac{r_2^2}{2r_1^2}$$ and thus $$\frac{E_{post}}{E_{pre}} == \frac{2^{\frac{2}{3}}}{2} = 2^{-\frac{1}{3}} \rightarrow \frac{E_{post}}{E_{pre}} < 1$$, and hence energy of the bigger drop is less than the energy of the drops pre combining. Therefore, as per principle of conservation of energy, difference of energy is liberated. Hence, ***answer is option (a).***
I-38	The best way is to verify dimension of each quantity, accordingly-

(a) [Moment of force]=[Force]x[Dispalcement from fulcrum] $\left(MLT^{-2}\right)\times L=ML^2T^{-2}$. This is not the given dimension and hence, **option (a) is incorrect**.

(b) $\left[Surface\,Energy\right]=\left[Surface\,Tension\right]\times\left[Area\right]\rightarrow\left[Surface\,Tension\right]=\dfrac{\left[Surface\,Energy\right]}{\left[Area\right]}=\dfrac{ML^2T^{-2}}{L^2}$. Hence, $\left[Surface\,Tension\right]=MT^{-2}$. Hence, **option (b) is incorrect.**

(c) As per Hook's Law $\left[Y\right]=\dfrac{\left[Stress\right]}{\left[Strain\right]}=\dfrac{\dfrac{\left[Force\right]}{\left[Area\right]}}{\dfrac{\left[Elongation\,in\,Length\right]}{\left[Length\right]}}=\dfrac{\dfrac{MLT^{-2}}{L^2}}{\dfrac{L}{L}}=ML^{-1}T^{-2}$. **This is the given dimension** and hence, **option (c) is correct.**

(d) As per definition $F=-\eta A\dfrac{dV}{dx}$, here all other notations have usual meaning except η, which is coefficient of viscosity. Accordingly, $\left[\eta\right]=\dfrac{\left[F\right]}{\left[A\right]\left[\dfrac{dV}{dx}\right]}=\dfrac{MLT^{-2}}{L^2\times\dfrac{LT^{-1}}{L}}=\dfrac{MLT^{-2}}{L^2T^{-1}}=ML^{-1}T^{-1}$. This is not the given dimension and hence, **option (d) is incorrect.**
Thus, *answer is option (c).*

I-39	Bubble, since hollow and filled with air, it has two surface, with wall thickness negligible. Hence energy of the bubble $E=2\times\left(4\pi r^2\right)\times S=8\pi r^2 S$. When air is filled, its energy becomes $E^{'}=2\times\left(4\pi(2r)^2\right)\times S=32\pi r^2 S$. Thus, work done is equal to difference of energy and hence, $W=\Delta E=E^{'}-E=32\pi r^2 S-8\pi r^2 S=24\pi r^2 S$. Thus, *answer is option (d).*
I-40	A bubble is a hollow sphere formed by a thin film of liquid, with air filled inside. Going back, ananlysis of pressure inside a bubble is first taken as drop with liquid filled inside. The drop can be visualized as Two hollow hemisperes in equilibrium with each other. Force exerted on the cross section of the drop has two componenets $F_e=P_a\left(\pi R^2\right)$due to atmosphere (P_a is atmoshperic pressure) outside the drop, and $F_i=2\pi RS$ is due surface tension of the surface of the liquid in the drop. It is to be noted that size of bubble is too small to be considered for pressure due to liquid column. Thus, net pressure P on cross-section of the drop is such that $\pi R^2 P=F_e+F_i$. It leads to $\pi R^2 P=\pi R^2 P_a+2\pi RS\rightarrow P=P_a+2\dfrac{S}{R}$. Thus, difference of pressure inside as compared to outside by $\Delta P_1=P-P_a=2\dfrac{S}{R}$. Now, bubble is a case where, inside drop air is filled and analysis of difference of pressure is applied to it such that $\pi R^2 P_2=\pi R^2 P+2\pi RS\rightarrow\Delta P_2=P_2-P=2\dfrac{S}{R}$. It leads to $\Delta P=\Delta P_1+\Delta P_2=\left(P-P_a\right)+\left(P_2-P\right)=P_2-P_a=2\dfrac{S}{R}+2\dfrac{S}{R}=4\dfrac{S}{R}\rightarrow P_2=P_a+4\dfrac{S}{R}$.. Differentiating, $P_2$the final form of w.r.t. R it leads to $\dfrac{d}{dR}P_2=-4\dfrac{S}{R^2}$. Thus when air is pushed in the bubble, despite increase in radius of the bubble, the value of the discriminator $4\dfrac{S}{R}$, even after being positive, decreases and thus net pressure inside the bubble decreases. Hence, *answer is option (a).*

