



LIGHT

the official

NEWSLETTER

of the indian society of lighting engineers

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FROM THE PRESIDENT'S DESK

Though ISLE has been affiliated to several international bodies for many years now, our members have not always taken an active role in their activities. In 2013 we will have an opportunity to renew and enhance our connections with at least two of these affiliates. The 7th Lux Pacifica is being held in March in Bangkok and the CIE Centenary conference in April in Vienna. There will be some papers from ISLE members at both these conferences and in addition it is expected that other members will attend. Contact information for both events can be found in this issue and I would urge members to attend these important international events.

The Light India exhibition organised by ELCOMA and Messe Frankfurt in October at Pragati Maidan was the largest lighting exhibition held in India so far and had a very impressive display of the latest technologies and products. The accompanying conference had a number of impressive presentations. The registration for this conference had been made complimentary for ISLE members. It is always worthwhile to take advantage of such opportunities to update one's technical knowledge and to network with a diverse range of lighting interests.

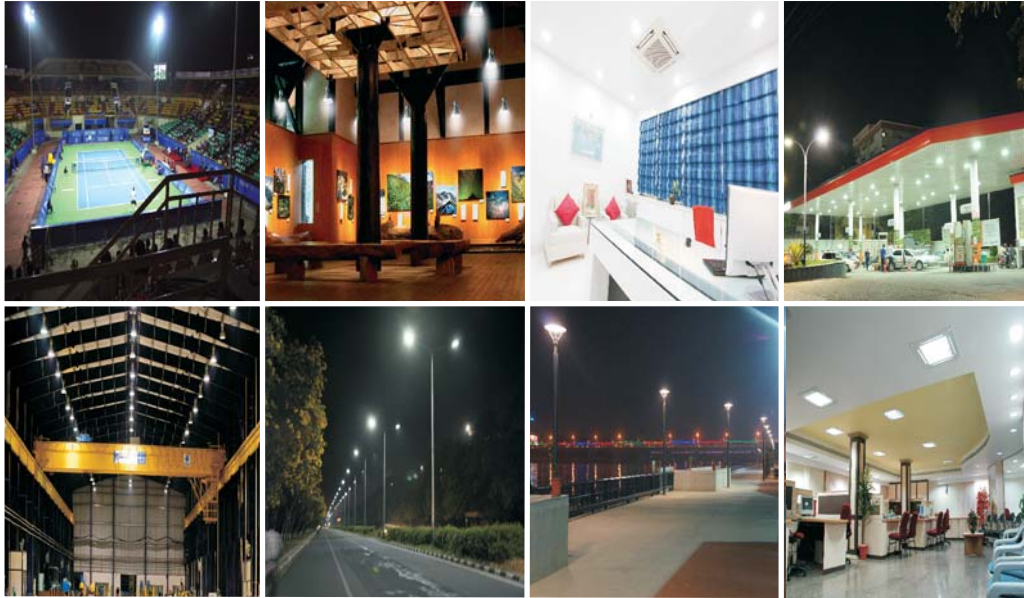
The last quarter also saw the launch of the ISLE LET diploma course at Mewar University at Chittorgarh. Once this course is established and running smoothly, it will be extended to other institutions. ISLE has always been committed to Education and we intend to take other steps in this direction.

The release of the 7th edition of the ISLE Directory has had a very positive reception and the feedback has encouraged us to make this into an annual publication. It has been said many times before but I would like to repeat that the level of success of this publication is dependent on the help we get from our members. I would like to make an appeal to all of you to help us make the



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Directory more inclusive with a greater number of entries in all categories and a larger number of advertisers.

The preparation of the roll of regular members has also been well received. We would very much appreciate feedback that would help us update and correct the data wherever necessary.

As always, I look forward to your help and corporation.

Gulshan Aghi
President
gaghi@ho.surya.in

EDITORIAL

It has been a busy and productive quarter and this issue brings you a number of reports on activities at all levels.

The breakfast meeting format for lectures and seminars that was initiated by MP State Centre (when it was still the Indore Local Centre) has been taken up first by Pune Local Centre and subsequently by Mumbai State Centre. There are a number of reports on these events are in this issue.

The Light India 2012 exhibition and conference organised by Elcoma in collaboration with Messe Frankfurt was an impressive and exciting event that caught the attention of lighting practitioners, users both large and small as well as decision makers in the government. A brief report and some photographs are carried in this issue.

As the President has said, the upcoming Lux Pacifica and the CIE Centenary Conference in early 2013 will be well worth attending. The huge amounts of information available on the internet notwithstanding, there is still much to be said for face to face interaction on such occasions to enrich one's professional experience. I would like to reinforce the President's message that ISLE members should attend these events and renew and maintain links with international organisations and experts in the field of lighting.

With the increasing ubiquity in LEDs in all areas of lighting discussion, we have reproduced from the 7th edition of the ISLE Directory published in October 2012, an article on the multiple issues involved in the use of LEDs for street lighting applications.

We are also publishing the lecture given by Ray Molony, Editor, Lux Review Magazine at the session on The Future at the Light India 2012 conference in which he identifies the 25 most important trends that will shape the future of lighting.

H.S. Mamak
Editor

ISLE ACTIVITY

New Lighting Education Course Launched by ISLE

The lighting industry in India is about 9500 Crores growing at the rate of 12% CAGR a year and is expected to maintain this growth rate over the next decade. The growth of this industry has been accelerated as a result of the development of infrastructure, expansion of the transport horizon, exponential growth of middle class income and the upsurge of the real estate boom across India. At the same time the lighting industry has undergone a huge transformation in terms of technology upgradation, new product innovation, creative lighting design and new areas of application. In addition to this there has been a strong demand for conservation of energy and the need to reduce the carbon foot print to combat climate change.

In India lighting alone consumes 18% of the energy generated and the demand is increasing by leaps and bounds.

A recent study suggests that by the end of next decade more than 50% of lighting use will move from conventional lights to LED based lighting systems because of its energy efficient performance, and hassle free maintenance.

In order to meet this kind of growth in demand the lighting industry in all sectors will need a large number of professionals trained in lighting to back up the industry in the domain of R&D, QC, Production, and Design and technology adaptation. At the same time, there is a growing demand by specifiers such as architects, consultants, and city planners for lighting professionals.

Responding to this urgent need, ISLE has initiated the process of establishing an internationally recognised education course in Lighting across India as an integral part of its mandate, by signing an MOU with the Lighting Education Trust (LET) UK to promote lighting education in India. To start with this course has been implemented in Mewar University, a UGC approved engineering education establishment in Chittorgarh, Rajasthan.

The Indian Society of Lighting Engineers (ISLE) was founded in 1984 and is the apex Non-Profit body of lighting in India. With a wide ranging membership of practitioners in different areas of lighting, the Society is actively engaged in the promotion of the Science, Technology and the Art of Lighting.

