

GYAN VIGYAN SARITA: शिक्षा



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

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Special Issue: Vision of Swami Vivekananda – Social Reform Through Education

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*"Take Up An Idea,
Make That One Idea Your Life,
Think Of It, Dream It, Live In That Idea,
Let Brain, Muscles, Every Part Of Your Body
Be Full Of That Idea, And Leave Every Other Idea Alone
This Is The Way To Success"*

जन्म दिवस: 12th January, 1863

निर्वाण दिवस: 4th July, 1902

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RAMAKRISHNA MISSION

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24th December, 2017

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Message

Swami Vivekananda undertook a Bharat Parikrama on foot after the Mahasamadhi of his Guru Sri Ramakrishna, for almost six years i.e. from 1887 to 1893 before his departure for the World Parliament of Religions held in Chicago in 1893. He travelled extensively throughout the country and had deep interactions with every segment of the society. He was appalled by the poverty, illiteracy and other afflictions of the society. But, he also had a tremendous sense of hope and belief. His vision of India was that it would rise to such an extent that its future glory would far surpass its past glory. One of the main areas of work which he thought would help India rise again was Education. He said, "Education is the panacea for all evils". But, then we all need to understand what exactly Swamiji's vision of education was. He spoke of man-making and character-building education. The dire need of the hour is to introduce Swami Vivekananda's ideas of education in our educational system. It is a hard and difficult but not impossible task. All of us need to work together towards this goal.

The initiative to bring out a monthly e-bulletin to spread awareness among the elite of our country is a step in the right direction and it deserves all support and encouragement. We wish this venture all success.

Yours in service,


(Swami Shantatmananda)
Secretary

Aim for the Best, but...



Online Mentoring
From Texas

Equipments at Mentoring Center

1. Compatible Desk-/Lap-top
2. WebCam
3. Headset with Microphone
4. Wacom Tablet Pen

AND

Broadband-Internet Connection:

**Minimum Bandwidth: 8 Mbps and
Monthly Data Capacity: (1xN) GB ;**
Here, N= No of Hours of Monthly

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



An Ideal Smart Training
Center
(If we can afford it for all)

Equipments at Learning Center

1. Compatible Desk-/Lap-top
2. WebCam
3. Speakers
4. USB Microphone
5. Overhead Projector.
6. Wacom Tablet Pen with Wireless Accessory
7. UPS (For Continuous Power Supply to computer, Internet modem and L&F)

AND

Broadband-Internet

Connection: **Min. 8 Mbps
and (1xN) GB monthly data
capacity; N= No of Hours
of Monthly sessions**



WebEx[®] Whiteboard – a Fully Shared Space between Students and Mentor using Wacom Tablet (Interactive Online Mentoring)



Primitive
Mentoring-cum-
Learning Centre
(Demo)

Important Links

1. Good Internet Connectivity (Preferably-Wired Broadband Connection, or 4 G Mobile)- Exclusive
2. Subject-wise Coordinator for Each Session to Bridge Learning Gaps between Mentor & Students



Special Features

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

subhashjoshi2107@gmail.com



Learning Centre
With LCD Screen Display at
RKM School, Sitanagram,
Guntur

We start with what is available in ground;
Aim at best Grooming for Competence Building
Unprivileged;
Welcome better and more economical, but functionally
suitable for IOMS, setup to reach Unprivileged Students
: Spiritually Democratize Education.



Learning Centre
With Projector Display
(Widely Practiced)

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



संपादकीय

हिंदूदर्शन के प्रचारक : देशभक्त संत विवेकानन्द

गुरु-शिष्य-परंपरा में कुछ शिष्य, गुरु से ज्ञान प्राप्त करते हुये, गुरु के प्रति श्रद्धा और भक्ति से, अपने को पूर्णतया गुरु को समर्पित कर देते हैं। यह समर्पण का भाव, गुरु के हृदय में शिष्य के लिये एक ऐसा स्थान बना देता है कि गुरु अपने संचित असीमित ज्ञान के भंडार को उसे सौंप देता है, और फिर वह शिष्य औरों के लिये गुरु बनने की दिशा में चल पड़ता है। स्वामी रामकृष्ण परमहंस ने प्रारंभ में बहुत प्रयास किया कि नरेंद्र उनका शिष्य हो जाये क्योंकि परमहंस को ज्ञात था कि सिर्फ थोड़े प्रयास से ही नरेंद्र को ध्यान और मोक्ष के मार्ग पर दौड़ाया जा सकता है। परंतु, नरेंद्र एक बुद्धिवादी होने के नाते रामकृष्ण परमहंस को कल्पना जगत में जीने वाला मात्र एक मूर्तिपूजक ही मानते थे। वह रामकृष्ण की सिद्धियों को एक मदारी के चमत्कार के अलावा और कुछ नहीं मानते थे। लेकिन एक समय आया जब वे परमहंस के चरणों में स्वयं झुक गये और समझ गये कि परमहंस के अंदर कुछ विशेष अवश्य है जो बाहर से दिखायी नहीं देता है।

परमहंस ने नरेंद्र के समर्पण की भावना से प्रभावित होकर उनकी अंतरात्मा को ज्ञान से प्रकाशित कर दिया और फिर उसे विवेकानंद बना दिया। कालांतर में विवेकानंद ने हिंदू दर्शन के प्रचार व प्रसार का काम किया और सबको यह बताया कि हिंदू दर्शन वह अपरिमित ज्ञान का स्रोत है जिसमें केवल व्यक्ति के हित की बात नहीं कही गयी है बल्कि राष्ट्रहित और समग्र मानव कल्याण का हित करने की शिक्षा भरी पड़ी है।

विवेकानंद ने अपने गुरु श्रीरामकृष्ण परमहंस के नाम पर रामकृष्ण मिशन की स्थापना की। उनका उद्देश्य था कि व्यक्ति को अपना काम तब तक नहीं रोकना चाहिये जब तक उसे उसका लक्ष्य न मिल जाये। किसी को भी अपने को निर्बल नहीं समझना चाहिये। मनुष्य जीवन एक स्वच्छंद जीवन है। यह स्वच्छंदता उसे अपने जीवन काल में ज्ञान अर्जित करने के लिये और फिर मनुष्य जाति की सेवा के लिये मिली है। हर मानव का धर्म सनातन है, इसलिये हर मानव का कार्य ऐसा होना चाहिये जिसका प्रभाव सनातन हो। विवेकानंद की सीख थी कि मनुष्य को यह नहीं भूलना चाहिये कि जिस प्रकार हर नदी नाला अपनी यात्रा के अंत में समुद्र में पहुंच कर विलीन हो जाता है, ठीक उसी

प्रकार उसके कार्य का हर प्रतिफल उसे ईश्वर की ओर ही ले जाता है, चाहें वह कार्य अच्छा हो अथवा बुरा।

हर मनुष्य को दूसरे मनुष्य की सहायता के लिये उपस्थित रहना चाहिये। अगर वह किसी की मदद किन्हीं कारणों से नहीं कर पा रहा है तो उसे वहां से हाथ जोड़कर हट जाना चाहिये लेकिन अपने पूर्ण प्रभाव का प्रयोग उसकी सहायता के लिये अवश्य दिखाना चाहिये। इस पृथ्वी पर मनुष्य के लिये कुछ भी असंभव नहीं है चाहें वह विचार हों अथवा उसके अनुरूप कर्म। सब कुछ संभव है अगर किसी के पास एक स्थिर मन और उस मन में बिना रुके काम करने की चाह है। जब मनुष्य अपने पर, अपने कामों पर, अपनी क्षमता पर, और अपने ईश्वर पर विश्वास करना सीख जाता है, तब उसका हर काम स्वतः होने लगता है।

जब कोई छात्र यह सोच लेता है कि उसे अमुक प्रश्न हर हाल में हल करना है तो कोई शक्ति उसे ऐसा करने से रोक नहीं पाती है। यही जुनून हर नयी खोजों में काम करती है। बड़ी-बड़ी खोजें इसी विश्वास के कारण हुयी हैं।

विवेकानंद का मानना था कि हर एक को अंदर से बाहर की तरफ विकास करना चाहिये। कोई किसी को पढ़ा नहीं सकता है, कोई किसी को आध्यात्मिक नहीं बना सकता है। यह सब केवल उसकी अंतरात्मा ही कर सकती है और यही अंतरात्मा सबकी गुरु है। अगर आस्था है तो फुटबाल खेलकर ईश्वर के नजदीक पहुंचा जा सकता है और आस्था नहीं है तो गीता पढ़कर भी ईश्वर के दर्शन नहीं हो सकते हैं।

हमें नहीं भूलना चाहिये कि कोई भी रास्ता अगर कठिनाइयों से भरा नहीं है तो वह सही रास्ता नहीं है। जब हमें कोई कठिनाई न दिखायी दे रही हो और हम आगे बढ़ते जा रहे हों तो हमें अपने रास्ते की पड़ताल कर लेनी चाहिये कि वह सही है अथवा नहीं।

हमें ध्यान रखना होगा कि जो अग्नि हमें गर्मी देती है, हमारे लिये भोजन बनाने में सहायक होती है, वही हमें नष्ट भी कर सकती है। यदि ऐसा होता है तो यह अग्नि का दोष नहीं कहा जायेगा बल्कि उसके

प्रयोग में सही तरीके को न अपनाना कहा जायेगा। ठीक यही बात सफलता तक पहुंचने में हमारे कामों के लिये भी लागू होती है।

मनुष्य को शक्ति संपन्न होना चाहिये। शक्ति ही जीवन है, निर्बलता मृत्यु है। विस्तार ही जीवन है, संकुचन मृत्यु है। प्रेम ही जीवन है, द्वेष मृत्यु है। हम ही अपने भाग्य के विधाता हैं। हवा बह रही होती है। जो जहाज अपने पाल खुले रखे होते हैं, और इन बहती हवाओं से टकरा रहे होते हैं, वे अपनी दिशा में आगे बढ़ते जाते हैं। जिन जहाजों के पाल बंधे होते हैं, और हवा को पकड़ नहीं रहे होते हैं, वे या तो रुके होते हैं अथवा गलत दिशा में बहे जा रहे होते हैं। इसमें हवा का कोई दोष नहीं होता है।

मनुष्य के दिमाग की शक्तियां सूर्य की किरणों के समान हैं। जब वे एक जगह पर केंद्रित हो जाती हैं, चमक पैदा कर देती हैं। हर मनुष्य को अपने दिमाग की इस शक्ति का प्रयोग करना चाहिये। मनुष्य की हर कमजोरी उसकी आकांक्षा, अज्ञानता और असमानता में छिपी होती है। जितनी जल्दी वह इनसे बाहर निकल जाता है, उतनी जल्दी वह आगे बढ़ जाता है।

विवेकानंद का जन्म 12 जनवरी 1863 को कोलकाता में हुआ था। इनके बचपन का नाम नरेंद्र था। इनकी माता का नाम भुवनेश्वरी देवी और पिता का नाम विश्वनाथ दत्त था। पिता पाश्चात्य खयालात के थे और माता शुद्ध आध्यात्मिक थीं। नरेंद्र का बचपन अलौकिक प्रतिभा से संपन्न रहा। जनरल असेम्बली कालेज के अध्यक्ष विलियम हेस्टी का कहना था कि नरेंद्र दर्शनशास्त्र के अति उत्तम छात्र थे। जर्मनी और इंग्लैंड के सारे विश्वविद्यालयों में नरेंद्र जैसा मेधावी छात्र नहीं था।

विवेकानंद का जीवन उनकी माता ने तराशा था। बचपन से ही मां ने अपने बच्चे के चारों ओर आध्यात्मिक वातावरण बनाये रखा था। रामायण, और महाभारत की कहानियों को उनके बालपन का अंग बनाया। पिता के कारण घर में पश्चिमी संस्कृति प्रभावी थी। इस कारण नरेंद्र ने डेकार्ट का अहंवाद, डार्विन का विकासवाद, स्पेंसर का अद्वैतवाद, आदि का अध्ययन किया और फिर चाह बनायी कि यह सब उन्हें एक जगह मिलनी चाहिये। वह इसे प्राप्त करने के लिये ब्रह्मसमाज में गये पर उनके प्रश्नों का उत्तर वहां नहीं मिला। कई अन्य जगहों की यात्रायें भी किये, पर उन्हें शांति नहीं मिली। वह

रामकृष्ण परमहंस से मिले। परमहंस ने उनके प्रश्नों का उत्तर दिया, और नरेंद्र शांत हो गये। उन्हें परमहंस की कृपा से आत्म साक्षात्कार हुआ, और 25 वर्ष की आयु में ही गेरुआ वस्त्र धारण कर विश्व भ्रमण पर निकल पड़े। रामकृष्ण परमहंस अब नरेंद्र के गुरु बन चुके थे, और नरेंद्र अब विवेकानंद बन चुके थे।

1893 में अमेरिका के शिकागो शहर में हो रहे विश्वधर्म सम्मेलन में विवेकानंद ने भारत का प्रतिनिधित्व किया। यह वह काल था, जब यूरोपवासी भारतीयों को हीन दृष्टि से देखा करते थे। सच कहा है, कोई भी उगते सूरज को देर तक रोक नहीं सकता है। एक क्षण था कि धर्म सभा में विवेकानंद को बोलने का समय नहीं मिल रहा था, पर किसी तरह जब उन्हें बोलने का मौका मिला और उन्होंने कहा, “अमेरिका की बहनों और भाइयों” तो तालियों की गड़गड़ाहट से संपूर्ण सभास्थल गूंज उठा। सभी श्रोता मंत्रमुग्ध हो गये। सभा के अध्यक्ष को भी पता नहीं चला कि विवेकानंद को दिया गया समय कब खत्म हो गया। जब विवेकानंद रुके तो उन्होंने विवेकानंद से अनुरोध किया कि वह और बोलें। उन्हें अतिरिक्त 20 मिनट मिला और उनका धाराप्रवाह संभाषण चलता रहा। उनके प्रवचन ने सिद्ध कर दिया था कि हिंदू दर्शन श्रेष्ठ है, हिंदू धर्म श्रेष्ठ है और यही धर्म विश्व के सभी धर्मों को अपने में समाहित करने की क्षमता रखता है।

विवेकानंद की हिंदू दर्शन के प्रति निष्ठा ने उन्हें मानव जाति का स्वप्नद्रष्टा बना दिया। उनका स्वप्न था कि एक ऐसे समाज को वास्तविक स्वरूप दिया जाये जहां धर्म और जाति के आधार पर भेदभाव न हो। एक बार रवीन्द्रनाथ ठाकुर ने कहा था कि अगर किसी को भारत को समझना है तो उसे विवेकानंद को पढ़ना होगा, उनमें कुछ भी नकारात्मक नहीं है, सबकुछ सकारात्मक ही है। नेताजी सुभाषचंद्र बोस की सोच को भी विवेकानंद की सोचने की शैली ने बहुत प्रभावित किया था। वह विवेकानंद को अपना आध्यात्मिक गुरु मानते थे। महात्मागांधी कहते थे कि विवेकानंद को पढ़ने के बाद उनकी राष्ट्र के प्रति प्रेम हजारों गुना बढ़ गया था। विवेकानंद का जन्म 12 जनवरी राष्ट्रीय युवा दिवस के रूप में मनाया जाता है।

रोमा रोलां एक फ्रांसीसी लेखक थे। उन्हें सन् 1915 में साहित्य के लिये नोबेल पुरस्कार मिला था। उनका मानना था कि महान वह होता है जो वह करता है जिसे दूसरे नहीं कर पाते हैं। विवेकानंद के बारे में उनका विचार था कि उन जैसा दूजा कोई नहीं हो सकता है।

विवेकानंद का संपूर्ण जीवन एक दीपक की भांति रहा जो हमेशा अपने प्रकाश से समस्त संसार को जगमगाता रहा और आज भी ज्वलंत रूप में सबके लिये प्रेरणा का स्रोत बना हुआ है। उनका मानना था कि हर मनुष्य को अपने जीवन में एक लक्ष्य निर्धारित करना चाहिये, उसी के बारे में सोचना चाहिये, उसी का सपना देखना चाहिये, उसी लक्ष्य के लिये जीना चाहिये, अपना तन, मन, दिमाग सबकुछ उसी में लगा देना चाहिये।

महान कार्य करने के लिये लगातार काम करना पड़ता है। हजारों ठोकें खाने के बाद ही एक अच्छे चरित्र का निर्माण होता है। हमें महान बनने के लिये तीन चरणों से गुजरना होता है। पहले चरण में लोग उपहास करते हैं। दूसरे चरण में लोग विरोध करते हैं, और अगर इतना सहने के बाद भी व्यक्ति अपने काम में लगा रहता है, तब अंतिम तीसरे चरण में लोग उसकी महानता को स्वीकार कर लेते हैं।

शुरुआत अगर छोटी है तो हमें उससे घबराना नहीं चाहिये। बड़ी योजनायें शुरु में ही नहीं बनती हैं। बड़े काम शुरु से ही नहीं हो जाते हैं। हर बड़ा काम छोटे से शुरु होता है। हर काम महानता की उपाधि बाद

में ही पाते हैं। महान काम उनसे होते हैं जो अपने पर विश्वास बनाये रखते हैं, खुद ही अपने सपने पूरा करने के लिये अपनी क्षमता पर भरोसा रखते हैं, और दूसरों का इंतजार नहीं करते हैं।

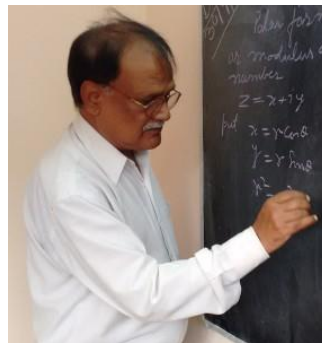
ज्ञान विज्ञान सरिता परिवार स्वामी जी के त्रिशब्द - शक्ति, सेवा, और संस्कार को अपना ध्येय बनाकर आगे बढ़ रहा है। धीरे धीरे लोगों को, संस्थानों को, बच्चों को जोड़ता जा रहा है। अनुशासित और अप्रतिम तरीके से अनवरत शिक्षण कार्य ने बच्चों में, उनके शिक्षकों में, और अभिभावकों में जिज्ञासा जगा दी है कि उनका भला ज्ञान विज्ञान सरिता परिवार से अवश्य होगा। चाहे वह सुदूर गुंटूर हो, विशाखापट्टनम हो, लखनऊ हो, बिजनौर हो, अथवा दिल्ली हो, ज्ञान की शक्ति लेकर, सबकी सेवा करने का भाव रखकर, व्यावहारिक वातावरण में सबको सरल और निःशुल्क, उत्तम स्तर की शिक्षा ज्ञान विज्ञान सरिता परिवार के सदस्य दे रहे हैं। ईश्वर नव वर्ष में ज्ञान विज्ञान सरिता परिवार को शक्ति-सामर्थ्य-सौभाग्य दे कि वह अपने कार्य में निरंतर आगे बढ़ते जायें।

—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 कर्तव्य के प्रति सहज विनीत आग्रह है; कृपया इस पर विचार करें.

—00—

An Appeal: Gyan Vigyan Sarita

A non-organizational initiative of a small set of Co-passionate Persons

Philosophy: Personal Social Responsibility (PSR)

Objective: Groom competence to Compete among unprivileged children from 9th-12th in Maths and Physics, 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 to the participators

Operation:

- a. **Mode:** Online since July'16, using Google Hangouts, a free we-conferencing S/w, with connectivity upto 15 nodes.
- b. **Participation:** Voluntary and Non-remunerative, Non-Commercial and Non-Political

Involvement:

- a. **As Promoter –**
 - i. Initiate a Learning Center,
 - ii. Sponsor a Mentor who is willing to join on certain terms,
 - iii. sponsor cost of operation and up-gradation of infrastructure to voluntary mentors,
 - iv. Sponsor Website.
- b. **As Facilitator –**
 - i. Provide space and infrastructure for **Online Mentoring Sessions (OMS)**, which is generally available, with a marginal add-on,
 - ii. Garner support of elite persons to act as coordinators at a Learning Centre.
- c. **As Participant –**
 - i. As a Mentor,
 - ii. As Coordinator,
 - iii. As Editor and or contributor of thought provoking articles for e-Bulletin, which are relevant to the initiative, and make it more purposeful and reachable to the target audience.
 - iv. As author of Chapters for Mentors' Manual, being uploaded as a Free Web Resource,
 - v. Anything else that you feel can add value to the mission and make it more purposeful.

- vi. *Anything else that you consider to make this initiative to become more effective.*

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

SARTHAK PRAYASH, a Ghaziabad based NGO, warmly accepted the proposition and created a facility to mentor students from 8+ to prepare in mathematics and physics and prepare them for engineering entrance tests. They warmly reciprocated and created a class room.

Experience in this selfless social work were used to navigate across without losing focus. He was associated with SUBODH FOUNDATION from Sept'15 to Sept'16 during which he published a monthly e-Bulletin **SUBODH-पत्रिका** to create visibility across persons who could make a difference.

In Sept'16, post transition, the mission has been continued as a non-organizational entity **Gyan Vigyan Sarita**, with a set of Four persons, including retired **Prof. SB Dhar**, Alumnus-IIT Kanpur, a middle aged **Shri Shailendra Parolkar**, Alumnus-IIT Kharagpur, settled at Texas, US and **Smt. Kumud Bala**, Retired Principal, Govt. School Haryana. Earlier, they were complementing the OMS. While, the initiative survived transition, a website: <http://gyanvigyansarita.in> has been launched. It contains under its **Menu: Publication>e-Bulletins**, and **>Mentors' Manual**. You may like to read them.

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



Freedom with Responsibility

"Freedom is a birth Right" is an old phrase from immemorial times. This phrase, if taken verbatim, it leads to chaos. Freedom is not absolute. It is relative, contextual and circumstantial. The nature in itself is an excellent manifestation of freedom with interdependent existence. Nature's cyclic perpetuation continues to be in a state of systematic self-regulation unless some disturbance occurs. Every disturbance in nature bears a penalty, in the form of earthquakes, storms etc. These penalties are to restore of normalcy of the natural cycle. An irresponsible human intervention into nature's balance leads to climatic changes heading towards making the mother earth unliveable. It is

Birth of a life appears to be freedom from bondage of mother; nevertheless it enters into a next phase of existence bondage of responsibility to be able to exist freely. This necessitates understanding boundaries of freedom and mutual infringement. Every action has an effect, and this effect in turn becomes an input to initiate next cycle of cause and effect, and this is an endless process. Human being is the only creation of nature which is bestowed with a capability to regulate its actions. This capability invokes in human being a proposition of responsibility with a freedom.

Sociological evolution of human race, from predator stage, is all about creation of an order where individuals are authorised to exercise freedom of action with an inbuilt reward or penalty for the extent of responsibility exercised while performing action.

Quest of technological development has taken in efforts of entire human race to bring comfort of living. Inertia of nature is mammoth. Initially actions of small population was well within resilience of nature to absorb cooking of wood fire, creation of water storage, making a pathway through forests etc. Cumulative effects of these human endeavours have grown exponentially with the population. Moreover, demand on nature for survival of population has also grown much steeper. This has reached to a brink where drift in nature has crossed its auto-correction capacity. Ecological changes being experienced now are effect of irresponsible exploitation of nature made by human race, collectively, and world is now awakening to it with a blame game rather than coming forward with a collective responsibility of restoring nature. National Green Tribunal (NGT) and Intergovernmental Panel On Climate Control (IPCC), is passing through riddles of disagreements,

directives and conflict resolutions. In all this tug-of-war mighty ones are forcing their way. The weaker ones are finding themselves under a crippling burden to bear transformation of their prevalent practices into environmental friendly modes. Recent, debate on smog problem in Delhi is an excellent example. This might lead to a scenario where survival compulsion will force upon this civilized world a reversal to predator age.

In theology, power of nature is seen in different incarnations and is worshiped in different forms. But, interdependence of freedom and responsibilities has been defined in different religion in the form of code of conduct based on socio-economic conditions prevalent at the time of its evolutions. Typically in Hindu religion its manifestation since ancient times has been as मातृ धर्म, पितृ धर्म, पुत्र धर्म, शजर धर्म, गुरु धर्म, पड़ोस धर्म, राज धर्म, राष्ट्र धर्म and many more based on interacting individuals are also called मर्यादा in each role. An excellent example of exercising the मर्यादा of interdependence is available in Ramayana.