	N.B.: Alternatively, Differentiating, P_2 the final form $\left(P_2 = P_a + 4\dfrac{S}{R}\right)$ w.r.t. R, it leads to $\dfrac{d}{dR}P_2 = -4\dfrac{S}{R^2}$. The (-) sign in rate of change of P_2 signifies decrease.
I-41	Let to bubbles A and B have radii R_A and R_B such that $R_A > R_B$, then pressure inside the bubbles shall be $P_A = P_a + 4\dfrac{S}{R_A}$ and $P_B = P_a + 4\dfrac{S}{R_B}$. Thus $P_A - P_B = 4S\left(\dfrac{1}{R_A} - \dfrac{!}{R_B}\right) = 4S\left(\dfrac{R_B - R_A}{R_A R_B}\right)$. With the given radii of the bubbles, $R_B - R_A < 0$ and hence $P_A - P_B$ is (-)ve or $P_B > P_A$. Therefore, air will flow from high pressure to low pressure, i.e. **from smaller bubble to bigger bubble.** Hence, *answer is option (c).*
I-42	Pressure at point A is arrived at by accounting difference of distributed force atmospheric pressure on liquid surface and forcedue to surface tension. Since, at point A, surface of liquid is perpendicular to the forces acting on it, and hence effective pressure shall be calculated from equation $P\left(\pi R^2\right) = P_0\left(\pi r^2\right) - 2\pi rS \rightarrow P = P_0 - 2\dfrac{S}{r}$. Hence, *answer is option (c).*
I-43	Let two bubbles A and B are of radius r_a and r_b having pressure inside ΔP_a and ΔP_b respecively, and given that such that $\Delta P_a = 2(\Delta P_b)$. Since, $\Delta P_a = \dfrac{4S}{r_a}$ and $\Delta P_b = \dfrac{4S}{r_b}$. Therefore, $\dfrac{\Delta P_a}{\Delta P_b} = 2 = \dfrac{\dfrac{4S}{r_a}}{\dfrac{4S}{r_b}} = \left(\dfrac{r_b}{r_a}\right)$. Accordingly ratios of the volumes $\dfrac{V_a}{V_b} = \dfrac{\dfrac{4}{3}\pi r_a{}^3}{\dfrac{4}{3}\pi r_b{}^3} = \left(\dfrac{r_a}{r_b}\right)^3 = \left(\dfrac{1}{2}\right)^3 = 0.125$. Hence, *answer is option (d)* **N.B.:** It is has to be noted care fully that ratio of excess pressure of the two bubbles is given and not the pressure inside the bubble. Any wrong interpretation of question will lead to wrong answer.
I-44	Ignoring volume of meniscus, upward force due to surface tension is $F = 2\pi rS$, and this force is balanced by the weight of liquid column $\left(W = \left(\pi r^2 h\right)\rho g\right)$, that rises through height h in the capillary. Here, r is the radius of the capillary. In state of equilibrium $F = W \rightarrow 2\pi rS = \pi r^2 h\rho g \rightarrow h \propto \dfrac{1}{r}$; **this relationship is represented only by the curve C.** Hence, *answer is option (c)*
I-45	When tube is vertical then height of liquid column is decided by equilibrium of weight of liquid column at poimt A and force due to surface tension at B, as $2\pi rS\cos\theta = \pi r^2 h\rho g \rightarrow h = \dfrac{2S\cos\theta}{r\rho g}$, here θ is contact angle. Next, when the tube is nclined at an angle α, pressure extered by it on base surface is $h' = l\cos\alpha$. Here, l is the length to which water rises due to surface tension. Thus, net force on the cross-section of the tube, due to liquid filled in it, will be $F_g = \pi r^2 l\rho g\cos\alpha = \pi r^2\left(\dfrac{h'}{\cos\alpha}\right)\rho g\cos\alpha = \pi r^2 h'\rho g$. It is same as that when the tube was vertical. Now,