ISLE is run by a professional Governing Body comprising eminent technical lighting experts working in the illumination engineering field.

ISLE is actively engaged in promoting education in the field of lighting and conservation of energy.

ISLE is a member of CIE, the highest international technical body of the lighting fraternity and has several other international affiliations as well.

Lighting Education Trust (LET) U.K is a charitable trust established for the purpose of overseeing and assisting in the funding of lighting Education at all levels, to develop syllabuses and course content, to accredit courses and to advance the overall standards of lighting practice. LET has several committees for the purpose of accreditation, lighting design etc with participation from its members.

LET collaborates with the Bartlett School of Graduate Studies, University College London, where the MSc in Light and Lighting is Europe's principal specialist graduate lighting course.

Also LET introduced in 2000 the LET Diploma in Lighting, a distance learning course delivered in the UK on behalf of the LET by London South Bank University. Both programmes are running successfully.

ISLE (Indian Society of Lighting Engineers) is the exclusive representative of LET, U.K. in India.

ISLE's Plan to promote Lighting Education in India - Initially ISLE plans to tie up with one Institute and evaluate the operation optimisation and then extend the implementation of the course in other parts of India in a phased manner.

The emphasis is to find partners with a long term commitment in this area rather than to increase the number of tie ups.

Career prospects of Students: For students who have completed their B.Sc or B.E. - Trainee officer positions in areas of R&D or Design or Production or Sales & Marketing in lighting companies.

Course Structure

- Light and Seeing
- Light Sources (including daylight)
- Windows and Luminaires
- Light Management
- Lighting Design Criteria for Interior and Exterior Application
- Interior Lighting Design Methods
- Exterior Lighting Design Methods
- Road Lighting
- Lighting of Buildings
- Lighting for Sports

- Area Lighting
- Design Calculation
- Lighting Software

Workshops: ISLE will conduct 4 one day workshops in a year covering the following:

- Interior Lighting
- Day Lighting
- Exterior Lighting
- Luminaire Design

Examination

- The exam will consist of 2 papers.
- Paper 1: Fundamentals
- Paper 2 : Advanced Lighting with sections as follows:
 - Interior Lighting (Decorative and Commercial)
 - Exterior Lighting (Flood Lighting and Road Lighting)
 - Day Lighting
 - Luminaires (Photometry and Luminaire design) and Light Sources.

Exam and Qualifying Marks:

- Fundamental Paper :25
- Advanced Paper: 50
- Workshop: 25.
- Total :100
- Students should achieve an overall weighted pass marks in excess of 50% and MUST achieve a minimum pass mark of 30% in each section.
- Examination and Certification:

The examination will be conducted in collaboration with ISLE technical professional assistance to the institute in terms of Question Paper, Workshop assessment, marking and the final evolution through a process mutually agreed between ISLE and the Education Institution in line with the procedure laid down by LET (UK).

On 29th August 2012 the ISLE-LET diploma course was launched at the main campus of Mewar University in Chittorgarh followed by a technical seminar. The following presentations were made:

- Past, Present and Future of the Lighting Industry by Mr. S. Chakraborty, Senior Vice President, Surya Roshni Limited.
- Is Street Light Pedestrian Friendly and Energy Efficient? by Mr. Bhavani Prasad, former Director General CPWD.
- LED and Lighting Concepts by Mr. Ravi AV, General Manager, Nichia Chemicals Limited.



L to R: Messrs. Ram Chandra, Ashok Kumar Gadiya, Gulshan Aghi, S. Chakraborty and Bhavani Prasad

- Façade Lighting by Mr. Raja Mukherjee, Country Manager, Cooper Lighting Limited.
- International and Indian Lighting Standards by Mr. P.K. Mukherjee, former DDG of Bureau of Indian Standards
- Lighting - Wellness and Human Health by Mr. Sudesh Gupta, Consultant.
- Phasing in Energy Efficient Lighting by Mr. R. Suresh, General Manager, ELCOMA.

The seminar was highly appreciated with the attendance of 200 people. The course commenced on 3rd October 2012.

T.K. Chattopadhyay
General Manager
ISLE

Note: For further information on the course Contact:

Prof. Ram Chandra
Programme Coordinator
Mewar University
+91 9650400065
director_dde@mewaruniversity.org

KOLKATA STATE CENTRE

Technical Seminar

September 14, 2012, Kolkata

Kolkata State Centre organised a technical programme in collaboration with Mescab India (P) Ltd at Dr. B.R. Ambedkar Hall, Nizam Palace, Kolkata. Even though it was arranged at very short notice many of the Kolkata based members attended the programme.

Mr. Ashis Mukherjee on behalf of Mescab India and Mr. A.K. Das Chowdhury, Secretary, ISLE, Kolkata State Centre, welcomed all the members and guests present for the programme.

Mr. P.K. Modak made a brief presentation on Mescab and their products.

Mr. S.K. Roy Chowdhury, ISLE Fellow and former Chief Architect CPWD delivered an enchanting lecture on

'Heritage Building and Structure Illumination and it's effect on Art'. He also emphasised the connection between lighting and architecture saying that while Architects create, it is Light that brings life into their creations.

This was followed by a talk by ISLE Fellow, Mr. Onkar Mitra, on electrical fundamentals. He spoke mainly on wires and cables and the importance of correct selection for electrical systems.



In the concluding session, Mr. A.P. Joshi, Chief Engineer (Electrical), Eastern Region, CPWD and Chairman, ISLE, Kolkata State Centre made an illustrated presentation on "Monument Lighting". He used examples from his extensive work in this field over his long career with monuments like Kumbhalgarh Fort, Chitradurga Fort, Virupaksha Temple, Halibeedu Temple, Ajanta Caves, Amravati Maha Stupa etc. His presentation was greatly appreciated by all the participants.

The programme ended with high tea.

A.K. Das Chowdhury
Secretary
ISLE, Kolkata State Centre

MUMBAI STATE CENTRE

Breakfast with Light 2

July 29, 2012, Mumbai

Subject: Lighting Sensibilities

Speaker: Ar. Rohini Mani

Lighting evokes emotions in different ways and has a profound effect on the way people perceive and experience their environment. Individuals perceive lighting differently depending on the cultural sensitivities, individual taste and past experience. The need for lighting to blend with people's lives was brought out vividly through slides showing varied structures and locations which were well designed making optimal use of artificial and natural light. The importance of harnessing daylight for good health and energy efficiency was well presented.

Lecture at Father Agnel Engg. College

August 25, 2012, Mumbai

Subject: Illumination/Photometry/LED-Theory & Applications.

Speaker: Mr. K. Naveen, Sr. GM Bajaj Electricals

This programme was attended by around 70 students. Examples of current methods of lighting design and illumination of different areas were covered including measurement. New light sources specially LEDs and their applications were introduced to the students. A lively Q & A discussion followed with students giving examples of using LEDs in their projects.