Self-pleasure is an outcome of exercise of freedom, while exercise of responsibility is proactive sacrifice of pleasure of freedom by undertaking pains for the pleasure for others. Actions performed on demand or directive is just a duty. Nevertheless, inaction in duty on the pretext of freedom is worst of its kind and leads to destruction of the order created by civilization. A balance in sharing of pleasure and pains, i.e. exercise of मर्यादा is the secret of coexistence and its perpetuation.

Education is an integral process of गुरु-शिष्य धर्म. Education has bestowed upon civilization growth, development and power of manipulation. Education is a process of self-carving, called तपस्या, to attain excellence, which in mythology is called enlightenment सिद्धि. The self-centric use of gains through education by elite to preserve their belongings is disowning of the responsibility. It has led to drift in perspective of education towards its commercialization and thus optimize the gains by producing a run-of-the-mill, so called educated people. It has transformed objective of education from excellence to accomplish quick results, which are quantitative in predominance over quality in education. In such a scenario importance of education in ability to question observation, believes

and practices is taking a back seat; ability to explore alternatives leading to sustainable coexistence has become secondary; skill to translate best alternatives into reality is missing increasingly. This is true in all disciplines of education, and mathematics, science and engineering are no exception to it.

Parents are most natural teacher, but affordability of parents to mentor their children is of varying degree. Some parents are in command of affluence to compensate their inability to mentor their children, for whatever reason, through branded schools, coaches and tutors. This has created a race among parents to pump in resources in educations of their children. This race is creating a fodder for fat-commercialization in education. In such a scenario even educated parents are withdrawing themselves from discharge of their responsibility of performing as natural teachers to their own beloved children. These innocent children are being handed over by parents to unnatural teachers. A logical consequence of this drift is visible in qualitative decline in learning. If this can happen to qualified parents, exponential extrapolation of its consequences among children of barely educated and uneducated parents is not an exaggeration.

This drift in every generation, five years of schooling, is small enough to be considered insignificant and hence it is generally ignored. Nevertheless, passionate teachers are pained to visualize successive change of focus among students. Life time experiences of such teachers are frightening. Moreover, growing competition among commercialized parallel schooling is making the situation worst.

This drift is thinning quality of educated elite with fat numbers. Thus, gap between in demand and availability of educated youth, with ability to perform, is widening. This gap is manifested in the form of growing dissatisfaction among youth both in numbers of number of aspirants of employment and salary package.

In such a complex scenario every action can be classified into one of category viz. active, reactive, passive, and pro-active. One who is capable of exercising influence on a process despite being its intrinsic element is an active person. One who can counter to impositions is reactive. In situations where a person confines to complacency to impositions or unpalatable actions is passive. But, highest form of action is to pre-empt possible damage or takes a corrective course to mitigate damage already done. Persons engaged in such actions are pro-active.

Education sector in a society encounters all the four types of persons. Active persons among elite are able to make their way, and are prompt to take a reactive posture to utilize every opportunity to criticize education system through their reports and treatise. Underprivileged and unprivileged persons, within their constraints remain complacent with a passive posture. The need of the time is proactive persons. None, howsoever mighty may be, would find himself to be a pigmy to meet mammoth demand of resources, infrastructure, people and change mindset of society to bring in reform. Despite, there is an urgent of a pro-active role to bring in the reforms by complementing of efforts, collectively. It is like playing the jig-saw-puzzle, in real life where mutual boundaries of capability and constraints are matched to create a purposeful matrix.

Among numerous experiences, Three of them form valid case studies. In First Two cases the top decision makers were persons from the most coveted cadre, and illustrious background from prestigious institutes. **First case** is of establishing Interactive Online Mentoring Sessions (IOMS) in a school in tribal district. Government is stated to have bestowed lot of administrative power for furtherance of education in backward districts. Nearly 1-1/2 years ago, it received an encouraging start in creation of First Learning Centre. Provisioning of necessary IT infrastructure was done within a fortnight. Despite, systems and processes could not be streamlined for perpetuation and replication. The only reason behind this setback was administrative premise that stabilization of IOMS is responsibility of management teachers at the school, where it was implanted. It lacked administrative pursuance to ensure utilization of freely volunteered mentoring resource. As a result the pro-active initiative to complement efforts of administration, through IOMS, collapsed. The premise itself was an immature expectation.

In **Second case** is of a school in one of the biggest public sector company managed by Mahila Mandal. It was a fit case to kick-start IOMS as complete infrastructure for it was in place. The only need was an administrative will and supportive involvement of Mahila Mandal a powerful body, as usual. The whole setup turned out to be ceremonial show-piece. Analysis of this case reveals that - **a)** children of decision makers were getting educated in branded school and **b)** the school was a destination of philanthropy, without concerns, for those who could afford it.

The **Third case** is of a school at Sitanagram, Guntur District, A.P.. It is managed by a spiritual organization, Ramakrishna Mission which

passionately caters to the educational needs of students either BPL or rural segment. This school has become an icon of spiritual passion, dedication and commitment, not as philanthropy but with a sense of responsibility philanthropy to groom competence to compete among deprived children, the future of nation. It practices preaching of Swami Vivekananda to bring in social reform through education. Dedication for the cause exercised by way of involvement of management, teachers, and parents is phenomenal. Operation of IOMS model, from a distance 2,000 km, at this school has become a successful prototype and is ready for adoption by more schools. Schools of Ramakrishna order and other schools with similar lineage have initiated adaption of the IOMS. In IOMS, distance between mentoring centre and learning centre is immaterial. As long as internet connectivity is available, learning centre can be situated anywhere, right from adjacent room.

This reflects need of reconsideration in training and upbringing of elite cadres and institutes to take a proactive role, a pre-requisite for social reform through education. This will make the key persons role model for supporting incumbents. This will make passage of spirit less abrasive. Need of the hour is to create an environment where the spirit of the kind prevalent in Case Three percolates automatically in public domain.

This realization has prompted a small number of passionate persons to pro-act with a sense of Personal Social Responsibility (PSR) to democratize education in a non-remunerative, non-commercial and non-political manner with a philosophy outlined below -

Oh GOD, with every new year, day and moment,

Keep fuelling in me a fire of survival instinct,

Keep driving will in me to work hard,

A wisdom to choose a right path,

Courage to walk along the path,

To co-exist with my brethren,

To serve the poor,

And the mother.

Oh my LORD, I am blessed !!!

This initiative is not driven with a sense of philanthropy luxury. Its endeavour is to motivate target children, extend them a finger hold, before they are able make a dream and strive for it. Thus groom

in them competence to compete. The thought process bears impression of many great thinkers and social reformers. Inspiration from Swami Vivekananda, who had opined that – “*We want that education by which character is formed, strength of mind is increased, the intellect is expanded and by which one can stand on one’s own feet*” . It infuses energy and drive in its pursuance.

This journey is not very old. It started 5-1/2 years ago with chalk-n-talk as an atheist. Accordingly, it was believed that “*a man is maker of his own destiny*”. Therefore, a sceptic view was held about believers as to “*what one gets from prayers ?*”. Growing in age and with experiences encountered during adversities it is a realization that really one gets nothing out of prayer. It is just a symptom of a person on भक्ति-योग on which sublime faith and submission infuses a self-confidence in शिष्य/भक्त to undertake endeavour stretching upto the limits unknown misadventure with only one belief that all the efforts are being made in service of Guru or GOD, an essence of निष्काम-कर्म-योग. This generates enormous faith in self and ability achieve even impossible, at times.

It is only Four months, since start of interaction with the spiritual institution at Ramakrishna Mission School. Experiences in respect of furtherance of this selfless proposition has boosted faith निष्काम-कर्म-योग. This educational adventure needs a special care as advised by Dorothy Law Nolte that -

If children live with criticism,
they learn to condemn,

If children live with hostility,
they learn to fight.

If children live with fear,
they learn to be apprehensive.

If children live with encouragement,
they learn to be confident.

If children live with fairness,
they learn justice.

If children live with tolerance,
they learn to be patient.

If children live with security,
they learn to have faith in, themselves.

And in those around them.

Swami Vivekananda: Social Reform Through Education

Swami Shantatmananda ji Maharaj

Swami Vivekananda was a great patriot-monk India had ever produced. The testimony of Mahatma Gandhi vouched for this assertion. Mahatma Gandhi visited Belur Math in 1921 and before leaving he wrote in the Visitors' Book that after reading Swami Vivekananda's works, his patriotism for the country had increased thousand fold. One of the Western disciples of Swami Vivekananda, Sister Christine, wrote in her reminiscences, "Our love for India came to birth, I think, when we first heard him (Swami Vivekananda) say the word, "India", in that marvelous voice of his. It seems incredible that so much could have been put into one small word of five letters. There was love, passion, pride, longing, adoration, tragedy, chivalry, *himweh*, and again love. Whole volumes could not have produced such a feeling in others. It had the magic power of creating love in those who heard it." In fact, his love for our motherland was perhaps the singular factor which held him tied to this earth. He was a born Yogi. He was a great contemplative and diving deep into meditation was the natural swing of his mind. However, he sacrificed all these to serve our motherland.

Swami Vivekananda knew everything about India like the palm of his hand. What was the source and basis of his knowledge? He was a keen student of history and had a thorough knowledge of India's glorious past. He was immensely practical in his outlook and that helped him understand the then condition of our country. After the passing away of his Guru and mentor, Sri Ramakrishna, he had gone on a pilgrimage of the entire country on foot. He met people from every segment of the society, from the richest to the poorest, from the most learned to the most ignorant, from high caste priests to those condemned as the low caste, from Maharajas to penniless beggars. The firsthand knowledge which he gained through his explorations gave him a complete understanding of our country including the causes for its downfall. He felt deeply concerned and pained by the degradation of our country. He said, "If there are holes in this national ship, this society of ours, we are its children, let us go and stop the holes. We will make a plug of our brains and put them into the ship, but condemn it never."



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Swami Vivekananda clearly identified that two important causes for India's downfall were the neglect of the masses and the monopoly of education by a few belonging to the privileged classes.

What is the way to regeneration? The first step in this regard is uplifting the masses by restoring their lost individuality and faith in themselves. Swami Vivekananda said that we should remember that the nation lives in the cottages and that no amount of politics will be of any avail until the masses of India are once more well educated, well fed and well cared for. He said, "Our mission is for the destitute, the poor, and the illiterate peasantry and labouring classes, and if, after everything has been done for them first, there is spare time, then only for the gentry." He was of the firm view that material progress was absolutely necessary to create work for the poor. He said, "Bread! Bread! I do not believe in a God, who cannot give me bread here, giving me eternal bliss in heaven! Pooh! India is to be raised, the poor are to be fed, education is to be spread..."

He said, "Education, education, education alone! Travelling through many cities of Europe and observing in them the comforts and education of even the poor people, these brought to my mind the state of our own poor people, and I used to shed tears. What made the difference? Education was the answer I got." According to him, a nation is advanced in proportion as education is spread among the masses.

But, what was the education that he advocated? He advocated a man-making character-building education. He said, "We want that education by which character is formed, strength of mind is increased, the intellect is expanded, and by which one can stand on one's own feet." He said that education must make one self-reliant and help face the challenges of life. He was highly critical of the so-called educated who do not care for the poor and downtrodden. He said, "So long as the millions live in hunger and ignorance, I hold every man a traitor who, having been educated at their expense pays not the least heed to them!"

आत्मचिंतन

निरंजन धुलेकर

इस लेख के माध्यम से शिक्षा से सम्बंधित चार मूलभूत आधार स्तम्भों का आत्मचिंतन पाठकों के विचारार्थ प्रस्तुत है ।

भाग - १: छात्र

जी हां, मैं छात्र हूँ, मिट्टी का कच्चा गोला, मुझे कुछ ज्ञान नहीं, कुछ आता जाता नहीं। दुनिया को देखने के लिए अर्जुन की तरह मुझे भी ज्ञान की दिव्य दृष्टि चाहिए।

जो आप दिखाओगे मेरे लिए वही दुनिया होगी, सत्य होगा! इसीलिए तो मैं स्कूल और कक्षा में आता हूँ, सब कुछ नया, अद्भुत, अनजाना सा। मुझे सब जानना है। उस तरह से जो मैं समझ सकूँ, सरल और आसान शब्दों में। मेरी बुद्धि जिसे आत्मसात कर सके, ग्रहण कर सके और संजो कर भी रख सके।

इतना तो समझ सकूँ की प्रश्न पूछ सकूँ, शंका पैदा कर सकूँ, क्यों, कैसे, कहाँ, कब आदि सवाल को जन्म दे सकूँ। मैं लिखना नहीं चाहता, समझना चाहता हूँ उस अणु को जो मुझमें पाठ के ज्ञान का विस्फोट कर सके और प्रकाश भी, हमेशा के लिए।

मेरे प्रश्न आप के लिए मूर्खतापूर्ण, नहीं हो सकते, कभी नहीं। मैं भिखारी हूँ ज्ञान का, जो मिले सब मुझे चाहिए, अनवरत! मुझे स्पष्ट किंतु सरल भाषा जिसे मैं समझूँ, मैं ज्ञान चाहिए। एकदम से फर्फटा नहीं भाग पाऊंगा।

आप मेरे स्तर पर नीचे उतरिये, हाथ बढ़ा के मुझे आगे रास्ता दिखाइए, कदम दर कदम, मैं चलूंगा जरूर। सड़क पे चलना सिखाइये, तभी तो पहाड़ों पे चढ़ सकूंगा, नदी नालों पर कूद पाऊंगा।

बाहर से मुझे मत रंगिये, मेरी मिट्टी को सुंदर, सख्त लेकिन लचीली बनाइये ताकि मैं इसमें ज्ञान की सरिता को सुरक्षित रख सकूँ, आजन्म!

मैं मिट्टी हूँ, जोर लगाएंगे तो टूट के बिखर जाऊंगा। मिट्टी मिट्टी में फर्क होता है। उसे जिसने समझा वही सच्चा गुरु सिद्ध हुआ। मेरे साथ आपको भी असीम धैर्य रखना ही होगा, आप भी तो कभी मैं ही थे।

जिस दिन ज्ञान, मिट्टी में पानी की तरह घुल जाएगा मेरी साधना और आपका उद्देश्य सफल हो जाएंगे। पानी को मिट्टी से अलग मत रखिये, उसमें मीढ़ दीजिये, मुझे समझना है, याद तो अपने आप हो जाएगा। याद रहे और समझ मे न आए तो सब व्यर्थ।

गुरुवर, क्या आप मेरी अपेक्षाओं को पूरा करने के लिए पूरी तरह समर्थ हैं ??

भाग - २: शिक्षक - कुम्हार

मुझे गुरु, शिक्षक और टीचर भी कहते हैं।

अपनी बिल्कुल ज़मीन से निकली कच्ची मिट्टी मेरे हवाले कर के समाज द्वारा मुझे ये दायित्व सौंपा जाता है कि मैं इस मिट्टी को एक सुंदर, समाज उपयोगी, मजबूत बर्तन बना सकूँ जिसमें ज्ञान, विज्ञान, कला संगीत, गीत गद्य पद्य और न जाने क्या क्या समाहित हो सके।

मेरे हाथ इस मिट्टी को सजाने, सवारने और आकृति देने के लिए तैयार किये गए, योग्य, प्रशिक्षित और समर्थ भी।

मुझे सबसे पहले, उस मिट्टी से प्रेम, स्नेह करना होगा, जिसका भविष्य अब मेरी कुशलता, ज्ञान सम्प्रेषण को समर्पित हो चुका है। मैं उस मिट्टी के लिए अब ब्रह्म हूँ, अंतिम सत्य भी।

एक बेहद जटिल कार्य !

ज्ञान को अनभिज्ञ तक, विषय की पवित्रता और प्रामाणिकता को जैसे का तैसा रखते हुए पहुँचाना, वो भी सरल, आसान और पूरी रोचकता के साथ।

अलग अलग परिवेश, समाज, से निकाले गए ये मिट्टी के गोले, कितनी आशा से मुझे देखते हैं।

ज्ञान बाद में, पहले वो मुझसे जुड़ना चाहते हैं, प्यार से, स्नेह से और मेरी सवरे वाली प्यारी सी मुस्कुराहट से भी! क्या मैं रोज़ ऐसा करता हूँ?

फिर, मैं इन्हें ज्ञान देना शुरू नहीं करता, मैं विषय को उस तरह से प्रस्तुत करना शुरू करता हूँ कि मेरी कक्षा का हर बच्चा स्वयं उसे समझना शुरू कर देता है।

मैं पढ़ाता कम हूँ पर माहौल ऐसा बनाता हूँ कि हर बच्चा उसमें उतरता चला जाए, खुद ब खुद। यही तो मेरा मुख्य औज़ार है ज्ञान प्रत्यर्पण का। छात्र को पढ़ना है, मैं तो मात्र प्रेरक हूँ, उत्प्रेरक हूँ, माध्यम हूँ और उत्कंठा निवारक भी।

मुझे समय के आगे चलना होगा, क्योंकि मुझे गुरु का दर्जा मिला है। हर प्रश्न का उत्तर मैं ही हूँ। छात्र अगर विद्यालय के बाहर अन्य स्थान पर यही पाठ जो मैं पढ़ाता हूँ, को पढ़ने जाता है तो क्या ये मेरी क्षमताओं और ज्ञान हस्तांतरण की खूबियों पर एक प्रश्नचिह्न नहीं?

मुझे कक्षा के सबसे कमजोर बच्चे को सर्वाधिक ध्यान देना होगा, सर्वोत्तम पर नहीं। अगर सबसे कम बुद्धिवाले बच्चे को मैं प्रथम श्रेणी में उत्तीर्ण कर सका तो ही मैं एक खरा शिक्षक कहलाऊंगा।

मैं गुरु हूँ, जिसके सामने मेरा आने वाला देश, समाज, व्यक्ति बैठा है, मैं इनके साथ कोई अन्याय नहीं करूँगा, कभी नहीं, वरना कल लिखा जाने वाला इतिहास मुझे ही सबसे बड़ा दोषी घोषित करेगा। मैं गुरु हूँ, गुनहगार नहीं बनूँगा।

भाग - ३: पाठशाला

चाक, कुम्हार का पहिया! इसे गुरुकुल, विद्यालय, शिक्षण संस्था, शिक्षा स्थल, स्कूल, आदि नामों से जाना जाने वाला मैं, विद्यालय, यानी विद्या का घर! मैं तो मात्र एक संधिस्थल हूँ! ज्ञान दाता और ज्ञान भिक्षुक का मिलन बिंदु!

मैं एक साधन, शांत, उत्प्रेरक, सुखद, शुद्ध हवा, समुचित प्रकाश, जल की पूर्ण व्यवस्था के साथ एक मनोहारी, आकर्षक विद्या भवन!

यहां मिलते हैं गुरु और छात्र और होता है ज्ञान का विकिरण, सम्प्रेषण, संग्रहण और मंथन।

मेरी ख्याति मेरे भवन से नहीं, बल्कि भूत काल में मेरे भवन में एकत्रित गुरुजनों की ज्ञान प्रदान करने की अद्वितीय शैली, श्रम की पराकाष्ठा, और छात्रों के प्रति कर्तव्यों के निर्वाह और साथ ही, छात्रों के अथक प्रयास और अध्ययन से मिली अपार सफलता और उसकी निरंतरता पर निर्धारित होती है।

छात्रों को कक्षा में वैज्ञानिक और आधुनिक शिक्षा हेतु वातावरण, उपकरण, प्रयोग शालाओं, और साहित्य से मुझे सजाया संवारा जाता है।

छात्रों की उम्र, वर्ग के अनुसार सारी सुविधाएं उपलब्ध की जाती हैं। गुरु और छात्र दोनों लगभग आठ घंटे मेरे परिसर में रहते हैं और इसीलिए मैं उनके जीवन का अविस्मरणीय अंग बन जाता हूँ।

मेरा अपना एक अस्तित्व छात्रों और गुरुजनों के बचपन और जवानी से घुल मिल जाता है। मेरे छात्र आजीवन एक दूसरे से मिलने का प्रयास करते हैं। समय में खो गए वो तो दशकों बाद मुझसे मिलकर रोने लगते हैं।

मैं सर्वधार्मिक, अजातीय, अभेद हूँ। मेरा धर्म या मजहब मेरी शिक्षा, मेरा पूजाघर, इबादतखाना, मेरा विद्यालय! मेरा परिवार मेरे छात्र।

मेरा कोई रंग रूप नहीं, धर्म, जाति नहीं, राजनीति नहीं, भेद, द्वेष नहीं, मैं असीम हूँ। पूरा विश्व ज्ञान ही मेरा भंडार है।

मेरा परम स्वार्थ, मेरा ज्ञान पूर्णरूप से संप्रेषित मात्र ही नहीं, बल्कि जिस का तस छात्र द्वारा ग्रहण किया जाना। मेरा उद्देश्य असीमित, अद्वितीय शिक्षा हर समय, हर छात्र को, सदैव उपलब्ध!!

मेरी गुरु दक्षिणा? मात्र इतनी की मेरा हर छात्र उज्ज्वल, तत्पर, ज्ञानी, संवेदनशील, बहुमुखी प्रतिभा का धनी, इम्मानदार, और जागरूक मात्र भूमि पर मर मिटने वाला नागरिक बन सके बस!