	vertical component of surface tension remains $S \cos\theta$. Since meniscus is always horizontal and hence length length of perimeter of the meiscus would increase such that net upward force that lifts water in the tube shall be $F_S = \left(\dfrac{2\pi r}{\cos\alpha}\right) S \cos\theta$. Therefore, component of viscous force along the tube, similar to that in case of verticak tube, shall be $F_S^{'} = F_S \cos\alpha = \left(\left(\dfrac{2\pi r}{\cos\alpha}\right) S \cos\theta\right)\cos\alpha$. Thus, $F_S^{'} = 2\pi r S \cos\theta$. Accordingly, height of liquid column in cined tube shall be $h^{'} = \dfrac{2S\cos\theta}{r\rho g} = h \rightarrow l = \dfrac{h}{\cos\alpha}$. Thus with given data of $h = 10$ cm and $\alpha = 45^0$ length to which water rises in the tube shall be $l = \dfrac{10}{\dfrac{1}{\sqrt{2}}} = 10\sqrt{2}$ cm. Hence, ***answer is option (b).***
I-46	Height of liquid column in capillary, ignoring colume of mensicus, is $h = \dfrac{2S\cos\theta}{r\rho a}$. The system under free fall, due to psuedo force, net acclereation acting on the liquid would be zero i.e. $a = g - g = 0$. Hence, limiting action of force under gravity would be zero. But when liquid reaches at the brink of open end of the capillary, contact angle would ajust itself in a manner that there would not be spilling of water. Thus, **length of water column shall be length of the capillary i.e. 20 cm**. Hence, ***answer is option (d).***
I-47	Viscosity occurs in material that can flow, and viscous force is proportion to velocity gradient across the height of liquid. This **property of flow is only in fluids which include liquid and gases**. Hence, **answer is opition (d).**
I-48	Viscous force acts between two layers in immediate contact, and it is succesively between each layer, of infinitesimal thickness. In this range exists interaction between molecules of ajoining layers is electromagnetic in nature. Hence, **answer is option (a).**
I-49	Since, force is acting along the surface of the two layers, and hence it is tangential. Thus, $\dfrac{F}{A}$ **is called tangential stress.** Hence, ***answer is option (c).***
I-50	Forces that acting on a rain drop during its fall are (i) $F_g = mg = \left(\dfrac{4}{3}\pi r^2 \rho_d\right)g$ due to gravity, (ii) , $F_b = \left(\dfrac{4}{3}\pi r^3 \rho_a\right)g$ is force of buoyancy which acts against gravity (iii) $F_v = 6\pi\eta r v$ viscous drag against direction of motion of the raindrop which is spherical in shape. Here, η is coefficient of viscosity, r is radius of drop and v velocity of the raindrop, and ρ_d and ρ_a are densities of raindrop and air respectively, Initially velocity of the raindrop $v = 0$ and hence $F_v = 0$. But, gravitayional forces causes acceleration and velocity increases, and thereby F_v also increases, but it acts in diretion opposite to that of the motion. Ultimately an equilibrium is reached when raindrop attains a unifrm velocity, called Terminal Velocity such that $F_g - (F_b + F_v) \rightarrow F_g - F_g = F_v$. It leads to $\dfrac{4}{3}\pi r^2(\rho_d - \rho_a) = 6\pi\eta r v \rightarrow v = \dfrac{2}{9}\pi\dfrac{(\rho_d - \rho_a)}{\eta}$. Thus **cause of terminal velocity is viscous force**. Hence, ***answer is option (c).***
I-51	A piece of wood inside a water column at the instant of release is pushed upward due to difference of force of buyoance and gravity with an acceleration such that $Ma = V(d_w - d_p)g$. But soonafter the block starts moving

