GYAN VIGYAN SARITA:शिक्षा

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Aim at the Best, but...



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

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



Cloud Internet

possible for seamless connectivity of audio-video

whiteboard across nodes where internt connectivity is

poor- Presently A-VIEW is in use)



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



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



Mentoring

atre



earning

Centre - 2



Learning Centre - n



2. Welcomes participation, promotion and facilitation on Zero-Fund-Zero-Asset (ZFZA) basis 3. More details on Technological and Operational - please write on http:// www.gyanvigyansarita.i n/contact/



Learning

Centre - 3

Learning

Centre

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

Learning Center (if asked for	by Mentor)	Mentoring Center (if asked for by Mentor)				
	Estimated Cap	pital 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	15,000	Headset with Microphone	3,000			
and Wireless microphones						
Wireless Surface Writing device	15,000	Wireless Surface Writing device	15,000			
Total	75,000		43,000			
	Estimated	l Recurring Cost				
Internet charges, based on estimate transfer which depends upon choice o and tariffs of ISP	d monthly data f cloud platform,	Internet charges, based on estimate which depends upon choice of cloud pl	ed monthly data transfer latform, and tariffs of ISP			
a. A-VIEW indegeneously devel University. It is found to available options for use in IO developed for use in impar Online Education, with bilate access, in an interactive platform.	loped by Amrita be best among DMS. It has been rting Interactive eral audio-visual manner. Cloud	IOMS is since an initiative drive Responsibility (PSR) operating n (ZFZA) basis, the Cloud Platform ha Centers for deriving benefit of IOMS be pleased to connect Learning complementing the cost of Clo payable, for arriving at a mutual agree	en with Personal Social Zero-Fund-&-Zero-Asset s to provided by Learning S. Gyan Vigyan Sarita will Centers for collectively ud Platform, whenever eement for cost sharing.			
b. The IOMS envisages sess Learning Centers. Charges f whenever payable may be s mutual agreement between L	tion upto Five for the platform shared across in earning Centers.	So also IT Infrastructure with the Mentors has been in use and is working. But, at any stage if upgradation becomes essential, support of learning centers, beneficiaries of the initiative, is gratefully welcomed on ZFZA basis.				
c. Benefit of sharing of charges of can be optimized with off among multiple sessions of extent Mentor can deliver.	of cloud platform set of schedule f IOMS, to the	Operating cost of Mentor, if require Learning Centers	ed, shall be supported by			

Infrastructural requirement for Centers in Interactive Online Mentoring Sessions (IOMS) Learning Center (if asked for by Mentor) Mentoring Center (if asked for by Mentor)

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

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

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

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

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

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

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

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

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

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संपाटकीय

देश के विकास के लिये जरूरी है : स्वदेश प्रेम

G0

स्वदेश का मतलब होता है-अपनी जन्मभूमि, अपनी मातृभूमि अर्थात वह स्थान जहां हम पैदा हुये हैं, पले हैं, और बड़े हुये हैं। जो जमीन हमें अपना अन्न, जल, वायु, धूल, फल-फूल देकर हमें बड़ा बनाती है, हम उसके ऋण से कभी मुक्त नहीं हो सकते हैं। हमारी धमनियों में उसी के नाम का रक्त हमेशा हमेशा के लिये बहा करता है। इस रक्त की याद, एहसास, अपनी जमीन से लगाव ही स्वदेश प्रेम बनता है।

स्वदेश प्रेम केवल मानव प्रजाति में ही नहीं पाया जाता है बल्कि यह हर पशु, पक्षी, कीट, पतंगों में भी होता है। आपने देखा होगा कि जीव दिन भर दूर-दूर भ्रमण करता है, चिड़ियां दाना चुकती हैं, जानवर दूर जाकर घास चरते हैं, फिर भी शाम होते होते सबके सब अपने रहने की जगह पर लौट आते हैं। समुद्र में पानी की जहाज पर रहने वाला पक्षी भी दिनभर पानी की लटमें पर भा फिरकर फिर में उमी जवान या आ जाना है।

लहरों पर घूम फिरकर फिर से उसी जहाज पर आ जाता है।

नौकरी पेशा के लिये विदेशों में रहने वालो को भी अपनी मातृभूमि रह रहकर याद आती रहती है। यह स्वदेश प्रेम ही होता है कि सैनिक सीमा पर, अपने देश की रक्षा के लिये, अपनी सुख-सुविधाओं को छोड़ने में नहीं चूकता है और समय आने पर अपना सबकुछ न्यौछावर करने में भी नहीं हिचकता है।

जिस प्रकार हमें जन्म देने वाली मां हमेशा निःस्वार्थ रहती है, ठीक उसी प्रकार हमारी मातृभूमि भी हमें अपना सबकुछ बिना कुछ मांगे देती रहती है। हर देशवासी अपने देश से चाहें वह वर्फ से ढंका हो, अथवा गर्म रेत से भरा हो, अथवा ऊंची पहाड़ियों से घिरा हो, प्रेम करता है और अथाह प्रेम करता है। पंडित रामनरेश त्रिपाठी हिंदी साहित्य के एक प्रतिष्ठित कवि रहे हैं। उन्होंने लिखा है-

विषुवत रेखा का वासी, जो जीता है नित हांफ हांफ कर,

रखता है अनुराग अलौकिक, वह भी अपनी मातृभूमि पर,

ध्रुववासी जो हिम में तम में, जी लेता है कांप कांप कर,

वह भी अपनी मातृभूमि पर, कर देता है प्राण निछावर

परंतु आज दुःख के साथ लिखना पड़ता है कि हमारे अनेक देशवासी देश प्रेम की भावना से दूर होते जा रहे हैं। स्वदेश प्रेम का उनमें अभाव होता जा रहा है। विदेशी वस्तुओं से लगाव, विदेशी संस्कृति से अपनापन और स्वदेश के बजाय विदेश में जाकर नौकरी करने की लालसा उनमें बढ़ती जा रही है।

देशप्रेम का भाव मात्र उपदेश अथवा अपने अतीत के गुणगान से अब नहीं उपजने वाला है क्योंकि कुछ भी बोलने की आजादी ने स्वदेशप्रेम के विरोध में, और देश के प्रति अपने ही देश में नफरत फैलाने वालों की संख्या बढ़ा दी है। लोग उसे अच्छा मानने लगे हैं जो देश के हित के लिये न बोलकर, देश के विरोध में सोचता और बोलता है।

हमें नहीं भूलना चाहिये कि स्वदेश प्रेम मनुष्य का स्वाभाविक गुण है। मथुरा-वृंदावन से द्वारिका जाकर बसने वाले कृष्ण भी कहते हैं-ऊधौ, मोंहि ब्रज बिसरत नाहिं।

स्वदेश प्रेम का राजनीति से कोई सरोकार नहीं होता है। स्वदेश भक्त होना किसी राजनीतिक पहचान का मोहताज होना नहीं होता है। स्वदेशभक्ति का सीधा संबंध अपने देश की सामान्य सीमा - रेखा, अपनी संस्कृति, अपनी भाषा, अपने लोगों से लगाव और एक दूसरे के प्रति सम्मान की भावना से जुड़ा होता है।

स्वदेश प्रेम उस विश्वास का नाम है जो प्रत्येक देश को यह अधिकार देता है कि जिस भू-भाग पर वह रहता आया है, जिस पर वह पला-बढ़ा है, उस पर उसी का शासन रहे।

हमारे पूर्व राष्ट्रपति प्रणव मुखर्जी ने कहा था कि भारतीय राष्ट्रवाद एक वैश्विक भावना है। अपने देश के प्रति निष्ठावान होना ही देशप्रेम है। यह स्वदेश प्रेम ही है जो अपने देश के लिये समर्पण और आदर जगाता है।

विकास करना हर एक की दिली ख्वाहिश होती है। इसके लिये समस्याओं से जूझना पड़ता है। राह में आने वाली परेशानियों को दूर करना होता है। शिक्षा के क्षेत्र में यदि हम विकास चाहते हैं तो हमें उसमें व्याप्त कुरीतियों को दूर करना होगा, वह सब करना होगा जिससे हर एक सीखने वाला वह ज्ञान पाये जो दूसरों के लिये उदाहरण बने।

अगर हम इंजिनियर हैं तो हमें ऐसी टेक्नोलाजी विकसित करनी होगी जो औरों से बेहतर हो। अगर हम डाक्टर हैं तो हमें ऐसी दवाओं, निदानों के तरीकों को ढूंढ़ना होगा जिससे हमारा मरीज अतिशी्घ्र ठीक हो और उसे सस्ता इलाज भी मिले।

अगर हम अधिकारी हैं, कर्मचारी हैं, राजनेता हैं, वैज्ञानिक हैं अथवा किसान हैं तो हमें हर दशा में अपनी सजगता, अपने देश के प्रति बनाये रखनी होगी यह सोचकर कि हमसे कोई दूसरा आगे न निकल जाये तभी हम सही देशभक्त, स्वदेशप्रेमी बनेंगे। यह देशप्रेम ही होता है जो अपने देश के लिये अच्छा से अच्छा करने की प्रेरणा देता है।

ध्यान रहे कि जीतना तो हर व्यक्ति की इच्छा होती है, लेकिन जीतता वही है जो जीतने की कीमत चुकाता है, यानि कठिन परिश्रम करता है, औरों से अधिक परिश्रम करता है, और औरों से अधिक शक्तिशाली बनने की कोशिश करता है। हमारा देश भारत एक शक्तिशाली देश है। भारत का इतिहास हमें बताता है कि वह धैर्यवान भी हैं। भारत ने कभी सीमा विस्तार यानि और देशों को अपने अधीन रखने की कभी इच्छा नहीं रखी। यही इसका एक विशिष्ट गुण है कि हर एक देशवासी अपना देशप्रेम अपने देश की सुरक्षा के प्रति और उसके विकास के प्रति रखता है।

सही देशभक्त, स्वदेशप्रेमी वह है जो देश के प्रति हर हाल में, हर पद पर रहते हुये अपनी मौजूदगी में अपनी सजगता कायम रखे। अगर हम अपने अंदर की सजगता यानि चौकीदारी की भावना जगाये रखें तो हम निश्चित तौर पर सदैव उन्नतिशील रहेंगे। जो अपनी जिम्मेदारी के प्रति चौकन्ना, वही सही चौकीदार।

प्रधानमंत्री मोदी ने देशप्रेम की एक नयी परिभाषा दी है जो वास्तव में प्रशंसनीय है। किसान जिस प्रकार अपने खेतों का चौकीदार हमेशा बना रहता है, ठीक उसी प्रकार बैंक के कर्मचारी को जनता के पैसों का सही चौकीदार होना चाहिये कि जनता के धन का दुरूपयोग न हो, पुलिस को जनता की भलाई के लिये चौकीदारी करनी चाहिये, अधिकारियों को अपने कर्मचारियों की देखभाल और उनको प्रेरणा देने की चौकीदारी लेनी चाहिये, देश के भविष्य संवारने में लगे शिक्षकों को अपने शिष्यों के प्रति दिल से समर्पित रहने की चौकीदारी लेनी चाहिए, हमारे वैज्ञानिकों को देश के संसाधनों के उपयोग में हमेशा सजग रहने की और हम जनता को, इन सबकी कारगुजारियों को ध्यान से देखते रहने की जिम्मेदारी लेनी चाहिए। यदि हम ऐसा कर पाए तो निश्चित मानिये, हमारा देश किसी भी देश से खद को पिछडा हआ कभी नहीं पायेगा।

विकास में पिछड़ने का मुख्य कारण है -हमारी अपनी जिम्मेदारियों से मुंह मोड़ने की आदत।

हर बुद्धिजीवी, विचारक, शिक्षाविद, अनुभवी नागरिक और इन सबसे ऊपर ज्ञानविज्ञानसरिता परिवार को स्वदेश प्रेम की कम हो रही भावना वाली समस्या का समाधान तलाशना होगा और एक मुहिम चलानी होगी कि हर वह व्यक्ति जो अपने को भारतीय अथवा हिंदुस्तानी कहता है अपने देश के प्रति समर्पित हो।

आइये, हम निश्चय करें कि हम हमेशा अपने जिम्मेदारियों के प्रति जागरूक रहेंगे, हम हर क्षेत्र में विश्वस्तरीय विकास करेंगे, आम जीवन से भ्रष्टाचार हटायेंगे और देश का गौरव बढ़ायेंगे।

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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:** Refer and thus create a visibility of the concerns of this initiative. It gives target students a feel that you care for them, and they are anxiously awaiting to get benefitted by your contributions. We request you to please feel free to send your creation, by <u>20th of each month</u> to enable us to incorporate your contribution in next bulletin, <u>subhashjoshi2107@gmail.com</u>.

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

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

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

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



Coordinator's View

Patriotism and Nationalism

Patriotism and Nationalism are the two traits which more often confused than misunderstood. Patriotism is an essence of allegiance to the nation which provides space for living and growth. It demands to be faithful to the other land in which living is being made, either by choice or compulsion, irrespective of the origin. Faithfulness for a state places one in a position of responsibility to ensure its well being above self through one's thoughts, words and actions (मनसा, वाचा, कर्मण). Nationalism is indiscriminate following of a certain socio-economic-cultural order of a place or country of origin one's origin. These two traits unless understood appropriately may individually lead to more harm than to the nation, and collectively it could lead to a catastrophe. Understanding these traits is very complex. It is an integrated growth right from origin of human race i.e. predator and nomadic era to prosperous democracies. They have faced menace of nationalism to the extent that it is on the brink of bankruptcy. There are numerous examples available in the world history. Aim of this article is to engage in brainstorming on this crucial aspect and explore its complex roots; it is found to be related aberrations in education system of countries suffering from radicalization.