सब बदल जाता है, पर मेरे परिसर में जो ज्ञान की गंगा बहती है उसकी धारा किसी समय भी नहीं रुकती नहीं।

ये बात और है कि सामाजिक मानसिकता के कारण मैं भी अब धार्मिक, जातिवाद, अमीर और गरीब, उच्च और साधारण, सरकारी और निजी के चक्रव्यूह में बांट दिया गया हूँ।

आधुनिकता ने कक्षाओं को अब घरों में कंप्यूटर के पर्दे पर भी समेट दिया है। अब गुरुजन भी पर्दे पर अवतरित हो कर शिक्षा देते हैं और छात्र डिजिटल माध्यम से उनसे जुड़कर सीधे वार्तालाप भी करते हैं। पढ़ाई के नवीनतम माध्यम तेज़ी से अपनी जगह बना रहे हैं। समय बेहद महत्वपूर्ण रूप लेता जा रहा है।

क्यों न हो, समय बदल भी तो रहा है।

मैं जिस भी रूप में रहूँ, मेरी आत्मा में मात्र शिक्षा के अलावा और कुछ नहीं।

भाग - ४: समाज

अंतहीन क्षितिज : समाज और आधुनिक शिक्षा प्रणाली।

पाठशाला, गुरु और शिष्य इस त्रिकोण में ही समाज को अपने भविष्य का क्षितिज दिखाई देता है। अपेक्षाएँ आसमान छूती हैं।

एक आशा भी दिखाई देती है कि आने वाले देश के नागरिक, देश को समाज को और परिवार को नई दिशा देने के लिए तैयार हो रहे हैं।

इस त्रिकोण के अंदर जो भी होगा उसका प्रभाव भविष्य दिखाएगा।

1935 के मिन्ट्स ऑफ मैकाले में जो लिखा गया उसने देश को दिए अर्ध शिक्षित बाबू, जिनका कार्य आदेश लेना और उसी तरह से कार्य करना मात्र था, ही दिए।

बाबू मतलब ,नौकर जिसे आज्ञा का पालन करना सिखाया गया । सोचने , अपना मत देने और सुझाव सामने रखने की बुद्धि उसे देना उचित नहीं समझा गया । पढ़ना उतना ही ज़रूरी था जितना सरकार को उचित लगा ।

अभी तक वो गुलामी की मानसिकता जारी है यानी नौकरी मिल जाए तो पढ़ाई पर हुआ खर्चा वसूला जाए । पर समय तेज़ी से बदल रहा है। शिक्षा तंत्र में भी ।

पर अब ये नहीं चलेगा । शिक्षा के तीनों कोने अब अपना स्थान बदल रहे हैं , अब ये त्रिकोण टूट रहा है जहां शिक्षक ,शिष्य और स्कूल नई तकनीक को लागू करके , अबाध विज्ञान और असीमित ज्ञान को पाने के लिए आकाश छूने चल पड़े हैं ।

ज्ञान पुस्तको से निकल कर कंप्यूटर के स्क्रीन पर छा रहा है ।गूगल, नेट ,और ई मेल के इस युग में सब कुछ सबके लिए ,हर वक्त का नया त्रिकोण जन्म ले रहा है ।

अब शिक्षा प्रणाली पैदा कर रही है निर्णय लेने वाले , प्रश्न करने वाले और शास्त्रार्थ करने वाले युवा ,निडर, बेखौफ ,और पूरी तरह से भविष्य को सींगों से पकड़ने वाले जुझारू नागरिक । अब ये रुकने वाले नहीं, इन्हें रोकने की हिम्मत भी किसी में नहीं ।

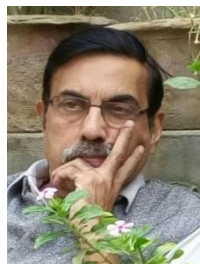
शिक्षक अब बेहद सजग होने लगे हैं कि कहीं उल्टा सीधा पढ़ा दिया तो शिष्य चेलेंज कर देगा , मार पीट के ज़माने गए , रटना घोटना अब ज़रूरी नहीं।

अब तो नई शिक्षा नीति आ गयी है ।नेशनल करिकुलम फ्रेमवर्क 2005 के अंतर्गत मैकॉले की दिशाहीन शिक्षा प्रणाली को समाप्त किया जा चुका है ।

अब पाठशाला का स्वरूप बदल रहा है । ब्लैक बोर्ड की जगह डिजिटल स्क्रीन ले रहे हैं , प्राथमिक पाठशालाओं में भी वीडियो क्लिप्स का सहारा ले कर आधुनिक समाज का चित्र कोमल मनो पर उकेरा जा रहा है , सहअस्तित्व का महत्व पढ़ाया जा रहा है ,सामाजिक कुरीतियों को ध्वस्त करने पे ज़ोर दिया जा रहा है ।

अब समाज को शिक्षा ,शिक्षक गुरुजन और शिष्य सब मिल कर एक सर्वधार्मिक, अजातीय ,मानवीय और सुसंस्कृत ही नहीं बल्कि अत्यंत शिक्षित , संवेदनशील , विचारोन्मुख नागरिक बनाने की दिशा में आगे बढ़ रहे हैं ।

अब समाज किसी त्रिकोण या चतुरभुज या चक्र में सिमटने वाला नहीं है ।



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*Education is just not training;
It is about ability to think;
It is about ability to reason;
It is about ability to choose;
It is to develop a faith in self,
And, a passion to apply.*

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FIVE DAUGHTERS OF PUNJAB: BLESSED AND ADMIRER BY SWAMI VIVEKANAND

(Article is dedicated to Sister Nivedita, chief foreign lady disciple of Swami ji ,on her 150th birth anniversary year)

Swami Swatmananada ji Puri

Swami Vivekananda had very high regards for Punjab specially the valour of the race, spirited by Guru Govind Singh ji. Swami ji, while wandering through the land of five rivers called Punjab, was deeply impressed by hard working race of locals, not only males but even of women- folk. Their large heartedness to feed the guests, be it poor or rich, with same regard *with service mindedness to all, without discrimination of caste, creed and religion taught to this race by Saint Guru Nanak ji shall glorify India in years to come was proclaimed by Swamiji.* We have been seeing fructification of this message, when scores of youth came forward to lay down their lives for protection of our motherland smilingly, whenever war was inflicted upon us. 'Wahe Guru ji ki Fatah' ,often heard chanted by Swami ji in the premises of Belur Math, when he was alive.

During his wandering in 1897-98 to Kashmir and in several regions of Himalaya, more than a year, with his sanyasi guru-bhai and disciples, and second time with his western disciples he spent considerable time in Punjab, most of which is now in Pakistan. In his biographies, we hardly get a glimpse of Swamiji having blessed these Punjabi sisters. About five of them are highlighted in this article.

Manika ji, the **First** and foremost one, was a daughter of a simple person Sukhlal ji. He hailed from Ambala but had to live in Srinagar for the sake of work and livelihood. He lost his wife when Manika ji was in her teens, so he had to leave her in the care of Shaiva Saint Ramji, Fatekdal Math. Holy saint groomed the girl in celibacy and taught Sanskrit and scriptures, and later ordained Sanyasa. He established Veda-vidyalaya with monastery of some of the Sanyasinees. Out of them Manika ji was brilliant and later became head of the Vidyalaya. When Swamiji visited Saint Ramji's Fatekdal ashram, as per instructions of their Gururji, Manika ji and her junior Gayatri ji invited Swami ji to visit Vidyalaya of girls. He was welcomed by Vedic chanting by the girls and they had conversation with him in Sanskrit. Swamiji was deeply overwhelmed and blessed them. When he was requested to influence householders to send their daughters to this monastery

with blessings, he called them gems of the mother Sarswati. We all know that Swami ji's dream, in those days, was to impart education to woman of India. He profusely blessed Manika ji, who also learnt English from an English lady so as to impart it to her taught in Vidyalaya. It was not so easy those days when Hindus used to consider English people as *mlecchhas*, and to refrain from them. Life and message of Swamiji influenced her to have blending of ideals of East and the West.

Second Sister was Gayatri ji from the same clan of Saint Ramji, who was junior to Manika ji. Swamiji advised Ramji that besides Sanskrit education if some type of project works are imparted to the inmates of monastery it will do good to them. And accordingly, Saint having in-depth knowledge of अथर्ववेद decided to start project of preparations of Ayurvedic medicines. Thus, on the advice of Swami ji, this project was successfully carried out at the Ashrama and Gayatri ji was well trained in this project, who was given its full responsibility. These medicines were used for the service of the inmates and poor people as well. Since, Gayatri ji had also seen Swamiji, she later used to tell the Bramhacharininees, while reading his life, that – *"Nobody has even thought and talked so freely about education on Indian Women as Swamiji did, so that women would become self-reliant"*.

Third sister is Amandevi, who first saw Swamiji in her 14/15 years age, when he landed in their house in Rawalpindi. Twice he visited their house. Her father was a pleader, Lala Hansraj Sahani . Amandevi was married at the age of 11 years and was widowed when she saw Swamiji first time. Swamiji was deeply grief stricken to see her so early as widow. He blessed her by putting his hand on her head giving advices to grow her future life. As per Swamiji's advice she resolved to educate herself, despite all restrictions, and passed B.A. in 1907. As per instructions of Swamiji's first Girl's school was established by Lalaji and other Aryasamaji leaders, of which she became first headmistress. She herself use to collect girl students, money for the school and used to run widow-home attached with the school. Later she wrote – *"Now I*

realize what a great blessing was imparted to me by Swamiji, when I was heart broken”

Fourth daughter of Punjab who had had the influence and blessing of Swamiji was Sushila devi. She was member of governing body of Girl's School of Sialkot, which was proposed by Swamiji. Swamiji in his letter dtd. 25th Oct 1898 from Belur Math to Sahniji ji to help start girls school, mentioning about wisdom of Sushila Devi and her hard working characteristic to utilize for the project. Sushila devi had her education from missionary school and college and also taught in one college of Lahore. She was related to Aman devi and was instrumental in pursuing latter's studies. Later Sushila ji became a great social worker as well as a freedom fighter. By her clarion call for freedom of the country, she influenced lot of young Punjabi ladies, quoting Swamiji's message in her speeches. She was a sore in the eyes of British Government and was ordered to be arrested which she cleverly escaped hiding herself intelligently for a long time. Ultimately she was caught in the year 1932, bearing torture of police in jail, like sleepless nights, fasting, thrashings and what not! But, always Swamiji was in her memory that made her to withstand the ordeals.

Fifth great lady was Rajandevi. She was wife of Kundan Singh ji of Mari, where Swamiji stayed in 14th Oct'1897 and was greeted by Bangalees and Punjabis there. Five generations of this family have close contact with Ramkrishna Sarada Ma, Vivekananda's missionary work and visit Ramkrishna Mission. During welcome of Swamiji, Kundan Singh ji offered him one Shawl and a muffler as a gift, which at first was refused by Swamiji, but later when he sought blessings for the growth of his shop, Swamiji smiled and accepted the offering. Swamiji gave a brief speech

in Hindi and talked about greatness of Punjab, particularly valour of the race. *“Service to man is the sum and substance of religion”*, he told as practised by Gurujis of Punjab. *“Education to the needy, food to the hungry, advice to the youngster to stand upon their feet, all these come in philanthropic service”* exhorted by Swamiji there.

By these words of Swamiji, *this family was so deeply influenced that they did a lot of service-activities in their villages*. They had a lot of tonga carts which used to be put on hire service. Some of them were diverted to carry mothers for delivery or old people and children to doctors, *hakims* etc. Rajan devi used to manage all these affairs and guide village widows to spin out threads through wheels (*Charkha*) which used to be taken for making Khadi yarn. Also first school of that village was started by their efforts. Swamiji gave a very elating message to the family which is framed and worshiped by the family members even now. It reads as - *“I was elated by your collective enthusiasm. I shall be more than happy, if your endeavour is extended towards the downtrodden. I pray to the Almighty for your well being.”*-14th Dec '97, Vivekananda.

Indeed, these Five Gems of Punjab, the mothers and sisters should remain in our memory in this 150th anniversary of Sister Nivedita, a great Irish lady, influenced by Swami Vivekananda, who came to India and lived till her death to serve women of Mother India.

Jai Thakur, Jai Maa, Jai Swami ji

Reference: Udbodhan, Bengali Journal, 'Saradiya', 1916.



Author renounced after a career for 18 years at a prestigious organization ISRO and had a privilege to work in the team of DR. A.P.J. Abdul Kalam for 10 years in pioneering rocket development activities in India like SLV, PSLV etc. Since then, his mission is to spread message of Swami Vivekananda in rural India and serve them, which he had been carrying out in Narmada Valley since last two decades, living with well wishers in cottages, temples, ashramas etc. which has told upon his health as well. He is now stationed at Ramkrishna Ashram Ghamapur, Jabalpur.

Coordinator of Gyan Vigyan Sarita had privilege to spend studenthood during 1967-69, while pursuing engineering studies, with the author, under the a tin-sheded structure then at Ramkrishna Ashsram, Ghamapur, Jabalpur. He is celebrate right from his childhood.

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PURPOSE OF TODAY'S EDUCATION

Manish Sharma

Education in today's world has undergone a change in Purpose, then what it used to be perceived in Vedic society. Today it has become a tool to drive many goals of modern world and most importantly a means to mitigate financial problems by taking higher degrees in prestigious institutions. More often than not Academic degrees and Education are loosely interchanged for each other and have become each other's synonym. Higher academic qualification in society is a symbol of good education.

But is it so? Is Education really serving its purpose of imparting knowledge which can be used not only for our benefit but also to the society by helping us use acquired knowledge to add value to society, by addressing community problem in most humane way? Is it really helping people to become more receptive and compassionate towards fellow neighbours, or helping in community leaving?

So question remains what is the true purpose of Education. Here I would like to quote my mentor Dr Daisaku Ikeda, who is also founder of Soka University. He states: *"The greatest resource that humankind has is to be found within human life itself. This treasure can be endlessly mined and developed. To believe in and encourage youth, bringing out their wisdom and strength; this is the challenge and purpose of education."*

Education which cannot empower people will ultimately produce people with high Academic Quotient who are missing on true purpose of Life. Wherein a true education will encourage individuals to become aware of their power and to use it for a greater purpose, a purpose with value that can lead to a transformation of one's environment. This is the gift bestowed upon us by education if we have the courage to embrace this possibility.

Education focuses on transmission of knowledge, however knowledge itself is a neutral tool that can be used for good or evil. Dr. Ikeda has called the *confusion between knowledge and wisdom as one of the grave failings of modern society*. He likens *knowledge to the ability of a doctor to discern the cause or nature of a person's illness and wisdom to the doctor's ability to successfully treat the disease*.

When knowledge and wisdom is separated, it creates sufferings in society. However when the two combines

together for a purpose, it fulfills richness of human community and removes sufferings which is rampant in today's global society.

Here I would like to give and quote some examples on how true education can lead to people rising above their capabilities which they never knew they possessed till such time.

It would be relevant to quote Dr. Maathai's example. For 30 years Dr. Maathai has struggled against and overcome harassment, persecution, and oppression as she has courageously led a grassroots movement of women to plant trees in order to enhance the lives of the Kenyan people and protect the environment.

After completing a master's course at graduate school in the U.S., she returned to Kenya, receiving her doctorate from the University of Nairobi and becoming the first woman to earn a doctoral degree at a Kenyan university. Thus she began her struggle for the happiness of her country and its people.

She has written that the professors at the college where she studied cared for her as if she were their daughter. One professor, whom she respected, deliberately placed her office in a location where the students would pass by frequently. The door was always open, and the professor smiled gently on each of the students as they passed.

Dr. Maathai describes this experience and her profound gratitude to her teachers: *"They did everything to help me, educate me, and enrich my life. I had already benefited from a full scholarship, yet I continued to receive so much more."* ¹

Similarly, at the University of Berlin, a method of instruction centered on joint research by students and professors was adopted. At the time, it was common for students simply to listen passively to the professor's lectures. There was little room for students to raise a critical view. Professors could neglect their own research efforts without exposing themselves to criticism.

The founding of the University of Berlin was a breakthrough moment in the history of the university. At the heart of this was the principle of education through research in which students are accorded equal standing to professors in the quest for knowledge and truth. The seminar system, where students present their

research findings and all participants engage in discussion and debate, is said to have started at the University of Berlin and other German universities.

"The university teacher is therefore no longer a teacher and the student no longer someone merely engaged in the learning process but a person who undertakes his own research, while the professor directs his research and supports him in it." 3.

Teachers and students mutually inspiring and stimulating each other in a vibrant process of learning through unfettered dialogue and debate, together scaling the summits of knowledge--herein lies an ideal vision of university education.

The introduction of the teaching principles of the University of Berlin marked the start of a period of dramatic development for German universities. A century later, by the early years of the twentieth century, German universities were leading the world in the number of Nobel Prize recipients for the natural sciences.

This emphasized the principle of Mentor and student relationship where individuals intellect and character are cultivated through dialogue and pursuit of truth.

If our education system can deliver it, we have all the reason for patting our back...



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***When I asked God for strength
He gave me difficult situations to face
When I asked God for brain & brawn
He gave me puzzles in life to solve
When I asked God for happiness
He showed me some unhappy people
When I asked God for wealth
He showed me how to work hard
When I asked God for favours
He showed me opportunities to work hard
When I asked God for peace
He showed me how to help others
God gave me nothing I wanted
He gave me everything I needed.***

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What is Meant by Education?

Swami Guneshanand ji Maharaj

The education which we are receiving at schools is of left brain, by which we can get bread, butter and shelter. But, that is not sufficient. Because, it doesn't teach us how to face day to day problems in midst of our life. Then what kind of education do we need?

Sw. Vivekananda said *"Education is the manifestation of perfection already in man". Now we have to manifest perfection in our life. By getting academic qualification we are manifesting only one part of education not the whole.*

Education includes four things: **1.** Observation, **2.** Discrimination, **3.** Perseverance, **4.** Manifestation.

Observation : Many people do not observe the situation or thing properly. We must observe the thing in its real sense. If we observe the situation or thing properly then we can keep any ourselves from many problems. By observing persons we can understand what type of nature he or she has. So observation has big role to play in our life.

Discrimination: The faculty which says us what is to be done and what is to be rejected. Once we observe things around then we have to scrutinize them and discard the useless things and accept the meaningful things to adopt them into our life. Best example is a sign board at the entrance of military area Over the sign board it is written STOP, WATCH. WAIT AND GO. In midst of activities we have to stop and watch it properly. Then we have to evaluate it impassionately and decide whether we have to proceed or not That is known as discrimination.

Perseverance: Perseverance means continuously putting efforts and energy in the work in hand till it is completed and the goal is achieved. After deciding goal we have to strength its means to achieve it Proper attention to the finishing. strengthening of the means is what we need. Whenever we fail and if we analyses it properly we find that it is because we did not pay attention to the means properly. Once we the means is strengthen well the goal will come itself.

Manifestation: Our past has made our present and our present will make our future. We tend to live in future. very little realizing present is the foundation of our future and future is nothing but present modified. So let us live in present & imbibe above qualities to manifest perfection.

Why do we study? Most of the students say to earn money, some say to gain social prestige, some say to get fame etc. Are these the sole purpose of our study. Our object of study should be knowledge & we should use that knowledge for the betterment of the society. Name, fame, money, prestige etc. are by-products of our main object. Study is the austerity for the student. When our purpose of gaining knowledge is for the service of the society then only

study will become austerity for us. We must resolve for higher knowledge and behind such resolution should lie love of truth and love of man, and courage. Such kind of resolution becomes silent onward creative movements of the human soul. We have to make our life the confluence of tapas and svadhyaya, self-discipline and study-research.

We have **wonderful example** of Dr. Yellapragada Subba Rao of Andhra Pradesh. He had spirit consisting of love of truth and the inquiring spirit and also love of man. He was a bright but very poor student. His brother fell ill of sprue of a serious kind. That time it was an incurable malady. The boy watched his brother sinking day by day and was unable to do anything. He, then and there, resolved within himself that he would dedicate his life to find such a remedy. After finishing his medical course at Madras, he went first to U.K. and then to U.S. he worked hard and obtained a degree in biochemistry. Impressed with his earnestness and talents, American Cyanimid Co. encouraged him to go ahead in his search. Like many other scientific seekers, he also must have often experienced frustration and dejection for not getting the expected result. Ultimately, he succeeded in his task and produced synthetic folic acid in the form of a yellow powder in 1945. It was a great discovery. He did not take any personal credit for this discovery, but he gave that credit to the members of his team. During all those years he gave freely from his earning to relieve the sufferings of other people around him.

What is meant by character? Emotions controlled and directed to creative work is known as character. We do have love, anger, jealousy, hatred and other emotions. We have to control above emotions and channelize them in proper way is known as character For e.g. we should have love towards good qualities of others, our goals, work and those things that will take us towards our purpose. We must have anger for our shortcomings We must feel jealous about others good qualities and not for success . A child lives in condemn, learns to criticise whereas the child who lives in encouragement learns to appreciate. We must hate over fault finding tendency for others. That's why Swami Vivekananda said *"Neither money pays, nor Name, nor fame, nor learning. It is character and character alone that can cleave the adamant wall of difficulties"*.

Why do we feel tension or stress? How to overcome stress and tension? In this modern competitive world the expectations are very high. Hence, the demand on us is mounting up. And there always pressure of time and this leads to tension on us. Thus tension and stress have become part and parcel of everybody's life. Be it a business man. a corporate employee. House-wife or student. Nobody can escape from this disease of tension or stress. Then next question that comes up is how to deal with such situation?

Arjuna also was in the state of dilemma in the battle field of Kurukshetra. In state of dilemma he put down his weapons and decided not to fight. We also do the same thing when adverse conditions attack on us. Instead of fighting heroically we buckle down ourselves at the situation. And that lends us to suffering. When Arjuna was in problems Krishna came to his help and said "Yield not to unmanliness. Cast off this mean faint-heartedness and arise, O scorcher of thine enemies!" Here Krishna did not say anything about God but gives wonderful message of manliness! "We are in the battle field of difficulties and adverse situations are our enemies. Be a real hero ! Say to yourself ' let them come up with full power ; I shall also fight with full energy vigour and will conquer them." Come up O Lions! And shake off the delusion that you are sheep! We have come to win the game and we shall be the winner. Have faith In yourself firmly. Remember Swamiji's call " What makes You weep my friend? In you is all power. Summon up your all-powerful nature, O mighty one, and this whole universe will lie at your feet. It is the self alone that predominates, and not matter." We must realize this infinite strength In our mind and body. Don't forget that we are lions not the sheep. We are born to lead the world not to be lead by the world. All great people passed through various difficulties so I have to pass through that and have to come as winner.

In difficulties we must not blame the situation or anybody else rather we have to bring change in our own self. We can learn from the simple example from our life itself. When rain comes we do not blame the rain but we use an umbrella to remain dry. Likewise when situations are adverse we must

and have to bring change in our own selves rather blaming the situation or person. He is the wise man who brings change in himself according to time, space and situation. Makes adverse condition into favourable one. If we keep the above things in mind, we can beat stress, and tension.

How to overcome our failures? When a student fails in the exams he blames on teachers. Teachers did not teach properly, questions were very tough etc. But, student doesn't say – 'I did not study well'. Remember "*we are our own friends , we are our own enemies.*". Take responsibilities on your own shoulder. Make sure that I am the only responsible for my present situation We must not blame anybody for our failure.

Krishna also says in Gita "*Raise yourself by Yourself: don't let yourself down, for you alone are your own friend, you alone are your own foe*". We do not get disturbed unless we become mentally weak! There may be thousands of misery floating around us but they dare not approach us, until the mind is awakened. Even if somebody troubles me, if I don't lodge it into my mind, it will not trouble me at all. If I take it, it will trouble me. So my accepting it is responsible for this trouble. Don't take your failure or error as defeat rather consider this as a lesson to learn and get yourself ready for another struggle.

Failures are the stepping stone of success. When athlete wants to take long leap he comes back a few steps and then proceeds forward. Likewise ,when failures come to us we have to take it in positive spirit & think that I have fallen back to take bigger leap rather than to get disturb by it. Then success will not be far behind.



Author is a monk of Ramakrishna Math & Mission and has been serving actively since last 23 years in this socio-spiritual organization. At present he is at its Vizag branch and conducting educational, cultural, medical and relief activities for a wide cross section of people in and around Visakhapatnam.

He has taken more than 200 seminars on various topics of Personality Development, National Integration, Education for Tomorrow etc. He has addressed more than Two lakhs students through various prominent schools, colleges and universities. He conducts number of workshops on stress management, business ethics, spirituality and corporate governance etc. many prestigious corporate offices. He also organizes various camps for school going children on theme of education to be, Indian culture, art & heritage etc.

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No body can go back and start a new beginning, but anyone can start today and make a new beginning

- Swami Vivekannanada

A Rare Conversation Between Swami Ramkrishna Paramahansa & Swami Vivekananda

S.N. Khanna

Please share with our next generation or read it loud to family, it's one of the best message I have come across...

Swami Vivekanand: I can't find free time. Life has become hectic.

Ramkrishna Paramahansa: Activity gets you busy. But productivity gets you free.

Swami Vivekanand: Why has life become complicated now?

Ramkrishna Paramahansa:- Stop analyzing life... It makes it complicated. Just live it.

Swami Vivekanand: Why are we then constantly unhappy?

Ramkrishna Paramahansa:- Worrying has become your habit. That's why you are not happy.

Swami Vivekanand: Why do good people always suffer?

Ramkrishna Paramahansa: Diamond cannot be polished without friction. Gold cannot be purified without fire. Good people go through trials, but don't suffer. With that experience their life becomes better, not bitter.

Swami Vivekanand: You mean to say such experience is useful?

Ramkrishna Paramahansa:- Yes. In every term, Experience is a hard teacher. She gives the test first and the lessons later.

Swami Vivekanand: Because of so many problems, we don't know where we are heading...

Ramkrishna Paramahansa:- If you look outside you will not know where you are heading. Look inside. Eyes provide sight. Heart provides the way.

Swami Vivekanand: Does failure hurt more than moving in the right direction?

Ramkrishna Paramahansa: Success is a measure as decided by others. Satisfaction is a measure as decided by you.

Swami Vivekanand: In tough times, how do you stay motivated?

Ramkrishna Paramahansa: Always look at how far you have come rather than how far you have to go. Always count your blessing, not what you are missing.

Swami Vivekanand: What surprises you about people?

Ramkrishna Paramahansa: When they suffer they ask, "why me?" When they prosper, they never ask "Why me?"

Swami Vivekanand: How can I get the best out of life?

Ramkrishna Paramahansa: Face your past without regret. Handle your present with confidence. Prepare for the future without fear.

Swami Vivekanand: One last question. Sometimes I feel my prayers are not answered.

Ramkrishna Paramahansa: There are no unanswered prayers. Keep the faith and drop the fear. Life is a mystery to solve, not a problem to resolve. Trust me. Life is wonderful if you know how to live.



Author is the Senior most person to be a backbone of this initiative in its toddler stage. He retired from a leading pharmaceutical Company. He is keen to return back to society through his voluntary engagements. He has been a regular contributor of the e-Bulletin ever started in this initiative.

VISION OF SWAMI VIVEKANANDA: SOCIAL REFORMS

D.V.S.Durga Prasad

Swami Vivekananda is a great thinker and reformer of India. He embraced education, which for him signifies 'man-making', as the very mission of his life.

