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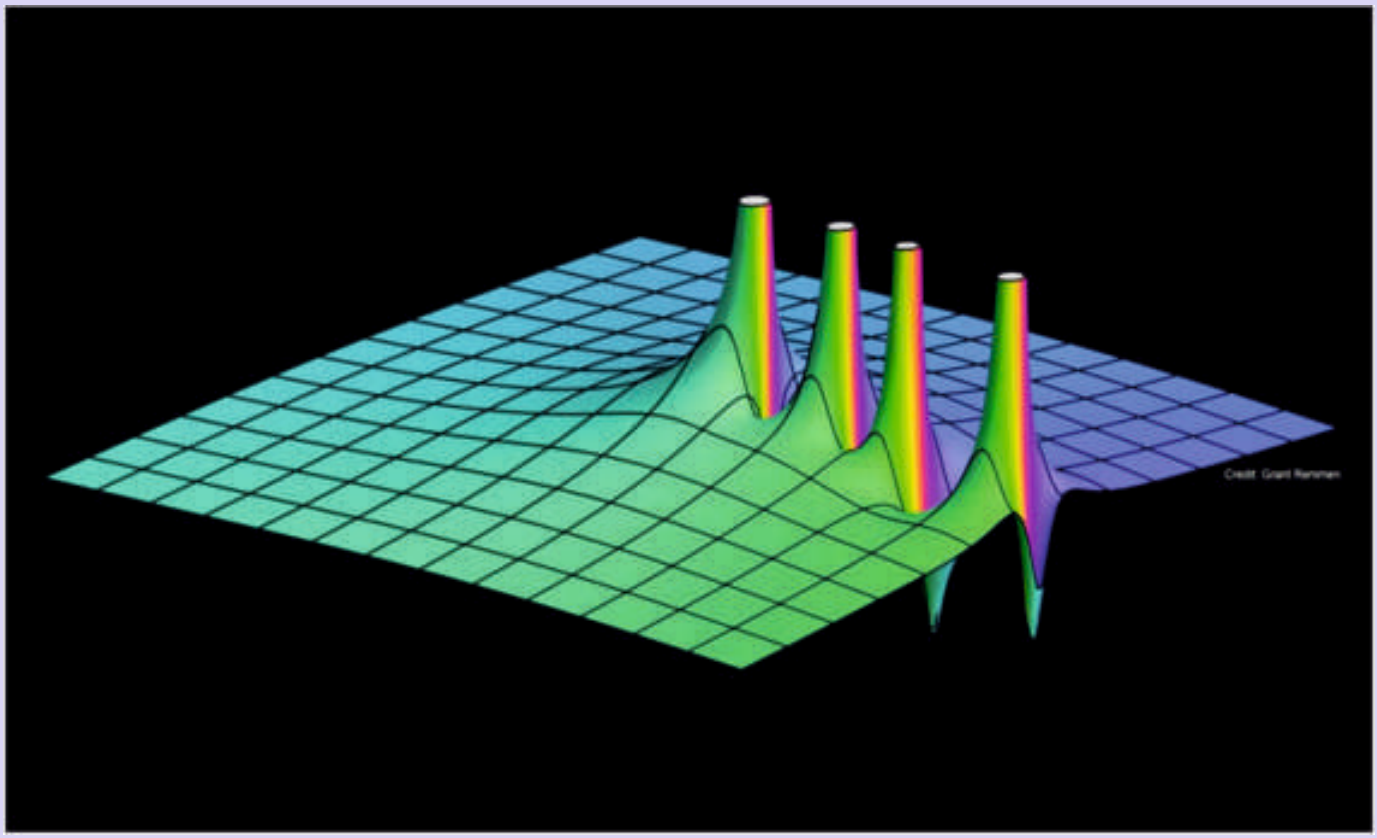

Numbers like π, e and ϕ often turn up in unexpected places in science and mathematics. Pascal's triangle and the Fibonacci sequence also seem inexplicably widespread in nature. Then there's the Riemann zeta function, a deceptively straightforward function that has perplexed mathematicians since the 19th century. The most famous quandary, the Riemann hypothesis, is perhaps the greatest unsolved question in mathematics, with the Clay Mathematics Institute offering a $1 million prize for a correct proof.

Physicist, Grant Remmen, believes he has a new approach for exploring the quirks of the zeta function. He has found a scattering amplitude (pictured) that translates the Riemann zeta function into the language of Quantum Field Theory (QFT). This means that researchers can now leverage the tools from QFT to investigate the enigmatic and oddly ubiquitous zeta function. His work could even lead to a proof of the Riemann hypothesis.

(https://phys.org/news/2022-01-quantum-zeta-epiphany-physicist-approach.html)

The Story of Cosmology through Postal Stamps- 12

REVIVAL OF ASTRONOMY

NICOLAUS COPERNICUS (1473-1543)

Copernicus published his theory of Heliocentric system in his book "***De Revolutionibus Orbium Coelestrum*** on The Revolution of Celestial Sphere) just before his death (1543). It was a pioneer contribution to astronomy.

Copernicus and Eagle-symbol of state

Copernicus and book "***De Revolutionibus Orbium Coelestrum***

"I stopped the sun. moved the earth" quote depicted .

Revolutionibus Orbium Coelestrum includes six books in which he established the relative size of orbit of planet in the solar system

In the Copernican system, the Earth orbits the Sun, like other planets. Planets Mercury and Venus move within the orbit of the Earth while planet Jupiter and Saturn outside the orbit of the Earth.

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All communication regarding the contents of the Bulletin should be addressed to:

Chief Editor (IAPT Bulletin)
Indian Association of Physics Teachers
Dept. of Physics, P.U., Chandigarh - 160014
Email: iapt@pu.ac.in
Ph.: 7696515596 (USK), 9464683959 (MK)

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INDIAN ASSOCIATION OF PHYSICS TEACHERS

REGISTERED OFFICE:
Indian Association of Physics Teachers
Flat No. 206, Adarsh Complex,
Awas Vikas-1 Keshavpuram,
Kalyanpur, Kanpur-208017
Ph. : 09935432990 • Email: iaptknp@rediffmail.com

EXAMINATION OFFICE:
Indian Association of Physics Teachers
15, Block 2, Rispana Road,
Near DBS (Post Graduate) College
Dehradun - 248001 (Uttarakhand)
Ph. : 9632221945
Email: iapt.nse@gmail.com, http://www.iapt.org.in

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General Secretary

NOTICE

The Life Membership Fee of IAPT will be increased from Rs. 1500/- to Rs. 2000/- effective from 1st April 2022.

The same has been decided by Executive Committee and approved by the General Body during Indore Convention 2021.

Sanjay Kr. Sharma

Secretary

PHYSICS NEWS

Study finds that black hole inner horizons can be charged or discharged

Black holes are intriguing and widely studied cosmic bodies with extremely high tidal forces, from which even light is unable to escape.While many studies predicted the existence of black holes, which have also recently been detected, many questions about these cosmic bodies remain unanswered.

Researchers have recently carried out a study examining the vacuum polarization induced by a quantum-charged scalar field near the inner horizon of a charged black hole. The results of their analysessuggest that at a charged black hole's inner horizon, the quantum charged current could be either positive or negative.Essentially, up to a black hole's inner horizon, the spacetime and everything happening within it can be theoretically predicted based on knowledge of the state of the universe at some point in the past, which physicists refer to as 'initial data." This ability to predict spacetime, known as determinism, is an important feature of physics theories.

Read more at :https://phys.org/news/2022-01-black-hole-horizons-discharged.html

Original paper : Physical Review Letters (2021). DOI:10.1103/PhysRevLett.127.231301

Study shows that monolayer tungsten ditelluride is an excitonic insulator

Tungsten ditelluride (WTe2) is a transition metal dichalcogenide with numerous advantageous properties and characteristics, which makes it an ideal material for a wide range of electronic applications. Over the past few years, physicists have been able to understand the origin of the material's topology fairly well. Nonetheless, the reasons why WTe2 monolayer behaves as an insulator (i.e., electrons cannot move freely in the material) remain unclear.

The recent study shows that monolayer WTe2 is a very promising 2D excitonic insulator candidate. In the future, it could inform further studies examining monolayer WTe2 or other materials with similar structures, to explore the possibility of uncovering more excitonic insulating materials.The results open new fascinating opportunities for the development of new experimental techniques for detecting neutral quantum phases hidden in insulators. This could improve the current understanding of electrical insulators, and more importantly, lead to the discovery of new types of electrical insulators beyond the standard ones.

Read more at :https://phys.org/news/2022-01-monolayer-tungsten-ditelluride-excitonic-insulator.html

Original paper : Nature Physics (2021).DOI: 10.1038/s41567-021-01422-w

Evidence of a quantum phase transition without symmetry breaking in cerium-cobalt-indium 5

Over the past few decades, many condensed matter physicists have conducted research focusing on quantum phase transitions that are not clearly associated with a broken symmetry. One reason that these transitions are interesting is that they might underpin the mechanism of high-temperature superconductivity.

Researchers have recently gathered evidence of a quantum phase transition without symmetry breaking occurring in cerium-cobalt-indium 5 (CeCoIn5), an unconventional superconductor. Their paperintroduces a model that could be used to describe the anomalous behavior they observed in CeCoIn5. Researchers hypothesized that the widely observed rapid changes in the properties of CeCoIn5 could be explained by a delocalization transition of the cerium f-orbital electron in the material. Therefore, they decided to shift the focus of their research from the measurement of low-temperature resistivity to the characterization of f-electrons in the material.

Read more at :https://phys.org/news/2022-01-evidence-quantum-phase-transition-symmetry.html

Original paper : Science (2021). DOI: 10.1126/science.aaz4566

Pankaj Bhardwaj
Friedrich Alexander University,
Erlangen & Nuremberg, Germany

Vacant Posts of EC Member Filled

Following vacant posts whose nominations were received after the due date were accepted and filled by new EC during the first EC meeting held online on Friday, January 21, 2022.

Sr No.	Name of the Post	Name of EC member
1	EC Member RC 01	Prof. O. P. Sharma
2	EC Member RC 06	Prof. R. K. Khanna
3	EC Member RC 10	Prof. S. K. Patel
4	EC Member RC 11	Prof. Krishnaiah
5	EC Member RC 16	Prof. Dilip Kumar Bisoyi
6	EC Member RC 17	Prof. Akhil Das
7	EC Member RC 19	Prof. Himanshu Kumar Pandey
8	EC Member RC 21	Prof. Miskil Naik
9	EC Member RC 14	No nomination received from RC.

Rekha Ghorpade
General Secretary

Election Result (RC-17)

Following are declared as the office bearers, elected unopposed to RC- 17 of Assam and Arunachal Pradesh for the vterm Jan. 2022 to Dec. 2024 against the post mentioned against their names.

1	President:		DR.RUNIMABAISHYA	L-5288	8135847815
2	Vice-President:		MR.DWIJENDUTTA	L-7303	9859610963
3	Secretary:		MR.MANABDEKA	L-3110	9435041524
4	Treasurer:		DR. SAMRATDEY	L-6375	9854655097
5	Members:	a.	MR.SAUMARRAJKHOWA	L-5492	8638228270
		b.	DR.BANDANADAS	L-5489	9401568884
		c.	MS.BANDANAGOGOI	L-5719	9863487518
		d.	DR.JNANENDRAUPADHYAY	L-7487	9101276356
		e.	DR.BUOYBARMAN	L-5367	8473958328

Pranab Kumar Das (L-5491)
Returning Officer
RC-17Guwahati

Regional Council Elections RC-11 Andhra Pradesh for the term(2022-24)

Nominations were invited from the life members of RC11 for various positions viz. President, Vice President, Secretary, Treasurer and five members for the term 2022-24 and the following are declared elected, unopposed.