Breakfast with Light 3

26th August 2012, Mumbai

Subject: Lighting: The New Destination of the Art of Designing

Speaker: Mr. Pramod Sawakare, Asst. Manager Lighting Design & Business Dev. Asian Retail Lighting

Lighting has progressed from just being of utility to being an important element of integrated environmental design and therefore factors like feelings, emotions, security, information, and above all, safe light sources have to be taken into consideration while designing for modern society. Use of new technologies like LEDs, Lasers, Fiber Optics, Induction Lamps can be harnessed to provide enhanced energy efficiency with lighting comfort.

The session was co-sponsored by Asian Retail Lighting.

Breakfast with Light 4

September 30, 2012

Subject: Automation and Lighting Control...Technology for Tomorrow

Speaker: Mr. Sudhir Kamat, Director, Raylogic Control Systems

The need for automation and its advantages in bringing lighting control at our finger tips along with energy efficiency was highlighted. Different light sources and their dimming techniques were illustrated. Protocols used for lighting control and their comparative advantages were explained. Need for interaction of the Architect with the Lighting consultant, right from the design stage for successful implementation of automation was expressed.

AGM

October 26, 2012, Mumbai

The 21st Annual General Meeting of the Indian Society of Lighting Engineers, Mumbai State Centre was held on Tuesday, 26th October, 2012 at 6.30 PM at the All India Institute of Local Self Government in Andheri (West) Mumbai.

The Chairman, Mr. Prakash.V. Mavinkurve welcomed all the members and announced the commencement of the AGM. Matters of the agenda were then taken up. The meeting had an enthusiastic participation by all the members who expressed their happiness at the introduction of the Breakfast meetings. Suggestions were received on conducting educational activities. The need for enrolling more Institutional members and funding of educational programs was discussed.

The meeting was followed by a by a Panel Discussion on Interface of Lighting in Control rooms / Sub-stations / Buildings / Commercial Complexes / Malls / Hospitals etc. with other services.

Participants:

Mr. Mukesh Mulchandani, (Panel Chairman) General Manager, Uhde India Ltd., Director, CEEAMA

Mr. Vinayak Sane, Principal Consultant, Elmark Engineers. President (Mumbai Chapter), Fire Safety Association of India

Mr. Bhavesh Mehta, Deputy General Manager, Reliance Industries

Mr. Aniket Mahajan, Manager, Sales and Marketing (Zone West) Intelligent Building Controls (KNX), ABB

Mr. Vijay Shigli, Manager, Electrical Marketing, Argos International

Mr. Mukesh Mulchandani opened the discussion by welcoming the participants. He started the ball rolling by expressing how lighting which occupies quite a bit of ceiling space has to also share the same with HVAC and other services making their physical parameters and electrical interface important.

Mr. Vinayak Sane expressed the need to maintain proper illumination along with the presence of other systems so that there is no physical obstruction and noise interference.

Mr. Bhavesh Mehta spoke on space occupied by various services specially air-conditioning and how the layout of lighting has to be integrated along with this system. In big malls, to attract customers, integration of all services in an orderly manner is of great importance.

Mr. Aniket Mahajan explained the use of control equipment with industry standard protocols which enable seamless integration of all services as well as ensuring smooth maintenance and sustainability.

Mr. Vijay Shigli said that with the variety of light sources, control-gear and protocols available the need for co-ordination between all agencies involved in the project arises right from the design stage. This can prevent costly mistakes due to mis-match in parameters like space, proximity etc. which can ruin the design.

The Panel discussion was followed by an interesting Q & A session where a number of queries from the audience were clarified.

Breakfast with Light 5

October 28, 2012

Subject: LED Lighting - The Changing Scenario

Speaker: Mr. Vijay Shigli, Manager Electrical Marketing, Argos International

LED lighting has been constantly evolving and improving in the last two years, faster than any other light source in history. Today LED's with an efficiency of 100 lm/w are available and the race is on to improve output giving rise to smaller and slimmer luminaires. A major factor to be considered is heat dissipation from the substrate which has given rise to new types of heat sinks for efficient heat dissipation, hence drivers are also being incorporated on the same board as the LED for dual advantage. Plastics too are playing a major role in the luminaire by creating uniform light output as well as providing heat extraction. All in all, an exciting scenario.

Stan Alvares
Hon. Secretary MSC

CHENNAI STATE CENTRE

Light Installation and Workshop

August 24 - September 2, 2012, Chennai



Lighting Installation

A 10-day Indo-German Urban Mela showcasing the potential of cooperation between India and Germany in areas including energy and sustainable development, was conducted from August 24 till September 2 at the YMCA College of Physical Education, Nandanam, Chennai. This event was a part of the celebration under the title: "Germany and India 2011-2012: Infinite Opportunities", commemorating 60 years of diplomatic relations between the two countries. It addressed the problem of urbanisation, wherein Germany offers great solutions to this universal problem and the German philosophy is to have a sustainable partnership between equals and forge a relationship with people, especially the young generation.

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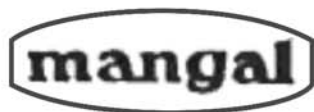
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One of the concurrent events in this Mela was "Shine a Light – Light Installation and Workshop". The event was organised by Chennai State Centre member Dr. Amardeep Dugar with the School of Architecture & Planning, Anna University and the Hindustan University with ISLE as the knowledge partner.

Members of the State Centre were individually addressed to attend the workshop and other events, enclosing an e-poster for the event. The lighting fraternity stood to benefit in many ways by the exposure to the leaders of German industry and the other programmes connected to the event.

R. Balasubramanian
Chairman
Chennai State Centre

RAJASTHAN STATE CENTRE

Workshop on LED Systems

July 23, 2012, Jaipur

The State Centre organised a one day workshop at the PWD Conference Hall in Jaipur. The workshop was sponsored by Lightron Industries

The workshop was inaugurated by Mr. Chiranjilal, Secretary PWD, Rajasthan. He emphasised the need for Energy efficient lighting in government buildings.



Mr. R.S. Saxena

Mr. R.S. Saxena, Chairman of the State Centre gave the welcome address and introduced the dignitaries. ISLE President Mr. Gulshan Aghi explained how the activities of the Society helped to update the technical knowledge of those with an interest in lighting.

This was followed by a presentation on how LEDs had entered our lives by Mr. H.S. Mamak, former President of ISLE. Mr. S. Chakraborty, VP Technology of Surya Roshni then gave a technical presentation on LED lighting.

The other presentations were:

- LED Indoor Lighting by Mr. Sudesh Gupta, Thorn Lighting
- Outdoor LED Lighting by Mr. B.M. Bhatia, Keselec Schreder
- Led Testing and Measurement Procedures by Ms Annie, Surya Roshni
- Photometry of LED Luminaires by Ms Priya Jain, Surya Roshni
- Dr. Manoj Gupta, Secretary RSC gave the vote of thanks.