Swami Vivekananda was a spiritual mentor to not only our country but also to all nations and civilizations. He was a multi faceted personality incarnated with a broad mind as the sky, deep as the ocean and pure as a crystal. He gave a social and scientific dimension to religion which he considered the summum bonum of all the religion. Swami Vivekananda created a national consciousness amongst all Indians. Swamiji interpreted the significance of Indians' ancient culture in the modern world. He travelled to different parts of the country and wherever he went, he loved and identified himself with the people of that region. He was the icon of national unity. He was the greatest social reformer.

Social reforms of Swami Vivekananda:

Swami Vivekananda was a great social reformer. He initiated many change to address the social problems. He felt that the three problems are the resistance of our progress. Those are education, poverty and castism. He gave a message to the downtrodden and masses. Swamiji was the first leader in modern India to speak for the poor and the downtrodden masses. He travelled extensively

within the country to understand their problems. He firmly believed that the main cause of Indians' downfall was the negligence and exploitation of the poor. He spoke about the basic necessities of life such as food, clothes and shelter for the Indian poor. He believed that solution for this would be making Indians learn modern methods of agriculture and cottage industry. He believed that self reliance is our goal and People need self-confidence. Vivekananda used to say, "He is an atheist who does not believe in himself" He boosted the confidence of people by saying "All power is within you; you can do anything and everything. Believe in that; do not believe that you are weak". It is very necessary in modern time. But the difficulty seems to be that we are losing faith ourselves day by day. Swami Vivekananda was a great patriot who dedicated his life in the service of our motherland. But he did not allow his love for India to limit his love for humanity. He loved and treated all human beings as equal without any distinction of caste, religion, race.

I strongly feel that Swamiji changed our society a lot and he is considered a great social reformer.



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Fear is death, fear is sin, fear is hell,

fear is unrighteousness, fear is wrong life.

All the negative thoughts and ideas that are in the world

have proceeded from this evil spirit of fear

—Swami Vivekananda

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HOW TO SUCCEED IN LIFE ?

Smt. Ch. Anjani Kumari

The main instrument for students to develop and be successful in life are : **a)** Concentration, **b)** Strength, **c)** Self-Confidence. Each of them is being discussed separately

Concentration: God has given a unique instrument called the “MIND” to all living beings including animals . But HE bestowed his special grace only on human beings in the form of freedom. Animals are controlled by nature but human beings are capable of conquering nature .Herein is the difference between man and animals – man has the greater power of concentration .The difference in their power of concentration is the degree of comparison between the highest and the lowest.

Concentration leads to perfection , perfection to confidence, confidence to success and success finally leads to happiness. Creativity, talents, originality, scientific discoveries and inventions, fine arts and even spiritual truths discovered by the sages are the product of a concentrated mind. Especially for students and youth concentration is must . It is impossible to acquire knowledge and working skills without adequate concentration . Restless mind leads to confusion , frustration , failures and various disasters.

“Concentration is the essence of all knowledge nothing can be done without it Ninety percent of thought force is wasted by the ordinary human being and therefore he is constantly committing blunders. The trained man or mind never makes amistakes.” -Swami Vivekananda.

Strength: Life is not always smooth like a bed of roses. Happiness and misery are two sides of a coin. One needs to develop mental strength to digest them. Many a time a weak mind that is unable to withstand suffering invites only untold miseries. What happened to Dronacharya , when he heard the news of his son Ashvatthama’s death? He lost confidence on account of grief and finally lost his life. Anger , grief, hatred, jealousy, ego, fear, inferiority complex are the obstacles which make a person weak and bereft of confidence.

Nowadays it has become a fashion to commit suicide. By committing suicide people think that they can solve their problem, those are cowards ,weak-minded. They don’t have confidence to face challenges and try to escape by choosing suicide. Is anyone free from problems in this world ? Without struggle, there is no meaning for life. We have come to this world only to conquer difficulties. Failures in examinations , a little scolding from parents , a petty quarrel with friends ,a temporary financial problems, failure involve affairs, inferiority complex, unemployment, dowry harassment etc., these are the common reasons which force people to commit suicide. It is a great sin to commit suicide .It is a great sin to commit suicide, it is not less terrible than committing murder. We are not the owner this body , we are only the keeper .Therefore, we have no right to destroy it. For every, problem there is a solution. We need only a little patience and confidence. Let us develop mental strength and courage to face the problems of life and they will disappear in no time.

“Be not afraid of anything , you will do marvelous work. The moment you fear ,you are nobody .” Therefore, “Arise , awake and stop not till the goal is reached.” - Swami Vivekananda

Self-Confidence: This also called श्रद्धा The ideal of faith in ourselves is of the greatest help to us. If faith in ourselves has been more extensively taught and practiced .I am sure a very large portion of the evils and miseries that we have , would have vanished. Throughout the history of mankind ,if any motive power has been more potent than another in the lives of all great men and women, it is that of faith in themselves up .Born with the consciousness that they were to be great, they become great .Let a man go down as low as possible, there must come a time when out of sheer desperation he will take an upward curve and will learn to have faith in himself. Our Prime Minister is the best example for this . So, have faith in ourselves is the first thing we have to develop and work hard to achieve our goals .”*You are the creator of your own destiny.*”



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The Stone Soup

Sqn.Ldr.Kshitij Kumar (Retd.)

The pots are on the fire,
The ingredients are all there,
Grandma is making, the stone soup here;
The gravy looks appetizing ,
The aroma mouth watering,
The gourmet is big,
It seems bigger than anything;

The warmth of the kitchen and the love of grandmother,
Promise a stomach full, to every poor brother.
The pot is on the boil,
The gravy thick and tempting,
The aroma is such, the whole village's appetite is pelting;
The buffet for the poor, and the one so hungry,
Has lured the whole village, everyone and sundry;
All around the fire and the pot they stand,
With golden bowls and sharp forks in their hand.

The first spoonful, most juicy and tender ,
Goes to the deity, who lit the fire yonder ;
The yet so meaty pieces, with the creamy gravy,
Were taken by the headmen,
In favour of their levy;

Finally it was the poor soul,
For whom the soup was made,
He got the heaviest portion,
And his tin plate was weighed...

Yes, indeed we have become masters in making stone soup for the poor. On 16 July 2013, 23 children died in Bihar after having 'Khichadi' in mid- day meal. Thankfully, it was only 'Khichadi' with its meager ingredients and minimal appeal, imagine the toll if they had tried to serve 'Biryani'.

Are we helping the poor with our freebies or helping those who are suppose to help. If after 70 years of Independence, our people have to be dependent for two

square meals, then I feel sorry for the great freedom fighters who laid their lives for a deadly concoction called 'Khichadi'. Is our government any different than the East India Company which took all the not so stony ingredients from our stone soup. The present Raj cannot even ensure the few basic elements of a 'Khichadi' to be handled right, so how can it be trusted to feed the country's poor.

The answers are all in front of us but we do not want to see them. It is possible for the country to arise and shine like many of the Western or so called developed countries, however every citizen will have to strive and contribute for a shining India. Education is one sector where the people of different demographics can come together to contribute to the growth of entire human race.

GyanVigyanSarita is one such noble cause in this direction, where some enlightened citizens have come above the realms of religion, caste and political divides to contribute to the development of the society as a whole by mentoring needy students in their knowledge domain, using Information Technology.

Bijnor Public School, Bijnor, a CBSE affiliated school catering to the dreams and ambitions of sixteen hundred students and their families in the hinterland of Western Uttar Pradesh has grabbed this opportunity provided by GyanVigyanSarita to kindle the light of knowledge amongst the students who are at a crucial juncture of their academic journey.

Bijnor Public School expresses its gratitude to Team, GyanVigyanSarita for their noble enterprise and request more educational institutions to join hands with GyanVigyanSarita and allow their students to be mentored by this dedicated team and help them in their journey of reform through education.



The author is a retired Air Force Pilot who had to take premature retirement due to medical reasons. He joined the Air Force through the National Defence Academy. After retirement he dedicated himself to training and development of students, teachers and corporates. He was also director Planning and Development of a group of eight institutions encompassing K-12 and degree courses in various disciplines. Presently apart from training and development he is Director Education of Bijnor Public School.

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Students' Section**Socio–Political Philosophy Of Swami Vivekananda****G.V. Sai Meghna**

The influence of swami Vivekananda on the Indian Nationalist Movement is well – known.

Swami Vivekananda was not only a visionary, or a monk but a nationalist and a reformer par excellence. Many in our own country think that religion and mysticism

and social amelioration and political and economic reconstruction cannot unite and declare that the secular and spiritual ideals are polar opposites. Such a nation has been responsible for the gross misrepresentations of the spirit of Indian philosophy, religion and culture, but the mystics, the saints and the sages of India prove standing refutation of this gross misconception. India's foreign domination is also attributed to her religion which is considered to be dreamy, idealistic, fatalistic, world – denying, pessimistic and unethical and other – word. Swami Vivekananda's contribution to a faithful and sympathetic representation of India's aspirations and ideals in foreign lands cannot be gainsaid. Swami Vivekananda created not only a lofty Advaita Vedantic Ideal under a new name known as Ramakrishna Mission but founded a new epoch in the life of the Indian people also on social, economic, and political fronts in

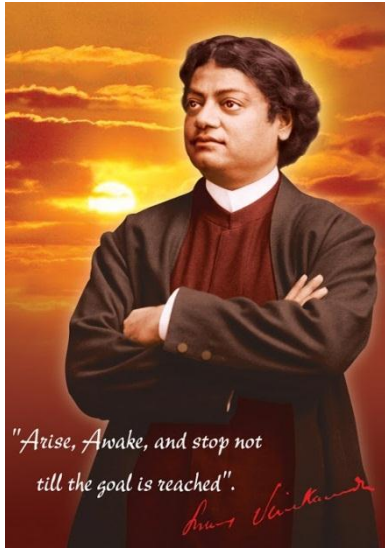
consistency with India's past heritage and in harmony with the western ideals. To my knowledge there has not been a single work so far exclusively on Swami Vivekananda's social and political philosophy. There is vast proportion of utilised materials with respect to his political and social views. India may take some contributions to the mitigation of tension and unrest widespread in the world. Thus subject matter of present thesis has been divided into eight chapters. The first chapter deals with the background of Indian Nationalism. In chapter two an attempt has been made to connect social progress with religion. Chapter three focus on the metaphysical background of the Indian social and political ideology. The relations between individual and society have been elaborated in the fourth chapter. In chapter five concentrated on a general review of the socio – political philosophy of swami Vivekananda. The sixth chapter ideals with the social and political order as envisaged in the philosophy of swami Vivekananda. The seventh chapter throws light on the social ideas of swami Vivekananda. Swami Vivekananda's political ideals have extensively discussed in eighth chapter.

Ultimately I owe much to the kindly and benevolent soul of my departed mother who always illuminated my path and gave path and gave strength and stamina in pursuing my research work, particularly at those moments of depression when the goal appeared too distant.

A quote of Swami Vivekananda - Your aim is yours so don't change it for others BUT your character is not yours so change it for others.



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Students' Section**Every Duty Is An Idol To Worship****N.Kamlesh**

Swami Vivekananda was born on 12th of January in 1863 in Kolkata as Narendranath Datta to the Vishwanath Datta and Bhuvaneshwari Devi. He was an extraordinary child with spiritual thoughts. His education was irregular but he completed Bachelor of Arts degree from the Scottish Church College, Kolkata. His religious and monk life started

when he met Shri Ramakrishna and made him his Guru. Later he led the Vedanta movement and introduced the Indian philosophy of Hinduism in western countries. His Chicago speech at the Parliament of the World's Religion on 11th September, 1893 had represented India. He became successful in establishing Hinduism as the important world religion. He was very intelligent person with in-depth knowledge of Hindu scriptures (Vedas, Upanishads, Puranas, Bhagawata Gita, etc).

His inspiring thoughts on duty, on many occasions are cited here.

"Duty of any kind is not to be slighted. A man who does the lower work is not, for that reason only, a lower man than he who does the higher work. A man should not be judged by the nature of his duties but by the manner in which he does them. His manner of

doing them and his power to do them are indeed the test of a man. A shoemaker who can turn out a strong, nice pair of shoes in the shortest possible time is a better man, according to his profession and his work, than a professor who talks nonsense every day of his life."

"Every duty is holy, and devotion to duty is the highest form of worship of God. It is certainly a source of great help in enlightening and emancipating the deluded and ignorance-encumbered souls of the baddhas—the bound ones."

"By doing well the duty which is nearest to us, the duty which is in our hands now, we make ourselves stronger; and improving our strength in this manner step by step, we may even reach a state in which it shall be our privilege to do the most coveted and honored duties in life and in society. . . ."

"The most practical man would call life neither good nor evil."

"Every successful man must have behind him some where tremendous integrity, tremendous sincerity, and that is the single cause of his success in life. He may not have been perfectly unselfish; yet he was tending towards it. If he had been perfectly unselfish, his would have been as great a success as that of the Buddha or of the Christ. The degree of unselfishness marks the degree of success everywhere."



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Students' Section

SWAMI VIVEKANANDA - GREAT GUIDE TO THE MANKIND

P. Kavya

The man who won the heart of millions is not a simple man. Winning the hearts of millions is not an easy task. Lion's heart and positive attitude made it possible to rule the world. He also conquered the minds of the people with greater mission and vision. Having such a great personality on this earth is certainly a boon to millions of people. People do love him a lot. Such a great personality, great visionary left a deep impact on everybody's mind and heart.

He is better known by the name Swami Vivekananda. A great human being who served the needy with a evergreen smile on the face. He ruled over the heart of millions of people from all over the world. Every slum in and around Kolkata prayed him like a God and a torchbearer of humanity, who came to remove the sufferings from their heart. He never got tired in helping the needy people. Helping the needy was his

only desire. His services got so much popularity and his mission was established in every corner of the country India and abroad also. He taught that love, affection, service to humanity, peace and humility are the only weapons through which one could conquer the hearts of the people of the world.

People cry for success and the biggest achievement in their life. But he was never interested in the same and devoted his entire life for all well being of people. Many critics also bowed their head at his selfless service and attitude towards downtrodden. Nothing can compare his power of thinking. His only mission was to serve, serve the millions who were needy.

He tried to make the world a better place to live and also made the world realize that service to humanity was service to God.



Author is a student of Class IXth at Ramkrishna Mission School, Sithanagram, Distt. Guntur, Andhra Pradesh. She a regular student of Interactive Online Mentoring Sessions (IOMS) being held at the school, and member of Susrutha of IOMS.

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

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

We are implementing this philosophy through [Online Mentoring](#)

Students' Section

GOOD LIFE: Be Grateful and Affectionate

T. Vijaya

Be kind , be thoughtful , be nice , be good , be sensitive , be loving and be compassionate. The best thing to give to your enemy is forgiveness , to your opponent , tolerance; to a friend , your heart; to father and mother , conduct that will make them proud of you; to all men , charity.

Each day do at least one act to make others happy. There can be a kind word , helping your colleagues ,

giving your seat in a bus to someone else , or giving a small present to someone you love. The possibilities are infinite. Do it without focusing on the reward. When you make someone happy , you become happy , and then people try to make you happy. We cannot always build the future for our youth , but we can build our youth for the future. Real happiness lies in making others happy.

LET US BE GRATEFUL TO PEOPLE WHO MAKE US HAPPY;

THEY ARE THE CHARMING GARDENERS WHO MAKE OUR SOULS BLISS.



Author is a students of Class IXth at Ramkrishna Mission School, Sithanagram, Distt. Guntur, Andhra Pradesh. She a regular student of Interactive Online Mentoring Sessions (IOMS) being held at the school, and member of C.V Raman Group in IOMS

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GROWING WITH CONCEPTS

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

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

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

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

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

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

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GROWING WITH CONCEPTS - Mathematics

COORDINATE GEOMETRY: CONIC SECTION

Prof. SB DHAR

We shall discuss the concepts and their uses in different types of problems useful for our readers, related to (a) Circle (b) Parabola (c) Ellipse, and (d) Hyperbola.

Let us recall some facts necessary for going forward.

- (a) *Coordinate axes* means rectangular axes i.e. angle at origin where both the axes meet is 90 degrees.
- (b) *x-axis* is called *abscissa*, *y-axis* is called *ordinate*, the ordered pair through which the points are represented on the plane is called *coordinates* of the point.
- (c) Each point on the plane has unique coordinates. If the coordinates are equal, it means the points are same.
- (d) The plane is called *Cartesian Plane* in the name of *Rene Descartes* (1596-1650), a French mathematician and philosopher who studied Geometry systematically by using Algebra in his book "La Geometrie" published in 1637.
- (e) Coordinate of Origin is (0,0).
- (f) *x - coordinate* on y-axis is always zero.
- (g) *y - coordinate* on x-axis is always zero.
- (h) A point whose both coordinates are rational is called *lattice point*.

Note

To find locus, we follow the following steps:

- (a) Assume the point whose locus is to be determined as (h,k) .
- (b) Fulfill the given conditions.
- (c) Simplify the equation.
- (d) Replace h by x and k by y .
- (e) The equation in x and y is the required locus.

Identification of Conic sections

General equation of 2nd degree

$$ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$$

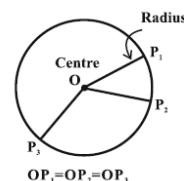
- (a) Circle if $\Delta = abc + 2fgh - af^2 - bg^2 - ch^2 \neq 0$; $a=b$ and $h=0$.
- (b) Parabola if $\Delta = abc + 2fgh - af^2 - bg^2 - ch^2 \neq 0$; and $h^2 = ab$.

- (c) Ellipse if $\Delta = abc + 2fgh - af^2 - bg^2 - ch^2 \neq 0$; $h^2 < ab$.

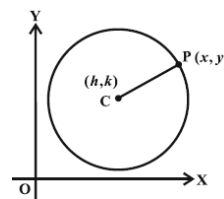
- (d) Hyperbola if $\Delta = abc + 2fgh - af^2 - bg^2 - ch^2 \neq 0$; and $h^2 > ab$.

CIRCLE

Circle is defined as the locus of a point that moves in such a way that its distance from a fixed point is always constant. The Fixed point is called the Centre and the constant distance is called the Radius of the Circle.

**Standard Equation**

Standard equation of a Circle is given by $(x-h)^2 + (y-k)^2 = r^2$ where (h,k) is centre and r is the radius of the circle.

**Some special Forms of Equation of a Circle**

- (a) If the center is at **Origin** then the equation of the circle becomes $x^2 + y^2 = r^2$
- (b) If the end points of a diameter are given as (x_1, y_1) and (x_2, y_2) , then the equation of the circle is written as $(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$.

General equation of a circle

- (a) $x^2 + y^2 + 2gx + 2fy + c = 0$
- (b) Its center is $(-g, -f)$
- (c) Its radius $= \sqrt{g^2 + f^2 - c}$

- (d) If $\sqrt{g^2 + f^2 - c} > 0$, radius of the circle is real and the circle is also real.
- (e) If $\sqrt{g^2 + f^2 - c} = 0$ then the radius of the circle is 0 and this circle is called the point circle.
- (f) If $\sqrt{g^2 + f^2 - c} < 0$ then the radius is imaginary. Since the centre is real but the radius is imaginary hence the circle cannot be drawn.
- (a) **Note**
- (b) General equation of 2nd degree represents the equation of a circle when the coefficient of x^2 = coefficient of y^2 and the coefficient of $xy = 0$.
- (c) Equations of circles having the same centre but different radii are called the concentric circles. For example $(x-h)^2 + (y-k)^2 = r_1^2$ and $(x-h)^2 + (y-k)^2 = r_2^2$ are concentric circles.
- (d) If P is a point and r is the radius of the circle and C is the centre of the circle then the **maximum** and the **minimum** distance of P from the circle is given by **(CP + r)** and **(CP - r)** respectively.
- (e) The lengths of Intercepts made by the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ on x and y-axis are $2\sqrt{g^2 - c}$ and $2\sqrt{f^2 - c}$ respectively.

Position of a point

If (x_1, y_1) is a point, and

$S = x^2 + y^2 + 2gx + 2fy + c = 0$ is a circle, then

- (a) The point lies on the circle if $S_1 = 0$
- (b) The point lies outside the circle if $S_1 > 0$
- (c) The point lies inside the circle if $S_1 < 0$
where $S_1 = x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c$.

Intersection of a line and a circle

A line $y = mx + c$ and the circle $x^2 + y^2 = r^2$

- (a) intersect at two real points if $r > \left| \frac{c}{\sqrt{1+m^2}} \right|$
- (b) touches when $r = \left| \frac{c}{\sqrt{1+m^2}} \right|$
- (c) do not intersect at real points if $r < \left| \frac{c}{\sqrt{1+m^2}} \right|$.

Some Other Forms of the equation of Circle

- (a) Equation of a circle passing through origin and having intercepts $2h$ and $2k$ with axes is given by $(x-h)^2 + (y-k)^2 = h^2 + k^2$.
- (b) Equation of a circle touching x-axis and center at (h, k) is given by $(x-h)^2 + (y-k)^2 = k^2$
- (c) Equation of a circle touching y-axis and centre at (h, k) is given by $(x-h)^2 + (y-k)^2 = h^2$
- (d) Equation of a circle touching both the axes and center at (h, h) is given by $(x-h)^2 + (y-h)^2 = h^2$

Condition for Tangency of a line

The line $y = mx + c$ touches the circle $x^2 + y^2 = r^2$ if $c = \pm r\sqrt{1+m^2}$.

The reason for the existence of the Two values of c is that **Two tangents** are possible. These tangents are at the ends of a diameter.

Equation of a tangent

- (a) General equation of a tangent to the circle $S = x^2 + y^2 + 2gx + 2fy + c = 0$ at a point (x_1, y_1) is given by: $T \equiv xx_1 + yy_1 + g(x+x_1) + f(y+y_1) + c = 0$.
- (b) Equation of the pair of tangents from an outside point (x_1, y_1) to the given circle $S = 0$ is given by $SS_1 = T^2$ where $S = x^2 + y^2 + 2gx + 2fy + c$; $S_1 = x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c$; $T = xx_1 + yy_1 + g(x+x_1) + f(y+y_1) + c$.

Length of a tangent

Length of tangent is given by $\sqrt{S_1}$.

- (a) If the point lies outside the circle then the Length of the tangent exists.
- (b) If the point lies on the circle then length of the tangent is 0.
- (c) If the point is inside the circle, then there exists no tangent, hence no length is possible

Note

- (a) If P is a point outside a circle and PT is the length of the circle i.e., T is the point of contact on the circle and another line from P cuts the circle at A and B then $PT^2 = PA \cdot PB$.
- (b) Square of the length of the tangent S_1 is called the **Power of the point**.
- (c) The power of point can be Negative, Zero or Positive as the point lies inside, at or outside the circle respectively.

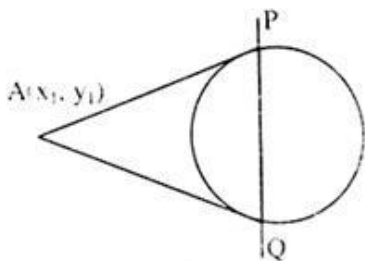
Normal to the circle

A normal to the circle is the line perpendicular to the tangent at the point of contact. Normal always passes through the centre of the circle.

Chord of Contact

Definition

Let AP and AQ be two tangents to the circle from the point (x_1, y_1) . Then the line joining P and Q is called the chord of contact.



- (a) Equation of a chord of contact is given by $T=0$.
- (b) Equation of a chord bisected at point (x_1, y_1) is given by $T=S_1$.

Diameter of a circle

Diameter is defined as the locus of the middle points of the system of parallel chords.

Common tangents

Common tangents to two circles are of Two types:

- (a) Transverse and
- (b) Direct

Number of common tangents

1. If C_1 and C_2 are the two centres and r_1, r_2 are the two radii and $C_1 C_2 > r_1 + r_2$ then
The two circles will neither touch nor cut each other, and
There will be 4 common tangents: 2 Transverse and 2 Direct.
2. If $C_1 C_2 = r_1 + r_2$, then
The circles will touch externally, and
There will be 3 Tangents: 2 direct and 1 Transverse.
3. If $|r_1 - r_2| < C_1 C_2 < r_1 + r_2$ then
The circles will intersect at two points and
Only 2 direct tangents will be possible.
4. If $C_1 C_2 = r_1 - r_2$ then
The circles touch each other internally, and

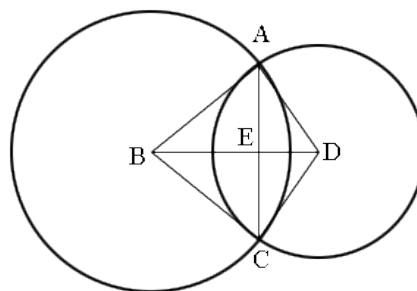
Only one common tangent is possible.