Position	Name of the Member	IAPT life membership Number	WhatsApp Number	Additional Phone number	Email Address	College Name and address	Home Address
National EC Member	Prof. M.Krishnaiah	L1973	9502988833		profkrishnaiah.m@gmail.com	Science Coordinator,Smt Padmavathi Mahila University,Tirupathi.	Science Coordinator, Smt Padmavathi Mahila University, Tirupathi.
President	Dr J Chandrasekhar Rao	L 5824	9390421450	8919528952	chandujoga1@gmail.com	Govt Degree College-Rajam, Srikakulam	Plot no 160 Pydimamba Colony Near Kamakshi Nagar Bus Stop Cantonment, Vizianagaram-535003
Vice President	MrKondamudi Ravindra Kumar	L5041	9652276666	9248050015	physicsravindra@gmail.com	Sri Chaitanya College, Gosala Boys zone, Gosala, vijayawada	Plot No 67, Middlefloor, CTO Colony, Gurunanaknagar, Vijayawada 520008
Secretary	Dr. G. Sahaya Baskaran	L5066	9490658088	7989963625	sbalc@rediffmail.com	Andhra Loyola College, Vijayawada-8	60-18-2, A3 Sarada Sadan Apartment, Near ITI Bus Stop, Vijayawada- 520 010
Treasurer	Dr P.B.Sandhya Sri	L7657	9494051548	8074203008	sandhyasri.prathipati@gmail.com	Government Degree College, Avanigadda, Krishna Dt., Andhra Pradesh	C/o Sri. P.Dhana Raju, Indira Nagar, Vissannapeta, -521215, Krishna Dt. Andhra Pradesh
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E.C. Member	Mr. SRINIVASA RAO VARANASI	L7024	9440963553	7013580677	contactvsr@gmail.com	A.P. MODEL SCHOOL, TAMADA, LAVERU MANDAL, SRIKAKULAM DISTRICT	FLAT NO. 221, RED ROSE BLOCK C, SINGAPORE CITY, DASANNAPETA, VIZIANAGARAM
E.C. Member	Sri. Anand Bhaskar Reddy		9441823923	8639092816	Kabhaskar2@gmail.com	MPUP SCHOOL, Pothulanagepalli, Dharmavarammandal, Ananthpur dist.	D.NO. 6-2-21, Kovurnagar, Ananthpurdist 515001

M.Krishnaiah, S. Sanyasi Raju

Proposed *e*-evaluation schemefor university'sPhysics & related courses

Amit Kumar
Department of Electronics
Bhaskaracharya College of Applied Sciences University of Delhi
South West Delhi 110075, India
amit.kumar@bcas.du.ac.in

Abstract

A number of challenges remain in e-evaluation despite extensive research in this area, such as the verification of examinee identities and answering papers.The purpose of this article is to share a systematic review of the literature regarding the few experiences of educational institutions worldwide regarding e-assessment and e-evaluation as integral components of electronic learning.In the report, extensive, continuous evaluation methods are recommended, including e-examsespecially for Physics and related subjects, along with local authentication, for supporting student evaluation. As a result, pupil monitoring may be improved, compliance violations may be reduced, and a standard practice may be implemented. A scheme for integrated e-learning and e-evaluation, specifically designed for university physics subjects, is presented on the basis of discussions.

Keywords: *e-evaluation, current practices, shortcomings, suggestive model*

1. Introduction

To measure students' skills or knowledge, educational institutions, professional associations and schoolsincreasingly use digital tools as part of formative assessment, often referred to as e-evaluation. Especially after Covid-19 pandemic, many educationists advocate use of electronic technologies in teaching and evaluation.E-assessment is being used more and more by exam awarding bodies, especially those with multiple locations and international study centers.The primary purpose of online evaluation is to measure cognitive abilities, demonstrating what has been learned following an educational event, such as the achievement of a goal.Online portfolios (or ePortfolios) are typically used to evaluate practical abilities or to illustrate learning over time.A course's assessment is essential in determining if learning is occurring, how much it's occurring and if the course should be changed.Some early adopters include the University of Cambridge Local Examinations Syndicate (under the brand name Cambridge Assessment), which used e-marking for its first major test in 2000 [1].The Assessment Syndicate has published a series of papers on e-marking and e-assessment, including research specific to e-marking.It is possible to combine e-marking with electronic exams in some cases, whereas in other situations students will have to hand-write answers on paper and upload them to e-marking systems, which will then mark them on-screen by examiners.The latercase uses a computer screen rather than paper to mark scanned scripts or online responses.

A number of technology-enhanced assessment organizations, such as the e-Assessment Association (eAA) and the Association of Test Publishers (ATP),

are growing as a result of greater adoption.In this contribution, we discuss the current method of electronic evaluation in open/distance educational environments and suggest a solution to overcome some of its shortcomingsfor Physics related subjects.

2. E-evaluation model

In an educational procedure, the examiners and evaluators can be any group of teachers who take part, including the students that are obviously the most obvious group.They are both integral parts of the educational process, thus serving as its most trustworthy judges.Authorities involved in managing evaluations are information systems that are capable of storing large datasets securely.The communication channels between two entities needs to be secure without a third party being able to view or access the data.

Fig. 1 represents the typical model used in e-evaluation procedures as a 10 step process [2]. Starting with setting of question papers, depending on the syllabi and instructions from administrators. The next step involves upload to the servers and setting the timing *etc.* as per stated rules by administrator. The start of examination done by admin so that students get login, take up exam and submit the response. The e-evaluation is done by teachers or examiners and provides the marks/grades. After moderations and corrections the final result gets uploaded by admin that can be obtained by students.

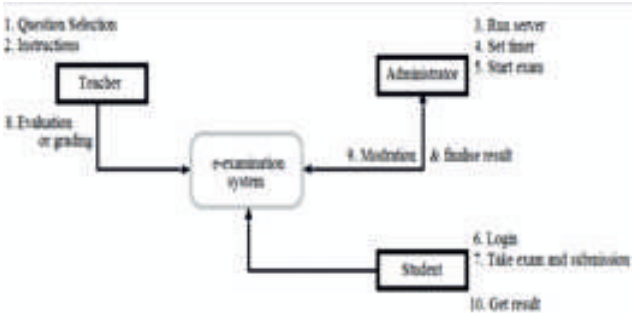


FIG. 1: Current e-evaluation model (re-drawn [2]).

This system is a cost-effective and flexible way to perform evaluation for a wide array of educational factors.As an online system, it has features such as storing result data and reusing it and facilitating either synchronous or asynchronous processes for evaluating results.Results can be statistically analyzed using software.The concerns include practical factors such as having the required IT hardware to facilitate the simultaneous administration of an electronic examination to many students as well as using a reliable form of security. Another important issue is academic dishonesty and cheating that cannot be ascertained in e-examination cum evaluation process, especially in de-centralized systems. In the literature review, it was found that most of the studies were designed to show learners' perception of online exams.During the Covid pandemic, few empirical studies have examined students' perceptions of e-exams conducted by Indian higher education institutions.According to a recent study, online exams cause students more anxiety, which leads to cheating [3].The research also found that online exams should not be as lengthy and do not improve the performance of the students.However, by implementing e-exams, conventional paper-based exams can be simplified.Their efficiency is especially evident when the class size is large, allowing easy devising and interpretation of the process.

1. Literature review

As many students take the exam from around the world, identification of students and monitoring of their performance is challenging.The controversy arises when the test is held outside a monitored classroom/examination hall.Although researchers have made great strides in developing and taking electronic exams, the main problem is still authentication and cheating.In recent literature, we can see the efforts of several groups to cope with the current situation involving e-evaluation under non-monitored examinations.

Ebad*et al.* recommended that all exam information be in digital format; a cryptographic scheme should be implemented to achieve the required security levels [4].Sarrayrih*et al.* proposed a multimodal biometric framework; this framework provides the Exam Shield platform, which includes live video streaming, recording of exam environments, and essential exam management tools [5].Bawarith*et al.* implemented a server-side firewall and proxy server on the client side, creating a web page and network [6]. Examiners can ensure the security of the online examination system against malicious individuals and cheating candidates using these methods or others.Al-Hakeem *et al.* applied new developments in face recognition technology to find a solution in the future [7].

2. Need for new evaluation techniques for Physics related subjects

Science fields, such as physics, need to stay on top of new assessment methods in order to appeal to the 21st-century student. As a part of Bloom's Revised Taxonomy of cognitive abilities, this paper advocates the use of higher-order thinking skills in e-assessment rather than lower-order thinking skills. Jones [8] suggests that the latter are categorized by the traditional types of online questions, such as multiple choice, true-false, fill-in-the-blank, and mix-and-match, whereas the former contain constructed response questions, such as numeric and calculated response questions. In terms of academics and students, assessment should not be limited to checking students' understanding of course content, but should be a part of the entire learning process.It is important to choose short-answer questions carefully, as Mullen and Schultz demonstrated when they used short-answer questions as part of a chemistry test [9]. Moving away from multiple-choice questions will not dramatically affect the overall mean score, and short-answer questions must be very carefully chosen. In their study, Heydey et al. show that these emerging online e-assessment question types can be used by physics instructors to supplement their learning and teaching through higher-order e-assessment and to go beyond traditional (online and offline) assessment methods [10].Alhashem*et al.* conducted a study to determine how education objectives appear in science, chemistry, physics, and biology examination questions [11]. The important recommendations from this recent study are:

a) During examinations, one should focus on chemistry, physics, and biology concepts instead of textbooks.

b) Adopting a clear examination policy by the Ministry of Education, as well as following a schedule of specifications, is essential

c) Build a bank of test questions that will include a wide range of questions concerning chemistry, physics, and biology, and organize them according to predefined criteria and in a scientific way, covering all three levels of Bloom's taxonomy

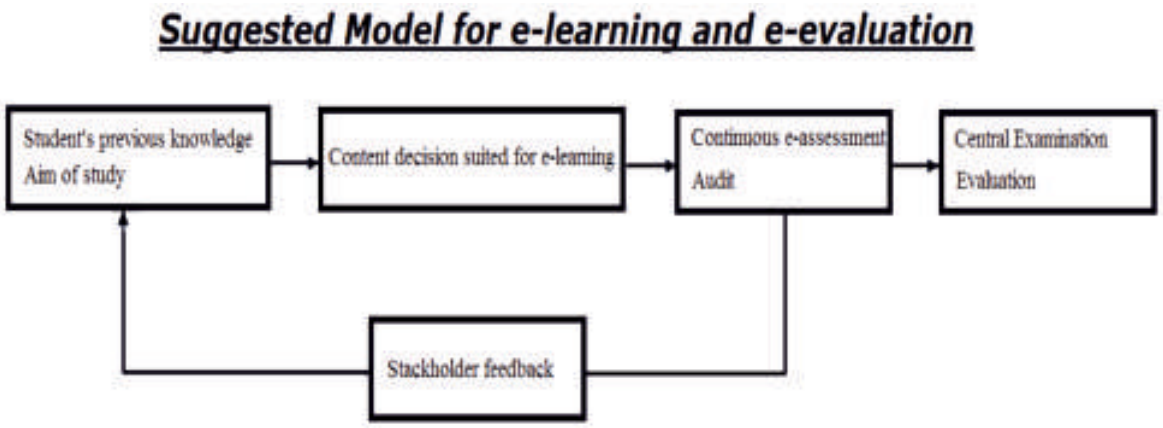
d) Implementing a standardized system for final examinations rather than narrow objectives based on textbooks

e) When developing valid assessments, supervisors should consider applying all domains of learning

According to the researchers, it is critical to revisit the mechanisms of writing final examinations, especially for Physics related subjects, and base them on standards covering all areas since these exams are only a reflection of textbooks. We must test and evaluate students based on concepts, not just facts from textbooks. In the following section we present one suggestive method to accommodate the latest recommendations from many educators working in the field of Physics and related subjects with focus on the emerging e-evaluation techniques.

3. Proposed e-evaluation schematic

The advance software development is under progress



In the proposed methodology, the continuous evaluation will be carried out by electronic means under the administration of local teachers, with correction/moderation handled by central agencies.The best way to evaluate is to map up the student-teacher interactions in the classroom.The evaluations must be done in accordance with the classroom discussions so that it is able to comprehend the teaching-learning process and be able to extend learning beyond the classroom.We need to revise how we teach given the situation of 'semesterization' of education under National Education Policy 2020.The semester system is perceived to be a fast means of education, where learners are busy learning and evaluating simultaneously.Thus, the situation becomes one of continuous evaluation.It is imperative to take advantage of the advent of technologies when designing teaching pedagogy so that learning and evaluation are understood together.The e-evaluation system provides this luxury, allowing teachers to give rapid tests/quizzes *etc.* to encourage students to learn by attempting to solve them.A discussion over a blog or chat room may also help to reduce repeated classroom discussions.Peer learning has been proven to be powerful in understanding, and can also be enhanced during these discussions.