Mr. Sudesh Gupta

Seminar on Energy Conservation in Buildings October 27, 2012, Jaipur

The State Centre organized a one day seminar Energy Conservation in Buildings at the Poornima College of Engineering Jaipur.

The seminar was addressed by Dr. R.P. Rajouria, Director Poornima College of Engineering, Mr. R.S. Saxena, Chair RSC, Mr. Arvind Kaul, Director Enertrac Instruments, Mr. B.M. Chandra, CEO Genesis, Mr. Prashant Bajpai, AGM Surya Roshni and Dr. Manoj Gupta, Director Academics PGC.

The State Centre launched its fourth Student Chapter at Poornima Engineering College during the seminar.

MP STATE CENTRE

Quiz on Lighting

July 29, 2012, Indore

The 33rd monthly meeting and lecture of the MP State Centre was organised on Sunday, July 29, 2012 at Hotel South Avenue, Indore.

After fellowship and breakfast the programme started with an address by Mr. Rajendra Raje, Committee Member of MPSC. He apprised the audience on the achievements of the State Centre especially the organising of three prestigious monthly lectures on Green Building Lighting from April to June 2012 by eminent personalities.



Mr. Sandeep Mathur and Mr. Akhilesh Jain

Mr. Akhilesh Jain, Chairman, MPSC gave information about the Directory of the Lighting Industry in India. Covering most of the contemporary concerns like Lighting Standards, Testing Requirements, Environment and Health, Sustainability, Lighting Design it was a delivery tool for Architects and Consultants and others interested in lighting in India. The list of classifications and listings in the Directory along with advertising rates and other important information was also given to the audience with a request to book their listings and advertisements before the last date i.e. July 31, 2012.

Thereafter a Quiz Competition on Lighting was organised by Mr. Akhilesh Jain and Mr. Sandeep Mathur



Quiz in progress

with a view to create awareness and disseminate knowledge. Gifts were given to encourage and motivate the participants who came out quickly with the right answers. The quiz was followed by a presentation on lighting by Mr. Akhilesh Jain in which he explained how lighting has emerged as a new media vehicle in western countries for advertising and brand image building of various products as well as for organising virtual fashion shows and light shows on buildings and monuments.

The presentation was followed by a birthday celebration for members born in July. Mr. Dinesh Wadhwa, Honorary Secretary, MPSC, proposed the vote of thanks.

Akhilesh Jain
Chairman
ISLE, MPSC

Breakfast Seminar

August 26, 2012, Indore

The 34th in the series of monthly Sunday breakfast seminars was again blessed with overwhelming attendance by lighting lovers. The presentation "In search of shadows" was made by Ar. Sachin Paliwal, Head of the Indore Branch of Design Avenues, an organisation in the field of Architecture, Graphics and Interior Design.

The programme commenced with the welcome address by the Chairman ISLE MPSC, Er. Akhilesh Jain. To celebrate Independence Day he read excerpts from the Autobiography of Mahatma Gandhi.

The Chairman also, brought to the focus of the audience, the forthcoming Light India event in New Delhi and the coverage of ISLE MPSC in the July 2012 issue of the Newsletter.

Through a series of graphic and photographic slides the speaker mesmerised the audience by explaining the inter-link between shadows and light and the way the human mind processes these by comparisons, expression and imagination to find new meanings in different objects under different conditions of light and shadow.

Mr. Paliwal also addressed the question of the lighting schemes of symbols such as corporate logos and the Church



Ar. Sachin Paliwal

of Light in Osaka which depicts the Cross as the source of light. He ended his presentation by saying "let us search the shadows to explore the world of creativity through Light."

The programme concluded with the usual ceremonial celebration of the birthdays of ISLE Members born in August 2012. The session was anchored by Dr. G. Chandrashekhar, Principal Director of a college in Indore and the Vote of thanks and announcements were made by Er. Dinesh Wadhwa, Hon.Sec. ISLE MPSC.

Lecture on Solar Energy

September 30, 2012, Indore

In spite of the Ganesh Viserjan procession which is a traditionally an overnight event for Indore, the audience response to the 35th continuous Breakfast Seminar on Sunday morning of 30th September 2012 was even greater than the previous meetings. The topic was "Solar Energy - the cleanest source for sustainable development" by Er. Atul Kumar Pandey, Project Engineer and Estate Officer IIT, Indore.



Er. Atul Kumar Pandey

Starting with a sher, he defined sustainable development through the eyes of an engineer. An Impressive video on Dr. M. Vishwesvaraya, not only suited the occasion but also gave a befitting salute to the eminent engineer in whose name in the month of September we celebrate Engineers Day.

From the concept of sustainable development to its achievement by use of solar energy, the speaker covered the drivers of renewable energy, the green building rating agencies - GRIHA of India and LEED of USA. He spoke of the green parameters of architecture and civil, electrical and horticulture aspects.

He quoted from the book Vision 2020, authored by former President of India, Dr. APJ Abdul Kalam about infrastructure development with reliable electrical power, the advantages of solar energy, the intensity of solar



radiation on the map of India, PV cells, nano technology and ways to promote solar energy.

He spoke of the first 1 MW canal-top solar power plant in Gujarat, and described a green school building made by public-private partnership without any government aid and without any electrical connection from the state electricity board that uses only solar energy for its energy needs. This school is in Bhikan Gaon, only a few kilometers away from Indore.

The presentation provided details of solar power collectors, solar trackers, zero energy buildings to the newest concept of distribution of excess energy to other sectors, created by these green buildings. Actual site pictures of the use of light pipes, light-shelves, solar panels on roof top coverings of parking areas in domestic and commercial buildings, national solar missions etc. The presentation ended with an exciting audio clip from Solar Choice Australia on seven excellent reasons to convert to solar power for homes and businesses and another of Dr. Kalam on success and failures through leadership.

The interactive Q& A session was very informative. It provoked one of the audience Mr. Mahesh Sharma, to display a clipping from a local newspaper that mentioned Indore as the place with the maximum solar energy potential, according to a research paper by NASA.

The programme, anchored by Mr. Mahesh Agrawal of Technocom Marketing and Treasurer, MPSC, was initiated by the welcome address by the Chairman, Mr. Akhilesh Jain and concluded with a vote of thanks by Mr. Dinesh Wadhwa, Hon. Sec. MPSC.

CIE ACTIVITY

CIE Centenary Conference Towards a New Century of Light

April 15 and 16, 2013, Paris

CIE is celebrating its one hundredth anniversary! A century during which our knowledge of lighting

fundamentals has taken enormous leaps forward, bringing new applications of light supported by both technological advances and economic success. A century that began with the revolution of the electric light and efforts to bring both the electric light bulb and the power it required into common use ends with the need to reduce energy distribution and use, and brings a technology that promises to achieve this for lighting.