A nation is conglomeration of individuals, families, societies into a socio-economic order governed by a system. This system is a political evolution governed by need of people to coexist and grow in harmony, peace and welfare through laid down conventions that have been established through collective wisdom. Moreover, everyone is not apt to do everything. Accordingly people take up roles based on their aptitude and capacity. Likewise, there are few persons who possess quality to take people along and lead them to achieve common objectives. Such are the persons more appropriately move on to find a place in political order. Politics is more about gaining position of power to meet aspirations of their following. This ability is tested only when one occupies a position in the hierarchy of governance, before that it is nothing more than a tall talk. A person in any position one can best perform to the abilities that have been groomed, and governance is no exception. Abilities have to be acquired through a tough process, and are not just about wearing a crown. This process involves a sensible sensitivity to pleasure and pain of polity, wisdom to choose a right way, and skills to make it happen for the larger good and achieve a growth with coexistence in a sustainable manner.

This leads to fundamental principle of Freedom – it is one's birth right. Freedom is not subjective it is highly objective and universal in nature. The principle lays down that "Don't do unto others what you don't want others to do unto you- Confucius" (500 B.C.). Instinct of freedom and its history is as old as human race and its traces are seen in anthropological and archeological discoveries, an objective assessment of the past. As against this recorded history is a subjective narration of the victors and their successors. Such narrative history is stale, static and leads to hero worship. History needs a scientific study with how and why of happening with facts recovered archeologically or in any other way for an objective as a guide to every administrator and politician to understand how big is the cost on the polity and the state for their errors.

Cultural history of India is full of multiple invasions, conflict between states, has grown into a democracy in diversity. All that is claimed of ancient India from scriptures a few millennium B.C. and relics is a matter of consideration from the fact that those ancient people could imagine and envision beyond the realm of science and technology of the time. Need is to establish the narrational treasure into a reality and relevant in the present state of science and technology. It is a big challenge. Conflicts and wars among kingdoms on one hand weakened the socioeconomic and political order in Indian subcontinent; on the other side it made inroads to foreign invaders easier. It started with Alexander 326 B.C. and continued until freedom from British in 1947. In between there were uprising of Indian kingdoms. During this period of over two millenniums Indian subcontinent has suffered torturous invasions on its socio-economic culture, heritages, devotional practices and territorial integrity. Despite, India has emerged as largest secular democracy giving space to all faiths and practices to coexist. As regards territorial integrity efforts of Sardar Vallabh Bhai Patel are unparalleled in post independence history. In country of the size with socioeconomic, geographical and religious diversity skirmishes cannot be ruled out. They did go wide spread on some occasions but were quickly contained with condemnation from all walks of life without any external intervention.

Here, it is important to consider the factors that might have attracted foreigners to travel through tough terrains to invade India and establish their empire. Definitely, it cannot be just to grab the land. India in ancient times must have had prosperous land, wealthy, culturally rich and potential human resource. It is a simple commercial arithmetic. In the process it has created amalgamation of cultures on invaders. It is now inseparable from the people of the land.

It leads to a driving point to analyze patriotic and nationalistic perspective. As a nationalist one has reason to act or react to any provocation to one's faith and origin. It provides space to activists to indulge into fanatic and fascist incitement of masses. On the contrary, patriotism is a wisdom that regulates behavior of a person in face of happening or provocations impeding peaceful coexistence. The patriotism calls upon to acts so as to curb misconduct and provocation be it by home grown or an act of invasion. A nationalist targets people connected to lineage other than their religious invasion by those who themselves have not been able to

The Man He Killed

own, and it results in disruption of peace and harmony. Thus it creeps in divisiveness and separatism which leads to radicalization and in its worst form terrorism. In such a situation first step of a state is to contain any upsurge of divisiveness with local security forces. There are limitations of local security to handle divisiveness, and it is attributed to influence of locals upon them. Indian armed forces have an exemplary patriotic culture and are indiscriminative to any separatist and terrorist attempts. History of Indian armed forces is full of gallantry acts against enemies, irrespective of religious faith of an incumbent in the forces. Incidentally, this spirit is beautifully depicted by Thomas Hardy in his poem "The Man He Killed" while, Makhan Lal Chaturvedi in his poem "Pushp Ki Abhilasha" has excellently conveyed epitome of patriotism.

It is this patriotic feeling in India which despite cruel history of invaders and demand of partition of India in 1947 on communal lines, it continues to be more peaceful, prosperous and livable than its neighbours. Foundation of patriotism is on universal humanity and thus it demands faithfulness to the land of living and its people. Any person choosing to live in a country other than that of his origin has to abide by the laws of

the land. Any act of such a person against peace, safety, belief and conventions of the land is criminal and liable

for penal action. Patriotism is proactive and participative in the larger interest of common welfare in conformance with laws of nature and natural justice, whereas nationalism is secretive. Laws of land are common to all, and must be so. but with a difference that foreigners have no role in its democratic formulation. Democracy is the best political system which provides a freedom of dissent leading to redefining believes and conventions including laws of land. But, in democracy exercise of dissent must be within the scope of freedom for common good. Such a dissent is an acceptable initiative towards reform. But, pursuit of dissent in a manner which is against national integrity which in turn is supportive to invaders is unpatriotic, and unacceptable.

Invasion can be territorial, cultural, educational, political and economic. With exception to our neighbor Pakistan, gone are the days when invasion implied only territorial. Residual effects of cultural and educational invasion in India are observed, despite passage of seven decades of independence. Some of the examples are influence of gay and live-in relationships finding place in the laws of land. Fermenting of communal feeling is a result of

Thomas Hardy
Had he and I but met
By some old ancient inn,
We should have sat us down to wet
Right many a nipperkin!
But ranged as infantry,
And staring face to face,
I shot him as he at me,
And killed him in his place
I shot him dead because –
Because he was my foe,
Just so: my foe of course he was ;
That's clear enough; although
He though- had sold his traps
He thought he'd 'list, perhaps,
Off-hand like – just as I –

Was out of work - had sold his traps -No other reason why.

Yes: quaint and curious war is! You shoot a fellow down You'd treat if met where any bar is, Or help to half-a-crown

> पुष्प की अभिलाषा चाह नहीं मैं सुरबाला के गहनों में गँथा जाऊँ. चाह नहीं. प्रेमी-माला में बिंध प्यारी को ललचाऊँ. चाह नहीं. सम्राटों के शव पर हे हरि. डाला जाऊँ. चाह नहीं. देवों के सिर पर चढ्रँ भाग्य पर इठलाऊँ। मुझे तोड लेना वनमाली उस पथ पर देना तम फेंक. मातभूमि पर शीश चढाने जिस पथ जावें वीर अनेक

> > - माखनलाल चतुर्वेदी

live in secular peace. Drifting of population to urban centers and overseas by shading away of the local skills and opportunities is a result of educational invasion. Political invasion is new form in which opinion of masses and political parties are fuelled with actions and speeches against their state and political establishment.

Economic invasion is deepest and has two forms one is to create arms-race to promote exports and second is to pumplow price consumer products in irrespective of the quality. Our country by way territorial challenges and a large population which for its survival needs cheap products becomes a good pasture for both kind of economic invasion. Until (a) our neighbours understand importance of peaceful coexistence. (b) mutual loss in falling pray to arms race, and (c) we gain self reliance in production of defense needs, in wake of inevitable arms race, economic invasion is an essential evil to be lived with. But, surprising is the observation of a section of affluent section of society, which despite affordability, giving way to inferior quality cheap Chinese products right into their kitchen, worship places, festivals and consumer products. Their

temptations for such products are unfazed, despite the country's non-supportive role to our national and international call to act

against terrorism. Is it patriotism? Is it patriotic to challenge our frontiers and government against such countries without understanding implication of their economic invasion? Is it patriotic to choose options based on personal convenience? Are such actions not supportive to hostile countries along unpatriotic lines?

In scriptures Lord Rama about 5000 BC fought against radicalized forces, so also did the Pandvas. In Mughal period despite atrocities of Aurangzeb, Shivaji did not allow radicalization of his forces to return atrocities on men and women of Mughal Empire. On the contrary he tried deradicalize Mughal forces and rehabilitate them in main stream. Likewise soon after

partition of India Mahatma Gandhi took upon himself to deradicalize national forces to stop atrocities on Muslims choosing to stay in India. That was the real patriotism and it aimed at strengthening nation in a manner that none can ever dare to invade. Patriotism is wholistic and it has a long term perspective and it evolves through strength of conviction gained through proper education.

Patriotism is culmination of proper education which is missing in administration of doctrine be it religious, political or of any other kind. Principle of universalism वस्थेव कटूंबकम is derived from ancient Vaidic philosophy taught by all seers, prophets and religions in India. Education is not an ability to acquire a solution, rather it is about -(a) ability to analyze a problem in retrospect and prospect, (b) find ways of resolving a problem, (c) choosing an alternative which is feasible and affordable for sustainable coexistence and (d) develop skill to implement it. A person having undergone such a process of education cannot at its first place fall prey to divisive temptations; and his chance of going non-patriotic is out of question. Proper education grooms an ability to agree to disagree in a manner that persons think individually and act collectively for sustainable coexistence, for the larger good. Patriotism leads to universal governance "....Where the world has not been broken up into fragments by narrow domestic walls; " in words of Rabindranath Tagore in Geetanjali. If education is construed to be marks, certificate, admissions, package, position and power, it can be only cup-oftea of those literate elites and ill-educated persons whose only aim at to enlarge their sphere of influence and belongings. Such persons lack sensible sensitivity with people and nature around them. They treat every other as a commodity for their convenience and interests with no hesitation to change sides, be it unpatriotic.

Every civilized society has evolved into secular democracy; some of them maintain a secular society upholding a particular state religion. Polity of such countries has matured into a rationalized thought process. They have a high proportion of migrant population where every person coming in brings his own qualities to enrich the human resource and economy of the country. Such countries could not be drifted into radicalization despite experiencing terror attacks. This is the strength of patriotism in a secular democracy.

Only those countries which lack cultural heritage and proper education are victims of fanatic communalism and anarchy; it has been driving their poverty and instability to the brink of collapse. All sorts fanatic doctrines find an opportunity to intoxicate poor, starving and ill-educated persons. Even in economically poor countries there are people who have gained power on some account. They use it to create their sphere of influence and power by imposing it upon such weaker or disintegrated individuals, families, societies and states to grow in an imperial way. Even today in such countries domestic helps and support service persons that are drawn from financially, sociologically and educationally weaker section of society. Such persons depend for their living on persons, families and organizations that can deploy them for their economical advantage and living comfort. It is a big dynamics in a reformed shape of slavery-cum-feudal system. This can be realized from the fact that people when get relocated to developed countries do not hesitate in self-help in their living. Such a transformation is not driven with either dignity of labour or self-dependence, but the prohibitive cost of labour in those countries which would take away economic advantage of their relocation. The same set of person either before or after their overseas relocation try to have a royal life-style needing help right from domestic to other services. Is it that these persons have changed? Answer is definitely no; the reason is simply economics of masters and servants. Separatists and unpatriotic persons keep watch on such persons and wait for an opportunity to throw lucrative temptations of a glamorous fortune to trap them into radical misadventures and terrorism. Economic disparity is a big catalyst driving such radicalization.

Gyan Vigyan Sarita, is a non-organizational, non-remunerative, non-commercial and non-political initiative to groom competence to compete among unprivileged children, who are otherwise more susceptible to radicalization. It is inspired with a sense of Personal Social Responsibility (PSR) initiated by a small group of persons. This endeavour executes its vision and mission through Interactive Online Mentoring Sessions (IOMS) at Learning Centers owned by schools, social and voluntary organizations. Financial model of the initiative is Zero-Fund-&-Zero-Asset (ZFZA). The initiative is open to all to collectively complement or take-away for the larger good.

Conclusion: In the above context, patriotism is universally straight, simple and invariant. But, in India, going forward, a secular democracy shall make discrimination of righteousness nationalists with different ideologies increasingly difficult. In this situation the only recourse for a peaceful growth with coexistence and universal patriotism is to ensure proper education to children, next generation citizens which is sensibly sensitive with dedication and honesty which is just not financial, but moral, intellectual and professional too with an ability to deliver results for sustainable manner.

It is a humble appeal to every elite person, because they are blessed enough to look out of box and pro-act patriotically with a sense of PSR. It is not a brand but a philosophy derived from the need to sustain the human race on this wonderful planet.

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

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

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

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

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

Operation:

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

Involvement:

a. **Promote**r –

- i. Initiate a Learning Center,
- ii. Sponsor a Mentor who is willing to join on certain terms,
- iii. Sponsor cost of operation and up-gradation of infrastructure to voluntary mentors,

b. Facilitator -

i. Provide space and infrastructure for **Interactive Online Mentoring Sessions (IOMS).** Most of it is generally available, and may need marginal add-on,

ii. Garner support of elite persons to act as coordinators at the Learning Centre.

c. Participator -

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

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

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

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

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

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सागौन का पेड़

किसान है बिरजू..जाति से नहीं..खानदानी विरासत की वजह से. अब ऐसी विरासत आज के समय मिले तो इतना तो तय है कि परेशान तो होगा ही..बड़े बड़े खेत मगर मरी हुई फसलें और उनके चलते सर पर चढ़े बैंक के लोन का बोझ..इतना बड़ा कि उतारने के लिए खेत बेचना भी काफी नहीं.