	it experiences a retardation against dircetion of motion due to viscosity of water such that $F_v \propto v\eta$, here v is the velocity of the piece and η is the viscosity. Thus while force of buoyancy tends to increase upward velocity of wooden piece, the viscous drag also increases proportional to the velocity. Net result is that acceleration of the piece decreases as it moves upward. Hence, answer is option (c).
I-52	Generally, forces that acting on a sphere during its fall in a medium are (a) $F_g = mg = \left(\frac{4}{3}\pi r^2 \rho_s\right)g$ due to gravity, (b), $F_b = \left(\frac{4}{3}\pi r^3 \rho_m\right)g$ is force of buoyancy which acts against gravity (c) $F_v = 6\pi\eta rv$ viscous drag against direction of motion of the raindrop which is spherical in shape. Here, η is coefficient of viscosity, r is radius of sphere and v velocity of the raindrop, and ρ_m and ρ_m are densities of sphere and medium, respectively, But in vacuum forces of buyoancy and viscosity are absent. Thus, **only force acting n the sphere is due to gravity, therefore, velocity of the sphere would go increasing continuously**, until it is obstructed. Hence, **answer is option (d)**
I-53	Forces that acting on a spherical ball during its fall are (a) $F_g = mg = \left(\frac{4}{3}\pi r^2 \rho_s\right)g$ due to gravity, (b), $F_b = \left(\frac{4}{3}\pi r^3 \rho_l\right)g$ is force of buoyancy which acts against gravity (c) $F_v = 6\pi\eta rv$ viscous drag against direction of motion of the ball which is spherical in shape. Here, η is coefficient of viscosity, r is radius of sphere and v is its velocity, and ρ_s and ρ_l are densities of ball and liquid respectively, Initially velocity of the raindrop $v = 0$ and hence $F_v = 0$. But, gravitayional forces causes acceleration and velocity increases, and thereby F_v also increases, but it acts in diretion opposite to that of the motion. Ultimately an equilibrium is reached when raindrop attains a unifrm velocity, called Terminal Velocity such that $F_g - (F_b + F_v) \to F_g - F_g = F_v$. It leads to **initially velocity increases, but due to viscosity an equilibrium is reached at a maximum value called terminal velocity**. This trend is demonstrated by graph B. Hence, *answer is option (b).*
I-54	As per Hook's Law, $\frac{F}{A} \propto \frac{\Delta l}{L}$. Applying thiss law to each of the options –
	(a) $F \propto A\frac{\Delta l}{L} \to F \propto \Delta l$, here **wieight hung is F and it is proportional to increase in in length**. Hence, **option (a) is correct**.
	(b) $\frac{F}{A} \propto \frac{\Delta l}{L} \to \frac{F}{A} \propto \Delta l$. Thus, **with increase in stress, is proprtiona to change in length** and therefore, **option (b) is correct.**
	(c) **This option the statement of Hook's law**, hence, **option (c) is correct.**
	(d) **This option is corolloray of option (a), which is correct, hence option (d) is also correct.**
	Hence *all options are correct.*
I-55	In bulk of liquid, net force acting on a molecule is zero, because of forces of attraction acting on the molecule caused by surrounding molecules in the molecular range(10-15 times diameter of molecule) is nullified. Whereas, on the surface **an imbalance of the force is cteated due to the fact that each molecule there, is influenced by molecules only inside liquid, while other side it is absent**. This is true for options (c) and (d). Hence *answer is option (c) and (d).*
I-56	The height of liquid in a capillary is at equilibrium of forces causes by surface tension $F_S = 2\pi rS\cos\theta$ and

gravitational force $F_g = W = \pi r^2 h \rho g$. Accordingly, $h = \dfrac{2\pi r S \cos\theta}{\pi r^2 \rho g} = \dfrac{2S\cos\theta}{r\rho g}$. Here, volume of meniscus is ignored. Now analyzing each of the options –

(a) The surface tension S is dependent on force of adhesion between liquid and the material of the tube, Hence, **option(a) is correct**.

(b) In case length o capillary is more than h, then capillary material in molecular range is uniformly distributed about the surface of liquid and contact angle θ remains uninfluenced. Hence, **option (b) is also correct**

(c) Generally outer radius is thicker than molecular range, for the rquired rigidity to handle it. Hence, **option (c) is not applicable.**

(d) Inner radius of the tube in final formulation of h is there and hence, **option (d) is correct.**