The schematic for the proposed e-evaluation model is shown in Fig. 2.The proposed model, when compared with an open system, is designed to consider students' past performance in classes when evaluating performance.Teachers can develop learning materials and content for continuous evaluation by keeping in mind the study objectives and curriculum.Audits of continuous evaluations must be conducted taking into account classroom discussions.Feedback and responses can be used to update continuous evaluation conducted electronically.This enhances the contents and then the evaluation, and so on.The proposed scheme is found to be the most suitable for dealing with current situations when advances of current technologies can be successfully integrated into teaching and learning.It is expected to make learning more enjoyable for learners as well.

1. Conclusion

Numerous studies have demonstrated the benefits of continuous electronic assessment in Physics related courses.Studies from many universities have shown that using technology still poses challenges, especially during a pandemic like COVID. For initial implementation, a combination of continuous e-evaluation system is recommended that will be administered by local teacher and central agencies may play the part of moderator.

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ARTICLE

Is it better to walk or run during rain without an umbrella to get less wet?

SoorajSahani
Class 12
National InfotechCollege, Birgunj Nepal
Soorajsahani1234@gmail.com

Abstract

In this piece of my work,I have used simple vector analysis to interpret the dependence between the speed of an object that travels through rain and the volume of water dumped on it by the raindrops. Using the concepts of relative velocity and the volume flux an expression is derived which answers the curious question "what is the best speed of man (without an umbrella) to run or walk with to get least wet in covering a certaindistance'd' under the rain?" Volume flux expression (1.16) has been evaluated with different numbers and volume flux for man's different velocities is compared, which depicts by running faster one gets less wet. Way to get least wet at any given velocity ($\vec{v}_m$)during rainis also discussed in the results.

1. Introduction

The physics of the question "is it better to walk or run during rain (without an umbrella) to get less wet?" is very simple. Consider the case,it is raining vertically and, if someone has to cover a certain distance under the rain (without an umbrella) but he does not move at all then raindrops will keep falling on him until raining stops means that person will get completely wet. However, if theperson starts moving then the raindrops approach him being slanted and the faster he runs,the faster the drops approachhim(due to relative velocity between man and raindrops) however then he will complete his journey in less time. From these facts, we can argue that the quantity of how much a man gets wet depends on the velocity of rain approaching him, the area of man's body exposed to rain, and the time for which person stays in the rain. Taking all of these things intoconsideration,we need a mathematical equation that can answer our question precisely.

For two bodies executing their uniform velocity -concerning some reference frame- then the most meaningful information from them is the relative velocity between them. Using the concepts of relative velocity, anyone of those bodies can be considered being at rest with respect to another one. Using this beauty of relative velocity an expression can be derived which reveals the best speed to cross a certain distance underthe rain (without an umbrella) to get the least wet.

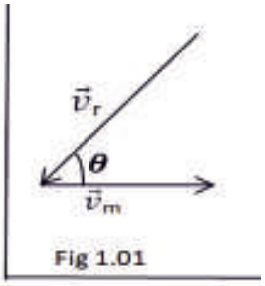


Fig 1.01

2. Method

Firstly, we need to define the term "volume flux rate of raindrops" symbolized$V_f$which as per this theory is defined as the volume of air (with raindrops uniformly distributed in it) flown into through certain area.

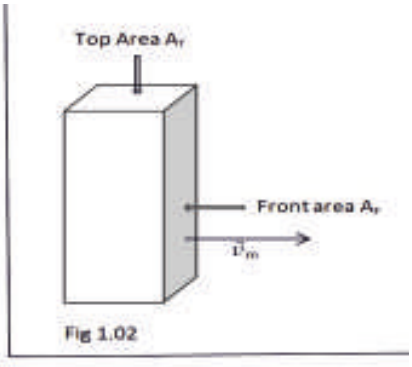


Fig 1.02

Imagine a cuboidal sponge of top area (A_T) and front area (A_F) -A_F is perpendicular tosponge's velocity- say $\vec{v}_r$ and $\vec{v}_m$ are the velocity of rain and sponge with respect to ground. $'\theta'$be the angle between $\vec{v}_r$ and $\vec{v}_m$when $\vec{v}_r$ and $\vec{v}_m$ are added head to tail

(fig 1.01). Using the concept of relative velocity, the sponge is considered to be stationary and from the sponge's perspective rain approaches it with velocity $\vec{v}_{rm}$which makes angle α with horizontal (fig 1.03).

$\vec{v}_{rm}$isthe velocity ofraindrops with respect to man, which is the resultantobtained afterreversing the directionof $\vec{v}_m$ and adding it to $\vec{v}_r$ vectorially.

Mathematically,

$\vec{v}_{rm} = \vec{v}_r - \vec{v}_m$..... 1.01

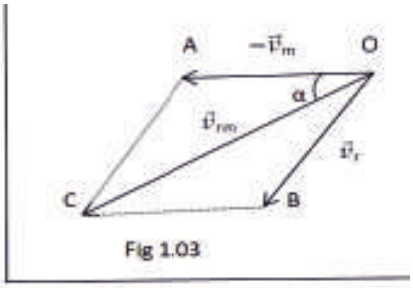


Fig 1.03

From fig 1.04the magnitude and direction of $\vec{v}_{rm}$ can be calculated as

$|\vec{v}_{rm}| = (v_r^2 + 2v_r v_m \cos\theta + v_m^2)^{1/2}$ 1.02

$\text{Tan}\alpha = v_r \text{Sin}\theta / (v_m + v_r \text{Cos}\theta)$.....1.03

From fig 1.05, We can resolve $\vec{v}_{rm}$in its rectangular components as;

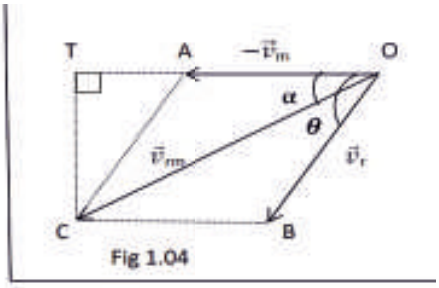


Fig 1.04

Horizontal component of$\vec{v}_{rm}$symbolized $v_{(rm,\,H)}$ is given by

$|\overrightarrow{OT}| = v_{(rm,H)} = v_{rm}\text{Cos}\alpha$.....1.04

Similarly, vertical component of $\vec{v}_{rm}$symbolized$v_{(rm,V)}$ is given by,

$|\overrightarrow{TC}| = v_{(rm,V)} = v_{rm}\sin\alpha$ ----1.05

Volume flux rate of raindrops through $A_T$symbolized $V_{(f,Atop)}$isgiven as,

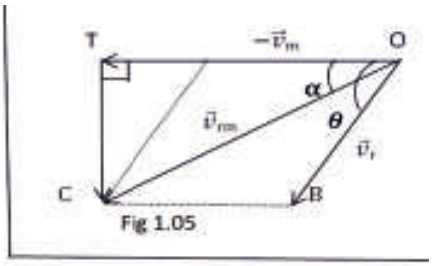


Fig 1.05

$V_{(f,A\ top)} = A_T v_{(rm,V)} = A_T v_{rm}\sin\alpha$ 1.06

Volume flux rate of raindrops through $A_f$symbolized $V_{(F,A\ front)}$ is given as,

$V_{(f,A\ front)} = A_F v_{(rm,H)} = A_F v_{rm}\text{Cos}\alpha$ 1.07

From these equations 1.06 And 1.07, it can be seen that volume flux rate depends on the area through which flux passes, the relative velocity between bodies, and the angle between normal to area surface and $\vec{v}_{rm}$.

Say sponge has to cover distance d in time t. since body moves with velocity$\vec{v}_m$on the ground So, t= d/v_m ------1.08

Total volume flux of raindrops through sponge for time t symbolized $V_{(f,t)}$ is the sum of total flux through A_T and A_F.

$V_{(f,\,t)}$ = ($V_f$through A_T + $V_f$though A_F) ×t

i.e. $V_{(f,\,t)} = [\,V_{(f,A\ top)} + V_{(f,A\ front)}\,]\times t$.....1.09

using equations 1.06 and 1.07 above equation can be written as

$V_{(f,t)}=v_{rm}(\,A_T\mathrm{Sin}\alpha+A_F\mathrm{Cos}\alpha)\times t$ 1.10

Substituting equation for $v_{rm}$and t in above equation,we get,

$V_{(f,t)}=(v_r^2+2v_rv_m\cos\theta+v_m^2)^{1/2}\ (A_T\mathrm{Sin}\alpha+A_F\mathrm{Cos}\alpha)\times d/\ v_m$

$V_{(f,t)}= d[(v_r/v_m)^2 + (2v_rv_m\cos\theta/\ v_m^2)+ (v_m^2/\ v_m^2)]^{1/2}\ (A_T\mathrm{Sin}\alpha+A_F\mathrm{Cos}\alpha)$ 1.11

putting$v_r/v_m = \beta$.... 1.12, then above equation reduces to

$V_{(f,t)}= d\ (A_T\mathrm{Sin}\alpha+A_F\mathrm{Cos}\alpha)(\ \beta^2+2\beta\ \mathrm{Cos}\theta+1)^{1/2}$ 1.13

From fig 1.04

$\mathrm{Sin}\alpha$= TC/OC=AC $\mathrm{Sin}\theta/v_{rm}=v_r\mathrm{Sin}\theta/v_{rm}$ .....1.14 [since AC=OB=v_r]

$\mathrm{Cos}\alpha$ = OT/OC=(OA +AT)/OC=$(v_m+v_r\ \mathrm{Cos}\theta)/\ v_{rm}$ 1.15

Substituting equations 1.08, 1.14, and 1.15 in equation 1.10 and with little algebra, we get

$V_{(f,t)}=d[A_T\beta\sin\theta\ +A_F\ (1+\beta\ \mathrm{Cos}\theta)\ ]$ 1.16

These two equations 1.13 and 1.16 revealthe answer to our question.

3. Result

It is very well known that raindrops (depending on their size) fall near the earth's surface with some constant velocity –due to air resistance- called terminal velocity.Raindrops generally have terminal velocities ranging from 7m/s to 9m/s. It also happens that due to moving air (wind) raindrops may fall slanted making a certain angle with vertical say.

Even though we have derived the equations 1.13 and 1.16 for cuboidal sponge, we can assume a man as a cuboid to a very good approximation (for calculation). Say if the area of man's head is A_T and the area of man's front is A_F then for a normal man $A_F = 10A_T$

Analyzing equation 1.16 With some numbers

We will take v_r =10m/s and for normal person $A_F = 10A_T$ i.e. $A_F / A_T = 10$

Using these data in equation 1.16 we get the volume flux in terms of d× Area top. So we will define a quantity Q as,

$Q=\frac{total\ volume\ flux\ to\ cover\ distance\ d}{d\ \times \mathrm{area\ top}}$

$\beta = (v_r/v_m)$

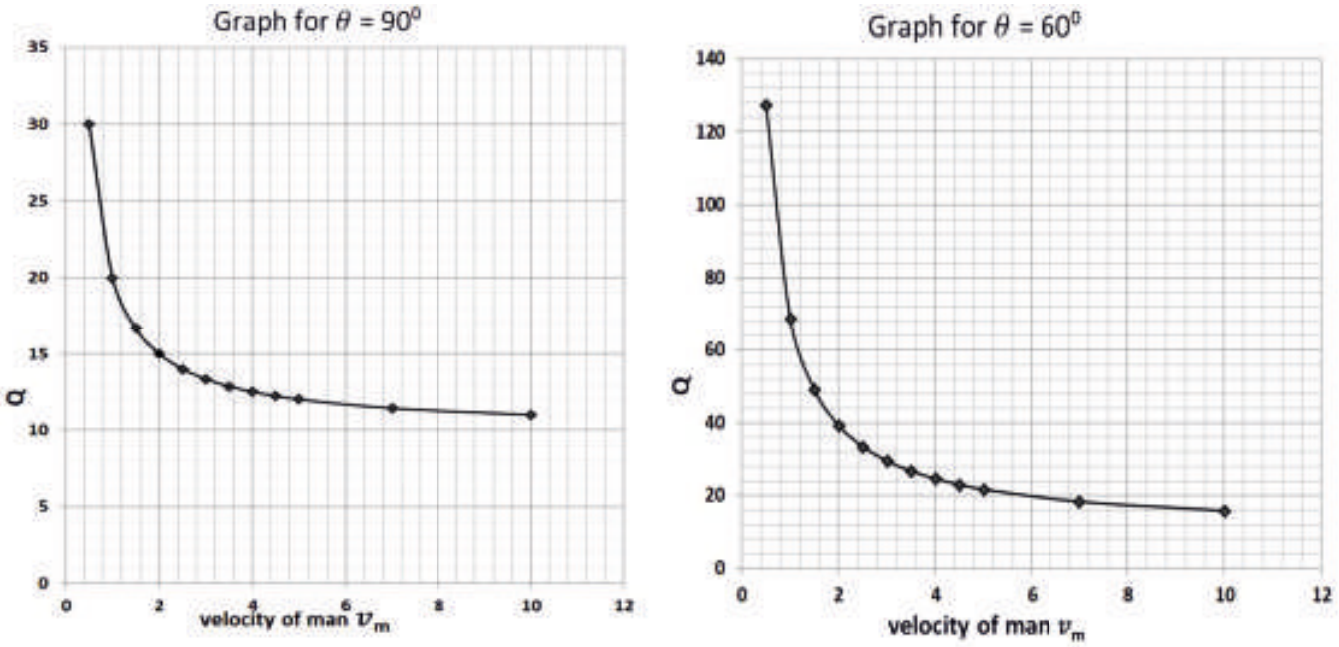
For rain falling vertically$\theta= 90^0$ but if there is a wind blowing then the angle will be slanted and to account for that, some different angles other than $90^0$are also taken and the results can be compared. Each table also has a graph plotted with the same data that is in the table.