ये परेशानी भी ऐसी वैसी नहीं है..एक सीमा होती है जहाँ मात्र एक ही रास्ता नज़र आता है, हो सकता है कि अन्य रास्ते भी हों, हैं ही मगर हताशा का वो चरम जो आँख को और कुछ देखने ही न देता. यह परेशानी उस सीमा के पार तक की है जब बिरजू जान गया था अब आत्म हत्या के सिवाय कोई और विकल्प बाकी नहीं बचा है. चरम होता है यह विकल्प.

वो सुबह सुबह उठा. पत्नी और बच्चों को नींद में देखकर उसके मन में भी वो ही भाव आये जो कभी गौतम बुद्ध के मन में आये होंगे जब वो राजकुमार सिद्धार्थ थे. मगर वो जानता था कि दोनो की राह अलग और अंजाम अलग था मोक्ष प्राप्ति का. वो मन के भीतर ही भीतर माफी माँगते हुए अहाते में लगे पेड़ पर रस्सी से फंदा बना कर लटक गया. मोक्ष प्राप्ति के लिए. उसने शार्ट कट लिया. आज वो मुक्त हो जाना चाहता था हर दायित्व से और हर उस कर्ज के बोझ से, जिसके नीचे दबा वो जिन्दा तो था मगर साँस न ले पाने को मजबूर. एक घुटन का अहसास हर वक्त मगर परिवार के समक्ष खुशमिज़ाजी. कैसे अपनी तकलीफें परिवार पर उजाअगर कर डाल दे उनपर भला वो जबकि वह परिवार का मुखिया है और लोगों की नज़र में उन्नत किसान. सरकार ने उसे एक उन्नत कृषक का दर्जा दिया हुआ है. 'जय जवान जय किसान' के नारे लगते हैं उसके मंत्री जी के साथ तस्वीर खिंचवाने पर.वो सोचता है कि किसान को अन्नदाता की श्रेणी ऐसे मिली हुई है मानो जेड सिक्यूरिटी. कोई भी माला पहनाते हुए मार जाये, बम फोड़ जाये मगर कहने को जेड सिक्यूरिटी. मगर किस्मत जब साथ न दे तो मौत भी धोखा दे जाती है. पेड़ें की टहनी कमजोर थी...जामुन के पेड़ में भला ताकत ही कितनी होती है कि उसका वजन ले पाती..गुलेल वार करती है जामुन के पेड़ की शाख से बनी मगर सह नहीं पाती और सारे जामून बिसरा देती है एक वार में उसी गुलेल के. कर्ज में डूबा था मगर था तो मेहनती किसान ही. टहनी टूंट गई और वो धड़ाम से गिरा जमीन पर..

कहते हैं गिरना हमेशा एक सीख देकर जाता है..तो भला वो कैसे

समीर लाल 'समीर'

अछूता रह जाता...एक सीख उसने भी ली इस गिरने से.

वो जान गया है कि सदियाँ बीत जायेंगी मगर हालात नहीं बदलेंगे..किसान आज भी भले कहलाता अन्नदाता है मगर परिस्थितियाँ यूँ हैं कि आत्म हत्या को मजबूर है..ये कल भी यूं ही था और कल भी यूं ही रहेगा..अन्नदाता आत्महत्या को हमेशा मजबूर रहेगा. यही यथार्थ है.

एकाएक वो उठा और घर में बचे सारे रुपये पैसे लेकर निकल पड़ा सुबह सुबह की बस पकड़ कर शहर की तरह...

शाम बहुत देर से लौटा तो उसके पास सागौन के पेड़ के बीज थे..और एक बहुत बड़ा सपना.

कल वो अपने अहाते से जामुन का पेड़ उखाड़ फेकेगा...और बोयेगा सागौन का बीज..जिसे आज वो खरीद कर ले आया है.

वो जानता है कि ये बीज अगले ५० साल बाद में जाकर परिपक्व मजबूत पेड़ बनेंगे सागौन का..

मगर वो यह भी जानता है कि अगले ५० साल बाद भी हालात न बदलेंगे और उसकी आने वाली पीढियाँ भी उसी की तरह अन्नदाता कहलाती किसी पेड़ से लटक कर आत्म हत्या करने को अभिशप्त होंगी..

बस अब उसे यह उम्मीद है इतनी सी..कि अब वो यह नहीं चाहता कि उसकी आने वाली पीढ़ियाँ भी उसी की तरह कम से कम आत्म हत्या कर इस जीवन से मुक्त हो जाने में धोखा न खायें..जामुन का वृक्ष हो और उसकी शाख टूट न जाये.

बाकी तो हर तरफ धोखा खाना किसान होने के कारण उसकी नियति है ही..उसे तो नजर अंदाज नहीं किया जा सकता. वो नियति है.

आज वो खुश है कि चन्द दशकों में उसके अहाते में सागौन का एक मजबूत पेड़ खड़ा होगा सीना ताने..

वो तो न होगा तब..मगर उसकी आने वाली नस्लें उसे याद करेंगी कि क्या इंतजाम करके गये हैं बिरजू दद्दा..इसे कहते हैं दूरदर्शिता!! शायद!!



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

ई-मेल: <u>sameer.lal@gmail.com</u>

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Ayurveda- Health Care

Prevention From Seasonal Problems- Spring Season

Dr Sangeeta Pahuja

In this series of articles on seasonal health problems, this article is on Spring Season called Vasant Ritu which is currently on. In Ayurveda it is called Sandhikal of Winter and Summer in Ayurveda. This requires changes in diet and lifestyle to cope up with fluctuating temperature and to balance the Doshas to stay healthy.

During this season rise in Kapha Dosha (Kapha Prakop) is experienced due to Kashay Ras pradhan (Astringent) caused by nature. That is the reason that average metabolism of the body undergoes disorders and respiratory problems erupt. Accordingly, some dietary and lifestyle changes are advised to cope up with the season's nature and to stay healthy without any medication.

Prevention from Metabolic Disorders: Healthy Digestive system is the most important aspect of our health and well-being. Healthy digestive system leads to healthy life. Unhealthy digestive system leads to unhealthy life. In short you are ,what you digest. Unhealthy food leads to Imbalance of Tridoshas (Vata, Pita, Kapha). Which further causes Gastrointestinal disorders and lately affects our whole body system. Making the proper food choices leads to optimal digestion. Food compatibility in different seasons has been already elaborated in previous articles in this series. Thus consumption of of healthy food in a healthy manner, compatible to the season can help us to keep our digestive system strong and healthy. Unhealthy food leads to indigestion, hyperacidity, abdominal distention caused by excessive gas formation, constipation, diarrhoea, burning epigastrium, vomiting, irritable bowel syndrome, abdominal pain etc.

Ayurveda works on the principle of balancing of Tridoshas to cure all above problems by providing the diet and lifestyle guidance to stay healthy and herbal medicines to cure the diseased.

Diet and Lifestyle Heplful in Constipation : Ayurveda classifies constipation as a vataj disorder. It is Vata which governs movement and elimination. Therefore, anything that aggravates this dosha viz. stress, tension, travel, dehydration, cold weather, dry,cold, rough food, change in diet, sedentary lifestyle, medication etc. can make constipation problems worse. Usually it is believed that fiberous diet like salad will help to relieve the constipation but people with vataj constitution are not aware that raw vegetables are cold and rough and can cause Vata aggravation and can worsen the condition. This requires them to opt for warm, moist, moderately oily, protein rich food items. Excess Vata causes spasm in the smooth muscles of colon.

Herbs and Food Items to Relieve Constipation : Useful herbs are – Haritaki, Triphala, Psyllium husk, Senna leaves, Nishoth, Cascara Sagrada, Rhubarb, Slippery Elm, Dandelion, Aloe Vera, Fenugreek, Giloy, Makoi, Choti kateri, Brahmi. These herbs are very helpful to relieve Constipation. How long and in which way these herbs are to be consumed, it depends upon constitution of your body. Therefore it is advised to consult with your doctor before taking these herbs.

Likewise, helpful food items are - protein rich diet, lemon water, green tea, cayenne pepper, grapefruit, coffee, apple, papaya, guava, beans, cucumber, ginger, broccoli, gourd, garlic, zimikand, brinjal, all green leafy vegetables are helpful. Grains like red rice, wheat, barley, legumes like mung, lentils, beans, spices like ginger, cinnamon, sweeteners like raw honey etc are very helpful.

Lifestyle: It is advised to opt for active lifestyle, drink plenty of water, avoid day sleeping, avoid night awakening, exercise daily. Eating at the right time in right amount according to season is very helpful to have healthy metabolic system. Do yoga and pranayam viz. kapal bhati,agnisaara pranayam, uddayan bandh asan,mandukasan, bhujang asan, shalabhasan, uttanpadasan, pawanmuktasan, balasan are very helpful.

Know Ayurveda, Follow Ayurveda and Stay Healthy.



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

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Nature's Horizontal and Circular Differentiation -Human's Vertical and Linear Inequality

Prakash Kale

As human being we are governed by two systems. One is of nature and another human made. All things in the system of nature are different, no two things are similar, yet they are at same horizontal plane, are equal, circular and exhibit a harmony. On the other hand human made system is hierarchy based, vertical, and linear and promote inequality and so exhibit continuous conflict and disharmony. To rule out the conflict and disharmony, many social reformer and law maker etc. unsuccessfully tried and trying to make everything equal. Such attemots are against the laws of nature and prompts us to we learn something from it.

It is essential to first understand nature's law. It reminds Two stories from childhood readings In the first one, there was a rat wishing to become big, stronger and strongest. It asked for a boon to a Rishi, the wish was granted changes started occurring. It became rian, then air, followed by a mountain and so on with a greed to more strong. But, but ultimately it ended up to rat in its unltimate pursuit of becoming strongest. Every transformation gave it a realization that someone else is stronger and the cyclical transformation brought it to its original form. Second one also relates to a rat. One day when lion got hold of the rat, it prayed lion to free him, and in turn promises to help the lion in case of need. The mighty lion did not feel that he will ever need any help from rat, however he sets theat free. One day the lion was caught in a net, and then rat frees him by cutting the net. Lesson from the two stories is that nature has made all different yet they are of same importance.

It is important to note that the nature does not follow rule of similarity. Yet, in its scheme of differentiation, nothing is either important or frivolous. No system is follower and no one else is leader. Nothing is big and nothing is small. Everyone is dependent on another and everything is interdependent and complementary to the other. Thus system of nature is horizontal and circular.

Take the example of seasons- summer, rainy and winter and accepted by all despite sharp differences among them. In nature every season is important as it set in beginning of the following season. Thus one cannot say which season is first and which one is last in a cyclic manner,

Against this take human made systems. Though, as said, every philosopher propagates message of equality, yet all human made systems are based on inequality. Difference is inherent due to genetic factor and man made laws of inheritance; it is vertical and linear. It means someone is above than other and two ends of system do not meet i.e. top does not meet bottom. This differentiates human being and their values and creates a race among them to aspire and reach to the higher levels in the hierarchy.

Take example, Mumbaikars who looks down upon people from other states aspiring to settle in Mumbai. This is without prejudice to their aspiration to settle overseas viz. USA. The same can be said about caste system prevalent in India and specially. Reservation and concession do create aspirations. Another example is of the king and the common man i.e. ruler and its Between them there subject. are SO manv layers. Arrangement is vertical and not circular. King does not meet common man. King commands more respect etc. and so on. Though from nature's point of view differentiation has to be there and someone has to organize and someone has to labor. If everyone becomes organizer, then who will do the labour. Differentiation is an unavoidable evil, but cause of friction is vertical inequality, someone feeling higher or lower than other.

It compels one judge which differentiation is utopian – natural or man-made? .

There is vast diversity among people in respect of theiro education, aptitude, taste and life style etc. Educationist laments that only 10-15 % of school children enroll in college. Hypothetically, if all are enrolled in college then emerging scenario is unimaginable. If all become engineer who will be mechanic. Take another example, let us assume that with the invention on mobile phone one fine morning every land line phone are discarded and thrown in sea. It is a binary transition which would require huge demand of resources. Same is truie for any change be it vehicles, fabric or any other commodity. This demands gradual and scaled transition that is managble, affordable and sustainable.

This suggests that any new concept or thought or technology passes through a cycle of theory-researchlaboratory-prototype-introduction. This introduction also starts from a small market before it is put into massive use. Every new product creates phasing out of existing products through decline and disappear. This cycle is just not restricted to technological, it equally applies to every system- be it legal, social, custom and so on. Any untested concept or product can turn out to highly detrimental and even irrepairable. Darwin's theory also propounds gradual adaption in nature's system.

This leads to a belief that human systems can be ever lasting is unsustainable, uneconomical and impractical and hence untenable. In political science USSR's failure is an example. The reason behind the failure is denial to the best ideas to flourish, therby abandoning economic use of resources and concept of recycle. What I am trying to explain is that differentiation in values, lifestyle, economic system, political system and everything else are natural and promotes ingenuity among individals. Moreover, they cannot be wished away.

50 years back population used to be differentiated based on whether they are having electric connection or not. Today it is based on DTH connection or any other criterion. Earlier we used to lament so how many are not going to school today we lament that so humany students after finishing school are not going to college. As per Mr. Nilkeni, in 60-70s, deprivation and differentiation and state's effort was to provide masses "Roti-Kapada-Makan", in 90s focus shifted to "Bijali-Sadak-Pani" and presently or near future it will be "UID-Bank Account-Mobile".