CIE's mission "to promote worldwide cooperation and exchange of information on matters associated with light and lighting" is as relevant today as it was one hundred years ago. As we move into a new century, knowledge, technology and the economy bring new challenges, among them:

- Light is important for vision, and is also crucial for health and mood
- Light is in need of measurement, appropriate to application and effect
- Light is a commodity, but it is also art and design, interactive and personalised
- Light is a commodity, but it can also be disruptive, a pollutant, an irritant, a waste

Our understanding of new technologies and the impacts of light must be used to enhance the positive and reduce the negative effects of light. Light, like life, should show versatility, intelligence and sustainability, realising that "the more the better" is not always necessary or best.

In celebration of a centenary of knowledge, and in recognition of our new challenges, we present a conference centred around three themes:

Rhythm of life, rhythm of light
Intelligent lighting
City at night

Rhythm of life, rhythm of light

Light must adapt to human needs in all their complexity, from seeing details, creating and revealing beauty, and promoting health and well-being, without affecting the biosphere.

Moreover, our lighting requirements vary over time, both across the life span and across the day. There are many phases through the day and the night that we have to consider in order to find the light that best suits the rhythm of our activities.

As a prerequisite for quality assurance and comparability the photometric - and electrical - parameters of lighting devices and systems need proper quantification.

Intelligent lighting

Technology has strongly developed over the last decades so that it is now possible to adapt light to our rhythms. Today's buildings can be modulated, particularly in terms of lighting, to suit a specific ambiance and to conserve energy. Controlling both daylight and electric light is thus a wonderful advantage for comfort and energy savings.

Indoor lighting appears to be slightly ahead of outdoor applications, but the light sources and electronic devices offer similar possibilities, and dimming is becoming common practice. The latest devices allow switching from on to off with a range of intermediate light levels which can be controlled in many ways. Moreover, operating a lighting installation has become possible over a large territory thanks to communication technology, bringing new optimisation opportunities (immediate exchange between the manager and the installation over a wide area, giving the possibility to optimise maintenance operations for example).

In a word, lighting is becoming intelligent - but it will only be as intelligent as our understanding of the needs of the people it is installed to support. Our multimedia society is also characterized by digital images surrounding our environment, especially with the advent of low-cost devices as well as powerful processing software, which allows a wide use of displays. The use of these devices has given the ability to drastically improve communication, education, culture, science, technology, medicine and much more. Digital images cover a technological field (from acquisition to realistic rendering and quality assessment), which is strongly evolving years after years.

City at night

As technology is beginning to offer a wide range of opportunities in terms of light adaptation, specifying the needs and requirements is becoming an issue. We are coming to understand that exterior lighting is more complex than only supporting road security and visibility; the issue deserves a holistic approach. Hence sociologists, urban planners, ecologists, and astronomers must become full partners of the CIE community.

Here and there, with energy saving efforts and battle against light pollution, there are some nowadays who find light in cities to be optional. The variety of users to consider is growing: pedestrians, cyclists, roller-bladers, drivers, young, old, visually impaired... The activity is also very diverse in time and space, because a city is a social place, a place to cross, a place to stay, a place to meet, a place to observe, a place to live in - and not only for humans. As a consequence, one definitely needs to study what the city is at night in order to enlighten the citizens and to smarten urban light.

1. Aesthetics of urban lighting
2. Art and philosophy of light
3. Light and the digital image
4. Light for health and well-being
5. Putting light into numbers
6. Using lighting energy intelligently
7. Lighting solutions for developing nations
8. Lighting the task, reclaiming the dark
9. Safe cities

When submitting an abstract please note the structure of the conference will reflect the interdisciplinarity of the subject. Presentations will be in panels and presenters should be prepared to discuss their findings with experts from other disciplines, and to dedicate some time to panel organisation prior to the presentations.

Further information can be found at www.cie.co.at

—

CIE Metrology of LEDs and LED Modules November 28-29, 2012, Vienna

Goal: The seminar will summarise fundamental differences in the measurement of traditional light sources and LEDs as well as LED modules.

Target Group: Anybody interested in solid state lighting, the photometry and colorimetry of solid state devices, especially LEDs and LED modules.

Please, note: places are limited and will be assigned on a first come, first serve basis.

Costs: EUR 800, (excl. 20% VAT)

Subjects to be covered are the following:

1. Fundamental differences between LEDs, LED modules and LED lamps as well as traditional light sources (LED structure, thermal differences, aging and life-time)
2. The most basic terms used with LEDs and LED modules
3. Photometry of LED devices (differences compared to traditional light sources):
 - a. Gonio-photometry, with special emphasis of absolute photometry of LED sources
 - b. Integrating sphere photometry
 - c. Spectroradiometry, with special emphasis on bandwidth and stray light effects.
4. Colorimetry of LEDs and LED modules
 - a. Tristimulus colorimetry
 - b. Problems with the CIE 1931 colorimetric system
 - c. CIE TC 1-36 based colorimetry and practical experience

The lectures will be accompanied by demonstrations and hands-on experiments.

To register, just click <https://www.dm-and-c.at/ei/cm.esp?id=50&pageid=3ARORP49G>
(for participation online and on-site)

CIE PUBLICATIONS

Proceedings of CIE 2012 Lighting Quality & Energy Efficiency, Hangzhou, China CIE x037:2012

In September 2012 the Lighting Quality & Energy Efficiency Conference took place in Hangzhou, China. The event gave academics, lighting industry professionals, designers, researchers and representatives of regulatory authorities the opportunity to discuss best practice and the latest developments in the field of light and illumination. Recommendations were also made for reducing the amount of energy used for lighting. One of the hottest topics at the conference was light emitting diodes (LEDs), which offer significant environmental and energy-efficiency benefits compared with conventional light bulbs and energy-saving lamps.

The Proceedings of this Conference include invited papers, papers of the oral and poster presentations as well as introducing summaries of the Workshops.

The publication consists of 799 pages including 123 contributions with more than 500 figures and some 200 tables.

A Computerized Approach to Transmission and Absorption Characteristics of the Human Eye (incl. Erratum 1)

CIE 203:2012 incl. Erratum 1

There has long been a need for a series of reference spectral transmission and absorption data for the human eye for applications in eye research and optical safety studies. TC 6-15 collected spectral data from the literature and determined from that literature the best form for the wavelength dependence of the transmission and absorption of the components of the human eye. After critical review, the data have been compiled in tabular form in comma-delimited computer-accessible data files. The tabulated data consist of the transmission and absorption data of the clear ocular media, including the cornea, the aqueous, the lens, and the vitreous of the young (< 10 years old) human eye and the rhesus eye for the wavelength range of 200 nm to 2500 nm. Transmittance data of the total clear ocular media in the human eye for the wavelength range 300 nm to 700 nm and for ages between 1 year and 100

years are also tabulated. These data can be downloaded by readers of this Technical Report from the CIE website.