Analyzation table

S.no	v_m (in m/s)	β	θ	Q
1	0.5	20	90^0 60^0 45^0 30^0	30.0 127.3 165.6 193.2
2	1.0	10	90^0 60^0 45^0 30^0	20.0 68.6 87.8 101.6
3	1.5	6.7	90^0 60^0 45^0 30^0	16.7 49.1 61.8 71.1
4	2.0	5.0	90^0 60^0 45^0 30^0	15.0 39.3 48.9 55.8
5	2.5	4.0	90^0 60^0 45^0 30^0	14.0 33.5 41.1 46.6
6	3.0	3.3	90^0 60^0 45^0 30^0	13.3 29.5 35.9 40.5
7	3.5	2.8	90^0 60^0 45^0 30^0	12.8 26.8 32.2 36.2
8	4.0	2.5	90^0 60^0 45^0 30^0	12.5 24.7 29.4 32.9
9	4.5	2.2	90^0 60^0 45^0 30^0	12.2 23.0 27.2 30.3
10	5.0	2.0	90^0 60^0 45^0 30^0	12.0 21.7 25.5 28.3
11	7.0	1.4	90^0 60^0 45^0 30^0	11.4 18.4 21.1 23.1
12	10	1.0	90^0 60^0 45^0 30^0	11.0 15.9 17.8 19.1

Below the graphs, for two different angles, 90^0 and 60^0 are plotted. Note the horizontal and vertical axis of the graph are not on the same scale as it would make the figure inconvenient to draw. The

nature of the graph is to be clear from the two figures included below and the data entry to plot those graphs has been taken from the analyzation table.



Findings from the above table:

From all of the cases evaluated in the table above we can see for high speed, volume flux through the body is small which implies a person gets less wet at high speeds.

Way to get least wet at any given velocity ($\vec{v}_m$)during rain

A man moving with velocity ($\vec{v}_m$) should move by tilting his body with angle α with horizontal such that, $\text{Tan}\alpha = v_r\text{Sin}\theta/(v_m + v_r\text{Cos}\theta)$. In this case, raindrops approach him with velocity $\vec{v}_{rm}$and $\vec{v}_{rm}$is perpendicular to the man's head. Say if $A_T$is the area of his head then there is volume flux only from the area (A_T) which isgiven as:

$V_{(f,t)} = A_T \times v_{rm} \times t = d\,[A_T\,(\beta^2 + 2\beta\,\text{Cos}\theta + 1)^{1/2}]$ ……1.17

Volume flux at a very fast speed of man

Say that by any means if the person manages to travel very fast (riding on a bike per say) then for very high speed of man, β tends to 0 and in that case, equation 1.16 reduces as;

$V_{(f,t)} = d \times A_F$ …….1.18

This shows at very high speeds $V_{(f,t)}$ to cover a certain distanceis independent of man's speed.

4. Discussion

I. Equation 1.16 predicts that a person gets less wet when he runs faster to cover a certaindistance during rain (without an umbrella). However beyond certain speed (when $\beta<0.1$) Volume flux is approximately constant as then equation 1.16 canbe approximated as $V_{(f,t)}\approx d\times A_F$. So it makes no sense to run very fast beyond that particular speed, which reduces β to less than 0.1.

II. If rain falls vertically (as seen by a stationary observer) then the volume flux equation 1.16 reduces as:

$V_{(f,t)}=d[A_T\ \beta+A_F\ ]$ 1.22

Above equation (1.22) shows that $V_{(f,t)}$through area perpendicular to man's velocity(A_f) is independent of his speed$\vec{v}_m$ in this case,

Volume flux through $A_F=d\times A_F$ 1.23

Volume flux through $A_F$depends on man's velocity $\vec{v}_m$only when rain falls at an angle other than $\theta=90^0$.

Cited ref.1 has presented two different models for raindrops and arrived at equations to solve the same problem.

5. Conclusion

In search of an answer to the question" is it better to run or walk during rain to get lesswet?" we firstly defined a term called volume flux rate of raindrops. We used simple vector analysis and used horizontal and vertical components of resultant ofman's and rain velocity and devised

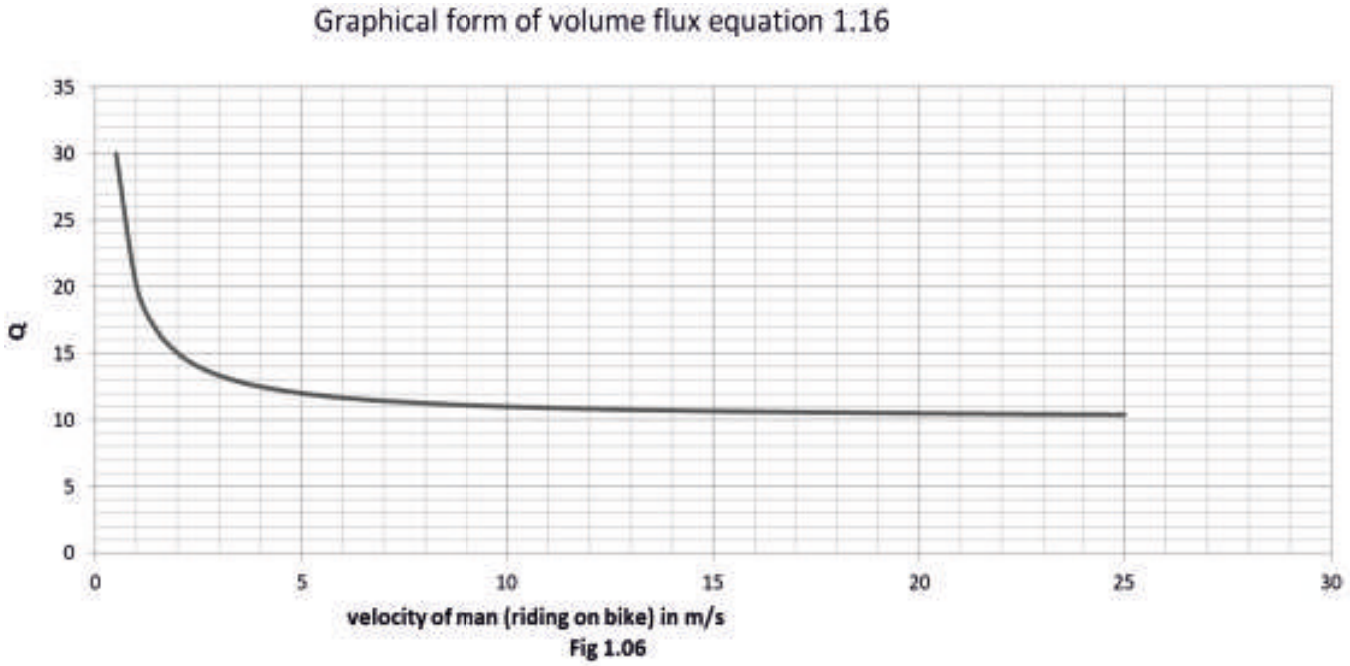


Fig 1.06

expression (1.16)to calculate the total volume flux through area top and area front of a body in covering certain distance under the rain. The volume flux equation 1.16 has all variables which can be measured,which implies that volume flux can very easily be calculated.

We see that man moving at 5m/s i.e.18 km/hr gets 40% less wet in comparison to man moving at 1m/s i.e. 3.6 km/hr. we can also calculate that body moving at 10m/s i.e. 36 km/hr gets 8.34% less wet in comparison to the body moving at 5m/s.

Above fig 1.06 is a graphical representation of equation 1.16, for a long-range of man's velocity. It is beyond the limits of any person to run with a velocity higher than 10 m/s even an Olympian has covered a 100-meter race in 10 seconds which translates into his speed being 10m/s. but here we want to know how does the curve of the volume flux equation look for higher velocities. For high velocity say a man is riding on a bike and we have kept the highest velocity in the horizontal axis as 25m/s which translates into a speed of 90 km/hr. The curve is plotted taking $\theta=90^0$ and $v_r = 10$m/s, along the vertical axis the quantity Q is plotted which has been introduced in the analyzation table. It clearly shows similar results as obtained in **analyzation table**but here the range of velocity is wide At low-speed $V_{(f,t)}$ is more and as the speed of man increases $V_{(f,t)}$ decreases, and after a certain speed, (from fig 1.06, after v_m greater than 20m/s) $V_{(f,t)}$ seems constant irrespective of increasing man's speed.

The result from this whole work indicates when rain falls at any angleθ (as seen by a stationary observer) then to get less wet it is better to run as fast as you can as by running faster you can reduce the number of raindrops damped on you. Although running is better than walking, it is seen from fig. 1.06that the velocity of man increased higher and higher but the decrement in volume flux is very small. This shows that running faster than a particular speed (such that $\beta<0.1$) will not do much in getting less wet.It was even discussed that if ran falls perpendicularly to a man's head then the raindrops hitting the front area is constant irrespective of the man's speed, the raindrops hitting the front area depends on the man's velocity only if the rain falls at an angle (other than $\theta=90^0$). However, running faster decreases the raindrops hitting the head (irrespective of θ). In the volume flux expression 1.16, there is a variable 'd' which is the distance to be covered in rain, and if one has to move a longer distance then running faster will no longer help, as then the body will have already soaked water and man will be completely wet before completing the journey. So if one has to travel a long distance then he should simply walk slowly. This model to a very good approximation explains the dependence between the speed of an object that travels through rain and the volume of water dumped on it by the raindrops.

Acknowledgment

Thanks to Professor HC Verma for encouragement and support.

Reference

1. The "running in the rain" problem revisited: an analyticaland numerical approach.https://www.scielo.br/scielo.php?pid=S1806-11172009000400006&script=sci_arttext

"KIRTUN"
Khandelwal's IAPT Reaching The Unreachable

Platform : Google meet

School students: 47

Std. : IX to XII

Date : 22 January 2022

Time : 4.00 PM to 5.05 PM

Resource persons : Mr. Amit K Bajpai and Mr. Yogesh K Jha

Coordinator : Mrs. Archana Singh

A session for students in rural areas was arranged. 47 students from many villages of Sarsaul Block of Kanpur Nagar (Uttar Pradesh) participated in this session. The special thing was that the students participating in the session belonged to different schools in different villages.

Mrs. Archana Singh, the organizer of the event introduced everyone to each other. After that she asked resource person Mr. Amit K Bajpai to take the program forward. Amit K. Bajpai with Mr Yogesh K. Jha showedsomefascinating science experiments to students. Students asked the questions related to the topic and he answered the queries. The response of the students was noteworthy. The interaction and discussion were at a high tempo! A true scientific temper was aroused!