One more example, contrary to current thinking and controversial, is combining both systems. Nature has made man and woman different. It did not say who is important and who is inferior and so on. But, over the ages, manmade rules declared man as superior; its work is superior and so on as compared to woman. This caused detrioartion in the condition of woman in society. Now social reformers and law makers are upbeat to achieve gender equality by equalising their functions. Woman is the first victim of the equalization and false pride. In the process women are burdened with double load, one is of natural role and another is self/society imposed. Another, aspect is when law mandates equality of pay /benefit and also special provision like maternity leave etc. for woman might sound against natural law of economics related. This is the reason that despite feminist movement growing into international arena growth of women workforce is disproportionate. This necessitates respecting maintaining natural geneder-difference but disregarding the vertical hierarchy. This would allow women to benchmark themselves by neither limiting or imitating their counterpart. Any effort to abolish vertical hierarchy or natural and functional differences are against natural order. They are doomed to create chaos in society and bound to fail.

It is concluded that in human system different layers will always be there and they have inherent utility. In fact possessions by elites because, which are not available to masses, enhances their value. They lose value once they become available to masses. No culture or reformer can abolish these differences. Further we need not feel guilty or be apologetic for these differences. All that we can learn from nature is that no one should steal space or right of others or feel superior/inferior. Cause of conflicts is not the inequality or differences, but the stealing or encroachment of other's space, wealth or right. Today much of private profit is coming through not paying, damaging or polluting public goods. Simple example is parking vehicles on road. Thus, a metro citizen neither should try to force a tribal to behave like him nor should he enforce his superiority on and thereby encroach upon his rights. Likewise, an employer need not feel guilty of better living as compared to his employee. All that employers must ensure that their wealth is not at the cost of employee(s). This will ensure harmony and co-existence a characteristic of natural systems.

Apart from differentiation with equality, issue is of connectivity; people at higher or a different stage have to connect with the lowest rung of hierarchy. This connect can be by CEO with peon, PM with common human and so on. There is proverb "ultimate of ruling the masses is to serve them". In fact, once our mindset is free from concept of vertical hierarchy, issue of connectivity is automatically solved.

Lesson from this discussion is that at micro level we need not feel proud or unsatisfied on our position in hierarchy. At macro level our culture should allow coexistence of all system (or hierarchy) as well as mobility from one layer to another without resistance. Such an attitude will evolve from learning of circular and horizontal differentiaon in nature. It has to be achieved individually and collectively a necessity for world peace and harmony.



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

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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— हमारा पंचवर्षीय प्रवास



Start: June-2012



April-2015



June-2016......

पारम्परिक शैक्षणिक मार्दर्शन से प्रारम्भ कर आज हम तकनीकी-विकास के सहारे मूलभूत प्रासंगिकता को आगे बढ़ने में संलग्न हैं.. यह प्रयास अपने सामाजिक कर्त्तव्य के प्रति सहजविनीत आग्रह है; कृपया इस पर विचार करें.

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

- Jonathan Lockwood Huie

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

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Typical Problem in Set Theory

Smt. U. Vidya Rani

In an effort to mentor students emphasis is on conceptual clarity rather than rote learning of formula, problems and their solutions. In this process students are mentored with how and why of every concept including formula. Once, students are drilled in this fashion it grooms in them- (a) conceptual clarity, (b) in the process of deriving various formula and handling problems from first principle, formulae are automatically remembered without carry of burden to do so, (c) twist in the problem, if any, receives attention during solution and thus chances of error in solution is averted, (d) students during practice develop sufficient speed to get to the basics, in the event of any doubt in formula and thus avoid chances of error, and (e) this way of practicing automatically makes formulae and sense of judgment in steps to be followed intuitive, a greatest strength of student under examination conditions, in stress-less mode.

In this pursuit a beginning is being made with a typical problem on set theory, involving its multiple concepts. Set theory has multiple applications in probability and database design, going forward.

Problem: Out of 800 boys in a school, 224 played cricket, 240 played hockey and 346 played soccer. Of the total 64 played both soccer and hockey, 80 played both soccer and cricket and 40 played cricket and hockey, and 24 played all games. What is the number of boys who did not play any game?



Illustration: Venn Diagram based on given data is drawn, taking intersections as per given data. Objective of the problem is to determine $n(U) - n(C \cup H \cup S)$. It requires to determine

From Venn Diagram, following equations are formed-

 $n(C \cap H) = n(W) + n(X), \text{ it leads to}$ $n(W) = n(C \cap H) - n(X) \dots (1)$ $n(H \cap S) = n(V) + n(X), \text{ it leads to}$ $n(V) = n(H \cap S) - n(X) \dots (2)$ $n(C \cap S) = n(T) + n(X), \text{ it leads to}$



$$n(\mathbf{T}) = n(\mathbf{C} \cap \mathbf{S}) - n(\mathbf{X}) \dots (3)$$

Further,

$$n(C) = n(P) + n(W) + n(X) + n(T) \implies n(P) = n(C) - (n(W) + n(X) + n(T)) \quad \dots (4)$$

$$n(H) = n(Q) + n(W) + n(X) + n(V) \implies n(Q) = n(H) - (n(W) + n(X) + n(V)) \quad \dots (5)$$

$$n(S) = n(R) + n(V) + n(X) + n(T) \implies n(R) = n(S) - (n(V) + n(X) + n(T)) \quad \dots (6)$$

Now $n(C \cup H \cup S) = n(P) + n(Q) + n(R) + (n(V) + n(W) + n(T) + n(X))$. Substituting values from Eqns. (4) to (6) -

$$n(C \cup H \cup S) = [n(C) - (n(W) + n(X) + n(T))] + [n(H) - (n(W) + n(X) + n(V))] + [n(S) - (n(V) + n(X) + n(T))] + (n(V) + n(W) + n(T) + n(X))$$

$$\Rightarrow n(C) + n(H) + n(S) - [n(W) + n(V) + n(T) + 2 \times n(T)] \text{Now using Eqns (1) to 3) in subtrahend,}$$

$$\Rightarrow n(C) + n(H) + n(S) - [(n(C \cap H) - n(X)) + (n(H \cap S) - n(X)) + (n(C \cap S) - n(X)) + 2 \times n(X)]$$

$$\Rightarrow n(C) + n(H) + n(S) - [n(C \cap H) + n(H \cap S) + n(S \cap C) - n(X)]$$

$$\Rightarrow n(C) + n(H) + n(S) - [n(C \cap H) - n(H \cap S) - n(S \cap C) + n(X)]$$

From Venn's Diagram $n(X) = n(C \cap H \cap S)$.

Accordingly, $n(C \cup H \cup S) = n(C) + n(H) + n(S) - n(C \cap H) - n(H \cap S) - n(S \cap C) + n(C \cap H \cap S)$. Thus the objective of the problems, in algebraic form, is to determine:

$$n(\mathbf{U}) - n(\mathbf{C} \cup \mathbf{H} \cup \mathbf{S}) = n(\mathbf{C}) + n(\mathbf{H}) + n(\mathbf{S}) - n(\mathbf{C} \cap \mathbf{H}) - n(\mathbf{H} \cap \mathbf{S}) - n(\mathbf{S} \cap \mathbf{C}) + n(\mathbf{C} \cap \mathbf{H} \cap \mathbf{S}) \quad \dots (7)$$

Substituting, the given data in Eqn (7)

$$n(U) - n(C \cup H \cup S) = n(U) - n(C) + n(H) + n(S) - n(C \cap H) - n(H \cap S) - n(S \cap C) + n(C \cap H \cap S)$$

= 800 - (224 + 240 + 346 - (64 + 80 + 40) + 24)
 \Rightarrow 800 - (810 - 184 + 24) = 800 - (834 - 184) = 184 - 34 = 150

Answer: Number of boys not playing any game is equal to 150.



Author is a passionate teacher of mathematics at Ramkrishna Mission High School, Sitanagram, (A.P.) She is into teaching for nearly Fifteen years. Since beginning of IOMS at the school in Aug'17 she has been a Coordinator-Teacher.

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

- Swami Vivekananda



BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE

Prof. SB Dhar

BITS, The Birla Institute of Technology and Science is situated at Pilani in Rajasthan. It is an all India Institution declared as Deemed to be University under Section 3 of the UGC Act 1956. It is India's highest ranked non-Govt. Institute as per QS BRICS, QS Asia and QS India 2019. It is one of the six Institutes of Eminence, as recently announced by MHRD, Govt. of India.

BITS runs the Integrated First Degree programmes at *Pilani* campus, *Goa* campus, and *Hyderabad* Campus. The admissions to these campuses are made on the basis of a *Computer based Online Test* conducted by *BITS*, *Pilani*. The Entrance Test for Admission is called 'BITS Admission Test', in short as BITSAT.

The following streams are available for study:

Pilani Campus

B.E.: Chemical, Civil, Computer Science, Electrical and Electronics, Electronics & Instrumentation, Mechanical, Manufacturing.

B.Pharm.;

M.Sc.: Biological Sciences, Chemistry, Economics, Mathematics, Physics and **M.Sc.:** General Studies.

K. K. Birla Goa Campus

B.E.: Chemical, Computer Science, Electronics & Communication, Electrical and Electronics, Electronics & Instrumentation, Mechanical.

M.Sc.: Biological Sciences, Chemistry, Economics, Mathematics, Physics.

Hyderabad Campus

B.E.: Chemical, Civil, Computer Science, Electronics & Communication, Electrical and Electronics, Electronics & Instrumentation, Mechanical.

B.Pharm.;

M.Sc.: Biological Sciences, Chemistry, Economics, Mathematics, Physics. III

Eligibility criteria-

For admission to all the programmes except B.E. : Candidates should have passed the 12th examination of 10+2 system from a recognized Central or State board or its equivalent with Physics, Chemistry, and Mathematics and adequate proficiency in English.

For admission to B. Pharm.: Candidates should have passed the 12th examination of 10+2 system from a recognized Central or State board or its equivalent with Physics, Chemistry, and Biology and adequate proficiency in English. However, candidates with PCM may also apply for Pharmacy program.

Important

- (a) The candidate should have obtained a minimum of aggregate 75% marks in Physics, Chemistry and Mathematics subjects (if he/she has taken Mathematics in BITSAT) or
- (b) A minimum of aggregate 75% marks in Physics, Chemistry and Biology subjects (if he/she has taken Biology in BITSAT) in 12th examination, with at least 60% marks in each of the Physics, Chemistry, and Mathematics/ Biology subjects.
- (c) Only Students who are appearing for 12th examination in 2019 or who have passed 12th Examination in 2018 are eligible to appear in the BITSAT-2019 test.
- (d) If a candidate has taken more than one attempt in 12th class or its equivalent, only his latest performance is considered, provided this attempt has been for the full component of subjects/courses prescribed. *Students who have passed 12th examination in 2017 or earlier are NOT eligible to appear in BITSAT-2019.* Students who are presently studying in BITS at any of its campuses are not eligible to appear in BITSAT-2019.

Direct Admission to Board Toppers

In the past, admission process of the Institute always ensured guaranteed admission to all the students who obtained first ranks in their respective board examinations. This has given a very vital input of highly meritorious students from all over India.

First rank students of all the central and state boards in India for the year 2019 will be given direct admission to the program of their choice, irrespective of their BITSAT-2019 score as per the eligibility criteria mentioned above. Further details about this scheme will be available at BITS admission website by 15th of May 2019.

Test Format

- (a) BITSAT-2019 will be of total 3-hour duration (without break).
- (b) The test will consist of four parts: Part I : Physics (40 Questions) Part II : Chemistry (40 Questions) Part III: (a) English Proficiency (15 Questions) and (b) Logical Reasoning (10 Questions)

Part IV : Mathematics or **Biology** (For B. Pharm candidates) (45 Questions)

(c) There will be in total 150 Questions. The nature of the Test Questions will be Multiple Choice Question (MCQ). Each question will have four options out of which only one will be the correct option. Each correct answer will have 3 marks and each wrong answer a penalty of 1 mark i.e. (-1 mark). If question is unattended, then no marks will be awarded.

Syllabus

The BITSAT-2019 test will be conducted on the basis of **NCERT syllabus for 11th and 12th** class. Candidates may refer to the NCERT textbooks for the contents.

Note

No student will be allowed to repeat the test in the same year.

Examination Centres- There are 51 Test Centers all over India to facilitate the aspirants.

Agra, Agartala, Ahmedabad, Allahabad, Banglore, Bareilly, Bhopal, Bhubneshwar, Chandigarh, Chennai, Coimbatore, Delhi, Dubai, Ghaziabad, Goa Campus of BITS, Gorakhpur, Gurgao, Guwahati, Gwalior, Hyderabad City, Hyderabad Campus of BITS, Hyderabad City, Indore, Jaipur, Jalandhar, Jammu, Jamshedpur, Jodhpur, Kanpur, Kolkata, Lucknow, Mangalore, Mumbai, Nagpur, Nasik, Noida, Patna, Pilani campus of BITS, Pune, Raipur, Rajahmundry, Ranchi, Roorkee, Siliguri, Surat, Tirupati, Thiruvananthapuram, Udaipur, Vadodara, Vijayawada, Visakhapatnam.