5. If $C_1 C_2 < r_1 - r_2$, then There will be no common tangent.

Common chord

Definition

A line joining two common points of intersections of the two circles is called common chord.



In the figure, AC is the common chord.

If the equations of two circles are $S_1 = 0$ and $S_2 = 0$, then the equation of the common chord is given by $S_1 - S_2 = 0$.

Angle between Two Circles

Angle between two circles is defined as the angle between their tangents at the common point of intersection.

- (a) Angle between two circles is given by

$$\cos \theta = \frac{r_1^2 + r_2^2 - d^2}{2r_1 r_2} \text{ where } d = \text{distance between two centres.}$$

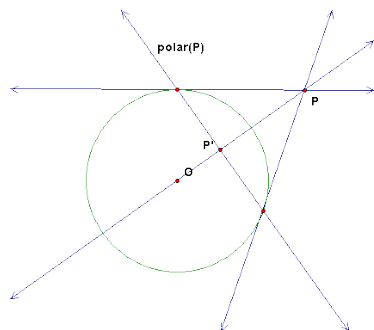
- (b) Two circles cut each other orthogonally iff $2g_1 g_2 + 2f_1 f_2 = c_1^2 + c_2^2$.

Director Circle

Director Circle is the locus of the point of the intersection of two perpendicular tangents to a circle. Obviously, the point will lie outside the circle. The equation of the director circle of $x^2 + y^2 = a^2$ is given by $x^2 + y^2 = 2a^2$.

Pole and Polar of a Circle

If $P' (x_1, y_1)$ is any point on the circle, *inside* or outside the circle and a chord AB passing through it is drawn; the tangents at A and B meet at some point P(h,k), then the locus of P is called the Polar of P' and P' is called the Pole. Its equation is $T=0$.



- Equation of a Polar w.r.t a point (x_1, y_1) is given by $T = 0$.
- Two points A and B are said to be conjugate points if each lies on the polar of the other.
- Two lines are said to be conjugate lines if pole of one lies on the polar of the other.
- If the Polar of P passes through Q and the Polar of Q passes through P, then they are called conjugate points.
- If O is the center of the circle and P is any point then OP is always perpendicular to the polar of P.
- If O is the centre of the circle, P is any point and OP (produced if necessary in any case) meets the Polar of P at Q then $OP \cdot OQ = (\text{radius})^2$.

Some Important Facts related to Circles

- If $S_1=0$ and $S_2=0$ are the two circles then the family of circles passing through the points of intersections of these circles is given by $S_1 + \lambda S_2 = 0$ where λ is a parameter obtainable under some necessary conditions. Note $\lambda \neq -1$.
- Radical axis** is the locus of the point from which the equal tangents to the circles are drawn. The equation is given by: $S_1 - S_2 = 0$
- The radical axis and the common chord are identical.
- The radical axis and the line joining the centres of the circle are always perpendicular to each other.
- The radical axis bisects common tangents of two circles.
- The radical axis of three circles taken in pairs are always concurrent i.e. they pass through the same point. This point is called the Radical Centre. The coordinate of Radical center is found by solving $S_1=S_2=S_3$.
- If two circles intersect a third circle orthogonally, the radical axis of the two circles will pass through the centre of the third circle.
- Locus of the centre of a circle intersecting two given circles orthogonally is the radical axis of the two circles.
- The Radical center of the three circles described on the sides of a triangle as diameters is the orthocenter of the triangle.
- A family of circles is called co-axial circles if it has the same radical axis.

- If radical axis is $P \equiv ax + by + c = 0$ and one of the circles of the system is $x^2 + y^2 + 2gx + 2fy + c = 0$ then the equation of the system of co-axial circles is written as $S + \lambda P = 0$ where λ is a parameter.
- If two circles are $S_1=0$ and $S_2=0$ then equation of co-axial system of circles is given by $S_1 + \lambda S_2 = 0$.
- The equation of the family of circles passing through the intersection of the circle $S=0$ and a line $L=0$, meeting the circle at two distinct points is given by $S + \lambda L = 0$.
- If the line $L=0$ touches the circle $S=0$ at P(say), then $S + \lambda L = 0$ is the equation of a family of circles each touching $L=0$ at P.
- The system of the **co-axial circles** is of the form $x^2 + y^2 + 2gx + c = 0$ or $x^2 + y^2 + 2fy + c = 0$.
- If $lx + my = 1$ touches a circle $x^2 + y^2 = a^2$, then $l^2 + m^2 = a^2$.

Limiting Points

Limiting Points of a coaxial system of circles are the members of the system which have zero radius. If $x^2 + y^2 + 2gx + c = 0$ is the coaxial circles having x-axis as common radical axis then its centre is $(-g, 0)$ and radius $\sqrt{g^2 - ac} = 0$ i.e., $g = \pm\sqrt{c}$. The limiting points will be $(\pm\sqrt{c}, 0)$

Note

- The limiting points are real and distinct if c is positive, imaginary if c is negative and real and equal (coincident) if $c=0$.
- The limiting points of a system of co-axial circles are conjugate points with respect to any member of the system.
- Each circle through the limiting points of a co-axial system is orthogonal to all circles of the system.
- The circles with Zero radius are called Point Circles.

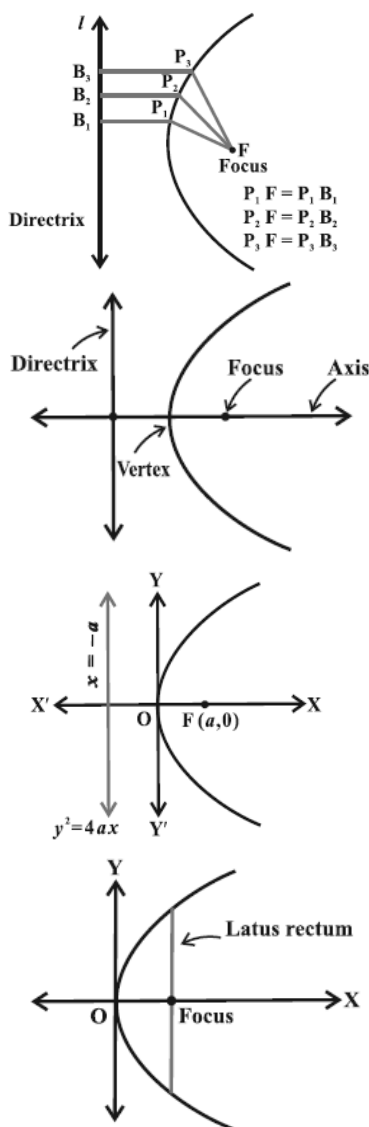
Images of the Circle

- Image of the circle $S \equiv (x-h)^2 + (y-k)^2 - a^2 = 0$ with respect to x-axis as line mirror will be $(x-h)^2 + (y+k)^2 - a^2 = 0$
- Image of the circle $S \equiv (x-h)^2 + (y-k)^2 - a^2 = 0$ with respect to y-axis as line mirror will be $(x+h)^2 + (y-k)^2 - a^2 = 0$
- Image of the circle $S=0$ with respect to the line $lx + my + n = 0$ as mirror will be $(x-h')^2 + (y-k')^2 - a^2 = 0$ where (h', k') is the image of (h, k) with respect to the line mirror $lx + my + n = 0$.

Parabola

A parabola is a locus of a point that moves in such a way that its distance from a fixed point is always equal to the perpendicular distance from a fixed line. The fixed point is called the **focus** and the fixed line is called the **directrix**.

Eccentricity(e) of the parabola is 1. In case of hyperbola $e > 1$, ellipse $e < 1$, circle $e = 0$.



Facts relating to the Parabola

- The straight line passing through the focus and perpendicular to the directrix is called the axis of the parabola.
- The point of intersection of Parabola and the Axis is called its Vertex.
- Double ordinates are the perpendicular lines to the axis of the parabola.
- Latus Rectum is the double ordinate perpendicular to the axis and passing through the Focus.
- Length of latus rectum = 2 (perpendicular distance of focus from the directrix)
- Focal chord is the chord passing through the Focus.

- Focal distance is the distance of any point on the Parabola from the focus. It is always equal to the perpendicular distance from the directrix.
- The Locus of the middle points of a system of parallel chords is called a Diameter and in the Parabola the diameter is the straight line parallel to the axis of the parabola.
- The point in which any diameter meets the curve is called the extremity of the diameter.

Standard Equation of a Parabola

- Standard equation of a Parabola is given by: $y^2 = 4ax$.
- Parametric form of the Parabola: $x = at^2$, $y = 2at$.
- General equation of a Parabola:
If $S(h,k)$ is a fixed point and $lx + my + n = 0$ is a fixed line then the Locus of the point $P(x,y)$ under the condition $PS = PM$ is called the Parabola.

$$\sqrt{(x-h)^2 + (y-k)^2} = \frac{lx + my + n}{\sqrt{l^2 + m^2}}$$

- General equation of 2nd degree $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a Parabola if $\Delta = abc + 2fgh - af^2 - bg^2 - ch^2 \neq 0$ and $h^2 - ab = 0$.
- Parabola $y^2 = 4ax$ opens to Right and symmetric to x-axis.
- Parabola $y^2 = -4ax$ opens to Left and symmetric to x-axis.
- Parabola $x^2 = 4by$ opens Upward and symmetric to y-axis.
- Parabola $x^2 = -4by$ opens Downward and symmetric to y-axis.

Position of a point

Let $P(x_1, y_1)$ be a point and S a parabola. Replace x by x_1 and y by y_1 in S to get a new expression S_1 . The point P will lie

- On the Parabola if $S_1 = 0$,
- Inside the Parabola if $S_1 < 0$, or
- Outside the Parabola if $S_1 > 0$

Length of intercept

The length made by line $y = mx + c$ between the parabola $y^2 = 4ax$ is $\frac{4}{m^2} \sqrt{a(1+m^2)(a-mc)}$

Condition for tangency

The line $y = mx + c$ touches a parabola $y^2 = 4ax$ if $c = a/m$

Condition for being Normal

The line $y = mx + c$ will be a normal to parabola $y^2 = 4ax$ if $c = -2am - am^3$

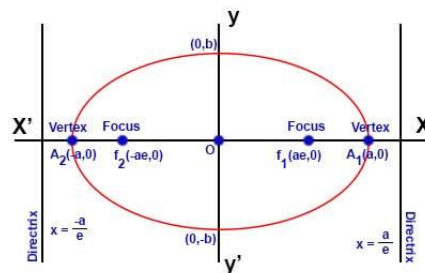
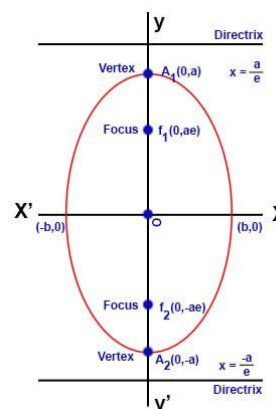
Some Important Facts

- (a) If a normal at t_1 meets again the parabola $y^2 = 4ax$ at the point t_2 then this is called as **normal chord**. For a normal chord $t_2 = t_1 - \frac{2}{t_1}$.
- (b) Length of normal chord =
$$a(t_1 - t_2) \sqrt{(t_1 + t_2)^2 + 4} = \frac{4a(t_1^2 + 1)^{3/2}}{t_1^2}$$
- (c) If two normals at point t_1 and t_2 meet on the parabola then $t_1 t_2 = 2$.
- (d) Equation of the chord of contact of tangents drawn from a point (x_1, y_1) to the parabola $y^2 = 4ax$ is given by $yy_1 = 2a(x + x_1)$.
- (e) Length of chord of contact = $\frac{1}{a} \sqrt{(y_1^2 - 4ax_1)(y_1^2 + 4a^2)}$
- (f) Area of the triangle formed by tangents drawn from (x_1, y_1) and their chord of contact is $\frac{1}{2a} (y_1^2 - 4ax_1)^{3/2}$
- (g) The area of triangle formed by three points on a parabola is twice the area of the triangle formed by the tangents at these points.
- (h) The parabola has two real foci situated on its axis. One at S and the other at Infinity, the corresponding directrix is also at infinity.
- (i) Length of latus rectum = 2 (harmonic mean of focal segment)
- (j) If SZ be perpendicular to the tangent at a point P of a parabola, then Z lies on the tangent at the vertex and $SZ^2 = AS$. SP where A is the vertex of the parabola.

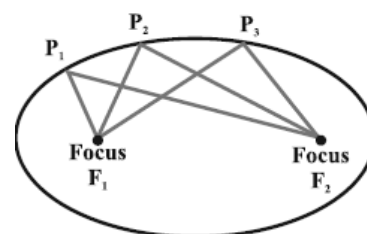
ELLIPSE

It is the locus of a point that moves in such a way that the ratio of its distance from the fixed point to the fixed line is always constant.

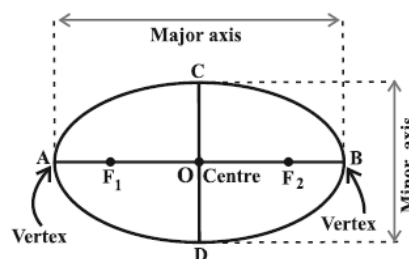
This ratio is called **eccentricity** and this is always less than 1. Fixed point is called the **Focus** and the fixed line is called the **directrix**.

Horizontal Ellipse**Vertical Ellipse****Another Definition**

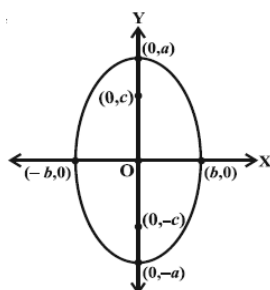
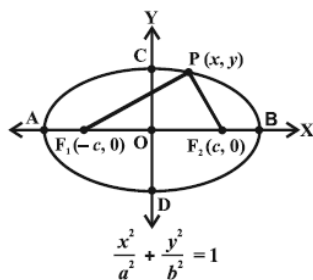
An ellipse is the set of all points in a plane, the sum of whose distances from two fixed points in the plane is a constant. The two fixed points are called the foci of the ellipse.



$$P_1F_1 + P_1F_2 = P_2F_1 + P_2F_2 = P_3F_1 + P_3F_2$$

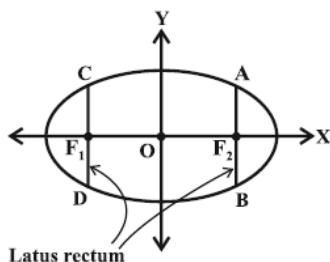
**Standard equation of an ellipse**

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \text{ where } b^2 = a^2(1 - e^2), e < 1.$$



Some basic facts

- Length of Major axis is $2a$ and that of minor axis is $2b$. Focus and vertices are always on major axis. Centre is point of intersection where the both axes meet.
- Foci are $(ae, 0)$ and $(-ae, 0)$.
- Directrices are $x = \frac{a}{e}$ and $x = -\frac{a}{e}$.
- Latus rectum are the double ordinates perpendicular to the Major axis and passing through the Foci.



- Length of latus rectum = $\frac{2b^2}{a}$.
- The coordinates of the End-points of the Latus Rectum are $\left(ae, \frac{b^2}{a}\right), \left(ae, -\frac{b^2}{a}\right)$
- Focal chord is a chord passing through one of the focus.
- Vertices are the points where Ellipse meet its Major axis. Focus always lies on the Major axis.

- Focal distances of a point (x_1, y_1) on the ellipse of standard equation is $(a + ex_1)$ and $(a - ex_1)$.
- The sum of the distances from the two foci of any point on the ellipse is always constant and is equal to the length of major axis i.e. $2a$.
- The surrounded region is the Interior part of the ellipse and outside this is the exterior region.
- Auxiliary circle is the circle drawn with centre as Centre of the ellipse and diameter as the length of major axis.
- Parametric form of the ellipse is $x = a \cos \theta$ and $y = b \sin \theta$.
- If an incident ray passing through the focus strikes the concave side of the ellipse, then the reflected ray will pass through the other focus.
- If SM and $S'M'$ are the perpendicular from the foci upon the tangent at any point of the ellipse, then $SM \cdot S'M' = b^2$ and M and M' lie on the auxiliary circle.
- Two straight lines $y = m_1 x$ and $y = m_2 x$ are conjugate diameters iff $m_1 m_2 = -\frac{b^2}{a^2}$
- In an ellipse, the major axis bisects all chords parallel to the minor axis and vice-versa, therefore major and minor axes of an ellipse are conjugate diameters of the ellipse but they do not satisfy the condition $m_1 m_2 = -\frac{b^2}{a^2}$ and are the only perpendicular conjugate diameters.
- Eccentric angles of the ends of a pair of conjugate diameter of an ellipse differ by a right angle.

Tangent and Normal

- A line $y = mx + c$ becomes a tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ if $c^2 = a^2 m^2 + b^2$.
- The tangent and normal at any point on the ellipse bisect the external and internal angles between the focal radii to the point.
- Four normals can be drawn from a point to an ellipse.
- The points on the ellipse, the normals at which to the ellipse pass through a given point are called co-normal points.
- If the normal at an end of a latus rectum of an ellipse passes through the other end of the minor axis, then $e^4 + e^2 = 1$.
- The Locus of the feet of the perpendiculars from the foci on any tangent to an ellipse is the auxiliary circle.
- Director circle of the ellipse is the locus of point of intersection of perpendicular tangents.

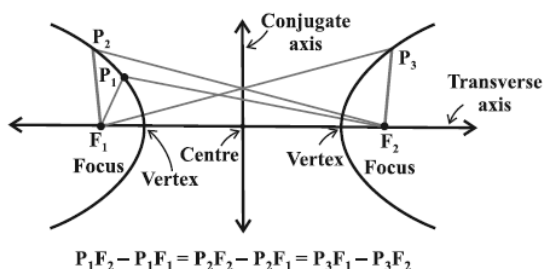
HYPERBOLA

It is the locus of the point that moves in such a way that the ratio of the distance of a point from a fixed point to the

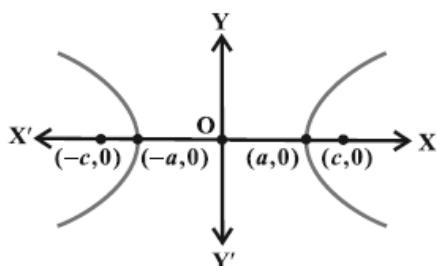
distance from a fixed line is always constant and this constant is called the eccentricity and is greater than 1.

Or

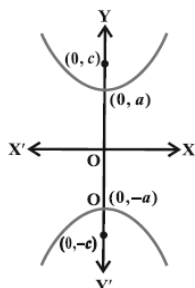
Hyperbola is also defined as the locus of a point which moves in such a way that the difference of the sums of its distances from two fixed points is always constant and is always equal to the length of the transverse axis.



Horizontal hyperbola



Vertical hyperbola



- Vertices and the foci are always on the transverse (Real Axis).
- The standard equation of a hyperbola is given by $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1, b^2 = a^2(1 - e^2), e > 1$.
- The line perpendicular to the Transverse axis and passing through the centre is called Conjugate axis and it nowhere meets the transverse axis. It is an imaginary line.
- The middle point of the Transverse axis is called the centre of the hyperbola.

(e) Focal distance of a point P(x,y) on the hyperbola is given as $SP = ex - a$ and $S'P = ex + a$ and $S'P - SP = 2a$.

(f) The hyperbola conjugate to $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1, b^2 = a^2(1 - e^2), e > 1$ is given by $-\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, a^2 = b^2(1 - e^2), e > 1$ and is symmetric about the y-axis as the main hyperbola is symmetric about x-axis.

(g) The region of the hyperbola that lie between the two leaves is the Interior region or the region where centre lies is the **Interior region** and the region where focus lies is the **Exterior region**.

(h) A line $y = mx + c$ is a tangent to hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1, b^2 = a^2(1 - e^2), e > 1$ if $c^2 = a^2m^2 - b^2$.

(i) The Parametric form of the $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1, b^2 = a^2(1 - e^2), e > 1$ is given by $x = a \sec \phi$ and $y = b \tan \phi$.

(j) Polar of the Focus is the directrix.

(k) Any tangent is the polar of its point of contact.

(l) Director circle of a hyperbola is the locus of the point from where the two perpendicular tangents are drawn and is given by $x^2 + y^2 = a^2 - b^2$.

(m) Number of normals drawn from a point to the hyperbola is Four.

(n) Points on the hyperbola, the normals at which pass through a given point are called the conormal points.

(o) Two diameters of a hyperbola are said to be conjugate diameters iff each bisects the chords parallel to the other.

(p) In a pair of conjugate diameters of a hyperbola only one meet the hyperbola in a real point.

(q) The hyperbola whose transverse and conjugate axes are equal are called the Rectangular axes and the eccentricity of such hyperbola is fixed and is equal to $\sqrt{2}$.

Some Illustrations

- Show that the locus of the point of intersection of the lines $x \cos \alpha + y \sin \alpha = a$ and $x \sin \alpha - y \cos \alpha = b$, where α is a variable, is a circle.

Solution:

Assume the point of intersection to be (h,k).

Eliminate α from the equations

$$h \cos \alpha + k \sin \alpha = a \dots (i)$$

$$h \sin \alpha - k \cos \alpha = b \dots (ii)$$

by squaring and adding the two equations we get,

$$h^2 + k^2 = a^2 + b^2$$

On replacing h by x and k by y, the locus becomes $x^2 + y^2 = a^2 + b^2$, an equation of a circle.

2. Find the equation of the circle described on the common chord of the circle $x^2 + y^2 - 4x - 5 = 0$ and $x^2 + y^2 + 8y + 7 = 0$ as diameter.

Solution:

The common chord is given by $S_1 - S_2 = 0$ i.e. $x + 2y - 3 = 0$

The equation of the family of circles through two circles is given by $S_1 + \lambda S_2 = 0$

The centre of this circle is $\left(\frac{2}{1+\lambda}, -\frac{4}{1+\lambda} \right)$

The centre lies on the common chord. So put this value in the equation of common chord and get the value of $\lambda = 1$.

The required equation of the circle is $(x^2 + y^2 - 4x - 5) + (x^2 + y^2 + 8y + 7) = 0$ or $x^2 + y^2 - 2x + 4y + 1 = 0$.

3. Show that in an ellipse the sum of the distances between foci is always less than the sum of focal distances of any point on it.

Solution:

Sum of the distances between foci = $2ae$

Sum of the focal distances = $\frac{2a}{e}$

$2ae < \frac{2a}{e}$ because $e < 1$ in ellipse.

4. Find the equation of the parabola whose focus is at (2,0) and directrix is $x = -2$.

Solution:

The focus is at x-axis, so x-axis is the axis of the parabola. The directrix is $x = -2$, hence it is of the type $y^2 = 4ax$ with $a = 2$.

So, the required equation of the parabola is $y^2 = 8x$.