Dr. Akhilesh Tiwari, Associate Professor, IIIT Allahabad informed the students about IAPT (Indian Association of Physics Teachers) and its activities. He gave a brief introduction of Dr. D.P. Khandelwal to the students. He said that to promote experimental skills among students National Anveshika Network of India (NANI), a unit of IAPT, conducts a competition NAEST (National Anveshika Experimental Skill Test) based on physics experiments each year since 2014. He also informed students about the National Graduate Physics Examination (NGPE).

Prof. H. C. Verma, the coordinator of the National Anveshika Network of India joined the program and he remained connected throughout the program. He motivated the students to enjoy physics by feeling it in every walk of life and ' learning by doing '. Mrs. Archana Singh gave a pleasant vote of thanks.

Mrs. Archana Singh
Programme Coordinator

Report (Annual Convention)

35th IAPT Annual Convention 2020-2021
And
National seminar on
"Innovation in Physics Teaching and Research" IPTR-2020-21.

November 28-30, 2021

Venue: SVVV Campus, Indore-Ujjain road Indore (M.P.)

Participants: 150 from all over India

Convention convener: Dr. Uttam Sharma,Head, Department of Physics, SVVV , Indore

Convention convener: Dr. Amit Saxena, Department of Physics, SVVV , Indore

The thirty fifth IAPT Annual Convention 2020-21 and National Seminar on "Innovation in Physics Teaching and Research" was jointly organized by Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore and IAPT-RC-09, with the financial support from shri Vaishnav Vidyapeeth Trust Indore and IAPT. Normally The IAPT convention is of three days but due to covid epidemic it was confined to two days, November 29 & 30, 2021. The EC Meeting was heldon 28/11/2021. As IAPT is celebrating the year 2021 as birth centenary year of great visionary late Dr. D.P. Khandelwal, this convention & seminar was dedicated to him.

The present seminar aimed at providing the post graduate, young researchers and faculty members from various academic and research organization all over the country, an opportunity to familiarize themselves with various aspects of innovation in physics teaching and research and interact with the Leading scientists, professors of the country working in appropriate area. It also provided the participants a new impetus and direction for enhancing their teaching and research capabilities. The fields covered in this seminar included, use of artificial intelligence and information technology, online physics teaching and learning, physics teaching through assignment and simulation technique, designing experiments for different levels, blending mode of learning and flip classroom and history of physics integrated in to classroom teaching.

The convention and seminar began on 29/11/2021 with inaugural ceremony at 10:00 a.m. in the auditorium of SVVV Indore, by lighting the lamp and Sarasvati Vandana. Convener Dr. Uttam Sharma welcomed all the guests and participants on the Dias and off the Dias, IAPT fraternity and invites. He also spoke about IPTR-21 and its genesis objective in brief.

Professor K.N. Joshipura, General Secretary talked about the IAPT activities in his welcome address. Professor Upinder Dhar, Vice-Chancellor of SVVV, Indore introduced Shri Vaishnav Vidyapeeth Vishwavidyalaya as one of the leading private universities of M.P. The Vishwavidyalaya provides excellent teaching learning resources and the right kind of co-curricular and extracurricular activities for developing leaders of tomorrow. Professor Vijay Singh, President of IAPT gave in detail the theme of the convention and seminar. Shri Purshottam Das Pasari Hon'ble Chancellor SVVV, Indore, who presidedover the ceremony, spoken on the basic objective and role of Shri Vaishnav Vidyapeeth Trust Indore.

The NGPE and IAPT DinbandhuSahu Awards for the year 2020 & 21 were given by the chief guest Dr. S.V. Nakhe, Director RRCAT, Indore to all the winners. Dr. Pius Angustine and Dr. Suchetana Chatterjee were givenDinbandhuSahu award.

Senior life members of IAPT, Professor S.B. Welankar, Professor M.L. Oglapurkar , Professor

U.S. Kushwaha and Padma Shri Professor H C Verma were felicitated by the chief guest Dr. S.V. Nakhe.

The **SOUVENIR** (Pre conference proceeding), **PragamiTarang** magazine and a book Physics of the Cities of India was also released by the all dignitaries present on the dais. Book on **Physics of Cities of India** is written by Dr. Vijay Singh and Dr. Himanshu Pandey.

The chief guest Dr. S.V. Nakhein his addresses spoke on the importance of Physics and the practical way of teaching in classroom. He shared some of his school days experience in Physics. He complimented IAPT for organizing such convention regularly Dr. Nakhe invited all the delegates and IAPT members for research and academic support and collaboration with RRCAT Indore. Vote of thanks were given by Dr. P.K. Dubey National EC member and Shri Kamalnarayan Ji Bhuradiya Honorary Secretary, Shri Vaishnav Vidyapeeth Trust, Indore. The program was conducted by Dr. Uttam Sharma.

The technical session-1 started after tea break. Dr. D.P. Khandelwal Memorial lecture was given by acclaimed researcher in the area of quantum optoelectronic, Professor J.T. Andrews of Shri G.S. Institute of technology and science Indore on the topic "Modern Physics tools and teaching applied to traditional medicine diagnostics". He discussed in details the Nadipareekshan and primary diagnostic tools in Ayurveda. He tried to explain Physics of vata, pitta and kapha pulse using appropriate filters; these three pulses are separated and digitized at seven levels. Dr. Andrew discussed at length the results obtained by him.

The second Dr. D.P. Khandelwal memorial lecture was given by Professor Vijay Singh on the SAGA of the Indian Science Olympiad. He discussed in detail all the information with respect to Olympiad examination, participants, accompanying faculty and the medal won by the India till date. Third talk in this session given by Dr. Pius Angustin, IAPT DSM award winner. He shared his experience with IAPT over the period of 5 years. He also discussed his achievements and plans. Fourth talk was prerecorded video of Dr. Suchetana Chatterjee, DSM award winner, was shown in her absence.

In the technical session – 2,(2:00 pm onwards) the first invited talk was given by Professor M.S. Jogad on the topic. "Teaching Physics through assignment/Innovative methods for teaching through simulation. Dr. Jogad discussed in his talk the concept of assignment given to the student at length. If computational facilities are available then simulation technique is useful. The second invited talk was given by Dr. Praveen Pathak on "Experiment using a smart phone. He discussed in detail the use of smartphone in teaching. One can record the variables with sensor available in smartphone. We can measure frequency, magnetic field, acceleration etc. with minimum tools at home.

The third invited talk was by Professor P.D. Lele on "TLM on digitization and its application" in his absence Mr. Divansh Desai presented it. Parallel session was organized in IBM Lab (2:00 pm onwards) and ten oral papers were presented.

The annual general Body Meting (AGM) was held in main auditorium of SVVV from 4pm to 7pm. After AGM, a cultural show by the students of SVVV was organized which was enjoyed by all the delegates.

On 30/11/2021 technical session-3 began at 10:00am. The first invited talk in the session was delivered by Professor Rajesh Kumar. He emphasized that if we use poems and stories at lower school level then we can make science more popular among students. The second invited talk in this session was on the topic "Integrating history of physics in to classroom teaching" by Professor G.Venkatesh. In his address he discussed if we describe the historical development of the topic before it is actually taught would be useful and motivational to the students. Dr.

Venktesh made his talk interesting by giving examples.Padmashri Professor H.C. Verma gave very interesting third invited talk by floating three puzzles to the audience. Professor S.K. Joshi gave away awards to the winners of national competition of essay writing in physics. Parallel sessions were organized for oral and poster presentation in the morning session. Number of oral and poster presentation were 10 and 25 respectively.

In the end, after lunch **ValedictoryFunction** was at 2:00 pm in which resource persons and participants shared their views regarding the success and fruitfulness of this seminar. The chief guest of the function was Dr. Vasant G. Sathe, Centre Director UGC-DAE Consortium for Scientific Research Indore.

Professor Vijay Singh in his valedictory address expressed his views regarding the success of convention. Padmashri H.C. Verma presented his report about NAEST & NANI awards, Professor Rekha Ghorpade declared the result of NCIEP and awards were given to winners.

The summary of the 35th Annual IAPT convention and National seminar was given by Dr. Uttam Sharma Secretary, RC – 09 and convener. In three technical sessions, 11 Invited talks were given along with 20 oral and 25 poster presentations.

The Chief guest Dr. V.G.Sathe in his address, talked about the facilities available at UGC-DAE-CSR Indore. He also spoke that in the hard time of epidemic, 150 participants are here in this seminar. It indicates the success of the convention and seminar.

At the end of the 35th Annual IAPT convention 2020-21 and National seminar on "Innovation in Physics Teaching and Research", vote of thanks was given by Dr. Dubey. He thanked Shri Vaishnav Vidyapeeth Vishwavidyalaya Indore for hosting the event, IAPT, all the delegates and committee members.

P.K. Dubey


IAPT CONVENTION 2020-21


XXXV ANNUAL IAPT CONVENTION 2020-21
&
NATIONAL SEMINAR
on
Innovations In Physics Teaching & Research (IPTR 2020-21)
November 28-30, 2021


XXXV ANNUAL IAPT CONVENTION 2020-21
&
NATIONAL SEMINAR
on

Report (Ammani Anveshika)

Magic of PI - a constructivist approach.

Organisers:

Agastya International Foundation

Workshop:
Online Constructivism workshop

Date & Time:
Jan 1, 2022 , 2-5 pm

Resource Person:
Sarmistha Sahu

School Teachers of AP:
23 participants

Soon after the introduction, we discussed what PI is, its definition, where it surfaces in Physics and Maths, and what's its importance and stories related to it. This itself boosted the participants to think independently and probe to find the answers. Activities were done to provoke the teachers to think and get the solution. The successive activities were built on the first, with progressing difficulty. Yet, the enthusiasm was rising exponentially. With simple channa-grains, circle, square and random throw of channa, they found the magic number PI without any standard formula! The complexity of experimental findings, the uncertainty involved, the statistical error, the large pollution, and many other concepts, became crystal clear.

Following the puzzle enlightened the group to think harder and device new activities to find PI. Simple as it sounds, gave an excellent homemade activity-quiz to 'count' the circumference and diameter and give the value of PI. An appropriate student centric exercise.

A step further to Monte Carlo simulation to determine PI withparallel lines separated by match-stick-distance and sticks cutting it. A novel pathway to find PI!

Teachers now had an idea how a challenging-facilitator can arouse the class. The very PI posed many more questions, leading to more and more revelations in this short session in 2022. The whole class was satisfied as well as the organisers of Agastya International Foundation.

Sarmistha Sahu

Report (Focus- Anveshika & RC-11)

Activity 1: Chekumuki Science Celebrations-2021

Duration: November 11th to 28th 2021
Venue: Zilla Parishad Conference Hall, Vizianagaram Dist.
Participants:16500 High School Students and 200 Teachers.
Organised by: Jana Vijnana Vedika, Vizianagaram
Catalyzed and supported by: Focus-Anveshika RC- 11
Resource Person: Dr. Joga Chandrasekhar Rao, HOD Physics, Govt. Degree College - Rajam, Srikakulam Dist.

The school level examination was successfully held in the district on November 11th as part of the step-by-step program of the Chekumuki Science Festival. The program was conducted in 194 schools in 28 mandals covering 4 towns in a total of 32 centers. 16500 students wrote the test. Nearly 200 teachers and all district committee members involved and assisted. There was widespread publicity in the media. DEO, PD SSA, MEO's, HM's, and all higher officials cooperated. In some places public representatives were also present. There was a definite division of work among those responsible persons in the district center. All the preparatory arrangements were easily completed by sharing the responsibilities of certain mandals each and following closely

Mandal level Program: It took place on November 23rd. The program was successful in 26 mandals and 4 towns. They were promoted directly to the district level as there was no competition in the 2 mandals. With the exception of Vizianagaram town, JVV literature could not be provided as prizes to the winners in the division. In the Parvathipuram division, however, the divisional officers were able to mobilize on the initiative of Satyam Naidu sir. It is commendable that some mandal authorities have shown their own initiative and carried out the mandal level program in an innovative and enthusiastic manner. It is a commendable development that all the members of the District Committee elected in charge of the various mandals at the District General Assembly held in August 2021 shouldered the mandal level program successfully.