Important dates and deadlines Deadline to apply online for BITSAT-2019: 20th March 2019 (5.00pm)

Revision/editing (online) in the application form by candidates: 22nd – 25th March 2019

Test center allotment and announcement to candidates: 27th March 2019

Candidates to reserve Test date and slot : 28th March – 8th April 2019

Candidates to download the Hall tickets with instructions: 12th April – 13th May 2019

BITSAT Online tests: 16th May - 26th May 2019 *

Apply for admission with 12th marks and Preferences: 16th May – 18th June 2019

Admit list and Wait list announcement: 20th June 2019 * Dates and No. of days may vary from center to center

How to apply for writing BITSAT-2019?

A candidate has to complete the application form online at *http://www.bitsadmission.com* and pay the prescribed fees.

The prescribed fee for BITSAT-2019 is Rs. 3150/-(three thousand one hundred fifty) for male candidates and Rs. 2650/- (two thousand six hundred fifty) for female candidates. This fee is non-refundable and nontransferrable.

If a candidate chooses Dubai as a test center the application fee for both male and female candidates will be same and will be US \$80 (Rs. 5600).

Deadline to apply for BITSAT-2019 online along with the fee payment was 5.00pm on 20th March 2019 (Wednesday).

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



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रंगों की बस्ती	नमन उन शहीदों को
मृणालिनी घुळे	डॉ. संगीता पाहुजा
रंगों की बस्ती	नमन उन शहीदों को,
सभी हैं एक हस्ती	जा वतन पर पुरुषान हो गए। जगत जननी धरा का कर्ज अदा कर.
आई है होली।	धरा में ही विलीन हो गए।
	लहलहाती रहे ये धरा,जान कुर्बान कर,
होली का चाव	रक्त स उस साथ गए। नमन उन शहीटों को
भूलागभेट भाव	जो वतन पर कुर्बान हो गए।
गुरारिनय-नाप	
वरस रगा	गुजायमान हा उठा समा, आसमां से धरा तक
	वन्देमातरम के सरों से।
हे पिचकारी	श्रद्धासुमन बह् निकले,
प्यार की रंग भरी	हर देशभक्त के चक्षुओं से,
रंगोली होली।	उनके लिए जी धरी की आने तान शान पर कर्तान हो गए।
मन में मस्ती	है समझते जो सभी देशवासियों को अपना परिवार,
ऋतु भी है हँसती	उनक सहार अपना का छाड़ गए। है नमन उन शहीरों के प्रतिगर्ग को
आई है होली।	जो इस कूर्बानी को सहर्ष सह गए।
• • •	
रंगों से करें	जो समझते स्वयं को देशवासी और देशभक्त,
तर्णभेद काअंत	वा जात पति से पर हा गए। देशभक्त बनकर देश
जनी निमंग	पर कुर्बान हो गए।
સુરામયગલા	नमन उन शहीदों को जो वतन पर कुर्बान हो गए।



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 प्रकाशितहै। ई-मेल mrinalinighule46@gmail.com



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

-00—

- Arnold Schwarzenegger

Students' Section

Home Work

This article is about the use of homework and how it affects a student. Homework has historically been given to students to reinforce what they learn at school and ultimately to help them learn the material better. However, too much homework is not helpful, and can be counter- productive.

The amount of homework increases with the increase in class. Dr. Kralovec, author of 'The End of Homework' argues that doing homework during High school has little or no effect on successful study skills of the students when they join college. Excessive amount of homework can be harmful to kids both physically and mentally. A lot of homework usually means a lot of books to carry. Carrying large amounts of weight daily at a young age can do a lot of damage because bones are still in development stage.

> When extracurricular activities such as sports, clubs etc. are added to picture, kids may even have to wake

Bharat Kumar

up early next morning to finish their homework, leaving them with insufficient amount of sleep.

Homework also takes away the time that a kid could be spending with his or her family. Rather than spending time together and building strong family relationships, parents and children argue over homework. When assignments are given carelessly and frequently, it causes student to lose interest in subject. Negative results can also occur when a student is not able to complete his or her homework. Many times they will resort to copying the homework, having others do their assignments, or cheating in tests.

The use of homework is effective when the rule is "less is more". This is not to say homework should be abolished, but it should be limited and made creative enough to arouse interest in the child. In this exercise teachers can also provide necessary tips to students.



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Technology

G.Ganesh

Technology is the collection of techniques, skills, methods and processes used in the production of goods or services or in the accomplishment of objectives, such as scientific investigation or it can be embedded in machines to allow for operation without detailed knowledge of their workings.

Technology And Its Effects: Technology and human life cannot be separated; society has a cyclical codependence on technology. We use technology; depend on it in our daily life. Humans use technology to travel, to communicate, to learn, to do business and to live in comfort. However, technology has also caused us concerns. Its poor application has resulted in the pollution of the environment and it has also caused a serious threat to our lives and society. This calls for the proper use of technology.

The biggest challenge facing people is to determine the type of future we need to have and then create relevant technologies which will simplify the way we do things. It is impossible to explore how each new advanced technology has impacted our lives and how it will impact the future. Technology impacts the environment, people and the society as a whole. The way we use technology determines its impacts which can be either positive to the society or negative.

Positive impact: We can use corn to make ethanol and this ethanol can be used as a fuel. Fuel can be used to run machines and cars which will increase the output of manufacturing units.

Negative Impact: However, if we decide to shift large quantities of fuel production from food productions, humans will be left with no food and this will cause world hunger which is even a worse situation.

Technology is an integral and important part of our life. Use of technology in computers and the internet has helps us to complete school projects and conduct research. It helps to speed up the learning process for students like myself because it creates a more efficient learning environment in many ways. For example I can write this article post much faster than I could if I were to hand write it. And of course without the internet I wouldn't be able to view my article after it is published.

"SAVE OUR EARTH, WE DON'T HAVE ANOTHER"



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

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

-00-

Answers: Science Quiz- March'19

Kumud Bala

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



ANSWER: CROSSWORD PUZZLE March'19: Inventions & Inventors Prof. S.B. Dhar

																						1R
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Growing With Concepts - Mathematics

LET'S DO SOME PROBLEMS IN MATHEMATICS-VIII (Focus-BITSSAT)

Prof. SB Dhar

This section contains some of the Questions asked in the Entrance Test of BITS Pilani from the section of English and Mathematics. The purpose of selection of these questions is to make the aspirants aware of the standard of the test paper. The solutions to the questions are not being given here. Only the answers are given. If the aspirants need solutions, they may request the Coordinator for that individually.

English

1. Out of the four alternatives, choose the one which express the right meaning of the word

Augment	
(a) Increase	(b) Decrease
(c) Save	(d) Mention
Ans: (a)	

Out of the four alternatives, choose the one which express the right meaning of the word *Consolation*
 (a) Comfort
 (b) Problem

(a) Connort	
(c) Sadness	(d) Solution
Ans: (a)	

Out of the four alternatives, choose the one which express the right meaning of the word *Auxiliary* (a) Chief
 (b) Supplemental

(a) Chief	(b) Supplement
(c) Negligible	(d) Separate
Ans: (b)	

4. Choose the word apposite meaning to the given word *Auspicious*

(a) Prosperous	(b) Unfavourable
(c) Improper	(d) New
Ans: (b)	

5. Choose the word apposite meaning to the given word *Recompense*

(a) Emolument	(b) Reward
(c) Payment	(d) Penalty
Ans: (d)	

6. Choose the word apposite meaning to the given word *Impede*

(a) Block	(b) Delay
(c) Push	(d) Free ze
Ans: (c)	

7. A part of sentence is underlined. Balance are given alternatives to the underlined part a, b, c and d which many improve the sentence. Choose the correct alternative.

They *requested* me to follow them

- (a) Ordered (b) Urged
- (c) Asked (d) No improvement

Ans: (a)

8. A part of sentence is underlined. Balance are given alternatives to the underlined part a, b, c and d which many improve the sentence. Choose the correct alternative.

She did not *believed* me.

(a) Believing
(b) Believe to
(c) Believe
(d) No improvement
Ans: (c)

- 9. A part of sentence is underlined. Balance are given alternatives to the underlined part a, b, c and d which many improve the sentence. Choose the correct alternative.
 - I am fine, what about *you*?
 - (a) Your
 (b) Your's
 (c) Yours
 (d) No improvement
- 10. What is your
 for tonight?

 (a) Principle
 (b) Motto

 (c) Plan
 (d) Objective

 Ans: (c)
 (c)
- 11. Arrange the following sentences in correct pattern and mark at the correct combination. Today we live in modern technology era. P:We have a lot of problems now. Q:We want to get everything in one day. R:Ancient time was quite pleasant. S:We had no problems then. C:Perhaps greed is the main cause for this.
 (a) PQRS (b) PRSQ (c) SRQP (d) RPQS Ans: (b)
- 12. Arrange the following sentences in correct pattern and mark at the correct combination. He is a common man.P:Yesterday our city saw a brutal crime. Q:Police is trying to arrest innocent persons. R:The criminals are well known.
 - S:Police as well as whole system in corrupt.

C:Police will arrest him as he is an easy target because of being a common man.

- (a) PRSQ (b) PQSR (c) PQRS (d) PSOR Ans: (a)
- 13. In a certain code language, 'SAFER' is written as 5@3#2 and 'RIDE' is written as 2@%#, how would 'FEDS' be written in that code? (b) 3©%5 (c) 3#%5 (d) 3#%2 (a) 2#©5 Ans: (c)
- 14. Today is Thursday, The day after 59 days will be (b) Monday (a) Sunday
 - (c) Tuesday (d) Wednesday Ans: (a)
- 15. If + means x, means +, x means \div and \div means -, then $6-9+8x3 \div 20$ is (a)-2 (b)6 (c)10 (d)12 Ans: (c)

Mathematics

(a) 3 (b)
$$\pi$$
-3 (c)4 (d) π -4
Ans: (d)

 $(d)_{3 \le M \le 4}$

$(c)2 \le M \le 3$	(d)3≤M≤4
Ans: (a)	

The complex number z=x+iy which satisfies the 2.

equation $\left| \frac{z - 3i}{z + 3i} \right| = 1$, lie on (a) The X-axis (b) The straight line y=3(c) A circle passing through origin

- (d) None of the above
 - Ans: (a)
- 3. If f(x) is an odd periodic function with period 2, then f(4) is equal to (a) -4 (b) 4 (c) 2(d) 0Ans: (d)
- The solution of the differential equation 4.

$$\frac{x + \frac{x^3}{3!} + \frac{x^5}{5!} + \dots}{1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \dots} = \frac{dx - dy}{dx + dy}$$
 is
(a) $2ye^{2x} = ce^{2x} + 1$ (b) $2ye^{2x} = ce^{2x} - 1$
(c) $ye^{2x} = ce^{2x} + 2$ (d) None of these
Ans: (b)

- 5. The value of k such that the lines 2x-3y+k=0, 3x-3y+k=04y-13=0 and 8x-11y-33=0 are concurrent, is (a) 20 (b) -7 (c) 7 (d) -20 Ans: (b)
- 6. Two lines, whose equations are

 $\frac{x-2}{2} = \frac{y-2}{3} = \frac{z-1}{\lambda}$ and $\frac{x-2}{3} = \frac{y-3}{2} = \frac{z-2}{3}$ lie in the same plane. Then, the value of $\sin^{-1}\sin\lambda$ is

equal to

7. If
$$\frac{e^x}{1-x} = B_0 + B_1 x + B_2 x^2 + ... + B_n x^n + ...$$
 then the value of $B_n - B_{n-1}$ is
(a) 1 (b) $\frac{1}{n}$ (c) $\frac{1}{n!}$ (d) None of these *Ans:* (c)
8. 2^{3n} -7n-1 is divisible by
(a) 64 (b) 36 (c) 49 (d) 25
Ans: (c)

- 9. If $\int_{0}^{1} e^{x-\lfloor x \rfloor} dx = k(e-1)$, then the value of k is equal to (b) 25 (c) 23 (d) 24 (a) 12 Ans: (b)
- 10. A variable chord PQ of the parabola $y^2=4ax$ subtends a right angle at the vertex, then the locus of the points of intersection of the normal at P and Q is (a) A parabola (b) A hyperbola (c) A circle (d) None of these Ans: (a)
- 11. If $\omega \neq 1$ is a cube root of unity, then

$$A = \begin{bmatrix} 1+2\omega^{100} + \omega^{200} & \omega^2 & 1 \\ 1 & 1+2\omega^{100} & \omega \\ \omega & \omega^2 & 2+\omega^{100} + 2\omega^{200} \end{bmatrix}$$

(a) is singular (b) $|A| \neq 0$
(c) is symmetric (d) None of the above
Ans: (a)

12.
$$\lim_{x \to \tan^{-1} 3} \frac{\tan^2 x - 2 \tan x - 3}{\tan^2 x - 4 \tan x + 3}$$
 equals to
(a) 1 (b) 2 (c) 0 (d) 3

Ans: (b)

13. Number of roots of the equation

$$\begin{vmatrix} \sin x \cdot \cos x \end{vmatrix} + \sqrt{2 + \tan^2 x + \cot^2 x} = \sqrt{3} \text{ where }, x \\ \in [0, 4\pi] \text{ are} \\ \text{(a) } 1 \quad \text{(b) } 2 \quad \text{(c) } 3 \quad \text{(d) None of these} \\ Ans: (d) \end{vmatrix}$$

16. If
$$f(x) = \begin{cases} \left(\tan\left(\frac{\pi}{4} + x\right) \right)^{\frac{1}{x}}, x \neq 0 \\ k, x = 0 \end{cases}$$