This publication corrects and replaces CIE 203:2012 "A Computerized Approach to Transmission and Absorption Characteristics of the Human Eye".

An Erratum is included that shows corrected Equations 4 and 5 as well as 2 changes in wording in Section 4.6.

The publication is written in English, with a short summary in French and German. It consists of 66 pages with 23 figures and 9 tables.

Tubular Daylight Guidance Systems (Including Erratum 1) CIE 173:2012

Tubular daylight guidance systems are linear devices that channel daylight into the core of a building. They consist of a light transport section with, at the outer end, some device for collecting natural light and, at the inner end, a means of distribution of light within the interior. Collectors may be either mechanical devices that actively focus and direct daylight (usually sunlight), or be passive devices that accept sunlight and skylight from part or whole sky hemisphere. The transport element is usually a tube lined with highly reflective or prismatic material or may contain lenses or other devices to redirect the light. Light is distributed in an interior by output components, commonly diffusers made of opal or prismatic material. The major emphasis of this Report is on passive zenithal systems, the most commercially successful type of daylight guidance being installed in many parts of the world.

The Report includes a contextual review of the technology of all generic types of daylight guidance systems. The major part of the report is concerned with photometry of components and systems, design methods, maintenance issues in both design and use, energy aspects, cost and benefits, human factors and architectural issues in the context of passive zenithal systems. The report includes case studies showing good practice.

This publication corrects and replaces CIE 173:2006 "Tubular Daylight Guidance Systems".

An Erratum is included that shows a corrected value in Table 3 and a corrected formula in Appendix C.

The publication is written in English, with a short summary in French and German. It consists of 75 pages with 44 figures and 5 tables.

Note: All CIE Publications are readily available at the web shop of the CIE (<http://www.techstreet.com/cgi-bin/joint.cgi/cie>). Members of the National Committees of the CIE get 66,7 % discount.

Is LED Photometrically Ready to replace conventional well-established Street lighting systems?

S Chakraborty

Street Lighting Scenario

Street lighting in India has undergone a metamorphosis in the last decade. The advent of global technology coupled with rapid infrastructure development in the country has changed the landscape of many places. The traditional Indian town has graduated to a city, the city into a metro and the metro has now become a Megapolis.

Traditional concerns such as road safety, crime prevention and personal security, are still the fundamental need of Street Lighting. In addition, Street Lighting has always been accepted as an effective tool to promote a city. Nowadays "expressive potential of light" is being utilised very intelligently in creating a unique identity of the city's day and night image for "City Marketing". Cities seeking to attract business, shoppers and tourists today face tough competition. Thus street lighting or more precisely urban lighting plays a very vital role for "City Marketing".

LED Scenario

LEDs represent a lighting technology that is fundamentally different from incandescent, fluorescent, or other gas discharge light sources. For that reason, standardisation agencies and other relevant bodies face difficulties in measuring and reporting on LED photometric performance and comparing LED output for use in place of traditional lighting sources. This is indeed a challenging task.

In addition, the advent of LEDs in lighting has brought the optoelectronic community into the lighting field resulting in an approach/outlook variation with conventional lighting professionals.

The LED is slowly but steadily establishing itself as a reliable Lighting Design tool. It is no longer limited only to Architectural or Aesthetic lighting, but is emerging as a strong alternative in Street Lighting, Industrial Lighting, Commercial lighting and domestic lighting.

Why LED Lighting Systems for Street Lighting?

With rapid urbanisation, energy consumption attributable to street lighting is on the rise. The advent of LEDs has opened up an opportunity for significant energy saving compared to conventional lighting systems.

This article will examine the burning issue "Is LED photometrically ready to replace conventional well-established lighting systems to match lighting performance parameters?"

One of pre-requisites of achieving energy conservation in Street Lighting is to understand its philosophy. The principal purpose of providing street lighting is to provide quick, accurate and comfortable seeing condition at night. Human beings have mental and physical capabilities and limitations. Thus while designing a Street Lighting System, the designer must be aware of the basic of Process of Vision, especially in the context of Road Lighting Design Principles. Thus we will discuss following issues:

- 1 Process of Vision
- 2 Road Lighting Design Principles
- 3 Mesopic Photometry
- 4 Lighting Calculation for Mesopic Vision
- 5 Analysis of Mesopic Lighting Parameters vis a vis Photopic Parameters

The mystery of the eye is not yet solved. And perhaps it will not be. It has inspired our great authors and painters to create masterpieces in world literature and art from the ancient times.

But the Process of Vision has a scientific foundation which plays an important role in lighting design. It is a complex process that is performed in the eye, on the retina, in the optic nerve and in the brain. There are four steps:

- 1 Light is reflected off the object to be seen.
- 2 Light passes through the iris which regulates the amount of light entering the eye.
- 3 It is then focused by the lens onto the retina where nerve endings called rods and cones detect light.
- 4 The optic nerve carries the data to the brain where it is processed, and turned into a mental image of the object.

(Note: The nerve endings that see colour are called Cones. Cones (7 million) are concentrated at the back of the eye ball, around the fovea (the place on the retina where objects are focused for view). Cones allow for precise focal vision such as reading. They have high resolution, but are not very sensitive.)

The Rods (120 million) are distributed around the eye. They are very sensitive especially to movement. Rods provide only black-and-white signals to the brain primarily for peripheral vision.

Photometric System

Light is part of the electromagnetic spectrum that stretches from cosmic rays to radio waves. What distinguishes the wavelength region between 380-780

nanometers from the rest is the response of the human visual system. Photoreceptors in the human eye absorb energy in this wavelength range and thereby initiate the process of seeing.

The sensitivity of the human visual system however is not the same at all wavelengths in this range. This makes it impossible to adopt the radiometric quantities conventionally used to measure the characteristics of the electromagnetic spectrum for quantifying light. Rather, a special set of quantities has to be derived from the radiometric quantities by weighting them by the spectral sensitivity of the human visual system. The result is the photometry system.

The Commission Internationale de l'Eclairage (CIE) has established three standard observers to represent the sensitivity of the human visual system to light at different wavelengths, in different conditions.

Photopic Vision

In 1924, the CIE adopted the Standard Photopic Observer to characterise the spectral sensitivity of the human visual system by day.

The photopic spectral luminous efficiency function, $V(\lambda)$, applies only at 'high' light levels (daylight, lit interiors etc.) where the rods in the human retina are less active and cones dominate our vision, and colour discrimination and the ability to resolve detail in the visual field are both good.

The CIE Standard Photopic Observer has continued to be widely used by the lighting industry. All lux meters are calibrated with the photopic spectral luminous efficiency function, $V(\lambda)$ (Fig: 1).