District level Program: Though the time gap between mandal level and district level is very short, with the planning of the district leadership, the district level Chekumuki Science Festival was successfully held on November 28 at the Vizianagaram Zilla Parishad Auditorium. 50 teams from 30 centers participated in this event. 150 students, 50 teachers and parents attended. Vizianagaram Zilla Parishad Chairperson provided the Zilla Parishad Auditorium free of cost for the event and attended as the Chief Guest, and inaugurated the District Level Chekumuki Science Festival. Jana Vijnana Vedika Senior State Leader, Teacher MLC, PDF Floor Leader, Sri V. Bala Subrahmanyam started the post-lunch program and guided the students. Dr. J. Chandrasekhar Rao, Honorary President, Jana Vijnana Vedika

District, Secretary RC 11, State Coordinator FOCUS Anveshika, impressed the students by demonstrating simple science experiments such as wave motion, longitudinal and transverse waves, resonance, Bernoulli's theorem, rectilinear propagation of light, reflection, laws of reflection, types of lenses, refraction, total internal reflection and its applications, polarity of charges, photoelectric effect etc., Another Honorary President, RWS District Superintendent Engineer Sri K. Sivanand Kumar presented prizes to the winners. Sri Gandreti Srinivas and his cultural group sang progressive songs to cheer the students. Visakhapatnam District Social Worker Sri Nani conducted a film show on Scientific Thought. JVV literature worth Rs. 10,000 was presented to the participating students and district level winners at the district level. This event was presided over by MVN Venkata Rao, District President, Jana Vijnana Vedika and Vote of thanks by Sri P. Ramana Prabhat, District General Secretary.

Activity 2: Workshop on Innovative Experiments in Optics

Dated: 16th December 2021

Venue: Narayana School, VJNPB Branch, Vizianagaram.

Class: 9th and 10th class., **Students:** 163 **Teachers:** 06

Resource Persons: Dr. J. ChandraSekhar Rao, Head, Dept. of Physics, Govt. Degree College, Rajam, Srikakulam.

Smt. M. Prabhavathi Devi, Principal, inaugurated this program and motivated the students to face public exams and their daily life. Dr. J. ChandraSekhar Rao, demonstrated all the properties of light by showing the experiments such as Rectilinear propagation of light, Reflection, Laws of Reflection, Refraction, Total internal reflection, Real & Virtual Images, Propagation of parallel rays, Types of lenses, Focal length, Relation between focal length and radius of curvature, Ray diagram experiment for convex lens. All the students interestingly and enthusiastically participated and discussed typical topics in the chapter light. Sri LVNSS Dora sir and Deepthi madam assisted and supported the entire program. The authorities and all the staff members appreciated and expressed that the experimental techniques are very important to understand science.

J. Chandrasekhar Rao

Report (RC-4)

Innovative Physics Workshop

at Mitra- Anveshika, Lucknow

Mitra-Anveshika, Lucknow is situated at the residence of Dr.R.K. Mitra, former secretary, RC-4. One of the living rooms of his residence acts as Anveshika Lab. Since its inception, in 2010, it has been conducting various activities for popularizing Innovative Physics Experiments among the student community.When a workshop is organized then other parts of his residence like terrace,portico and balcony are also used to facilitate a good number of students to do hands-on experiments.

On 24thDecember 2021, a Physics Workshop (from 10 am to 2 pm with strict COVID-19 protocol) was organized at Mitra-Anveshika in the honour of Prof. H.C.Verma,the National Coordinator of National Anveshika Network of India,who has recently been conferred with a number of Prestigious Awards from Govt. of India, IIT Kharagpur and few years back from Government of Bihar.

Around 53 participants (43 students & 10 teachers of different schools) attended the four-hour long workshop.Rev. Bro.Mathew T,the Vice Principal of Montfort Inter College was the Chief Guest of the event. The workshop was basically organized for senior secondary (science group) students.The schedule was divided into 4 parts,

1) Visit to the Exhibits of Anveshika by the teachers and Students in small group of eight to ten person at a time (it took around 1 hour)
2) Hands-on experiments by students of class 11 & 12 separately at different locations like balcony,terrace & other rooms of Dr.Mitra's residence (it took around 2 hours)
3) An online Google Meet gathering was organized with Prof.Verma. It was indeed the most interesting part of the workshop,where the students and some teachers directly interacted with Prof. Verma.It was around a 30-40 min program.
4) Each of the participants including the visiting teachers received the Participation Certificates from our Chief Guest Rev.Bro. Mathew.T

In the above schedule,soon after the Inaugural Speech by the Chief Guest and subsequently briefing by Dr.Mitra about the workshop,the video meeting with Prof Verma started. After that, the Chief Guest distributed the Certificates, and then only,the other activities took place in a very systematic manner despite the shortage of space; it was managed meticulously and highly appreciated by all the participants and visitors. Even during evening time (between 5.30 pm to 8.30 pm) a number of other students and their parents visited the lab after getting the feedback from the workshop participants.

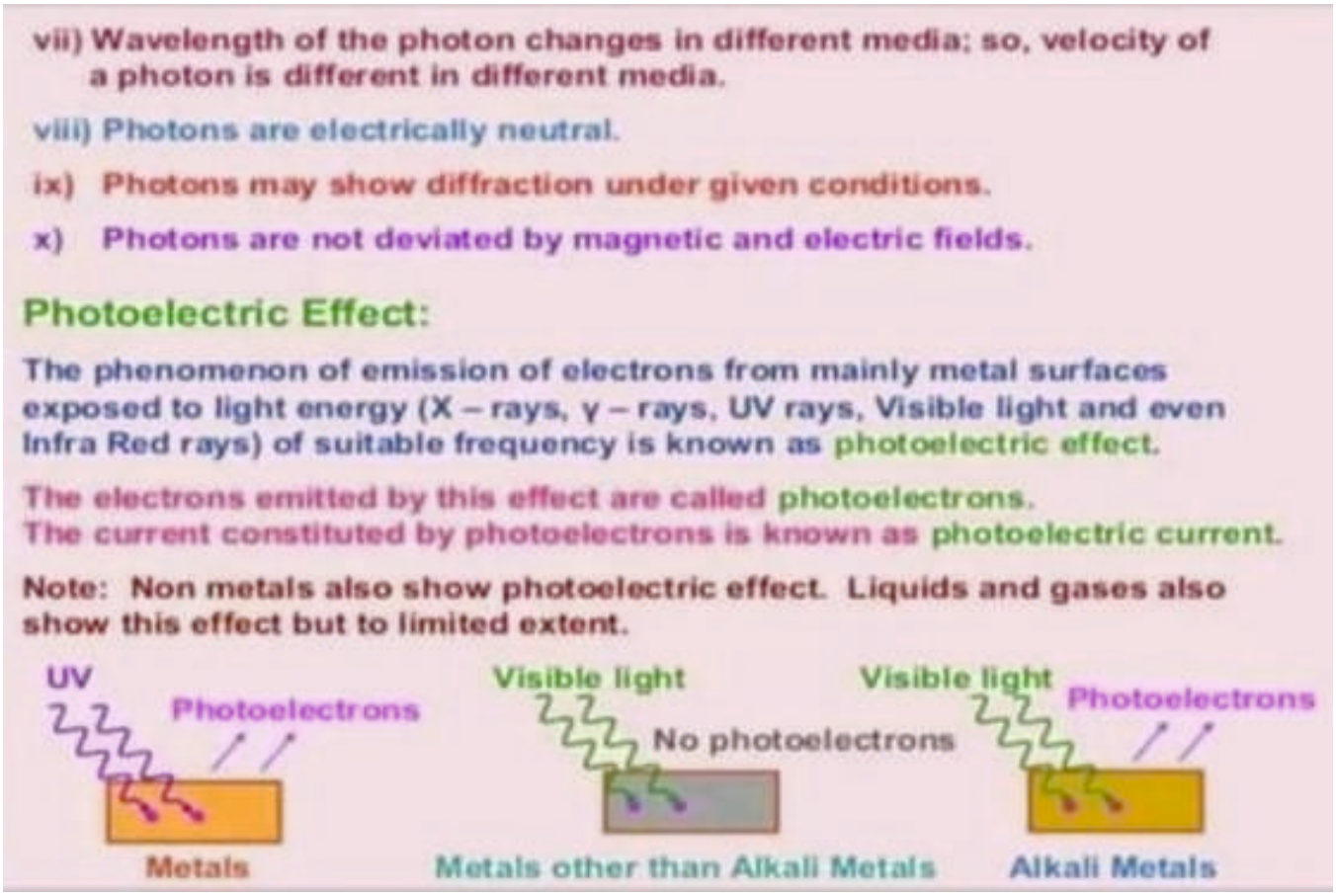
Akhilesh Tiwari

Report (RC-12)

Webinar on Photoelectric Effect in connection with 100 years of Nobel prize for Photoelectric Effect

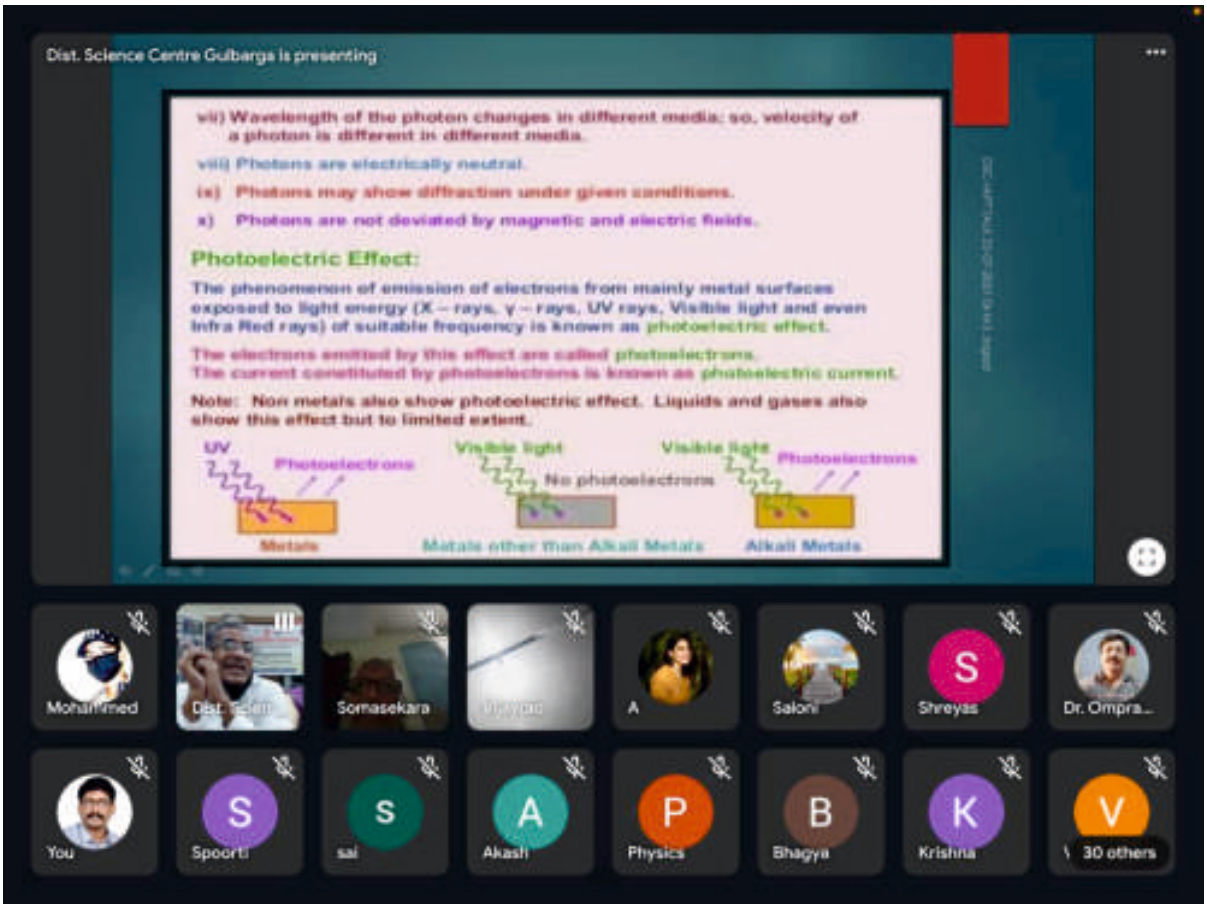
RC-12 (Karnataka) organized on 22-07-2021, online talk on photo electric effect in view of Nobel Prize to Albert Einstein for his work on Photo electric effect. More than 100 teachers and students attended the webinar. Technical support was given by "District Science center, National Council of Science Museums, Ministry of Culture, Govt. of India, Kalaburagi".