- For what value of k, f(x) is continuous at x=0? (a) 1 (b) 0 (c)e (d)e² Ans: (d)
- 17. Five persons A,B,C,D and E are in queue of a shop. The probability that A and E are always together, is

(a) $\frac{1}{4}$	(b) $\frac{2}{3}$	(c) $\frac{2}{5}$	(d) $\frac{3}{5}$
Ans: (c)			

18. The sum of the $\log_4 2 - \log_8 2 + \log_{16} 2 - \dots$ Is

(a)
$$e^2$$
 (b) $\log_e 2 + 1$
(c) $\log_e 3 - 2$ (d) $1 - \log_e 2$
Ans: (d)

19. The sum of the coefficients in the expansion of (5x-4y)ⁿ, where is n a positive integer, is
(a) 0 (b) n (c)1 (d)-1 Ans: (c)

20.
$$a = \sum_{n=0}^{\infty} \frac{x^{2n}}{3n!}, \ b = \sum_{n=1}^{\infty} \frac{x^{3n-2}}{(3n-2)!}, \ c = \sum_{n=1}^{\infty} \frac{x^{3n-1}}{(3n-1)!},$$

then the value of $a^3 + b^3 + c^3$ -3abc is
(a)1 (b) 0 (c) -1 (d)-2
Ans: (a)

21. The unit vector perpendicular to the vectors $\hat{i} - \hat{j}$ and $\hat{i} + \hat{j}$ forming a right handed system is



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(a)
$$\hat{k}$$
 (b) - \hat{k}
(c) $\frac{\hat{i} - \hat{j}}{\sqrt{2}}$ (d) $\frac{\hat{i} + \hat{j}}{\sqrt{2}}$
Ans: (a)

22. The area bounded by the curves $y = -\sqrt{-x}$ and

$$x = -\sqrt{-y} \text{ where } x, y \le 0 \text{ , is}$$
(a) $\frac{1}{3}$ (b) $\frac{1}{4}$ (c) $\frac{1}{5}$ (d) $\frac{1}{2}$
Ans: (a)

23. If α and β are the roots of the equation $x^2-px+q=0$, then the value of

$$(\alpha + \beta)x - \left(\frac{\alpha^2 + \beta^2}{2}\right)x^2 + \left(\frac{\alpha^3 + \beta^3}{2}\right)x^3 - \dots \text{ is}$$

(a) log(1-px+qx²)
(b) log(1+px-qx²)
(c) log(1+px+qx²)
(d) None of these
Ans: (a)

- 24. A student is allowed to select atmost n books from a collection of (2n+1) books. If the number of ways in which he can do this, is 64, then the value of n is
 (a) 6 (b) n (c) 3 (d) None of these Ans: (c)
- 25. Let R={(3,3), (6,6), (9,9), (12,12), (6,12), (3,9), (3,12), (3,6)} be a relation on the set A={3,6,9,12}. The relation is

 (a) An equivalence relation
 (b) Reflexive and symmetric
 (c) Reflexive and transitive
 - (d) Only reflexive
 - (a) Only 1 Ans: (c)
- 26. The value of a so that the sum of squares of the roots of the equation x²-(a-2)x-a+1=0 assume the least value, is

 (a) 2
 (b) 0
 (c) 3
 (d) 1

CROSSWORD PUZZLE April'19 : NATIONALISM

Prof. SB Dhar

		1		2		3								
						4		5						
											6			
		7	8								9			
								10						
											11			
	12													
13														

Across	Down
4 Patriotism is virtue of the vicious	1 The true India resides in the villages
7 No sanction can stand against ignited minds	2 India is a country in which every great religion finds a home
9 Nations whose nationalism is destroyed are subject to ruin. We are Indians firstly and lastly	3 A nation that cannot control its border is not a nationrs
10 We are Indians firstly and lastly	5 You can change friends but not neighbours
11 Turn Mujhe Khoon Do, Main Tumhe Aazadi Dunga	6 Our true nationality is mankind
13 Citizenship consists in the service of the country	8 A nation that does not honour its past has no future
	12 Swaraj is my birth right and I shall have it

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

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

- John Adams

Growing with Concepts : Physics

Heat & Temperature - Foundation of Thermodynamics

Understand of heat and mechanics is has grown organically with human civilization, It is only in 1840 that James Prescott Joules formalized through an experiment mechanical equivalent of heat and set the understanding of thermodynamics. While Heat is one of the form of energy, temperature is a perceivable effect of heat. Heat is an inseparable to existence of nature.

Mentors' Manual is one of the dimensions of the Gyan Vigyan Sarita through which efforts are being made to reach out to remote teachers through our experience of mentoring unprivileged children who are disconnected from us by virtue of multiple barriers. Direct interaction through Interactive Online Mentoring Sessions (IOMS) is our real life model of connecting unprivileged children in a selfless manner. This experience is being disseminated to the teachers spread out writing of chapters for Mentors' Manual. Accordingly one chapter has been dedicated on Heat and Thermodynamics.

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

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

It creates a question, can one wait for the virtual labs to become available to gain proficiency in concepts? Definitely not, then the only way to get going on acquiring proficiency in concepts and their applications, soon after learning them, is solving problems of variety. This is a key to patience and perseverance to acquire proficiency, and an essential ingredient of development of skill.

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

In addition questions from different examinations provide an opportunity to handle questions of sorts, a necessary practice to be followed once graded questions are solved.

In the illustrations, to the problem in the question banks, some student may find them to be a bit lengthy and dwelling into basics more than required. Their patience is requested for the benefit of those students who did not have proper opportunity to understand basics and apply them. Such students are in plenty spread all across, yet disconnected from main stream and interactive learning through IOMS.

Three question and their illustrations are drawn from the set-1, on Heat and Thermodynamics, covering question on temperature and thermal expansion and appended here. The complete set of 41 questions is being uploaded as a free web-resource.

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

ILLUSTRATIONS OF TYPICAL QUESTIONS ON HEAT and TEMPERATURE

(Set 1, on Chapter 2: Heat and Thermodynamics)

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

Question 1: If the temperature of a uniform rod is slightly increased by Δt , its moment of inertia *I* about a line parallel to itself will be increased by

- (a) Zero
- (b) $\alpha I \Delta t$
- (c) $2\alpha I\Delta t$
- (d) $3\alpha I\Delta t$

Illustration: Taking rod to be of circular cross-section of radius r, its moment of

inertia is $I = \frac{mr^2}{2}$. On increase of temperature by Δt the radius would undergo thermal expansion and it would be $r_{\Delta t} = r(1 + \alpha \Delta t)$. Accordingly,



$$I_{\Delta t} = \frac{mr_{\Delta t}^{2}}{2} = \frac{m\left(r\left(1+\alpha\Delta t\right)\right)^{2}}{2} = \frac{mr^{2}}{2}\left(1+2\alpha\Delta t+\alpha^{2}\left(\Delta t\right)^{2}\right) \approx I\left(1+2\alpha\Delta t\right).$$
 This

approximation is based on the fact that $\alpha \ll \Delta t$ and therefore $\alpha^2 (\Delta t)^2 \rightarrow 0$. Accordingly, $I_{\Delta t} = I + 2\alpha I \Delta t$.

Moment of inertia of a rod of length *l* and mass *m* is about an axis X'-X' parallel to axis of the rod X-X, and a distance *d*, as per *parallel axis theorem*, would be $I_d = I + \sum md^2\Delta l = I + md^2 \int_0^l dl = I + md^2 l$. And on increase of temperature by Δt by new moment of inertia would be $I_{d-M} = I_M + md^2 l$.

Thermal expansion of cross-section of rod is radially uniform and hence it will have no effect of change in temperature on d. Accordingly, change in moment of inertia is $\Delta I_{d-\Delta t} = I_{d-\Delta t} - I_d$. This simplifies into $\Delta I_{d-\Delta t} = (I(1+2\alpha\Delta t)+md^2l) - (I+md^2l) = 2\alpha I\Delta t$. Thus answer is option (c).

N.B.: In the problem radius is since not given it is assumed to be r. This is essential unless problem states that it is a thin rod or a wire.

Question 2: A spinning wheel is brought in contact with an identical wheel spinning at identical speed. The wheel slows down under action of friction. Which of the following energies of the first wheel decrease?

- (a) Kinetic
- (b) Total
- (c) Mechanical
- (d) Internal

Illustration: Since the two wheels are identical $M_1 = M_2 = M$; $I_1 = I_2 = I$; $R_1 = R_2 = R$. Let wheel has initial angual velocity $\omega_{1i} = -\omega$ i.e. in clockwise direction, and $\omega_{2i} = 0$. Therefore initial kinetic of

the system would be
$$KE_i = \frac{1}{2}I\omega_i^2 + 0 = \frac{1}{2}I\omega_i^2$$
.

When the two wheels are brought in contact they will experience a force of friction such that, f_1 will tend to retard wheel 1 i.e. decrease magnitude ω_1 with an angular

retardation such that $I\alpha = fR \Rightarrow \alpha = \frac{fR}{I}$ and f_2 will accelerate wheel 2 i.e. increase magnitude of ω_2 with an angular acceleration $\alpha = \frac{fR}{I}$. This will continue until $\omega_1 = \omega_2$. In this process at any time t when $\omega_1 > \omega_2$ kinetic energies of

the two wheels would be $KE = \frac{1}{2}I\omega_1^2 + \frac{1}{2}I\omega_2^2$. Here, $\omega_{1t} = \omega_{1t} - \alpha t = \omega_{1t} - \frac{fR}{I}t$ and

 $\omega_{2t} = \omega_{2i} + \alpha t = 0 + \frac{fR}{I}t = \frac{fR}{I}t.$ In the process angular displacement of the two wheels are $\theta_{1t} = \omega_{1i}t + \frac{1}{2}\alpha t^2 = \omega_{1i}t + \frac{fR}{2I}t^2$ and $\theta_{2t} = \omega_{2i}t + \frac{1}{2}\alpha t^2 = \frac{fR}{2I}t^2$, respetively. Thus frictional work done during this on wheel 1 is $W_{f1} = 2\pi R\theta_{1t}f = 2\pi R\left(\omega_{1i}t + \frac{fR}{2I}t^2\right)f$ and that on wheel 2 is $W_{f2} = 2\pi R\theta_{2t}f = 2\pi R\left(\frac{fR}{2I}t^2\right)f$.

Thus for wheel 1, at time t shall be $KE_{1t} = \frac{1}{2}I\omega_{1t}^2 = KE_{1t} - W_{f1} = \frac{1}{2}I\omega_t^2 - 2\pi R\left(\omega_{1t}t + \frac{fR}{2I}t^2\right)f$ and kinetic energy of

wheel 2 at that instant shall be $KE_{2i} = KE_{2i} + W_{f2} = \frac{1}{2}I\omega_{2i}^2 = 2\pi R \left(\frac{fR}{2I}t^2\right)f$. Thus, kinetic energy of the wheels decreases. It leads to $\Delta KE_1 = \Delta KE_{1i} - \Delta KE_{1i} = \left(\frac{1}{2}I\omega_i^2 - 2\pi R \left(\omega_{1i}t + \frac{fR}{2I}t^2\right)f\right) - \frac{1}{2}I\omega_i^2$. It leads to

 $\Delta K E_1 = -2\pi R \left(\omega_{1l} t + \frac{fR}{2I} t^2 \right) f$, here (-)ve sign is indicative of the fact that kinetic energy of the system decreases with time. *This makes, option (a) true*.

Question 3: What will be the stress at -20[°]C in steel rod having tensile load of 5000 N at 20[°]C. Cross-sectional area of the rod is 150 mm² and it is stretched between two fixed points. Given that for the rod $\alpha = 11.7 \times 10^{-6}$ /[°]C and $Y = 2.00 \times 10^{13}$ N · m⁻²

Illustration: Let free length of rod at $\theta^0 C$ be l_{θ} the fixed streched length of the rod be l_0 . Free length of the rod at $20^0 C$ is $l_{20} = l_{\theta} (1 + \alpha (20 - \theta))$. This rthemally expanded rod is subjected to force of 5000 N to fix it between two rigid ends at a distance l This will create an elastic elongation in the rod $\Delta l_1 = l - l_{20} = l - l_{\theta} (1 + \alpha (20 - \theta))$.

As per Hooke's Law $\frac{\Delta l}{l} = \frac{p}{Y} \Rightarrow \Delta l = \frac{pl}{Y} = \frac{Fl}{AY}$. Thus elastic elongation in the rod of cross-section $150 \times 10^{-6} \text{ m}^2$



is N.m⁻² under a stress
$$\sigma_1 = \frac{5000}{150 \times 10^{-6}} = 33.3 \times 10^6$$
. N.m⁻²

Now keeping the ends of the lod fixed at distance l the system is cooled to $(-)20^{\circ}$ C. Therefore freelength of rod will change to $l_{-20} = l_{\theta} (1 + \alpha (-20 - \theta))$. Thus total themal contraction in free length of the rod is $\Delta l_{\Delta t} = 40 \times l_{\theta} \times \alpha$.