5. Find the equation of the ellipse, with major axis along the x-axis and passing through the points (4,3) and (-1,4).

Solution:

We know that the standard equation of an ellipse with x-axis as major axis is given by

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \text{ where } b^2 = a^2(1 - e^2) \text{ and } e < 1.$$

If the ellipse passes through the given points, then

$$\frac{16}{a^2} + \frac{9}{b^2} = 1 \quad \text{and} \quad \frac{1}{a^2} + \frac{16}{b^2} = 1 \quad \text{give} \quad a^2 = \frac{247}{7} \text{ and } b^2 = \frac{247}{15}$$

6. Find the equation of the hyperbola whose foci are $(0, \pm 2)$ and the length of the latus rectum is 36.

Solution:

The standard equation of the hyperbola whose foci are $(0, \pm ae)$ is given by vertical hyperbola

$$\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1 \text{ where } a^2 = b^2(1 - e^2).$$

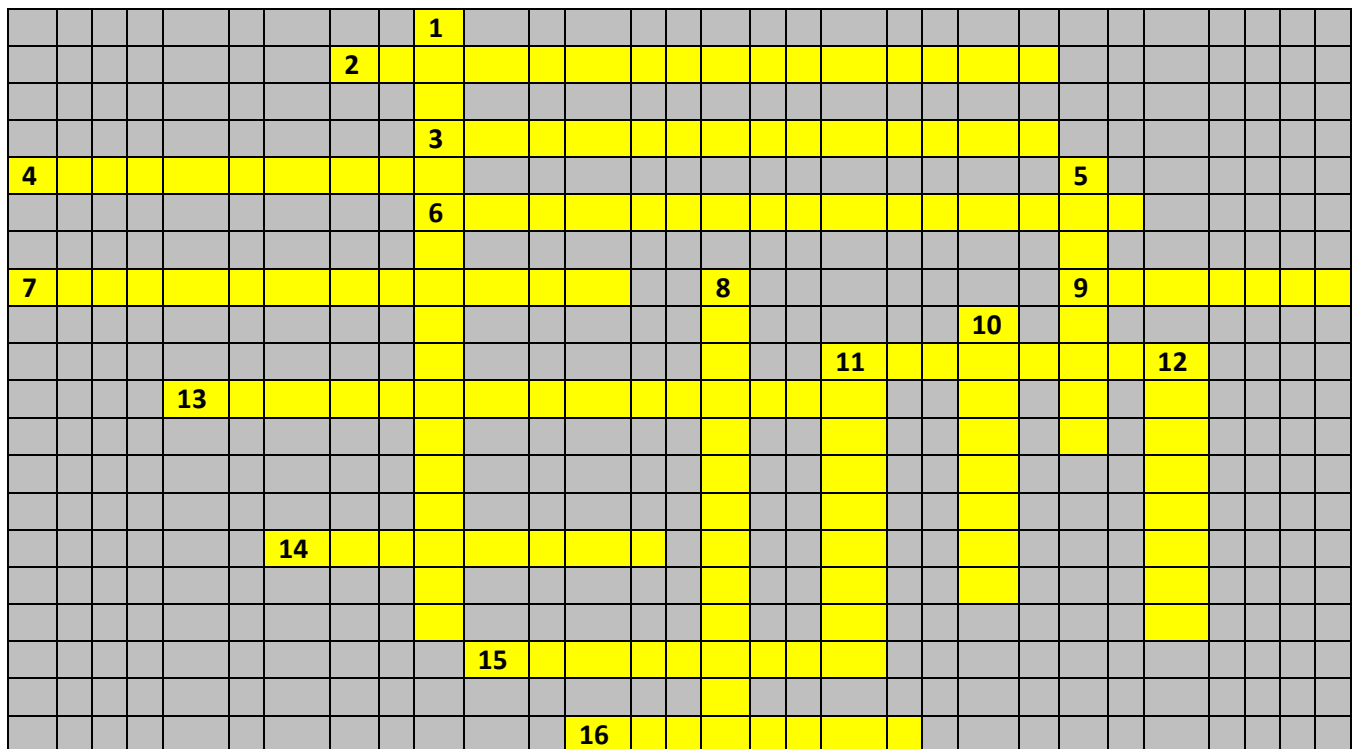
Given the latus rectum $\frac{2a^2}{b} = 36$ and $be = 12$.

On solving these two equations we get $b = 6, -24$. We cannot take $b = -24$ as it will make a^2 negative which is a real number. So $b = 6$ and hence $a^2 = 108$. On putting these values we can get the required equation of the hyperbola.



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CROSS WORD PUZZLE January'18: VIVEKANANDA**S.B. Dhar****Across**

- 2 President of Chicago World Religion
- 3 Name of Essay in Bangla by Swami Ji
- 4 Name of Guru of Vivekanand
- 6 Vivekanand's Birthday is celebrated as
- 7 Principal of General Assembly's Institution
- 9 Place where World Religion Congress held in 1893
- 11 Literary work of Vivekanand
- 13 Father of Vivekanand
- 14 Lady follower of Swami Ji
- 15 First Ramkrishna Math was founded at
- 16 Philosophy Vivekanand Represented in Chicago

Down

- 1 Mother of Vivekanand
- 5 City where Vivekanand was born
- 8 French Nobel laureate who wrote biography of Vivekanand
- 10 Caste of Vivekanand's family
- 11 Indologist from Oxford University who wrote first biography
- 12 Name of Book of Lectures of Swami Ji at New York

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*Growing with Concepts : Physics***Modern Physics: Part II: Schrödinger Wave Equation and Atomic Structure**

Schrödinger Wave Equation is as fundamental to quantum mechanics as Newton's Laws of Motion to classical mechanics. The only difference in classical mechanics is that it followed discovery of Laws of Motion by Newton. But, in Quantum many discoveries and hypotheses preceded derivation of wave equation by mechanics Erwin Schrödinger in 1925, and published 1926. The wave equation created better understanding of Quantum Mechanics, Bohr's Electron Orbit. de Broglie, while propounding wave nature of electron suggested certain radii of electro orbits propounded based on relation between its momentum and wavelength. Heisenberg propounded Uncertainty principle to suggest hybrid description of electron, satisfying quantum and classical mechanics in a language of wave to describe coordinates and velocity of electrons.

It would been easy to go ahead with Nuclear Physics, without elaborating Schrödinger Wave Equation, to remain within the curriculum being targeted. Nevertheless, extending thought experiments is to incite inquisitive minds into out-of-box thought process, with the available knowledge of mathematics and physics. Circumventing Schrödinger Equation for simplification of subject matter would have been a deviation from the objective of this endeavour. In view of this Schrödinger Wave Equation is being made an integral part before proceeding into remaining part of Modern Physics. It has extensive use in Chemistry to define atomic structure and chemical bonding.

Wave in One Dimension: This is simplest case to evolve the concept and is taken as a starting point. Classical Mechanics defines wave equation as $\frac{\partial^2 y(x,t)}{\partial x^2} = \frac{1}{v^2} \frac{\partial^2 y(x,t)}{\partial t^2}$, where $y = A \cos(kx - \omega t) + B \sin(kx - \omega t)$ is a sinusoidal wave function. Here, $k = \frac{2\pi}{\lambda}$, $\omega = 2\pi f$, and $\lambda = \frac{v}{f}$. Frequency, f , at times, is interchangeably expressed as ν . In this A and B determine amplitude ($= \sqrt{A^2 + B^2}$) and phase angle $\phi = \tan^{-1}(\frac{B}{A})$. Taking forward double derivatives of the wave function w.r.t. x , $\frac{\partial^2 y(x,t)}{\partial x^2} = -k^2[A \cos(kx - \omega t) + B \sin(kx - \omega t)] = -k^2 y$. Likewise, double derivatives of the wave function w.r.t. t , $\frac{\partial^2 y(x,t)}{\partial t^2} = -\omega^2[A \cos(kx - \omega t) + B \sin(kx - \omega t)] = -\omega^2 y$. Thus, $k^2 = \frac{\omega^2}{v^2} \rightarrow 2\pi f = vk$. Alternatively, $k = \frac{2\pi}{\lambda} = \frac{2\pi}{\frac{v}{f}}$.

It considers free particle moving on an equipotential surface where no forces are acting on it. Thus particle will have same potential energy where $F_x = -\frac{dU}{dx} = 0$. Making another simplification where $U = 0$, hence net energy of the particle would be $E = KE = \frac{1}{2}mv^2 = \frac{(mv)^2}{2m} = \frac{p^2}{2m}$. The kinetic energy of particle would remain unaltered since particle will not be experiencing any acceleration. Taking forward the concept into domain of quantum mechanics $E = hf = \frac{h}{2\pi}(2\pi f) = \hbar\omega$ and $p = \frac{h}{\lambda} = \frac{h}{2\pi} \cdot \frac{2\pi}{\lambda} = \hbar k$. This translates energy equation of particle to $\hbar\omega = \frac{(\hbar k)^2}{2m} \rightarrow \omega = \hbar \frac{k^2}{2m} \rightarrow k = \frac{2\omega m}{\hbar} \neq \frac{\omega}{v}$. It is seen that value of k in wave function changes with amalgamation of quantum mechanics into it.

Taking this change in the value of **wave number** (k) and **angular frequency** (ω), the sinusoidal wave function $y(x,t)$ is expressed in its Quantum Mechanical version as $\Psi(x,t) = A \cos(kx - \omega t) + B \sin(kx - \omega t)$. Taking second order partial derivative of this new form $\frac{\partial^2}{\partial x^2} \Psi(x,t) = -k^2 \Psi(x,t)$. With a mathematical

manipulation involving multiplication on both sides of the equation by $\left(-\frac{\hbar^2}{2m}\right)$, the equation takes a form $\left(-\frac{\hbar^2}{2m}\right)\frac{\partial^2}{\partial x^2}\Psi(x,t) = \frac{\hbar^2 k^2}{2m}\Psi(x,t) = \hbar\omega\Psi(x,t)$. While, taking first derivative of $\Psi(x,t)$ w.r.t. t gives a factor ω such that $\frac{\partial}{\partial t}\Psi(x,t) = -(-\omega)A\sin(kx - \omega t) + (-\omega)B\cos(kx - \omega t) = \omega[A\sin(kx - \omega t) - B\cos(kx - \omega t)]$. In a step forward in mathematical manipulation these Two derivatives of $\Psi(x,t)$, (second order derivative w.r.t. x and first order derivative w.r.t. t) and combining them with a new factor C called **Fudge Factor** the equation takes a form $\left(-\frac{\hbar^2}{2m}\right)\frac{\partial^2}{\partial x^2}\Psi(x,t) = C\hbar\frac{\partial}{\partial t}\Psi(x,t)$. Taking expanded form of these Two derivatives in equation, it leads to $\left(-\frac{\hbar^2}{2m}\right)(-k^2)[A\cos(kx - \omega t) + B\sin(kx - \omega t)] = C\hbar\omega[A\sin(kx - \omega t) - B\cos(kx - \omega t)]$. This equation is simplified into $\frac{\hbar^2 k^2}{2m}[A\cos(kx - \omega t) + B\sin(kx - \omega t)] = C\hbar\omega[A\sin(kx - \omega t) - B\cos(kx - \omega t)]$. It further gets simplified into $\hbar\omega[A\cos(kx - \omega t) + B\sin(kx - \omega t)] = C\hbar\omega[A\sin(kx - \omega t) - B\cos(kx - \omega t)]$, using $\frac{\hbar^2 k^2}{2m} = \hbar\omega$. Thus, $A\cos(kx - \omega t) + B\sin(kx - \omega t) = CA\sin(kx - \omega t) - CB\cos(kx - \omega t)$. Combining coefficients of like terms in the equation $A = -CB$, and $B = CA$. It leads to $A = -C^2A \rightarrow C^2 = -1 \rightarrow C = \sqrt{-1} = i$. Accordingly, the wave equation can be written as: $-\frac{\hbar^2}{2m}\frac{\partial^2}{\partial x^2}\Psi(x,t) = i\hbar\frac{\partial}{\partial t}\Psi(x,t)$, and is known as **One Dimensional Schrödinger Wave Equation for a Free Particle**. Solution of this equation is $\Psi(x,t) = A[\cos(kx - \omega t) + i\sin(kx - \omega t)]$, a complex quantity. It can also be written as It has a real part $\Psi(x,t) = \text{Re}\Psi(x,t) + i\text{Im}\Psi(x,t)$. Using *Euler's Identities* ($e^{i\theta} = \cos\theta + i\sin\theta$, and $e^{-i\theta} = \cos\theta - i\sin\theta$) the **Schrödinger Wave Equation** is written as $\Psi(x,t) = Ae^{i(kx - \omega t)} = Ae^{ikx}Ae^{-i\omega t}$. Here, (+)ve value of k designates particle moving along (+)ve x , and vice-versa for (-)ve value of k . Accordingly, momentum of particle ($p = \hbar k$) depends upon the signed value of k , while energy of particle $E = \hbar\omega = \frac{\hbar^2 k^2}{2m}$ is independent of sign of k , and is always (+)ve. Nevertheless, wavelength of the particle $\lambda = \frac{2\pi}{|k|}$, is always (+)ve.

This brings home the point all oscillatory real phenomenon involve imaginary quantities, as already discussed in chapter on **Waves and Motion**.

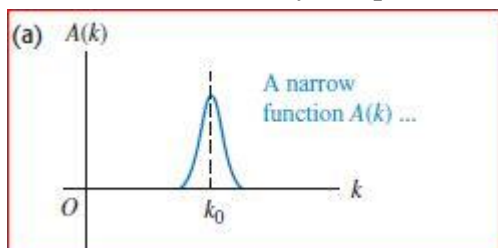
It has already been discussed in electromechanical model intensity of wave (I) at a point is proportional to square of magnitude of electric field (E) and is expressed as $I \propto E^2$. But, quantum mechanics defines intensity of wave as number of photons (probability) striking at or around a point. This implies that probability a particle to be found at position in range x to $x + \Delta x$ at time t is $|\Psi(x,t)|^2 \Delta x$. **Max Born**, in 1926, was first to make an interpretation on probability of position of a particle. And probability of a photon being found anywhere is $\int_{-\infty}^{\infty} |\Psi(x,t)|^2 dx = 1$. This interpretation gives better understanding of wave nature of a free particle. It describes momentum of particle without ($p = \hbar k$) uncertainty i.e. $\Delta p_x = 0$. As per Heisenberg Uncertainty Principle $\Delta x \cdot \Delta p_x \geq \frac{\hbar}{2}$. Accordingly, as $\Delta p_x \rightarrow 0$, $\Delta x \rightarrow -\infty$ to $+\infty$. Mathematically, $|\Psi(x,t)|^2 = \Psi(x,t) \cdot \Psi^*(x,t)$. Accordingly, probability distribution function $|\Psi(x,t)|^2 = (Ae^{ikx} \cdot e^{-i\omega t}) \cdot (Ae^{ikx} \cdot e^{-i\omega t})^* = (Ae^{ikx} \cdot e^{-i\omega t}) \cdot (Ae^{-ikx} \cdot e^{+i\omega t}) = A^2$. it has same value at all times.

Likewise, certainty in energy of a particle ($E = \hbar\omega$) leads to $\Delta E = 0$. Therefore, as per *Heisenberg's principle* $\Delta t \cdot \Delta E \geq \hbar$ shall lead to $\Delta t \rightarrow \infty$ making it uncertain as to when a particle shall pass through a given point on X -axis.; and that it has same value at all times. Nevertheless, since there s some idea of locating a particle the wave function appears to be unrealistic.

Wave Packets: The analysis of wave function, in previous para, predicts particle anywhere $-\infty < x < \infty$ and is thus not localized and hence not normalized. Localizing the wave function by superimposing two sinusoidal waves with different wave number and amplitudes, in the same manner as was done in quantum mechanics, will help to construct one wave function which depicts position of wave and particle where amplitude is maximum. This localized pulse is called wave packet and is represented as $\Psi(x, t) = \int_{-\infty}^{\infty} A(k) e^{i(kx - \omega t)} dk$. It is a superimposition of a very large number of waves with different wave number (k) and angular frequency ($\omega = \frac{\hbar k^2}{2m}$) and each with amplitude $A(k)$. There is an important relationship between $\Psi(x, t)$ and $A(k)$ and has been shown qualitatively. It is sharp peaked for a narrow range of wave numbers, and broader for a wide range of wave numbers, which is substantiated by uncertainty principle $\Delta x \cdot \Delta p_x \geq \frac{\hbar}{2}$.

Difference between matter waves and electromagnetic waves is crucial. Speed of light waves is same for all wavelength/frequencies. But, particle waves have different speed for different wavelengths. This is evident from basic relationships $v = \lambda f = \frac{\omega}{k}$. Using above stated value of $\omega = \frac{\hbar k^2}{2m}$ and $k = \frac{2\pi}{\lambda}$, it leads to $v = \frac{\hbar k}{2m} \rightarrow v = \frac{h}{2m\lambda}$.

One Dimensional Schrödinger Wave Equation of Potential Energy: The Schrödinger Wave Equation for a free particle with Potential Energy $U = 0$. It is a hypothetical proposition and is not valid while considering atomic structure. Inside atom electrons continuously keep revolving in orbit around nucleus

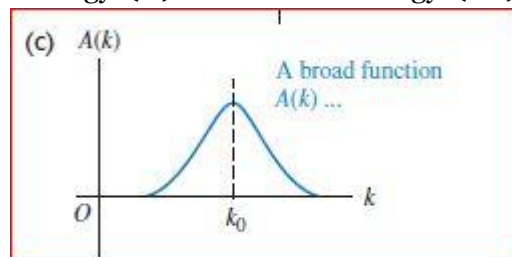
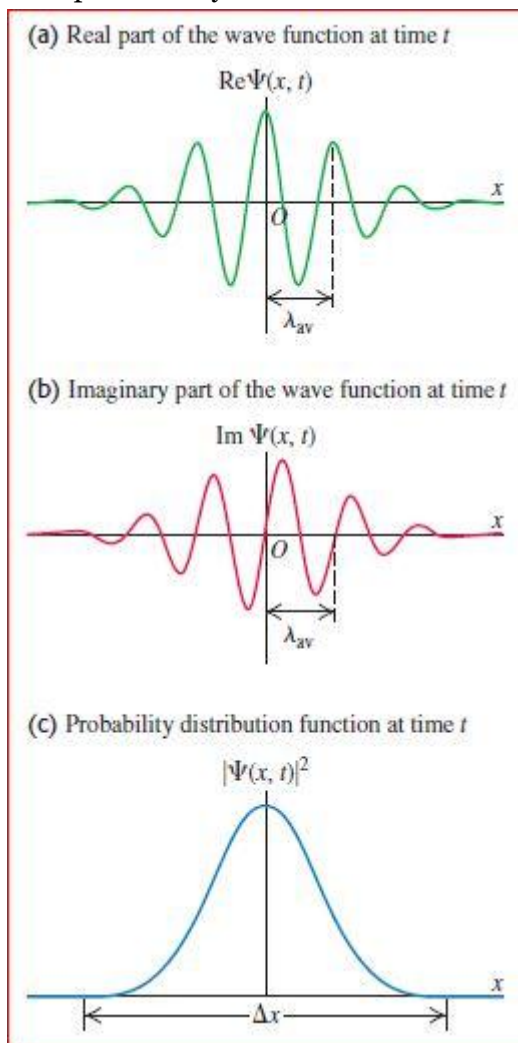


which is a consequence of constant centripetal acceleration caused by (+)ve charged nucleus. Thus every orbiting electron has a some potential energy. This has necessitated a review of Schrödinger Wave Equation and arrive at a hypotheses which satisfies : **a)** Conditions of free particle, **b)** Wave nature of particle, and **c)** Total energy of revolving electron is potential energy (U) and kinetic energy (KE) remains constant, as per laws

of classical mechanics, since atom in normal state does not exhibit radiation. Thus new form of equation is $-\frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} \Psi(x, t) + U(x) \Psi(x, t) = i\hbar \frac{\partial}{\partial t} \Psi(x, t)$, which retains $\Psi(x, t) = A e^{ikx} e^{-i\omega t}$ and thus taking each term of the equation, the first term is:

$$\frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} \Psi(x, t) = \frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} A e^{ikx} e^{-i\omega t} = \frac{\hbar^2}{2m} (ik)^2 A e^{ikx} e^{-i\omega t} = -\frac{\hbar^2 k^2}{2m} \Psi(x, t).$$

Likewise, $i\hbar \frac{\partial}{\partial t} \Psi(x, t) = i\hbar \frac{\partial}{\partial t} A e^{ikx} e^{-i\omega t} = i\hbar(-i\omega) A e^{ikx} e^{-i\omega t} = \hbar\omega A e^{ikx} e^{-i\omega t} = \hbar\omega \Psi(x, t)$. Combining these three terms, in the equation $-\left(-\frac{\hbar^2 k^2}{2m} \Psi(x, t) + U(x) \Psi(x, t) = \hbar\omega \Psi(x, t)\right) \rightarrow \frac{\hbar^2 k^2}{2m} \Psi(x, t) + U(x) \Psi(x, t) =$



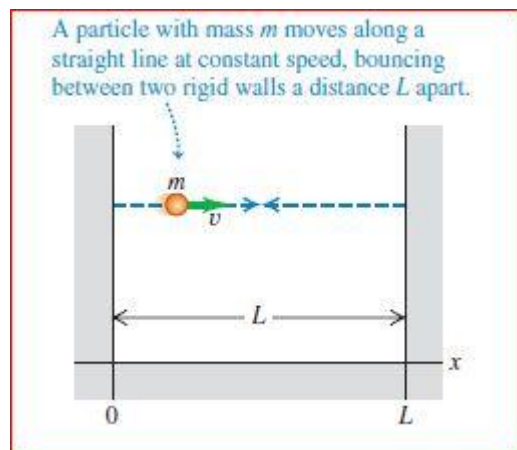
$\hbar\omega\Psi(x, t)$ In this equation kinetic energy of the particle $K = \frac{p^2}{2m} = \frac{\hbar^2 k^2}{2m}$, while $\Psi(x, t)$ represents sinusoidal variation of the energy at any point x at any point of time t and total energy of the particle $E = \hbar\omega = h\nu$. Accordingly, it can be written as $E\Psi(x, t) = K\Psi(x, t) + U\Psi(x, t) \rightarrow E = U + K$, and its latest forms it conforms to basic equation of classical physics $E = U + K$. This is not enough to take forward the hypothesis, unless it is corroborated by experimental observations. Such evidences are brought out below.

Stationary Waves: Wave function of any free particle corresponds to energy $K = \hbar\omega = \frac{\hbar^2 k^2}{2m}$ and angular frequency $\omega = \frac{E}{\hbar}$ and therefore, sinusoidal wave function can be written as $\Psi(x, t) = Ae^{ikx}e^{-i\omega t} = Ae^{ikx}e^{-i(\frac{E}{\hbar})t}$. Since for every orbiting electron $U(x) \neq 0$, it violates basic assumption of Schrödinger Wave Equation, to be suitable for use as a building block of wave function.

In view of this taking other form of equation $\Psi(x, t) = Ae^{ikx}e^{-i\omega t} = \Psi(x)e^{-i(\frac{E}{\hbar})t}$. It is product of functions position dependent [$\Psi(x) = Ae^{ikx}$] and a time-dependent factor [$e^{-i(\frac{E}{\hbar})t}$]. Thus each energy level in Hydrogen atom there is a specific wave function. It is possible for an atom to be in a state where it does not have definite energy, while state of definite energy is called **stationary state** and this function is conjured by taking complex conjugate of new form as : $|\Psi(x, t)|^2 = \Psi(x, t) \cdot \Psi(x, t)^* = \left[\Psi(x)e^{-i(\frac{E}{\hbar})t}\right] \cdot \left[\Psi(x)^*e^{i(\frac{E}{\hbar})t}\right] = |\Psi(x)|^2$. This final form of product of complex-conjugate is not dependent on time and is thus justifiably state of definite energy to be called *stationary state*.

A paradox with name stationary Waves, here, needs to be clearly understood, and is that the particle is not stationary, but probability of finding a particle at various positions is fixed, but not of a particular particle. This makes Schrödinger Wave Equation a bit simple for stationary states and accordingly it is written differently as $-\frac{\hbar^2}{2m}\frac{\partial^2}{\partial x^2}\left[\Psi(x)e^{-i(\frac{Et}{\hbar})}\right] + U(x)\Psi(x)e^{-i(\frac{Et}{\hbar})} = i\hbar\frac{\partial}{\partial t}\left[\Psi(x)e^{-i(\frac{Et}{\hbar})}\right]$. This form gets resolved into a simple version as $e^{-i(\frac{Et}{\hbar})}\left[-\frac{\hbar^2}{2m}\frac{\partial^2\Psi(x)}{\partial x^2} + U(x)\Psi(x)\right] = i\hbar\left(-i\frac{E}{\hbar}\right)\Psi(x)e^{-i(\frac{Et}{\hbar})} \rightarrow -\frac{\hbar^2}{2m}\frac{\partial^2\Psi(x)}{\partial x^2} + U(x)\Psi(x) = E\Psi(x)$. It is free of term $e^{-i(\frac{Et}{\hbar})}$ and is thus time independent wave . Solution of this equation leads to determine definite energy in allowed levels for different physical situation. It is pertinent to notice the difference in the way $\Psi(x, t)$ and $\Psi(x)$ are written, the latter is in *Italic*.