Resource person Dr. M. S. Jogad, Professor of Physics (Hon.) SSSUHE, Kalaburagi, delivered the talk. Many teachers – Dr. S. Somashekar, Dr. S. M. Khened, Dr G. Venkatesh, Prof. Raghvendra Fathepur, Dr. K. Ramakrishna, Dr. L. A. Udachan, Dr. Om Prakash, Prof Aravinda Dyama and Prof. V. T. Deshapande and Prof. Padamanavara, participated in discussion and answered many queries of students and young teachers.



Sri C. N. Laxminaryan welcomed, Dr L. A. Udachan introduced the speaker and Dr S. M. Khened proposed the vote of thanks.

L. A. Udachan



REPORT

Report (RC-12)

Webinar on
Data Acquisition and Validation in Industrial Internet of Things (IIoT) Application and New Education policy(NEP) 2020

A one day webinar was organized on 22-08-2021 at 5 pm, in an online mode by IAPT RC-12 (Karanataka) in association with District Science center, National Council of Science Museums, Ministry of Culture, Govt of India , Kalaburagi.

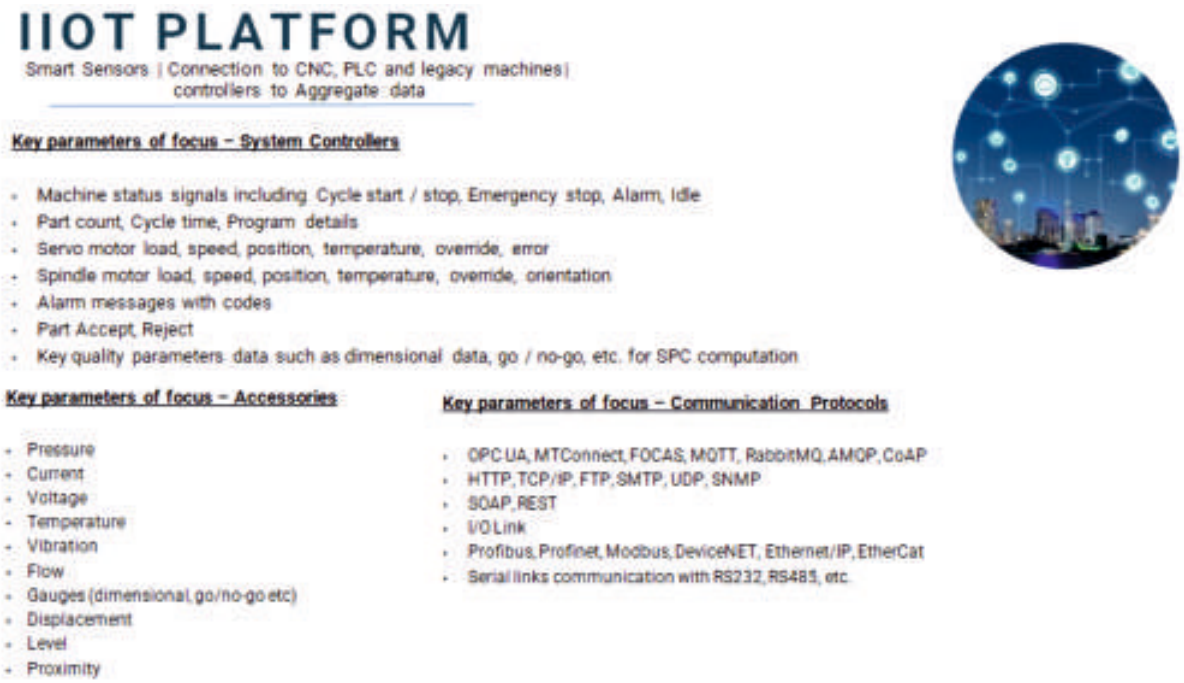
More than 50 faculty members and 20 students across the state participated.

1:Data Acquisition and Validation in Industrial Internet of Things (IIoT) Application by Er Panchakasharayya Hiremath, Co-Founder and Technical Director Electrono Solutions Pvt Ltd., Bengaluru

What is IIoT?

The industrial Internet of Things (IIoT) connects your people, products, and processes to power digital transformation. Using industrial IoT platforms, companies connect, monitor, analyze, and act on data in new ways.

You can start fast with digital transformation, using IoT for strategic pilots, while easily scaling solutions to reshape your organization. Leaders depend on the industrial IoT from how they design, manufacture, and service products, to how they create value and engage with customers.



DATA AGGREGATION

Data aggregation is **the process of gathering data and presenting it in a summarized format**. The data may be gathered from multiple data sources with the intent of combining these data sources into a summary for data analysis

DATA VALIDATION

Data validation is the process of ensuring data has undergone data cleansing to ensure they have, that is, that they are both correct and useful. It uses routines, often called "validation rules", "validation constraints", or "check routines", that check for correctness, meaningfulness, and security of data that are input to the system.

This process is to avoid **Garbage In & Garbage Out** & provide required information for Decision Makers

2. New Education policy(NEP) 2020- by Dr M S Jogad, Prof of Physics, SSSUHE, and EC Member IAPT

Karnataka State is the first State that implemented NEP 2020 from 2021-22. Education minister Dr C Ashwath Narayan, Prof Timmegouda, Prof S M Shivaprasad and other Committee members, and Vice Chancellor of different Universities of state reformulated curriculum as per the NEP.

Prof S M Shivaprasad mentioned during meeting- Spirit of New Education Policy 2020, not only about adjusting credits and giving ample choices, but also about what happens in the classrooms and beyond them. It is not about 'covering' the syllabus but enhanced learning. Our pedagogy should address the attainment of the defined 'graduate attributes'.

The success of the new education policy depends on how we change our pedagogical practices by introducing more activity based and research based learning in the undergraduate courses.

To accommodate some pedagogical activity based learning in class room requires imagination and creativity of teachers but it is not difficult if they put a thought in it. The activity should be designed that it realized outcomes such as content competency, concept clarity, hands on skill activity, confidence building, communication and presentation skill working in teams etc.

New education policy strongly desires that the 'thinking ability' of students be nurtured along with their remembering and understanding abilities.

Lot of discussion of undergraduate physics curriculum took place and outcome of this discussion is submitted to Director of Higher Education to incorporate this.

Sri C N Laxminaryan, District science center officer welcomed, and introduced the speaker and Dr S M Khened proposed vote of thanks.

M S Jogad

REPORT

Report (RC-02)

Webinar

Environmental Radioactivity

YouTube Link: https://youtu.be/vL47Rz7ppC0

Schedule: 11:00AM-1:00PMon 21/01/2022

Sponsored by : DBT Star College Scheme for the Dept. of Physics, DAV College Bathinda

Activity Incharge : Dr Gurpreet Singh.

Registration : 68 Coordinator: Dr. Kulwinder Singh Mann

The resource person, Dr. RohitMehra, Associate Professor,Department of Physics, Dr B R Ambedkar NIT, Jalandhar, elucidated the basics of nuclear-radiations and their effects on living beings. He explained the various instruments and their working principles used to measure the concentrations of Radon, Uranium, and natural radionuclides in water, air, and soil samples. He also described the permissible limits of radionuclides prescribed by various health and environmental protection agencies. He pointed out that the groundwater quality in the Malwa region of Punjab is on the higher side of the permissible limits. Students and faculty members actively participated in the interactive session. Various topics, like fully ventilated rooms, to minimize the Indoor radioactivity concentration, modified water purification system in removing the Uranium, and suggestion to shift on Nuclear-Reactors for the power generation, to avoid the fly ashrelated health problems were discussed. Dr. Mehra suggested many UG level research projects and spoke about, various placement options after doing PhD in Nuclear Radiation Physics.He invited all participants to use various state of the art research and analysis facilities available at NIT, Jalandhar.

The webinar was very interesting and useful to achieve the basic objective of the DBT star college scheme that is to inculcate the research interest in the UG Science students.Dr.Kulwinder Singh Mann, gave a brief introduction about DBT star college scheme's objectives. Dr. Gurpreet Singh, Head of the Physics Department, introduced the expert. Principal Dr Rajeev Kumar Sharma welcomed the expert, faculty members and studentsfrom various institutions. The Google meet and YouTube links were created by Ms. Harpreet Kaur Brar. Dr. Vikas Duggal proposed the vote of thanks.

Kulwinder Singh

Report (RC-03)

Online Faculty Development Programme (FDP)
on
Model Based Simulations in Classical Physics Using XCOS

As a part of the centenary celebrations of Dr. D. P. Kandelwal, founder president of IAPT, Department of Physics and Astronomical Sciences, Central University of Himachal Pradesh (CUHP) and RC-03 jointly organized an Online Faculty Development Programme (FDP) from 15th to 21st November, 2021on the topic Model Based Simulations in Classical Physics using XCOS.

Prof. OSKS Sastri from CUHP and Dr Pawan Kumar from IAPT were respectively convener and organizing secretary of the program.

The program started on 15th Nov at 3pm with ved mantra chanting and created a learning environment in best Indian traditions. Prof OSKS Sastri introduced the keynote speaker Prof P. K. Ahluwalia, who spoke on "Developing Mathematical and Computational Thinking of Science Students: New Education Policy Paradigm". Prof. Ahluwalia stressed on developing computational thinking by elucidating on the various steps that lead to it with many examples. The vote of Thanks was presented by Dr Pawan Kumar, organising secretary of the program.

Next day, Prof Sastri discussed Simulation Methodology and applied it to study of simple harmonic oscillator (SHO) with its implementation in XCOS. He started with the basic idea of solving differential equations using XCOS and discussed all the fine details of XCOS like picking desired blocks from palette browser and connecting them, setting parameters in various blocks and their significance.

First session on second day of the program on 17th Nov was taken by Dr Pawan Kumar. He extended the SHO by introducing a damping term and discussed various cases such as under-damped, critically damped and over-damped oscillators in his presentation. The second presentation on the day was by Dr Sapna Sharma from St Bede's College Shimla and she introduced the Forced oscillator by adding a sine wave generator to the block diagram of DHO and introduced the ideas of how to take the data to scilab console for further processing to obtain the resonance curves.

On the third day Prof . C. Nagaraja Kumar, Punjab University talked on "Introduction to Chaos and Non-linear Systems". While it served as an introductory lecture on understanding the ideas of chaos to a beginner, the second lecture of the day by Dr. Vikram Sagar from Goswami Ganesh Dutta Sanatan Dharma College, Chandigarh on Lorentz Attractor elucidated its practical realization in XCOS. On 5th day of FDP, 19th Nov, the first presentation was on Solving Coupled Oscillator by Sapna Verma, RKMV College, Shimla. It was a very comprehensive lecture which used all the techniques and methods developed and discussed during the previous days of FDP and the second was on "Solving the Central Field Potential Problem" by Prof. O.S.K.S. Sastri. This lecture took the usage of XCOS to basic problems of Newton's law of gravitation. It showed how the shape of Earth's orbit changes for various values of n in GMm/r^n like 1.9 and 2.001 and 2. Participants realized as to why n=2 is a must for the stability of Earth, to orbit around the Sun. At the end of the FDP , vote of thanks was given by Dr Pawan Kumar. In this FDP, doing assignments was necessary for getting certificate. The participants worked on their assigned projects on 20th November and on 21st November at 11: 30 am, Project Presentations by various participants were held. While Dr. Vandana Luthra, Gargi College, New Delhi has shown how XCOS models could be converted into Scilab programs with ease, Dr Deepak More from Mumbai gave an excellent presentation on how to apply the XCOS models to electrical circuit simulation.