Thus, elastic elongation in the rod with it length fixed at
$$l$$
 is
 $\Delta l_2 = \Delta l_1 + \Delta l_{\Delta t}$. Thus, rod will experience an additional stress to
undertake an elastic elongation $\Delta l_{\Delta t}$ such that
 $\Delta p = \Delta l_{\Delta t} \left(\frac{Y}{l_{\theta}}\right) = 40\alpha l_{\theta} \left(\frac{Y}{l_{\theta}}\right) = 40\alpha Y$. It solves into
 $\Delta \sigma = 40 \times (11.7 \times 10^{-6}) \times (2.00 \times 10^{11}) = 9.36 \times 10^7 \text{ N.m}^{-2}$. Thus
stress at -200C would be $\sigma_2 = \sigma_1 + \Delta \sigma$, it solves to
 $\sigma_2 = 33.3 \times 10^6 + 93.6 \times 10^6 = 126.9 \times 10^6 = 127 \times 10^6 \text{ N.m}^{-2}$



N.B.: Though $l_{-20} < l_{0} < l_{20}$, but due to coefficient of thermal expansion being very small for elastic elongation $_{-20} \approx l_{0} \approx < l_{20}$ In addition principle of significant digits is used in reporting the answer

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

It is a real thrill, full of fun. But, it can't be done in dicrete manner, it has to be done patiently, like climbing stair far a faster and purposeful journey. This is where role of education come in; it is to streamline the process.

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

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

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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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Growing with Concepts: Chemistry

EQUILIBRIUM

Kumud Bala

It is a common observation that most of the reactions when carried out in closed vessels do not go to completion under given set of conditions of temperature and pressure. In fact in all such cases, in the initial stage, only the reactant are present but as the reaction proceeds, the concentration of reactants decreases and that of products increases. Finally, a stage is reached when no further change in concentration of reactants and products is observed. At this stage there is a balance between reactants and products and the reaction appears to have stopped. This state is called equilibrium state. So, "Equilibrium" may be define as the state of a process in which properties like temperature, pressure and concentration of the system (reactants and products) do not show any change with the passage of time. In all processes which attain equilibrium, two opposing processes are involved. Equilibrium is attained when the rates of the two opposing processes become equal. If the opposing processes involve only physical changes, the equilibrium is called physical equilibrium. If the opposing processes involve chemical changes i.e. the opposing processes are chemical reactions, the equilibrium is called chemical equilibrium. The mixture of reactants and products at equilibrium is called an equilibrium mixture. In general, a chemical equilibrium is represented as aA + bB $\leftrightarrow xX + yY$ where A and B are the reactants and X and Y are the products. The double arrow between the reactants and products shows that the reaction is taking place in both the directions simultaneously. But the rates of forward and backward reactions become equal. As a result, the concentration of each species becomes constant. The system is said to be in a dynamic equilibrium. Dynamic means moving and at a microscopic level, the system is in motion. Thus, although there is no apparent change at equilibrium yet both forward and backward reactions continue to take place. Rate of forward reaction = Rate of backward reaction.

Equilibrium in Physical Processes: We know that the substances exist in three states: solid, liquid and gaseous. Equilibria involving physical processes are those which involve phase transformations. These include solid \leftrightarrow liquid, liquid \leftrightarrow gas and solid \leftrightarrow gas. In addition, there are equilibria involving dissolution of solids in liquids and gases in liquids, i.e. solid \leftrightarrow solution, gas \leftrightarrow solution. Let us consider these equilibria briefly.

1. Solid – liquid equilibrium (melting of ice) –



let us place some ice and water in a perfectly insulated thermos flask at 273K and normal atmospheric pressure. Since the flask is insulated, no heat will enter or leave the system

and mass of ice and water is found to remain constant. However, the two opposing processes going on at equilibrium are melting of ice and freezing of water. At equilibrium, rate of melting of ice = rate of freezing of water. The equilibrium is represented as $H_2O(s) \leftrightarrow H_2O$ (l). At equilibrium under normal atmospheric pressure, the temperature at which the solid and liquid form a pure substance, is called normal freezing point or melting point of that substance. We can conclude that both the processes (melting and freezing) occur simultaneously. Both the processes occur at the same rate so that amount of the substance on both sides become constant.

2. Liquid- vapour (gas) equilibrium:-(Evaporation of water in a closed vessel) : consider a closed vessel connected to a manometer. Suppose the vessel is evacuated. The level of the mercury in both the limbs of the manometer will be same. Now water is added into the vessel and the whole apparatus is allowed to stay at room temperature. It is observed that the level of mercury in the left limb of the manometer begins to fall and that in the right limb begins to rise.



However, after sometime the level become constant. The system is then said to have attained equilibrium. The difference in the levels of mercury in the two limbs gives equilibrium vapour pressure of water at room temperature. From molecular point of view, the above observation can be explained as follows: In the beginning more and more of the water evaporates, i.e. number of water molecules in the vapour phase increases. Some of these molecules strike back on the surface of water and get condensed. Ultimately, the amount of water vapour becomes constant, i.e. as much water changes into vapour, the same amount of water vapour change back into the liquid water. Thus, at equilibrium, as rate of evaporation \leftrightarrow rate of condensation, the equilibrium is represented as $H_2O(l) \leftrightarrow H_2O(g)$. It is important to note that in the beginning as water evaporates pressure increases but at constant temperature, the rate of evaporation becomes constant. Further. equilibrium cannot be attained if the process is carried out in an open vessel. This is obvious because in an open vessel condensation of vapour back to water will not take place.

- Solid-Vapour equilibrium: This type of 3. equilibrium is attained for solids which undergo sublimation. For example, we place some solid iodine in a closed vessel and warm it. Iodine sublimes to iodine vapour. The vessel gets filled up with violet vapour and the intensity of colour increases with time. After some time, the intensity of colour becomes constant. At this stage, equilibrium is attained, rate of sublimation of solid I_2 to form vapour = rate of condensation of I_2 vapour to give solid I_2 , I_2 (solid) \leftrightarrow I_2 (vapour). Some other examples showing this type of equilibrium are: NH_4Cl (solid) \leftrightarrow NH_4Cl (vapour), camphor (solid) \leftrightarrow camphor (vapour).
- 4. Solid-Solution Equilibrium (dissolution of sugar in water):- suppose sugar is added saturated Solution continuo





usly into a fixed volume of water at

room temperature and stirred thoroughly with a glass rod, the sugar first keeps on dissolving but then a stage will come when no more sugar dissolves. Instead, it settles down at the bottom. The solution is now said to be saturated and in a state of equilibrium.

- At this stage, as many molecules of sugar from the surface of undissolved sugar go into the solution (process called dissolution), the same number of molecules of sugar from the solution are deposited back on the surface of the undissolved sugar (process called precipitation). As a result, the amount of the undissolved sugar and the concentration of sugar in the solution remain constant. At equilibrium, rate of dissolution = rate of precipitation. The equilibrium is written as sugar (solid) \leftrightarrow sugar (in solution). The amount of the solid in grams that dissolves in 100 g of the solvent to from a saturated solution at a particular temperature is called the solubility of that solid in the given solvent at that temperature.
- Gas-solution equilibrium (dissolution of a 5. gas in a liquid under pressure in a closed vessel): the best example of this type of equilibrium in that of a soda water bottle. The equilibrium that exists within the bottle is CO_2 (g) \leftrightarrow CO_2 (in solution). The amount of the gas dissolved is governed by Henry's law which states as follows: "The mass of a gas dissolved in a given mass of a solvent at any temperature is directly proportional to the pressure of the gas above solvent". i.e. mass α pressure or m = kp where k is called a constant of proportionality and is called Henry's constant. Its value depends upon the nature of the gas, nature of the liquid and temperature. The reason is that why the gas fizzes out when a soda water bottle is opened. In the sealed soda water bottle, the pressure of the gas is very high above the liquid, so that mass of the CO₂ gas dissolved is also high. As soon as the bottle is opened, the pressure tends to decrease to atmospheric pressure, so the solubility decreases, i.e. the dissolved gas escapes out.

General Characteristics of Equilibrium Involving Physical Processes: These are –

- (i) Equilibria involving gases can be attained only in closed vessels.
- (ii) This is because if the vessel is open, the gas will escape and there will be no equilibrium.
- (iii)Equilibrium is dynamic in nature, i.e. there are two opposing processes taking place at equal rate.

- (iv)At equilibrium, the concentrations of the different substances become constant at constant temperature.
- (v) At equilibrium, there exists an expression involving the concentrations of the substances which is constant at constant temperature. For example, $CO_2(g) \leftrightarrow CO_2(aq)$ $[(CO_2)(aq)]$ = constant at constant $[CO_2](g)$ temperature. This constant is called equilibrium constant.
- (vi)The magnitude of the equilibrium constant represents the extent to which the process proceeds before equilibrium is attained. For example, greater value of the constant in the above case shows greater dissolution of CO_2 in water.

Equilibrium in Chemical Processes:- When opposing processes take place in a chemical reaction, the reaction is said to be a reversible reaction. "A reaction in which not only the reactants react to form the products under certain conditions but also the products react to form reactants under the same conditions is called a reversible reaction. In other words, a reaction which takes place not only in the forward direction but also in the backward direction under the same conditions is called a reversible reaction". It is represented by putting a double arrow (\leftrightarrow) between the reactants and the products, one arrow pointing towards the products and the other pointing towards the reactants. For example, a reversible reaction between A and B to form C and D is represented as $A+B\leftrightarrow C+D$, the concept of reversibility in a chemical reaction may be explained with the help of the following example. If pieces of iron are placed in an open glass vessel which is being heated and steam is passed through it, the following reaction takes place: $3Fe(s) + 4 H_2O(g) \rightarrow Fe_3O_4(s)$ $+ 4H_2(g).$ Again if in place of iron, iron oxide (Fe_3O_4) is placed in the vessel which is being heated and hydrogen is passed over it, the reaction which takes place is Fe_3O_4 (s) + $4H_2 \rightarrow 3Fe + 4 H_2O(g)$. Since in both the above cases, the tube was open, hydrogen in the first case and water vapour in the second case escape out. However, if the tube is closed. both the reactions take place simultaneously and hence the reaction becomes reversible. It may be represented as: 3Fe (s) + 4 H₂O (g) \leftrightarrow Fe₃O₄(s) + 4 H_2 (g). Obviously, whereas the first two reactions can go to completion (i.e. whole of iron can be converted into iron oxide in the first case and iron oxide into iron in the second case), the last reaction,

viz; the reversible reaction does not go to completion. In fact, ultimately an equilibrium mixture of the various reactants and products is obtained in a reversible reaction. A few more common examples of reversible reactions carried out in closed vessels are given below:

(i) $CaCO_{3}(s) \leftrightarrow CaO(s) + CO_{2}(g)$ (ii) $N_{2}O_{4}(g) \leftrightarrow 2NO_{2}(g)$ (iii) $PCl_{5}(g) \leftrightarrow PCl_{3}(g) + Cl_{2}(g)$ (iv) $H_{2}(g) + I_{2}(g) \leftrightarrow 2HI(g)$ (v) $N_{2}(g) + 3H_{2}(g) \leftrightarrow 2NH_{3}(g)$ (vi) (vi) $CH_{3}COOH(l) + C_{2}H_{5}OH(l) \leftrightarrow CH_{3}COOC_{2}H_{5}(l) + H_{2}O(l)$

Irreversible reactions:- If a reaction cannot take place in the reverse direction, i.e. the products formed do not react to give back the reactants under the same conditions, it is called an irreversible reaction. It is represented by putting a single arrow between the reactants and the products, pointing from reactants towards products, i.e. $A + B \rightarrow C + D$ examples are:

- (i) $\operatorname{AgNO}_3(aq) + \operatorname{NaCl}(aq) \rightarrow \operatorname{AgCl}(s) + \operatorname{NaNO}_3(aq)$
- (ii) $BaCl_2(aq) + Na_2SO_4(aq) \rightarrow BaSO_4(s) + NaCl$ (aq)
- (iii) $2Mg(s) + O_2(g) \rightarrow 2MgO(s)$

It is interesting to note that a reversible reaction becomes irreversible if one of the products (which is gaseous) is allowed to escape out. It is for this reason that the reaction between iron and steam is irreversible if carried out in the open tube because hydrogen gas formed escape out.

Concept of Chemical Equilibrium:- Consider the general reversible reaction $A + B \leftrightarrow C + D$, in the beginning the concentration of A and B are maximum and the concentrations of C and D are minimum (equal to zero because no C and D are yet



formed). As the reaction proceeds. the concentrations of А and B are decreasing with the passage of time whereas the concentrations of and D are С increasing. Therefore, the

rate of forward reaction is decreasing while the rate of backward reaction goes on increasing. Ultimately, a stage comes, when the rate of forward reaction becomes equal to the rate of backward reaction. The reaction is then said to be in a state of chemical equilibrium. The variation of reaction rates with time and ultimately the attainment of chemical equilibrium may be represented graphically as shown in figure.

The following example illustrates how the equilibrium is attained. Decomposition of calcium carbonate in a closed vessel:- If calcium carbonate is heated in a closed vessel, the reaction is reversible. $CaCO_3$ (s) \leftrightarrow CaO (s) + CO₂(g) If the temperature of the furnace is kept constant (say at 1073 K) and the vessel is connected to a manometer, the pressure (due to CO₂) first keeps on increasing and ultimately becomes constant. This is obviously due to the fact that now as much of CO₂ is formed from CaCO₃, the same amount of CO₂ reacts with CaO to give back

CaCO₃. In other words, the rate of forward reaction and backward reaction become equal. Hence, the



reaction has attained chemical equilibrium.