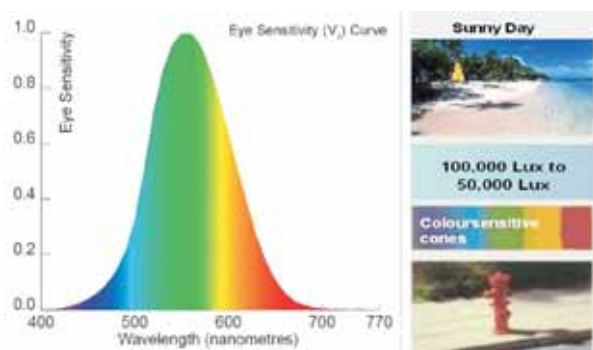


Fig: 1

Scotopic Vision

In 1951, the CIE adopted the CIE Standard Scotopic Observer to characterise the spectral sensitivity of the human visual system by night.

At 'low' levels (e.g. moonlight), only the rods are active, visual acuity is poor, and it is not possible to distinguish colours; in this condition, the scotopic spectral luminous efficiency function, $V(\lambda)$ (Fig : 2), applies.

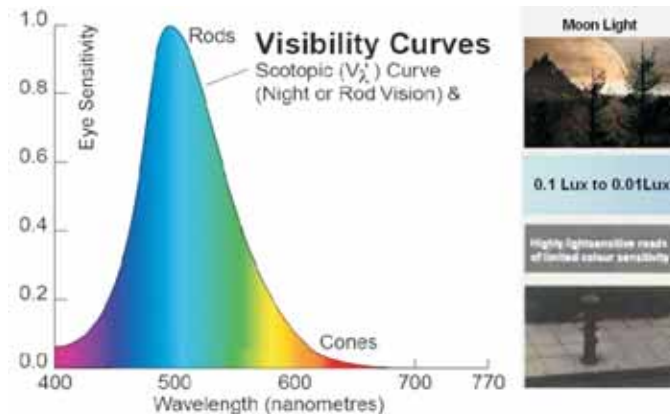


Fig: 2

Mesopic Vision

In the intermediate, so-called mesopic region, the eye's sensitivity changes rapidly depending on the characteristics (level and spectral distribution) of the lighting used, shifting towards the blue as the light level decreases.

The establishment of a system for quantifying the visual effectiveness of light in the mesopic region, where the eye is in an intermediate state between fully light adapted (photopic) and fully dark adapted (scotopic), and where both rods and cones contribute to visual processes, is a problem that has exercised vision scientists for more than 70 years. This is an important problem to solve, since for many critical visual tasks, such as driving on a road at night, the eye is operating in the mesopic region. Under the current system of photometry, lamps which emit a large proportion of their power around the peak of the $V(\lambda)$ function (such as high pressure sodium lamps) are rated as having a high luminous efficacy and are thus the lamp of choice in many situations. Under mesopic conditions, however, a lamp with a higher blue content (e.g. metal halide or LED, Induction lamp) will have a greater visual effectiveness and may therefore be a better choice. Thus an agreed system for mesopic photometry offers the potential for optimising the energy efficiency of

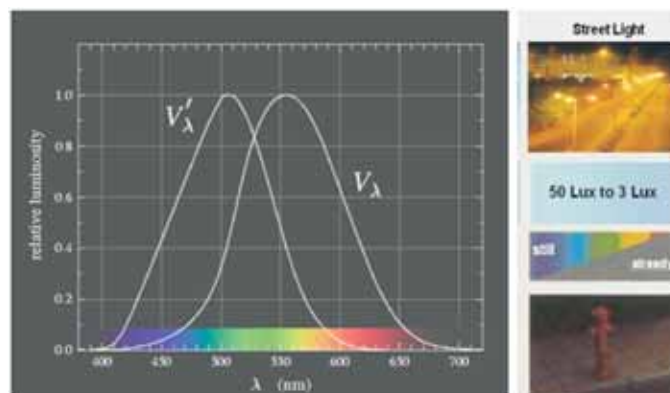


Fig:3

Continued on page 20

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Continued from page 14

lighting used for road lighting and other applications, without adversely impacting on visibility.

It is to be noted for simplicity of understanding we have classified three different visions {photopic, scotopic and mesopic in terms of illuminance level (lux)}. The eye cannot see "lux" but only registers reflected Light (luminance). Thus technically different vision should be defined in terms of Luminance (cd/sq.mtr) as shown below:

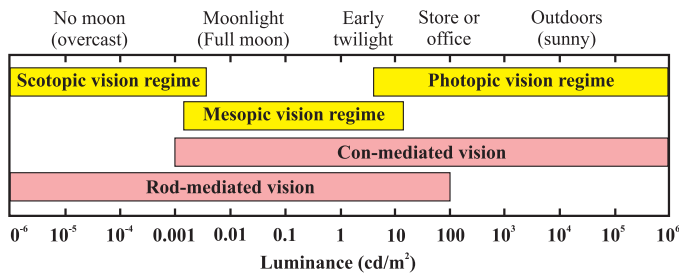


Fig:4

Road lighting Design Principles

Light Technical Parameters

Street Lighting installations are evaluated in terms of following Lighting parameters:

- 1 Luminance level
- 2 Illuminance level
- 3 Illuminance uniformity
- 4 Luminance uniformity
- 5 Degree of glare limitation
- 6 Visual guidance.

Requirement of Road Users

- 1 Visibility of the road and its surroundings.
- 2 The visual comfort and visual field of the driver comprises the following:
 - i) The carriageway
 - ii) The surrounds to the road, including signs,
 - iii) The sky, including the bright luminaries.
- 3 Identification of obstacles.
- 4 In the absence of any obstacles, the presentation of the road should be such that the driver is certain that the road is clear. In other words providing "visual comfort" to the driver.
- 5 Lighting of the street should appear continuous and uniform.

Why Luminance and not Illuminance is the proper yard stick?

The most generally used approach to selecting quality criteria for lighting roads for motor traffic is based on the

luminance concept. This is the minimum value to be maintained throughout the life of the installation.

A person looking at an illuminated area, registers only the light which that area reflects in his direction i.e. luminance (L). It is the perceived brightness of a luminous or illuminated object and is measured in cd/m².

On the other hand illuminance refers only the amount of light reaching the road surfaces and makes no impression on the eye's receptor cell. It is invisible to eye.

A motorist sees an illuminated roadway surface from a very low angle. So, in planning and appraising street lighting, it makes sense to take luminance (cd/m²), the motorist sees as the yard stick of assessment.