Pawan Kumar

Report (RC-06)

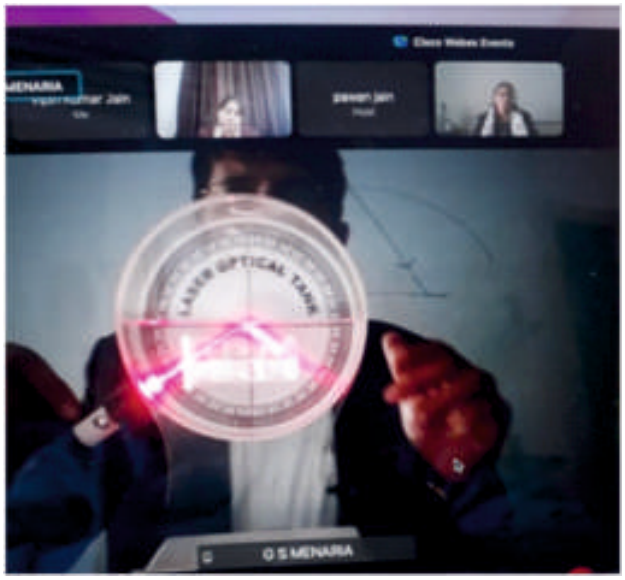
Workshop: 1 Physics Concepts – Seeing is believing

Organized by: Department of computer engineering & Department of first year Poornima College of Engineering, Jaipur
Venue: Auditorium Poornima University
Date : 15 December 2021, 1 pm onwards
Number of Participants: 250 +

The workshop was organized for the first-year students on 15 December, 2021. The workshop started with the welcome of the guest Prof. G. S. Menaria by Director and Principal Prof. (Dr.) Mahesh M. Bundele. Prof. G. S. Menaria demonstrated many physics concepts practically with innovative instruments to explain topics like centrifugal force, Electromagnetic force, Light reflection, Force of Gravity, Faraday's Laws of Electromagnetic Induction and many more topics in the same innovative way.

Dr. Rekha Nair, Dean first year department, Dr. Surendra Kumar Yadav Professor and Head of computer engineering department, workshop coordinator Mr. Manish Dubey, Deputy Head Computer Engineering department and workshop coordinator Mr. Manish Choubisa, Assistant Professor, Computer Engineering Department and student volunteers organized this workshop very efficiently. Around 250 students enhanced their knowledge in Physics through this workshop.

Workshop-1



Workshop-1 2

Workshop : 2 'learning physics through simulation and experiment' (LPSE 2021)

Organized by: Department of physics, Swami Keshvanand institute of technology (SKIT), Jaipur on Webex platform.
Time& date: 2 Pm onwards on December 8, 2021
Participants: 200 +
Topic: Optics & Electromagnetism

Resource person: G.S. Menaria (Regional coordinator Anveshika)

In association with IAPT, Department of physics at SKIT Jaipur organized a five day kphysics workshop. The aim of this workshop was to introduce the effectiveness of scientific measurement while developing a conceptual understanding of measurement and uncertainty. The workshop created practical skill as well as their views on applying the virtual experiment in general physics lab.

On the third day of LPSE, taking optics and electromagnetism as central topics, Dr Menaria demonstrated about 15 activities. The session was interactive& responsive. Dr. Menaria motivated the students to spent maximum time in the laboratory. During the workshop, Associate professor Dr. Komal Sharma, Dr. Manasvi dixit, Dr. Pawan Jain, Dr. Rajeev Kumar & Dr. Vivek Vijay were also present

The workshop was coordinated by Prof. Rishi Vyas. The workshop concluded with a vote of thanks by Dr. Braj Raj Sharma, Head department of physics.

Workshop : 3 The fun of doing experiments.

Organized by: Department of physics, AGRWAL PG College, Jaipur, Rajasthan
Venue: conference hall APGC
Date: Saturday, December 18, 2021
Time: 11:30 am onwards
Participants: 300 +

In association with ANVESHIKA Jaipur the department of physics AGRWAL PG College, Jaipur organized a one day physics workshop "Anveshika" based on fun of doing experiment. The college student & faculty members accorded a warm welcome to the resource person Prof. G.S. Menaria. The program started with the inaugural address by Dr. P.S. Rathore the principal of the college. Dr. Meenal Bafana, Head Department of physics delivered a talk on significance of experiment learning in physics.

Dr. Menaria motivated student to give more stress on learning by doing in their laboratories. Looking into various concepts of mechanics, optics & electromagnetism through demonstration was really an awesome experience for the students. The workshop was highly interactive and responsive.

The event was coordinated by Dr. Manjari Gupta, Student coordinator Dr. Neha Garg,Naman Mathur and many faculty members were present. Vote of thanks was given by organizing secretary Dr. Ankit Gupta

G S Menaria

Report (RC-15)

Online Workshop On

Undergraduate Physics Experiments

Organized by: Department of Physics, Victoria Institution (College), Kolkata and RC-15

Educational system has suffered enormously during the pandemic. Practical based subjects have suffered the most as experiments can hardly be done in online mode. In order to partly compensate this loss, a three-day **Online** workshop was held on 27th , 28th Nov & 2nd Dec, 2021. Resource persons delivered online talks on several experiments at the undergraduate 1st and 2nd year levels with demonstrations and videos. Even the 3rd semester students did not find any opportunity to do any practical in laboratory in their first year. So, we thought it was very important to impart some basic ideas of practicals for these students in online mode so that they could do some interesting work when they are confined to their homes. The experiments were so designed that **the students could perform them using simple and easily available equipments even at their home.**

This Online Workshop was dedicated to the memory of Late Prof. D. P. Khandelwal, Founder of IAPT.

The workshop started with a brief inaugural ceremony. Welcome address was delivered by Dr. Pratibha Pal, Associate Prof, Dept. of Physics, VIC which was followed by an introduction of IAPT by Dr. Bhupati Chakrabarti. The motivation for organizing this workshop was highlighted by Dr. Surajit Chakrabarti, a senior member of IAPT.

Dr. Bhupati Chakrabarti, Ex-Professor, City College, Kolkata and former General Secretary of IAPT, was the resource person of the first technical session. He discussed how to determine the Young's Modulus of a long wooden ruler in the form of cantilever by the method of its free end oscillation and also how to verify Newton's Law of cooling by measuring the heat loss by a glass of water using a digital thermometer.

This was followed by the demonstration by Mr. Soumen Sarkar, Assistant Teacher of Physics, Karui P.C. High School, Hooghly, WB on the measurement of the focal length of a biconvex lens, focal length of a concave lens by the method of combination. The students were instructed to use the torch of a mobile phone as a source of light. He then explained how to find the refractive index of water kept in a bucket with a plastic ruler immersed in it. The very important idea of parallax was explained with a video demonstration by Dr. Surajit Chakrabarti, Ex-Professor, Maharaja Manindra Chandra College. He also enlightened the participants on the measurement of the focal length of an equiconvex lens and its radius of curvature using the lens as a concave mirror without the use of a spherometer, in the last technical session of day 1. [Ref.1]

Speaker of second day's first technical session was Dr. Makhan Lal Nanda Goswami, Associate Professor of Physics, Midnapore College, Medinipur. His lecture was on the measurement of horizontal component of earth's magnetic field and magnetic moment of a bar magnet using a magnetic needle. He thus replaced a bulky magnetometer so that the experiment could be done at home.

Then Dr. Surajit Chakrabarti explained how to measure the velocity of sound by the method of resonant air column in a 250 ml semi-transparent measuring cylinder partially filled with water. He used the source of sound from the PHYPHOX app. The students were instructed to download the app. for free in a smart phone.

Dr. Makhan Lal Nanda Goswami then explained how the traditional potentiometric and meter bridge experiments

could be easily performed from home replacing the potentiometer by a handy small 10 turn 100-ohm pot. The theoretical basis of a potentiometer was explained by Dr. Surajit Chakrabarti. Final technical session of Day 2 was on home experiments using thermistor. Resource person was Mr. Deep Narayan Ghosh, Assistant Teacher of Physics, Vidyasagar Shishu Niketan, H.S. school, Medinipur.

The third and the final day of the online workshop started with demonstrations by Mr. Sanjoy Kumar Pal, an Assistant Teacher of Physics, Anandapur H.S. School, Paschim Medinipur on the study of charging and discharging of a capacitor through a resistor. His idea of using the mobile phone charging adaptor instead of a conventional dc power source was quite interesting.

The last technical session of this workshop was a presentation by Dr. Syed Minhaz Hossain, Associate Professor at the Department of Physics, IIEST, Shibpur. His topic was explanation of the principles of Light Emitting Diode using band diagram: I-V characteristics and emission spectra and finally the method of determining Planck's constant [Ref.2] which got much admiration from the students.

A small kit which contained lenses, measuring cylinder, bar magnets along with a magnetic needle, one digital thermometer, one multi turn pot, few resistances, capacitances etc. were provided by IAPT, RC15 to the 1st and 3rd Sem. Physics Hons. students of VIC so that they could carry out most of these experiments at home.

About 50 students participated in this workshop from various colleges of West Bengal as well as from other states of India. Most of them responded positively and are showing interest in carrying out the experiments at home. A post workshop discussion WhatsApp group has been created where the students are posting their results and communicating with the resource persons. It is very heartening to find students performing the experiments from home even after a month of the formal presentations. There is a plan for a follow up program, where the students will give short presentations on their experiences of performing the experiments at home.

Faculty members of the Dept. of Physics, VIC conveyed their sincere thanks towards the resource persons, who took this challenging job of designing these experiments and demonstrating them online. They were also thankful to the members of IAPT, RC 15 for providing the experimental kits.

Dr. Nibedita Chakrabarti , Principal. VIC and Prof. Gour Prasad Das, President, IAPT, RC15 and Distinguished Visiting Faculty, Department of Physics, St Xavier's College, Kolkata were the patrons of this workshop.

Dr. Surajit Chakrabarti and Dr. Shinjinee Das Gupta, HOD, Dept. of Physics, VIC were the convenor and co-convenor of this online workshop respectively. Technical support was provided by Smt. Kathakali Biswas, SACT, Dept. of Physics, VIC. Dr. Gayatri Pal, Smt. Swarnalekha Bandyopadhaya senior teachers in the Dept. of Physics, VIC and the members of IAPT RC 15 provided the crucial support for this endeavour. The concluding remarks were given by the President, RC15 Prof. G.P. Das and the vote of thanks was given by Dr. Subhendu Chandra, Assistant Prof., Dept. of Physics, VIC.

Following the joint efforts of our colleagues from VIC and the members of IAPT RC15, the summary of the various user feedback could be collated almost instantaneously, and a representative report is illustrated below. The feedback form was prepared by Dr. Shinjinee Das Gupta and Dr. Chinmoy Kumar Ghosh, a senior member of IAPT.

The whole programme was conducted online by Dr. Shinjinee Das Gupta.

[Ref.1] Soumen Sarkar, and Surajit Chakrabarti, Physics Education (IOPscience): 57 (issue 1), 015004 (January, 2022)

[Ref.2] Roger Morehouse, American Journal of Physics, 66, 12 (1998)

Shinjinee Das Gupta
Surajit Chakrabarti

INDIAN ASSOCIATION OF PHYSICS TEACHERS

(Registered under Section XXI of Societies Act 1860, Regd. No. K 1448)

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The Story of Cosmology through Postal Stamps- 13

REVIVAL OF ASTRONOMY

TYCHO BRAHE (1546-1601)

A Danish nobleman, astronomer and writer, he was described as -***First competent mind in modern astronomy to feel ardently the passion for exact empirical facts.*** He was a good example of admirer of Copernican achievement, but unable to accept the motion of the earth and proposed an alternative theory in which moon and the Sun revolve around the earth but other planet revolve around moving Sun (Tychonic System)

He was the last of the major ***necked eye astronomer***, who wert using telescope for celestial observations.

Tycho Brahe (with his nose made of brass) known for his accurate and comprehensive astronomical observations,

Uraniborg observatory, Copenhagen (a hand painted, copper plated engraving)

Sextant, used by Tycho Brahe in Prague, made by Habermel, a mechanics of Prague

Tycho Brahe was the first astronomer to observe and record Supernova, in Constellation Cassiopeia in 11 Nov.1572

The armillary sphere used by Brahe

Brahe observed the Great Comet of 1577 and was first to realize that its tail always points away from the sun

Large size instrument-Major Quadrant, used by Brahe for observations

Kepler was his Pupil and Assistant in the final years of Tycho's life in Prague and inherited all the observations documented by Tycho

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FOUNDED BY (LATE) DR. D.P. KHANDELWAL

VOLUME 14 NUMBER 02 FEBRUARY 2022

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Dr. Sanjay Kr. Sharma

Managing Editor

Flat No. 206, Adarsh Complex,

Awas Vikas-1, Keshavpuram, Kalyanpur, Kanpur-208017

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