Dynamic Nature of Chemical Equilibrium: When the equilibrium is reached, the most important observable property is that the concentration of each of the reactants and the products becomes constant. For example, in the reaction between H_2 and I_2 to form HI, the colour becomes constant because concentrations of H₂, I₂, and HI become constant, H₂ (g) colorless + $I_2(g)$ purple $\leftrightarrow 2HI$ (g) colorless. Similarly, in the dissociation of N₂O₄ at a particular temperature, the percentage of N_2O_4 and NO_2 become constant. Thus, when the equilibrium is reached, it appears that the reaction has stopped. However, the reaction is still going on in the forward as well as backward directions but the rate of forward reaction becomes equal to the rate of backward reaction. In other words, as much as the reactants react to form products the same amount of products react to give back the reactants in the same time. Hence, the equilibrium is dynamic in nature and not static.

Characteristics of Chemical Equilibrium: These are-

(i) At equilibrium, the concentration of each of the reactants and the products becomes constant. The experiments showing decomposition of calcium carbonate and constancy of colour at equilibrium in the decomposition of N_2O_4 prove the above characteristic.

- (ii) At equilibrium, the rate of forward reaction becomes equal to the rate of backward reaction and hence the equilibrium is dynamic in nature.
- (iii) A chemical equilibrium can be established only if none of the products is allowed to escape out or separate out as a solid. This is obvious because if any product is allowed to escape out e.g. CO₂ gas in case of decomposition of CaCO₃, the reaction will no longer remain reversible. A chemical equilibrium has a meaning only for a reversible reaction. Similarly, the reaction is irreversible if one of the products separates out as solid, e.g. AgNO₃ +KCl → AgCl ↓ + KNO₃
- (iv)Chemical equilibrium can be attained from either direction, i.e. from the direction of the reactants as well as from the direction of the products. To understand this characteristic, let us reconsider the reaction: N_2O_4 (g) $\leftrightarrow 2NO_2$ (g) (reddish brown). Suppose two identical glass bulbs A and B are filled with NO_2 gas at the same pressure.



placed in boiling water shown in figure. The gas in bulb A is found to be almost colorless where in bulb B. it is found to be reddish brown. Experiments show that most of molecules in bulb A have the formula N₂O₄ where most of the molecules in bulb B have the formula NO₂. Now, suppose both the bulbs are placed in a vessel containing water at 298K. It is observed that the color in the bulb A deepens whereas the color in the bulb B fades. Obviously, the reaction taking place in bulb A is N_2O_4 (colorless) $\rightarrow 2NO_2$ (reddish brown), whereas the reaction taking place in bulb B is $2NO_2 \rightarrow N_2O_4$. Ultimately, the color in the two bulbs becomes identical and no further color change occurs. This shows a state of equilibrium in both the bulbs. Thus, equilibrium





2HI(g) colorless. If 1 mole of H_2 and 1 mole of I_2 are taken in bulb A at 500°C and 2 moles of HI are taken in an identical bulb B at 500°C, the intensity of color in bulb A decreases while that



of the bulb B increases and ultimately both have the same intensity of color. This again proves that the equilibrium can be attained from either direction. These conditions have been represented graphically

(v) A catalyst does not alter the state of equilibrium. This is obviously due to the fact that a catalyst increases the speed of the forward reaction as well as that of the backward reaction to the same extent. Hence, the equilibrium is not disturbed, i.e. at equilibrium the concentration of each of the reactants and the products is the same as found at equilibrium when no catalyst was added. The only effect of adding the catalyst is that the equilibrium is attained quickly.

ASSIGNMENT

- 1. When a system is at equilibrium -----
 - (a) the concentration of reactants and products becomes equal
 - (b) the opposing reactions (forward and backward) stop
 - (c) the rate of backward reaction becomes very low
 - (d) the rate of forward reaction and backward reaction become equal
- 2. If concentration is expressed as mol L⁻¹, the equilibrium constant K for the reaction: 2N₂O₅(g) ↔ 4NO₂(g) + O₂(g) has the units ----
 - (a) mol³L⁻³ (b) mol L⁻¹
 - (c) $mol_{3}L^{-1}$ (d) no units
- **3.** The equilibrium constant in a reversible chemical reaction at a given temperature -----
 - (a) depends on the initial concentration of the reactants
 - (b) does not depend upon the initial concentration of the reactants
 - (c) depends on the presence of a catalyst
 - (d) is characteristic of the duration of time till the equilibrium is maintained.
- **4.** In which of the following reaction, pressure has no effect on equilibrium?
 - (a) $N_2O_4(g) \leftrightarrow 2NO_2(g)$
 - (b) $2SO_2(g) + O_2(g) \leftrightarrow 2SO_3(g)$
 - (c) $CO_2(g) + H_2(g) \leftrightarrow CO(g) + H_2O(g)$
 - (d) $N_2(g) + 3H_2(g) \leftrightarrow 2NH_3(g)$
- 5. Which of the following statements is not correct?

- (a) the solubility of NH₄Cl increases with increase of temperature
- (b) the equilibrium constant value depends upon the presence of catalyst
- (c) the equilibrium can be attained only if the system is closed
- (d) both chemical and physical equilibria are dynamic
- **6.** In a reversible chemical reaction having two reactants in equilibrium, if the concentrations of the reactants are doubled, then the equilibrium constant will ------
 - (a) also be doubled (b) be halved
 - (c) become one fourth (d) remains the same
- **7.** Chemical equilibrium is dynamic in nature because -----
 - (a) the equilibrium is maintained quickly
 - (b) concentration of reactants and products become same at equilibrium
 - (c) concentration of reactants and products are constant but different
 - (d) both forward and backward reactions occur at equilibrium with same speed
- **8.** Which of the following statements is false in case of equilibrium state?
 - (a) there is no apparent change in properties with time
 - (b) it is dynamic in nature

- (c) it can be attained from either side of the reaction
- (d) it can be attained from the side of the reactants only
- **9.** At any moment before a reversible reaction attains equilibrium, it is found that ------
 - (a) the rate of the forward reaction is increasing and that of backward reaction is decreasing
 - (b) the rate of the forward reaction is decreasing and that of backward reaction is increasing
 - (c) the rate of both forward and backward is increasing
 - (d) the rate of the both forward and backward reactions is decreasing.
- **10.** A chemical reaction $A \leftrightarrow B$ is said to be in equilibrium when ------

- (a) complete conversion of A to B has taken place
- (b) conversion of A to B is only 50% complete
- (c) only 10% conversion of A to B has taken place
- (d) the rate of transformation of A to B is just equal to rate of transformation of B to A in the system.
- **11.** The volume of a closed reaction vessel in which the equilibrium $2SO_2(g) + O_2(g) \leftrightarrow 2SO_3(g)$ sets is halved, now ------
 - (a) the rates of forward and backward reactions will remain the same
 - (b) the equilibrium will not shift
 - (c) the equilibrium will shift to the right
 - (d) the rate of forward reaction will become double that of reverse reaction and the equilibrium will shift to the right.

ANSWERS

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



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

- Wilma Mankiller

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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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Kumud Bala

SCIENCE QUIZ : April-2019

1. Which of the following enzymes acts efficiently at pH of two-----

(A) Trypsin (B) Pepsin (C) Ptyalin (D) All

- **2.** Gastric juice has a pH of about ----(A) 1 (B) 2 (C) 16 (D) 10
- **3.** Which of the following animals has no need for a gall bladder?

(A) Horse(B) Lion(C) dog(D) Human

- 4. Amount of O₂ normally carried by 100 ml of pure blood, is ---(A) 20 ml
 (B) 40 ml
 (C) 60 ml
 (D) 10 ml
- **5.** Which blood constituent makes up of more of the volume of blood?

(A) Red blood cells(B) Plasma(C) Blood proteins(D) White blood cells

6. Besides calcium phosphate the bones contain ----

(A) Magnesium phosphate

- (B) calcium chloride
- (C) Magnesium sulphate
- (D) Sodium chloride
- **7.** The vitamin which is generally excreted in urine by human?

(A) Vitamin K	(B) Vitamin C
(C) Vitamin E	(D) Vitamin A

8. Cholesterol is synthesized in ----

(A) Liver	(B) Pancreas
(C) Spleen	(D) Gall bladder

- 9. Skull of man is made up of -----
 - (A) 10 bones
 - (B) 22 bones
 - (C) 30 bones
 - (D) 24 bones
- 10. Largest part of the brain of man is called -----

(A) Olfactory lobe

- (B) Cerebral hemisphere
- (C) Mid-brain
- (D) Hind- brain

- **11.** If a pellet of camphor is left at room temperature, its size starts to decrease. The process involved is
 - (A) Evaporation(B) Melting(C) Sublimation(D) Condensation
- **12.** Take the iron filing and sulphur powder crush and heat it then add dilute sulphuric acid. Which gas is evolved?

(A) SO_2 (B) H_2S (C) O_2 (D) SO_3

- **13.** Particles of matter in the gaseous state can be brought close together by -----
 - (A) increasing temperature and decreasing pressure
 - (B) increasing pressure and decreasing temperature
 - (C) increasing pressure and increasing temperature
 - (D) decreasing temperature and decreasing pressure
- **14.** X and Y are two type of conducting tissues present in plants. Y transports materials in only one direction. The tubular structures of Y are ----
 - (A) Tracheids and sieve tubes
 - (B) Sieve tubes and vessels
 - (C) vessels only
 - (D) Tracheids and vessels
- **15.** Which of the following solutions has the diameter of its constituent particles larger than 1 nm?
 - (A) Tincture of iodine
 - (B) Soda water
 - (C) Wheat flour in water
 - (D) Aqueous sugar solution
- **16.** At 298 K and 1 atmosphere pressure, a gas mixture contains equal masses of He, H_2 , O_2 and NH_3 . Which of the following is correct for their average molecular velocities?
 - (A) He> H₂> NH₃> O₂
 (B) He < H₂ <O₂ < NH₃
 (C) H₂< He < NH₂ <O₂
 (D) O₂< NH₃ <He < H₂
- **17.** A test tube along with calcium carbonate in it initially weighed 30.08 g. Heated the test tube till calcium carbonate completely decomposed with

evolution of a gas. Loss of weight during this experiment was 4.40 g. What is the weight of the empty test tube in this experiment?

(A) 20.08g	(B) 21.00g
(C) 24.50g	(D) 2.008g

18. Bacteria which are utilized to produce gobar gas -----

- (A) Aerobic and heterotrophic
- (B) Aerobic and chemoautotrophic
- (C) Anaerobic and chemoautotrophic
- (D) Anaerobic and heterotrophic

19. For a given mass of a gas, if pressure increases:

- (A) volume and temperature remain constant
- (B) volume increases provided temperature remains constant
- (C) temperature increases provided volume remains constant
- (D) temperature decreases provided volume remains constant
- **20.** Measurement of the amount of dry gas collected over water from volume of moist gas is based on ----
 - (A) Gay Lussac's Law
 - (B) Boyle's Law
 - (C) Charles's Law
 - (D) Dalton's law of partial pressure
- **21.** Which of the following postulates of kinetic molecular theory of gases is not correct?
 - (A) Molecular collisions are perfectly elastic
 - (B) There are no forces of attraction or repulsion between molecules

- (C) The molecules are in a state of rapid motion in all directions.
- (D) The average kinetic energy of the gas molecules is inversely proportional to the absolute temperature
- **22.** If V₁ ml of a gas at 37°C and 1.2 atmospheric pressure contains N₁ molecules and V₂ ml of the gas contains N₂ molecules at the same temperature and pressure, then:

(A)
$$\frac{V_1}{V_2} = \frac{N_2}{N_1}$$

(B) $\frac{V_1}{N_2} = \frac{V_2}{N_1}$
(C) $\frac{V_1}{V_2} = \frac{N_1}{N_2}$
(D) $V_1 N_1 = V_2 N_2$

- **23.** 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
- 24. The kinetic energy of gaseous molecules is ---

(A)
$$\frac{1}{2} \text{ mv}^2$$
 (B) $\sqrt{\frac{1}{2} mv^2}$
(C) $\frac{1}{2} \text{ mv}$ (D) $(\frac{1}{2} mv)^2$

- **25.** The ratio of universal gas constant (R) and Avogadro number is called ---
 - (A) Planck's constant
 - (B) Boltzmann constant
 - (C) Rydberg constant
 - (D) Van der Waal's constant

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

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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)

izquotes.com

PREMISE:We are pleased to adopt a song" इतनी शक्ति हमें देना दाता....."from a old Hindi MovieDo Aankhen Barah Haath दो आँखें बारह हाथ of year 1957, directed by The Late V. Shantaram. The lyrics are by Shri Bharat Vyas, singer Melody Queen Sushri Lata Mangeshkar, and Music Direction by Vasant Desai. It has become a widely accepted inspirational song and/or prayer in many educational institutions and socially inspired initiatives engaged in mentoring of unprivileged children. This newly formed nonorganizational initiative, being selflessly operated by a small set of compassionate persons, finds its philosophy in tune with the song and conveys its gratitude to all he eminent persons who brought out the song in a manner that it has attained an epitome of popularity. While working its mission and passion, the group invites one and all to collectively complement in grooming competence to compete among unprivileged children. The song/prayer goes as under -

इतनी शक्ति हमें देना दाता, मन का विश्वास कमजोर होना हम चले नेक रस्ते पे हम से, भलकर भी कोई भल होना ॥

दूर अज्ञान के हो अंधेरे, तू हमें ज्ञान की रोशनी दे हर बराई 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 मधूबन अपनी करुणा का जल तु बहा के, कर दे पावन हर एक मन का कोना॥

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

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







(TEAM)