Particle in a Box: A question is to determine energy of a particle having stationary-state wave function $\Psi(x)$ Time Independent Schrödinger Wave Equation (SWE) for a given potential energy. In initial form for $U(x) = 0$ for a free particle e allowed wave function and corresponding energy is represented by $\Psi(x) =$



$Ae^{ikx}E = \frac{\hbar^2 k^2}{2m}$. In this wave number $k = \frac{\pi}{\lambda}$, which shall have a real value so that energy of the free particle $0 \leq E \leq \infty$ and particle can be found at $0 \leq x \leq \infty$. But, a bound particle is in a restricted space and cannot escape to infinity. Accordingly, a system is considered to be having a particle within rigid walls separated by distance L performing motion in one dimension. The rigid walls are represent fixed ends of a vibrating string.

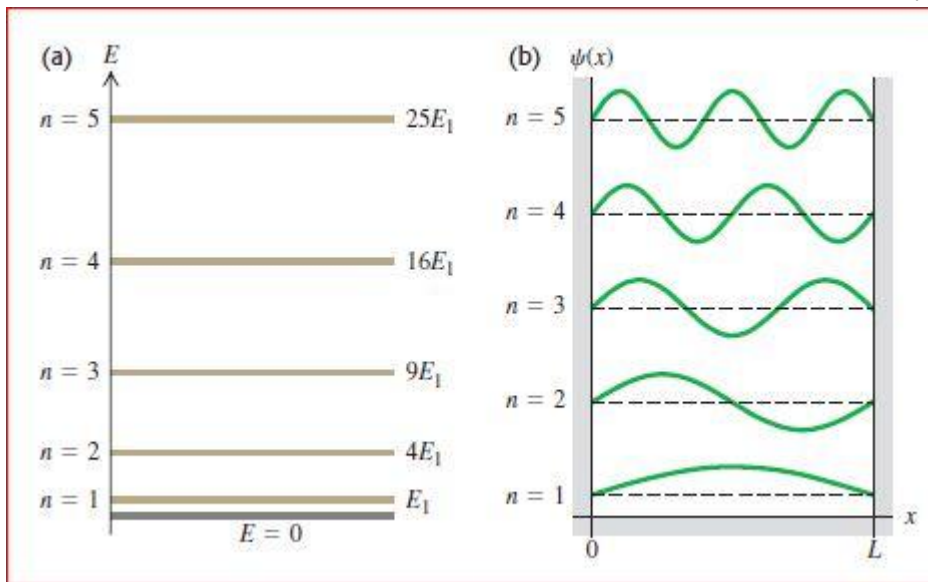
Solution to the SWE is made with some restrictions on particle's stationary state wave function $\Psi(x)$ confined in region $0 \leq x \leq L$. Eventually, this leads to problem $P(\Psi(x)) = 0$ in region $x > L$ and $x < 0$. Accordingly, for $U(x)\Psi(x)$ to be finite, it is must that

$\Psi(x) = 0$, while $U(x)$ is finite and is analogous to vibrating string. Taking these two condition, solution of wave equation must satisfy $-\frac{\hbar^2}{2m} \frac{\partial^2 \Psi(x)}{\partial x^2} = E\Psi(x)$. This is SWE for a free particle leading to conclusion that $\Psi(x) = Ae^{ikx} = \frac{\hbar^2 k^2}{2m}$ for $U(x) = 0$, and has First continuous derivative $\frac{d\Psi(x)}{dx} = ikAe^{ikx}$. But, it does not satisfy boundary condition where $\Psi(0) = Ae^0 = A$ and $\Psi(L) = Ae^{ikL}$, both of which are not Zero. Thus, for function to be Zero necessary condition turns out to be $A = 0$. It implies that there would be no particle at the boundary.

This dilemma is resolved with concept of standing wave in classical mechanics derived from superimposition of Two waves with same k , but travelling in opposite directions. This leads to $\Psi(x) = A_1 e^{ikx} + A_2 e^{-ikx}$. This resolves into $\Psi(x) = A_1 (\cos kx + i \sin kx) + A_2 (\cos kx - i \sin kx) = (A_1 + A_2) \cos kx + i(A_1 - A_2) \sin kx$. Thus at $x = 0$, $\Psi(0) = A_1 + A_2 = 0 \rightarrow A_1 = -A_2$. Thus $\Psi(0) = A_1 + A_2 = 0 \rightarrow A_1 = -A_2$. Accordingly, it evolves a new term $= 2iA_1$, where $\Psi(x) = 2iA_1 \sin kx = C \sin kx$.

Likewise, for second boundary condition, at $x = L$, $\Psi = \Psi(L) = 0$. Thus $kL = n\pi$, where $n \in I$, a set of integer numbers. It leads to $k = \frac{n\pi}{L}$ and $\lambda = \frac{2\pi}{k} = \frac{2L}{n} \rightarrow L = \frac{\lambda}{2}n$. It implies that L is an integral multiple of half wave length.

Energy level for a particle in a Box: Energy of a particle $E = \frac{\hbar^2 k^2}{2m} = \frac{p^2}{2m}$ depends upon momentum of the



particle $p = \hbar k = \frac{h}{\lambda} \cdot \frac{2\pi}{\lambda}$. With wave number k and wave length λ . This makes energy within the defined region is all kinetic, while $U = 0$. Thus for each n there is corresponding p, λ and E such that $p_n = \frac{h}{\lambda_n} = \frac{nh}{2L}$ and energy level of particles in a box is $E_n = \frac{p_n^2}{2m} = \frac{n^2 \hbar^2}{8mL^2} = \frac{n^2 \pi^2 \hbar^2}{2mL^2}$, here energy levels $n \in I$. Quantum number for each energy level is different and accordingly wave function is $\Psi_n(x) = C \sin \frac{n\pi x}{L}$, where $n \in I$ and k

has been replaced by $\frac{n\pi}{L}$. Spacing between energy levels is proportional to n^2 . Number of energy levels extends to infinity with spacing between successive increasing in square proportion.

It is pertinent to observe that particle has non-zero wave function and $E \neq 0$. Thus according to uncertainty principle for $E = 0$, will have $n = 0$, leading to position uncertainty to be infinite such that particle could be found anywhere, which is impossible in the case of a particle in a box. Thus $E = 0$ is not a feasible state. Thus allowed states are with $n \in I$ have momentum along X-axis $+p_n = \frac{2nh}{L}$ and $-p_n = -\frac{2nh}{L}$.

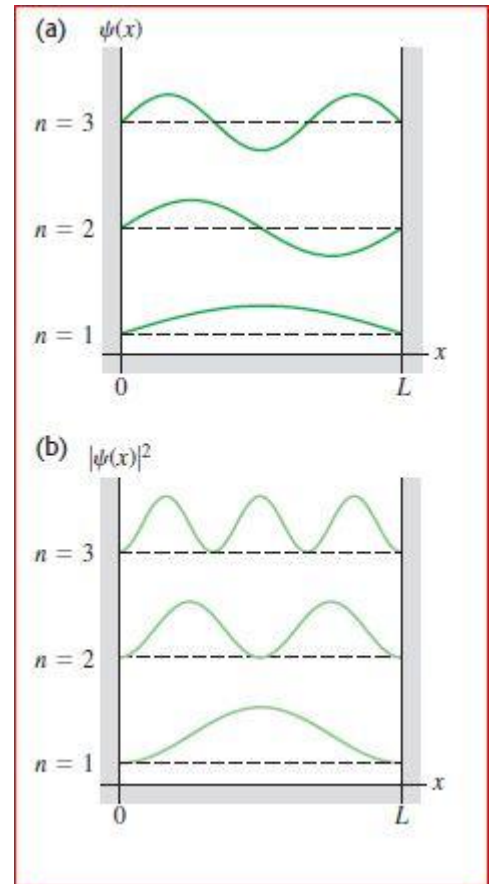
Probability and Normalization: In One dimensional model $|\Psi_n(x)|^2$ is proportional to probability of a particle in a small interval Δx about x . Accordingly, $|\Psi_n(x)|^2 = C^2 \sin^2 \frac{n\pi x}{L} \Delta x$. From graphical representation of $\Psi_n(x)$ and $|\Psi_n(x)|^2$ shown in the figure it is seen that for $n \in I$ at some points $|\Psi_n(x)|^2 = 0$. It implies that particle can not be found at these positions. It is unlike proposition of classical mechanics, which states particle can be found equally found in the region. These two propositions are contradictory. The particle is

since localized within the box normalizing the function leads to $\int_0^L |\Psi_n(x)|^2 dx = \int_0^L C^2 \sin^2 \frac{n\pi x}{L} dx = 1 \rightarrow \frac{C^2}{2} \int_0^L \left[1 - \cos \frac{2n\pi x}{L}\right] dx = C^2 \frac{L}{2} = 1$. This solution of the value of $C = \sqrt{\frac{2}{L}}$. Thus for a particle in a box $\Psi_n(x) = \sqrt{\frac{2}{L}} \sin \frac{n\pi x}{L}$, here $n \in I$.

Time Dependence: It is determined that wave function depends upon spatial coordinate x , while wave function for a definite energy is $\Psi(x, t) = \Psi(x)e^{-\frac{iEt}{\hbar}}$ was derived earlier. Nevertheless, the time-dependent stationary-state wave function for a particle in a box can be written as $\Psi_n(x, t) = \sqrt{\frac{2}{L}} \sin \frac{n\pi x}{L} e^{-\frac{iE_n t}{\hbar}}$, $n \in I$. It depicts that higher the quantum number, greater is the angular frequency $\omega_n = \frac{E_n}{\hbar}$. But, $\left|e^{-\frac{iE_n t}{\hbar}}\right|^2 = e^{\frac{iE_n t}{\hbar}} e^{-\frac{iE_n t}{\hbar}} = e^0 = 1$. Thus probability distribution function $|\Psi_n(x, t)|^2 = \frac{2}{L} \sin^2 \left(\frac{n\pi x}{L}\right)$ is independent of time. Thus it is concluded that energy states are definite and stationary.

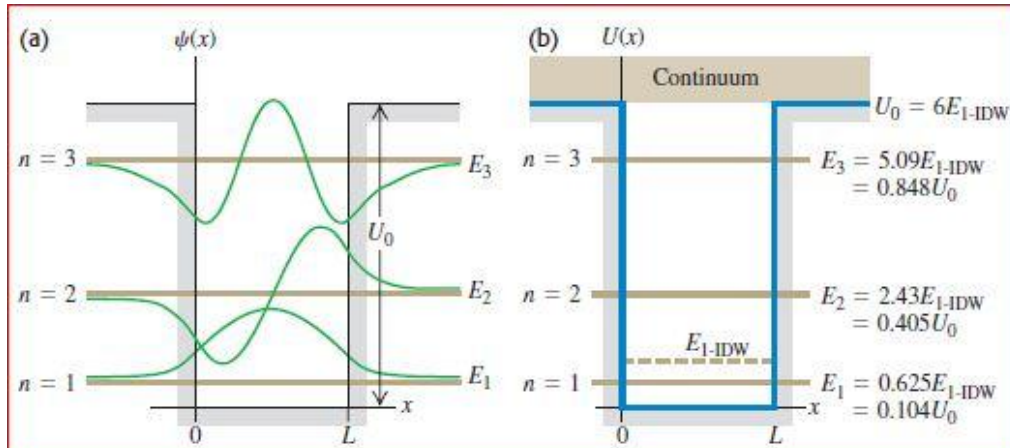
Potential Well: A region where potential energy function $U(x)$ has minimum value is called potential well. Analysis of back and forth vibration of a particle in a box is an application of SWE. It is a rudimentary potential well where $U(x) = 0$ within an interval, and infinite elsewhere. A good approximation of infinite well is shown in figure. In this $U(x) = 0$ for $0 \leq x \leq L$, and potential energy U_0 outside this interval. This is called square-well-potential which is analogous to an electron moving perpendicular to the surfaces and within a metal sheet of uniform thickness L . An electron can move freely inside the metal sheet and it shall have to climb a potential barrier U_0 to come out of the surface of metal. This U_0 is related to **Work Function** invoked in photoelectric and thermionic emission. Extrapolating this function in three dimensions gives an appropriate explanation of motion of proton and neutron within nucleus.

Bound States of Square Well Potential: A particle with energy E shall remain confined within boundary having energy U_0 as long as $E < U_0$, and such a state is called **Bound State**. An easiest approach to solution of SWE for this bound state is to consider region where $U = 0$ and $U = U_0$. Taking this premise ahead, at $U = 0$, the equation becomes $\frac{\hbar^2}{2m} \frac{d^2 \Psi(x)}{dx^2} = E \Psi(x) \rightarrow \frac{d^2 \Psi(x)}{dx^2} = \frac{2mE \Psi(x)}{\hbar^2}$. This is similar to the wave equation of a particle in a box having $0 \leq x \leq L$, and its solution can be written as $\Psi(x) = A \cos\left(\frac{\sqrt{2mE}}{\hbar} x\right) + B \sin\left(\frac{\sqrt{2mE}}{\hbar} x\right)$, here $E = \frac{\hbar^2 k^2}{2m}$ or, $k = \frac{\sqrt{2mE}}{\hbar}$. It has Two constants A and B . This is similar to the wave function for a particle in a box. The only difference in the two is that in square-well-potential $U \neq 0$ and hence $\Psi(x) \neq 0$ outside the well i.e. $x < 0$ and $x > L$. Thus time-independent for $U = U_0$ is $-\frac{\hbar^2}{2m} \frac{d^2 \Psi(x)}{dx^2} + U_0 \Psi(x) = E \Psi(x) \rightarrow \frac{d^2 \Psi(x)}{dx^2} = \frac{2m(U_0 - E)}{\hbar^2} \Psi(x)$. Since inside well $U_0 - E > 0$, it makes solution of this equation exponential. Accordingly, $\Psi(x) = C e^{\kappa x} + D e^{-\kappa x}$, here a new symbol is introduced it is $\kappa = \frac{2m\sqrt{U_0 - E}}{\hbar}$, a Geek alphabet (lower case), pronounced as Kappa. The constants C and D have different values in region $x < 0$ and $x > L$. Further,

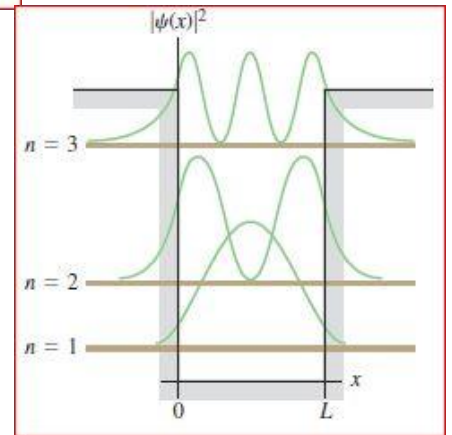


$\Psi(x)$ cannot be infinity at either $x \rightarrow \infty$ or $x \rightarrow -\infty$. Accordingly, for $x = 0 \rightarrow D = 0$, and $x = L \rightarrow C = 0$. Thus wave function in bound state within finite well is sinusoidal i.e. $\Psi(x) = A \cos\left(\frac{\sqrt{2mE}}{\hbar}x\right)$ and exponential outside it as $\Psi(x) = Ce^{kx} + De^{-kx}$. In a finite well $U - E$ is finite at every point, and, therefore, $\frac{d^2\Psi(x)}{dx^2}$ must be finite everywhere.

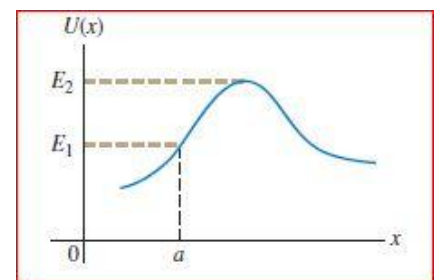
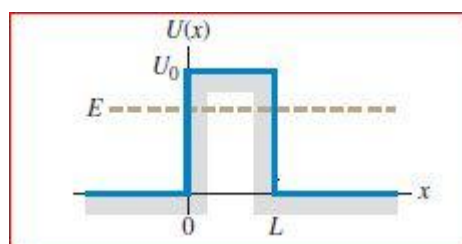
Comparing Finite and Infinite Square Well: Wave function for a finite well is not Zero at $x = 0$ and $x = L$



U_0 for a well of finite depth, as against this there are infinite states in a deep well. Ground energy for infinitely deep well (IDW) is $E_{1-IDW} = \frac{\pi^2 \hbar^2}{2mL^2}$. In a deep well U_0 is much larger than E_1 and bound energy of few lowest states are nearly same as that of deep well. With infinitely deep well there is no state with $E = 0$, it is a case that leads to non-conformance of certainty principle. Probability distribution of wave function $|\Psi(x)|^2$ shows that there is some probability of finding a particle outside the well in the forbidden region and there are states when unbound particles are free to move through all values of x . Any energy $E > U_0$ is possible leading to continuum for free particle states instead of discrete energy states with definite energy levels having sinusoidal wave function within and outside the well.



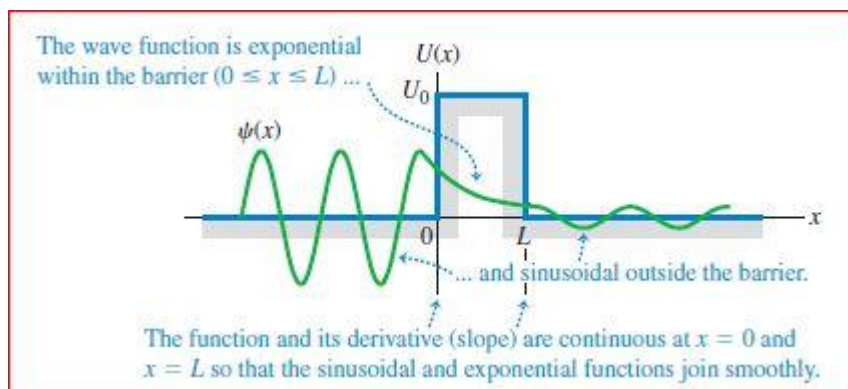
Potential Barriers and Tunneling: As per classical mechanics, a particle located on one side of a barrier can't reach to other side unless its total energy exceeds potential energy at the peak of the barrier. But, quantum mechanics explains passage of a particle onto the other side across the barrier by a phenomenon called –Quantum-Mechanical-Tunneling. Understanding this concept is done with a rectangular potential barrier having potential energy U_0 in region $0 \leq x \leq L$, while particle along $x < 0$ has total energy E . This represents an electron having energy E in a metal on one metal sheet having potential U_0 separated by another at higher potential U with an air gap of thickness L between the



two sheets. Now, SWE for this case with $U = 0$ for at $x < 0$ and $x > L$ is a sinusoidal function given by $\Psi(x) = A \cos\left(\frac{\sqrt{2mE}}{\hbar}x\right) + B \sin\left(\frac{\sqrt{2mE}}{\hbar}x\right)$. But, within barrier $0 \leq x \leq L$, where $U = U_0$ the solution is exponential function given by $\Psi(x) = Ce^{kx} + De^{-kx}$. These solutions have to join smoothly at boundary at $x = 0$ and $x = L$, which requires both $\Psi(x)$ and $\frac{d\Psi(x)}{dx}$ to be continuous at both the boundaries. It leads to a wave function

like the one shown in figure where function is not Zero inside the barrier. Eventually, a particle on left of the

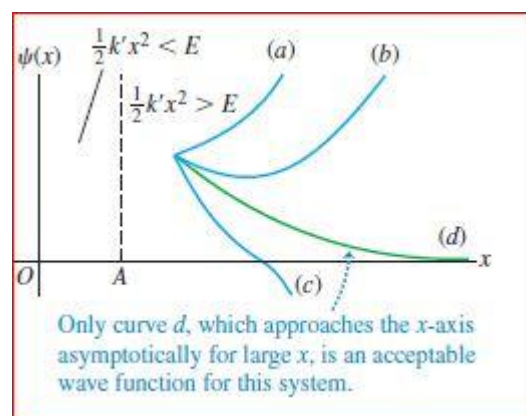
barrier has a probability of being found on right of the barrier. This probability depends upon width (L) of the barrier and energy of particle E , as compared to the energy of the barrier U_0 . This is called Tunneling expressed as $T = Ge^{-2\kappa L}$, where $\kappa = \frac{2m\sqrt{U_0-E}}{\hbar}$ and $G = 16 \frac{E}{U_0} (E - U_0)$. This probability decreases with - a) increase in width (L) of the barrier and b) difference of energy $U_0 - E$. Determination of T , is deferred for present going too far the domain if this manual. Nevertheless, inquisitive readers are welcome to us at [CONTACT US](#).



Concept of tunneling is of great importance in nuclear physics involving fusion reaction where two nuclei tunnel through electrical potential barrier caused by repulsion to enter into Zone of nuclear attractive forces responsible for fusion.

Harmonic Oscillators: Oscillations at macro level including sound are easy to visualize. But, getting down ultra-microscopic level can be explained with SWE. Quantum mechanics explains emission of radiation of frequency ν when an electron descends through a discrete energy level having a difference in potential energy ΔE such that $\Delta E = h\nu = \hbar\omega = \hbar\sqrt{\frac{k}{m}}$. This leads to quantum mechanical analysis of harmonic oscillator.

Wave Function, Boundary Condition and Energy Levels; Replacing $U = \frac{1}{2}k'x^2$, One Dimensional Time-Independent SWE becomes $-\frac{\hbar^2}{2m} \frac{d^2\psi(x)}{dx^2} + \frac{1}{2}k'x^2\psi(x) = E\psi(x)$. Solution of this equation gives physically possible states of the system. Here the problem is to determine boundary condition of harmonic oscillator, as a potential well where energy levels are determined based on boundary conditions of the wall of the well. In classical physics $|x| \leq A$, where $E = \frac{1}{2}k'A^2$, but quantum mechanics allows penetration of particle into forbidden region with probability decreasing with increase in depth of penetration. Thus $\psi(x) \rightarrow 0$ as $x \rightarrow \infty$. This requirement is satisfied when $\frac{d^2\psi(x)}{dx^2} = \frac{2m}{\hbar^2} \left(\frac{1}{2}k'x^2 - E \right) \psi(x)$. Value of x is large enough to make $\left(\frac{1}{2}k'x^2 - E \right) > 0$, while $\psi(x)$ and its second derivative w.r.t. x have same sign. This leads to Four possibilities when $\left(\frac{1}{2}k'x^2 - E \right) > 0$.



Curve (a): Initially slope of $\psi(x)$ is (+)ve since $\frac{d^2\psi(x)}{dx^2} > 0$, the curve is concave upwards and goes upto infinity with increasing steepness. This is not possible.

Curve (b): Initially slope of $\psi(x)$ is (-)ve and $\frac{d^2\psi(x)}{dx^2}$ has large (+)ve value which changes its direction to go upto (+)ve infinity. This is again not possible.

Curve (c): Initially slope of $\psi(x)$ is (-)ve but $\frac{d^2\psi(x)}{dx^2}$ is slightly (+)ve to make it convex upward as it approaches $\psi(x) = 0$. Soon after

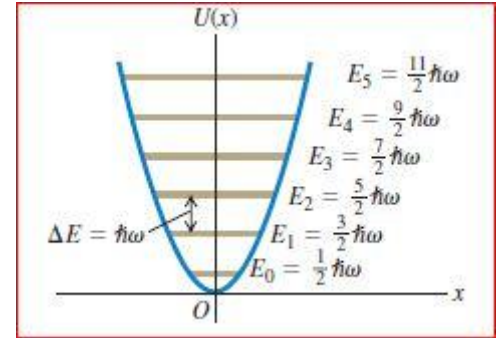
crossing X-axis both the $\psi(x)$ and $\frac{d^2\psi(x)}{dx^2}$ become (-)ve which make the curve progressively approach towards (-) infinity, which is again not possible.

Curve (d): Initially slope of $\Psi(x)$ is (-)ve, while $\frac{d^2\Psi(x)}{dx^2}$ is slightly (+)ve to make the curve asymptotic as $x \rightarrow \infty$ the function $\Psi(x) \rightarrow 0$ and it occurs for certain values of energy E .