Hemce, *answer is (a), (b) and (d)*

I-57	Contact angle in a capillary depends upon – a) force of cohesion in liquid molecules, b) force of adhesion between molecules of liquid and and moecules of tube, and c) weight of liqid column. These forces are since dependent on – (a) Force of adhesion depends upon the material of the container, hence, **Option (a) is correct**. (b) Force of cohesion depends upon the material of the liquid, hence, **Option (b) is correct** (c) Shape of container is much larger than the molecular range, and therefore it does not influence resultant force, Hence, **option (c) is incorrect**. (d) Liqiud in the container is much beyond the moecular range, and mass of liquid does not influence resltant force, and ths contact angle. Hence, **option (d) is incorrect**. Thus *answer is (a) and (b)*
I-58	With contact angle Zero, surface of the liquid is horizontal, and hence force due to surface tension on semi circular curved part of surface $F_C = \pi r S$ and that on the flat surface is $F_F = 2rS$. Thus, the required rattio is $\dfrac{F_C}{F_F} = \dfrac{\pi r S}{2rS} = \dfrac{\pi}{2}$. **This is the value given in option (c)**, hence, **answer is option (c).**
I-59	Height of lidqid column in a acapillary dipped inside liquid is $h = \dfrac{2\pi r S \cos\theta}{\pi r^2 \rho g} = \dfrac{2S\cos\theta}{r\rho g}$. Accordingly,for $h = 0$ the given condition, each of the option is being analyzed – (a) Despite $S = 0$, the force of cohesion and weight of liquid, which are not Zero, will interact to cause either rise or dip of the liquid in the capillary. Hence, **must** given in option (a) is incorrect. (b) Contact angle under influence of force of adhesion, gravitation and force of cohesion, cannot be 90^0. Hence, **must** given in option (b) is incorrect (c) If, $S = 0$ the mathematical formulation leads to $h = 0$. Thus, **may** given in option (c) is correct. (d) If contact angle $\theta = 90^0 \rightarrow \cos\theta = 0 \rightarrow h = 0$, thus **may** given in option (d) is correct Hence, *answer is optio (c), (d)* **N.B.:** At time simple mathematical formulation of the problem may not work, unless physysics behind is incorporation in the solution. This is clear from the analysis above of options given above.. Thus carefully reading a question to discriminate given conditions from those generally perceived is most important
I-60	Forces that acting on a spherical ball during its fall are (a) $F_g = mg = \left(\dfrac{4}{3}\pi r^2 \rho_s\right)g$ due to gravity, (b) , $F_b = \left(\dfrac{4}{3}\pi r^3 \rho_l\right)g$ is force of buoyancy which acts against gravity (c) $F_v = 6\pi \eta\, rv$ viscous drag against direction of motion of the ball which is spherical in shape. Here, η is coefficient of viscosity, r is radius of sphere and v is its velocity, and ρ_s and ρ_l are densities of ball and liquid respectively, Initially velocity of the

raindrop $v = 0$ and hence $F_v = 0$. But, gravitayional forces causes acceleration and velocity increases, and thereby F_v also increases, but it acts in diretion opposite to that of the motion. Ultimately an equilibrium is reached when raindrop attains a unifrm velocity, called Terminal Velocity such that $F_g - (F_b + F_v) \to F_g - F_g = F_v$. This equilibrium leads to

$$\left(\frac{4}{3}\pi r^3 \rho_s\right)g - \left(\frac{4}{3}\pi r^3 \rho_a\right)g = 6\pi\eta\, r v_t \to \frac{2}{9}r^2(\rho_s - \rho_a)g = 6\eta\, v_t.$$ Now analyzing each of the option –

(a) Since there is no gravitational field, and hence **there will not be any downward acceleration**, hence, **option (a) is incorrect.**

(b) Inititial velocity is terminal velocity $20\,\text{m.s}^{-1}$ and this is achieved in presence of acceleration due to gravity $9.8\,\text{m.s}^{-2}$ downward. In the state of equilibrium. When this velocity is given to an object in gravity free hall, the equilibrium is disturbed, and viscous force at the velocity would create an acceleleration $a = -g$ i.e. $9.8\,\text{m.s}^{-2}$ upward. Hence, option (b) is correct.

(c) The acclereation at (b) would tend to reduce downward velocity of the sphere and in turn F_v, therefore, **upward acceleration due to downward velocity would also decrease** with passage of time. Hence, **option (c) is correct**.

(d) As, per (c) above since velicty of whpere gradually decereases with passage of time, in gravity free space, hence at **succesively some point it will eventually halt**. Hence, **option (d) is correct**.

Hence *answer is option (b), (c), (d).*

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GROWING WITH CONCEPTS

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

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

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

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

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

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

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Theme Song :

<u>PREMISE:</u>*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 he eminent persons who brought out the song in a manner that it has attained an epitome of popularity. While working its mission and passion, the group invites one and all to collectively complement in grooming competence to compete among unprivileged children. The song/prayer goes as under -*

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

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

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

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

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

Together Each Achieves More
(TEAM)

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