This qualitative discussion suggests possible energy levels as $x \rightarrow \infty$ in a quantum mechanic harmonic oscillator. These boundary conditions are satisfied if energy corresponds to

one of the $E_n = \left(n + \frac{1}{2}\right) \frac{1}{h} \sqrt{\frac{k'}{m}} = \left(n + \frac{1}{2}\right) \hbar\omega$, here $n \in W$, where W is a set of Whole Numbers and n is quantum number of each state. Thus corresponding energy level at ground level is $E_0 = \frac{1}{2} \hbar\omega$, when $n = 0$. It is to be noted that for ground state $n \neq 1$.

This equation validates Planck's hypothesis that energy levels are separated by a constant interval $\hbar\omega = h\nu$, here ν is the frequency. Thus there are infinite energy level for an infinite deep well with an increase in $U = \frac{1}{2} k' x^2$ with an unbound increase of $|x|$. Typical lowest Six energy levels are shown in x vs U_x plot.



Summary: This has set a platform for taking forward understanding of behavior of Semiconductors, and even chemical bonding; the latter constitutes studies of chemistry. A further detailing of the understanding reading book cited at reference¹ is recommended.

References:

1. Sears & Zemansky; University Physics with Modern Physics
2. H.C. Verma; Concepts of Physics, (Vol 1 & 2).
3. Resnick, Halliday, Resnick and Krane; Physics (Vol I and II).

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एक समय आता है, जब मनुष्य अनुभव करता है कि थोड़ी से मनुष्य की सेवा करना लाखों जप-ध्यान से कहीं बढ़कर है

- **स्वामी विवेकानंद**

Swamiji harmonized the East and the West, religion and science, past and present. And that is why he is great. Our countrymen have gained unprecedented self-respect, self-reliance and self-assertion from his teachings.

- **Netaji Subhash Chandra Bose**

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GROWING WITH CONCEPTS - Chemistry

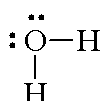
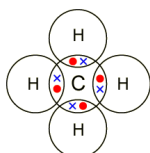
VALENCE SHELL ELECTRON PAIR REPULSION THEORY (VSEPR)

Kumud Bala

Lewis concept is unable to explain the shapes of molecules. The first simple theory that was put forward to explain the shapes of molecules is known as Valence Shell Electron Pair Repulsion (VSEPR) theory. This theory was given by Sidgwick and Powell in 1940 and was further improved by Nyholm and Gillespie in 1957. The basic idea of this theory is: "the electron pairs surrounding the central atom repel each other and move so far apart from one another that there are no further repulsions between them. As a result, the molecule has minimum energy and maximum stability."

Postulates of VSEPR theory:

1. The shape of a molecule depends upon the number of valence shell electron pairs (whether bonded or not) around the central atom. In the formation of a bond, the central atom shares its valence electrons with the surrounding atoms. However, in certain cases, all the valence shell electrons may not take part in the bond formation. The electrons left in the valence shell without forming bonds exist as lone pairs. For example, in methane, CH_4 , carbon uses all the four valence electrons in forming four bond pairs with four hydrogen atoms. In water (H_2O), the central oxygen atom has ($1s^2 2s^2 2p^4$) six valence electrons. The hydrogen atom shares two of these six valence electrons in bond formation leaving four electrons as two lone pairs. Thus, in methane, there are four bond pairs around carbon, while oxygen in water has two bond pairs and two lone pairs around it.
2. Electron pairs in the valence shell tend to repel one another because their electron clouds are negatively charged.
3. The electron pairs tend to occupy positions in space that minimize repulsions. Therefore, they try to stay as far apart as possible to acquire a state of minimum energy or maximum stability.
4. The valence shell is taken as a sphere with the electron pairs localizing on the spherical surface at maximum distance from one another.
5. The electron pairs in multiple bonds are treated as a single unit like a single electron pair. In other words, two or three electron pairs of a double or triple bond respectively are considered as a single super pair equivalent to a single electron pair.
6. Repulsion between the lone pair and lone pair of electrons is different than that between two bond pairs or one lone pair and one bond pair. The repulsive interaction decreases in the order: lone pair – lone pair > lone pair – bond pair > bond pair – bond pair. The presence of lone pairs in addition to bond pairs, will result in certain distortions in the regular geometry of molecules.
7. If the central atom is linked to similar atoms and is surrounded by bond pairs of electrons only, the repulsion between them are similar. As a result, the shape of the molecule is said to have a regular geometry.
8. Repulsive forces decrease sharply with increasing angle between the electron pairs. They are strong at 90° , weaker at 120° , weakest at 180° .



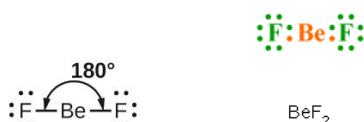
(four bond pairs)
(two bond pairs and two lone pairs)

Let us illustrate this theory by considering a few examples:

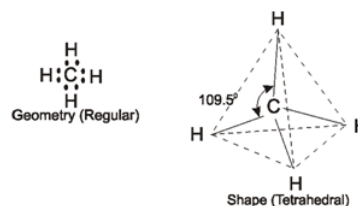
A- Shapes of molecules containing bond pairs only:-

1. Shape of BeF_2 molecule: Linear-In BeF_2 , the central Be- atom ($Z=4$, $1s^2 2s^2$) has two

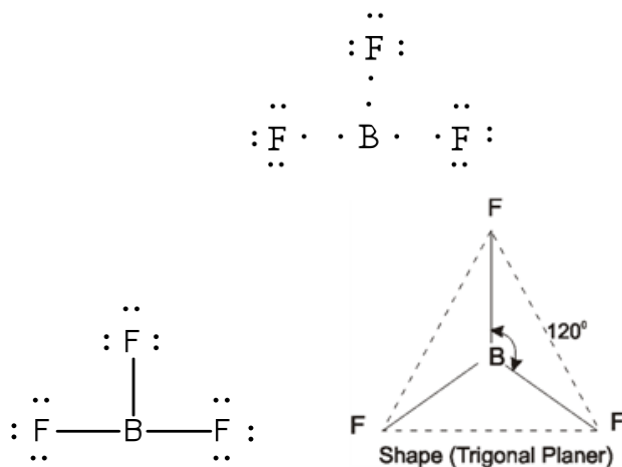
electrons in the valence shell. In the formation of BeF_2 , each of these valence electrons is shared by two fluorine atoms. As a result, the Be-atom is surrounded by two bond pairs of electrons. Therefore, the geometry of BeF_2 molecule is linear and the bond angle is 180° . Other molecules such as BeCl_2 , ZnCl_2 , and HgCl_2 have linear shape.



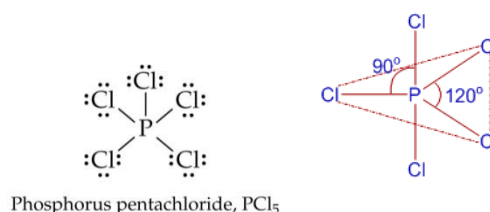
examples of tetrahedral molecules are SiF_4 , CCl_4 , SiH_4 , NH_4^+ etc.



2. Shape of BF_3 molecule: Trigonal planar, the central atom, boron ($Z=5$, $1s^2 2s^2 2p^1$) has three valence electrons. BF_3 molecule has three electron pairs around B-atom. The molecule adopts trigonal planar geometry. In this geometry, all the F-B-F bond angles are of 120° . This geometry is planar because the three F-atoms and B-atom lie in the same plane. For example- BCl_3 , AlCl_3 etc. have same shape.

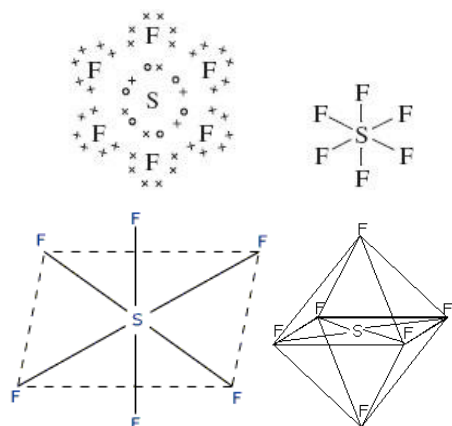


4. Shape of PCl_5 molecule: Trigonal bipyramidal, in PCl_5 , the central atom P ($Z = 15$, $1s^2 2s^2 2p^2 3s^2 3p^3$) has five valence electrons. It forms five bond pairs with Cl-atoms to form a molecule of PCl_5 . Since there are five electron pairs around the central phosphorus atom and therefore, it has trigonal bipyramidal geometry. In this geometry, all the bond angles are not equal. Three electron pairs are in the same plane at an angle of 120° , while other two are perpendicular to the plane, both making an angle of 90° with plane. In this geometry, all five P-Cl bonds are not equal. The three bonds lying in the trigonal plane are called equatorial bonds. Of the remaining two bonds, one lies above and the other below the equatorial plane, both making an angle of 90° with the plane. These bonds are called axial bonds.



3. Shape of CH_4 molecule: Tetrahedral, the central atom carbon ($Z=6$, $1s^2 2s^2 2p^2$) has four valence electrons. All the four valence electrons are bounded to four hydrogen atoms forming four bond pairs around the central carbon atom. These four electron pairs, trying to remain as far apart as possible, adopt tetrahedral structure. In this geometry, all the H-C-H bond angles are of 109.5° . Other

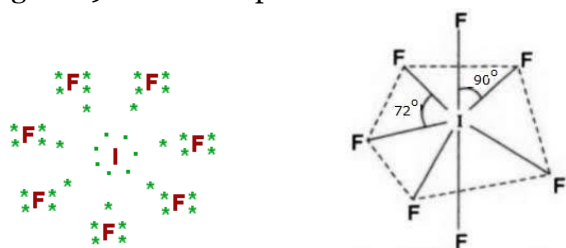
5. Shape of SF_6 molecule: Octahedral, in SF_6 , the central S-atom ($Z= 16$, $1s^2 2s^2 2p^6 3s^2 3p^4$) has six valence electrons. Each of these six valence electrons forms bond with F-atom and therefore, the molecule has octahedral geometry. In this case, all the bond angles are same and are of 90° each. Other examples of octahedral molecules are SeF_6 , TeF_6 etc.



repulsion is more than bond pair – bond pair repulsion. Therefore, bonded pairs of electrons are pushed more closely and the O-S-O bond angle gets reduced to 119.5° from the value of 120° .



6. Shape of IF_7 molecule: Pentagonal bipyramidal, in IF_7 , the central atom I ($Z=53$, $1s^2 \dots 5s^2 5p^5$) has seven valence electrons. Each of these seven valence electrons forms bond with F-atom and therefore, the molecule has pentagonal bipyramidal geometry. In this case, all the bond angles are not equal. Five electron pairs are in the same plane at an angle of 72° , while other two are perpendicular to the plane both making an angle of 90° with the plane.



7.

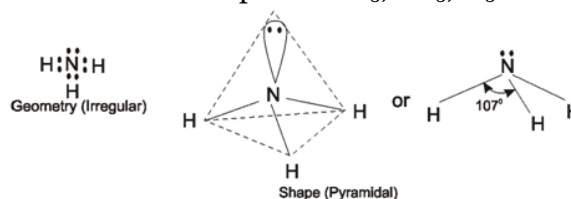
B- Shape of molecules containing lone pairs and bond pairs

Now, let us consider a few molecules containing bond pairs as well as lone pairs.

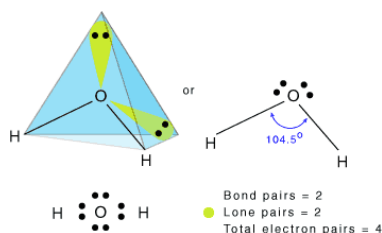
1. Molecules containing three electron pairs (AB_3 , AB_2L) (where B represents bond pair and L represents a lone pair) - For example- shape of sulphur dioxide (SO_2) has V-shaped geometry. In SO_2 molecule, there are three electron pairs (two bond pairs and one lone pair). The three electron pairs should acquire a trigonal planar arrangement with bond angle 120° . Since one of the positions is occupied by a lone pair, the geometry may be described as angular or V-shaped or bent shape. Because, lone pair – bond pair

2. Molecules containing four electron pairs (AB_4 , AB_3L , AB_2L_2)- As already learnt, the molecule AB_4 has tetrahedral geometry. But if lone pairs are also present in addition to bond pairs, the geometry gets distorted. For examples- (i) Molecules containing 3 bp and 1 lp AB_3L e.g., NH_3 (ii) Molecules containing 2 bp and 2 lp AB_2L_2 , e.g., H_2O

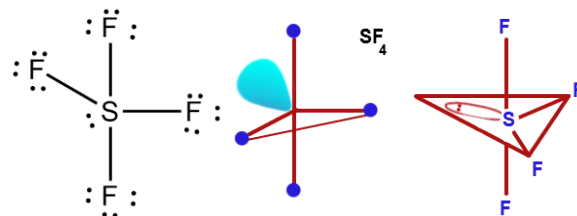
- (i) Shape of NH_3 molecule: Pyramidal, in NH_3 molecule, the central nitrogen atom ($Z=7$, $1s^2 2s^2 2p^3$) has five valence electrons. Three of these valence electrons share electrons with three hydrogen atoms forming three bond pairs around the nitrogen atom. The remaining two electrons are present as a lone pair. Thus, in ammonia, nitrogen is surrounded by three bond pairs and one lone pair and therefore, it has distorted tetrahedral geometry. The bond angle will not be 109.5° but it is 107° . This distortion is due to the presence of one lone pair in addition to bond pairs. Lone pair – bond pair repulsion is more than bond pair – bond pair repulsion. As a result, the lone pair of electrons will repel the bond pairs strongly and bond angle decreases to 107° . The geometry of ammonia molecule is also regarded as pyramidal. Other molecules with same shape are PCl_3 , NF_3 , H_3O^+ etc.



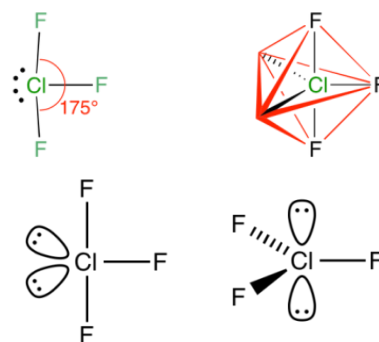
(ii) Shape of H_2O molecule: Bent or angular, in case of water molecule, the central oxygen atom ($Z=8$, $1s^2 2s^2 2p^4$) has six valence electrons. In the formation of water molecule the electrons form two bond pairs with two hydrogen atoms leaving four electrons as two lone pairs. However, all the four electron pairs around O-atom are not equivalent and therefore, geometry is distorted tetrahedral. The bond angle in water molecule is not of 109.5° but it is of 104.5° . The distortion is due to the presence of two lone pairs in addition to bond pairs. The force of repulsion between lone pair-lone pair is larger than the force of repulsion between two bond pairs of electrons. So the bond angle decreases to a larger extent to 104.5° . The geometry of water is regarded as bent or angular. Other molecules with same shape are H_2S , F_2O , SCl_2 , etc.



trigonal bipyramidal geometry in which one position is occupied by a lone pair. The bond angles in SF_4 are 89° and 117° instead of 90° and 120° respectively.



(ii) AB_3L_2 (3 bp and 2 lp) molecule: Let us take the example of ClF_3 , chlorine trifluoride which is isoelectronic with SF_4 . The central chlorine atom ($Z=17$, $3s^2 3p^5$) has seven electrons in its valence shell. In the formation of ClF_3 , three electrons form three bond pairs with fluorine atoms and leave four electrons as two lone pairs. Thus, the five electron pairs around chlorine atom adopt trigonal bipyramidal geometry, in which two equatorial positions are occupied by lone pairs. The lone pair in trigonal bipyramidal geometry experience more repulsions at axial positions, therefore, both the lone pairs are present at equatorial position. The molecule is T-shaped and bond angle is 87.6° instead of 90° .

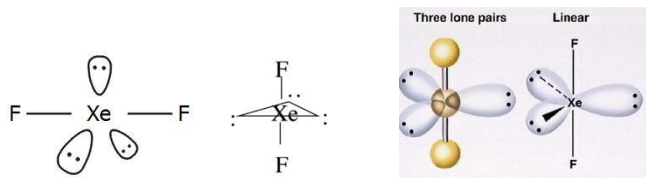


3. Molecules containing five electron pairs (AB_5 , AB_4L , AB_3L_2 , AB_2L_3)- When the central atom is surrounded by five electron pairs, the geometry is trigonal bipyramidal. However, if one or more bond pairs are replaced by lone pairs, the geometry gets distorted. This may be illustrated by the following example: (i) Molecules containing 4 bond pairs and 1 lone pair e.g., SF_4 (ii) molecules containing 3 bp and 2 lp e.g., ClF_3 (iii) molecules containing 2 bp and 3 lp e.g., XeF_2

(i) AB_4L (4 bp and 1 lp) molecules:- Let us take the example of SF_4 . In this case, sulphur atom ($Z=16$, $1s^2 2s^2 2p^6 3s^2 3p^4$) has six valence electrons. In the formation of SF_4 , four electrons form four bond pair and leave two electrons as one lone pair. Thus, five electron pairs around sulphur adopt

(iii) AB_2L_3 (2bp and 3lp) molecules: Let us take the example of xenon difluoride (XeF_2) molecule. Xenon atom has ($Z=54$; $5s^2 5p^6$) eight electrons in the valence shell. In the formation of XeF_2 , there are two bond pairs and three lone pairs. These five electron pairs adopt trigonal bipyramidal geometry with three positions occupied by lone pairs.

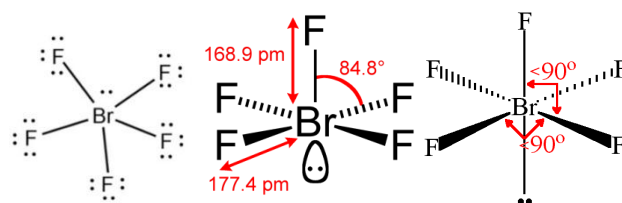
Since the three lone pairs are present at the corners of an equilateral triangle, the net repulsion on the bonds due to lone pairs is zero. Thus, the molecule has linear geometry.



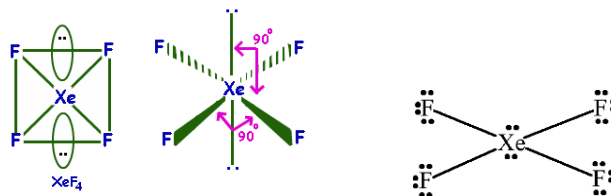
4. Molecules containing six electron pairs (AB_6 , AB_5L , AB_4L_2) : When the central atom is surrounded by six electron pairs, the geometry is octahedral. However, if one or more lone pairs are present in addition to bond pair, the geometry gets distorted. This may be illustrated by the following examples:
- (i) Molecules containing 5 bp and 1 lp e.g., BrF_5 (ii) Molecules containing 4 bp and 2 lp e.g., XeF_4

- (i) AB_5L (5 bp and 1 lp) molecules:- Consider the example of bromine pentafluoride. The central bromine atom ($Z=35$, $4s^2 4p^5$) has seven valence electrons. In the formation of BrF_5 , it has five bond pairs and one lone pair. The six electron pairs has octahedral

geometry in which one of the positions is occupied by a lone pair. Since all the six positions in octahedral geometry are equivalent, therefore, lone pair may be placed on any position. The geometry of BrF_5 is square pyramidal.



- (ii) AB_4L_2 (4 bp and 2 lp) molecules:- Consider the example of XeF_4 . In this case, the central xenon atom has valence electrons. In the formation of XeF_4 , there are four bond pairs and two lone pairs. The six electron pairs have octahedral geometry, in which two positions are occupied by lone pairs. The structure is termed as square planar.



Assignment

- Arrange the following sets of molecules in the decreasing order of bond angle. (i) SF_6 , CCl_4 , H_2O , NH_3 (ii) $AlCl_3$, H_2S , BeH_2 , H_2O
- Give one example each of molecules which have the following geometries: (i) linear (ii) trigonal bipyramidal (iii) tetrahedral
- The octahedral shape is associated with: (i) PF_5 (ii) SF_4 (iii) TeF_6 (iv) ClF_3
- XeF_2 molecule is: (i) Angular (ii) triangular planar (iii) linear (iv) none of these
- PCl_5 molecule has the geometry: (i) trigonal bipyramidal (ii) octahedral (iii) square planar (iv) bipyramidal.
- An example of a molecule having two lone pairs and three bond pairs is: (i) XeF_2 (ii) SF_4 (iii) H_3O^+ (iv) ClF_3
- Molecular shapes of SF_4 , CF_4 and XeF_4 are: (i) the same with 2,0 and 1 lone pairs of electrons respectively. (ii) the same with 1, 1 and 1 lone pairs of electrons respectively. (iii) different with 0,1 and 2 lone pairs of electrons respectively. (iv) different with 1,0 and 2 lone pairs of electrons respectively.

1. (i) CCl_4 , NH_3 , H_2O , SF_6 (ii) BeH_2 , AlCl_3 , H_2O , H_2S ; 2. (i) BeF_2 (ii) PF_3 (iii) CH_4 ; 3. (iii); 4. (iii); 5. (i); 6. (iv); 7. (iv)

ANSWERS TO THE ASSIGNMENT:



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INVITATION FOR CONTRIBUTION OF ARTICLES

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

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

- **With the start of Second year of operation, and reach to 6th Quarterly e-Bulletin Gyan-Vigyan Sarita: शिक्षा shall be brought out 1st February'18.**
- **And this cycle of monthly supplement sandwiching consecutive Quarterly e-Bulletin Gyan-Vigyan Sarita: शिक्षा is aimed to continue endlessly**

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

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I have gone through his works very thoroughly, and after having gone through them, the love that I had for my country became a thousand-fold.

-Mahtma Gandhi

SCIENCE QUIZ : Jan'18

Kumud Bala

- No matter how far you stand from a spherical mirror, your image appears erect. The mirror may be
(i) Concave mirror
(ii) Convex mirror
(iii) Plane mirror
- Focal length formula for the mirror is:
(i) $1/f = 1/u + 1/v$
(ii) $1/f = 1/u - 1/v$
(iii) $1/u = 1/f + 1/v$
- How many elements occur in nature?
(i) 100 (ii) 118 (iii) 92
- Which is the most abundant non-metal?
(i) C (ii) O (iii) H
- Which is the ore of iron?
(i) Hemalite (ii) Cryolite (iii) Bauxite
- Non –metal are elements that have a tendency to gain electrons and form anions. They have character
(i) Electropositive
(ii) Electroplating
(iii) Electronegative
- Magnalium is made up of two components (i) Aluminium and Magnesium
(ii) Copper and Magnesium
(iii) Copper and Zinc
- A clear liquid region between the cornea and the lens is called
(i) Vitreous humour
(ii) Aqueous humour
- (iii) Blind spot
- Name the chemist who showed that the bubbles of oxygen and hydrogen are produced when electric current passes through water.
(i) William Nicholson
(ii) William Harvey
(iii) Alessandro Volta
- Plant tissues help in bending leaf stalk is called
(i) Collenchymas
(ii) Parenchyma
(iii) Aerenchma
- Which type of tissue is present in the brain? (i) Epithelial tissues
(ii) Neuron
(iii) Tendon
- How many liters of blood are present in normal adult human being?
(i) 7 Liters (ii) 6 Liters (iii) 5 Liters
- Which law of motion gives the measure of force?
(i) Newton's first law of motion
(ii) Newton's second law of motion
(iii) Newton's third law of motion
- Name the scientist who experimented with moving balls on a ramp and proved that objects move with constant speed when no forces act upon them.
(i) Newton (ii) Galileo (iii) Archimedes
- Number of valence electrons in Cl⁻ ion are:
(i) 16 (ii) 17 (iii) 18

(Answers to this Science Quiz – Jan'18 shall be provided in Quarterly e-Bulletin dt 1st February'18)

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Answers to Science Quiz in Dec'17

Kumud Bala

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

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Theme Song :

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

इतनी शक्ति हमें देना दाता, मन का विश्वास कमजोर हो ना
हम चले नेक रस्ते पे हमसे, भूलकर भी कोई भूल हो ना ॥

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

इतनी शक्ति हमें देना दाता, मन का विश्वास कमजोर हो ना
हम चले नेक रस्ते पे हमसे, भूलकर भी कोई भूल हो ना ॥

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

इतनी शक्ति हमें देना दाता, मन का विश्वास कमजोर हो ना
हम चले नेक रस्ते पे हमसे, भूलकर भी कोई भूल हो ना ॥



**Together Each Achieves More
(TEAM)**

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