The roadway luminance depends on the following factors:

- 1 Luminous flux of the lamp
- 2 The intensity distribution of luminaire
- 3 Geometry of the installation
- 4 Reflective properties of Road surface

Good Uniformity Makes For Better Hazard Perception

Dark patches act as camouflage, concealing obstacles and hazards. Thus one of the primary requirements of Good lighting is to address problem of "dark patches". There are the two parameters to take in to account of uniformity of lighting:

- 1 Longitudinal Uniformity
- 2 Overall uniformity

Longitudinal Uniformity (U_l)

Motorists primarily watch out for obstacles and hazards directly ahead, so longitudinal uniformity is important. It is defined as the ratio of minimum to maximum luminance along a line parallel to road axis through the observer's position.

It depends on the following and varies from 0.7 to 0.4.

- 1 Permissible speed
- 2 Traffic density
- 3 Number of hazard features

Overall Uniformity (U_o)

The overall uniformity U_o (ratio between minimum luminance and average luminance) refers to the entire width of the road. The value of U_o should not be less than 0.4. This is intended to ensure that dangerous camouflage zones are avoided and a motorist will promptly and clearly perceive, for example a pedestrian is about to step into his lane.

How much Light? --Luminance Level

The most generally used approach to selecting quality criteria for lighting roads for motor traffic is based on the luminance concept, though formerly illuminance was used by some countries. Experience however, has shown this to be an unsatisfactory criterion. In this concept the aim is to produce a bright road surface against which objects are seen in silhouette. It therefore, uses luminance level and uniformity of road surface luminance, as well as glare control as quality criteria. However, many objects on road surfaces are of high reflectance so they are seen not in silhouette but by virtue of direct reflected light. In addition to that, in congested traffic conditions, a wide view of road surface is obstructed by vehicles and cannot provide a background for revealing objects. Nevertheless, the approach of providing a good level and uniformity of road luminance with adequate glare control has been widely accepted as road lighting design criteria.



Fig. 5 Different Visual Impressions of the Road Surface Under the Same Lighting Level for Dry (Left) and Wet (Right) Conditions

However, it should be kept in mind that the visual appearance of a road is solely determined by the luminance values and uniformity. The road surface plays very important criteria in road lighting. The same illuminance may result in a different visual scene because of difference in the road surface reflectance and uniformity as shown in the Figure: 1.

In India we still follow the Illuminance criteria. In order to get the full advantage of Mesopic Photometry, we have to adopt the luminance concept. The good news is that the National Lighting Code: 2010 specifies luminance criteria as per CIE-115:1995 as an alternative criteria, initiating the shift of design criteria for road lighting.

CIE 115:2010 lists luminance requirements based on roadway lighting classes which, in turn, are classified from M1 to M6. These are selected according to the functions of the roads, traffic density, traffic complexity, traffic separation and the facilities for traffic control.

Mesopic Photometry: CIE 191:2010

CIE 191:2010 has recommended the system for Mesopic photometry based on visual performance, and shown in the Table 1 are the differences between the luminance values calculated using the recommended

system. In general, lamps with a relatively high output in the short wavelength region result in decreased (photopic) luminance values. For example, at a photopic luminance of 1 cd/m², effective luminance level of HPS lamp (S/P = 0.65) decreases by 4 %, while LED lamp (S/P = 2.25) increases 14 %. This indicates that photopic light level from an LED lamp can be reduced and still deliver the same level of visual performance as with a HPS lamp.

Table 1 - Differences between Mesopic and Photopic Luminances

		Photopic luminance / cd·m ⁻²									
S/P		0,01	0,03	0,1	0,3	0,5	1	1,5	2	3	5
LPS ~	0,25	-75%	-52%	-29%	-18%	-14%	-9%	-6%	-5%	-2%	0%
	0,45	-55%	-34%	-21%	-13%	-10%	-6%	-4%	-3%	-2%	0%
HPS ~	0,65	-31%	-20%	-13%	-8%	-6%	-4%	-3%	-2%	-1%	0%
	0,85	-12%	-8%	-5%	-3%	-3%	-2%	-1%	-1%	-0%	0%
MH warm white ~	1,05	4%	3%	2%	1%	1%	1%	0%	0%	0%	0%
	1,25	18%	18%	8%	5%	4%	3%	2%	1%	1%	0%
	1,45	32%	22%	15%	9%	7%	5%	3%	3%	1%	0%
	1,65	45%	32%	21%	13%	10%	7%	5%	4%	2%	0%
	1,85	57%	40%	27%	17%	13%	9%	6%	5%	3%	0%
LED cool white ~	2,05	69%	49%	32%	21%	16%	11%	8%	6%	3%	0%
	2,25	80%	57%	38%	24%	19%	12%	9%	7%	4%	0%
MH daylight ~	2,45	91%	65%	43%	28%	22%	14%	10%	8%	4%	0%
	2,65	101%	73%	49%	31%	24%	16%	12%	9%	5%	0%

S/P Ratio (Scotopic/ PhotopicRatio)

It is the ratio of the luminous output of the light source evaluated according to the CIE scotopic spectral luminous efficiency function V'(l) to the luminous output evaluated according to the CIE photopic spectral luminous efficiency function V(l). It is used to characterise the spectral characteristic of a light source. Basically the higher the S/P ratio, the more effective the visual performance will be for low light levels encountered in street and road lighting.

Lighting Design Calculation for Mesopic Vision

The lighting design calculation can be performed by using available lighting design software such as DIALux, Relux . The Dialux software for lighting design can be easily downloaded free of cost from <http://www.dial.de/DIAL/en/dialux.html>. It calculates the photopic luminance for the required street lighting installations and specified observer position as per the international standards; either CIE 140/EN-13201 or IESNA-RP-08. These photopic luminance values can be converted to respective mesopic luminance values with the help of information given in CIE 191-2010.

The methodology of conversion from photopic to mesopic luminance depends upon following factors:

- S/P Ratio of the light source/luminaire
- Luminance effectiveness multipliers (as per CIE-191-2010)

A step by step procedure for the calculation of mesopic luminance (cd/m²) is given below:

Step 1: Select Lighting parameter including Luminance level

1st : The International Commission on Illumination (CIE) Roadway Lighting Standard 115:2010, addresses adaptive street lighting and gives guidance on its application for temporal change in parameters such as traffic volume and composition (CIE 115:2010, section 6.2.2) that effectively alter a location's lighting class. Lighting classes are a system of differentiation amongst areas where streetlights are used based on traffic and pedestrian volume and other considerations. The lighting class for a roadway is normally determined by the most onerous conditions, while the use of adaptive lighting recognises that roadway conditions are not static. However, care must be taken to ensure that appropriate light levels are always present.

Table- 2: Lighting Classes for Roadways (adapted from CIE 115:201)

Parameter	Options	Value	Selected Value
Traffic Speed	Very High	1	
	High	0.5	
	Moderate	0	
Traffic Volume	Very High	1	
	High	0.5	
	Moderate	0	
	Low	-0.5	
	Very Low	-1	
Traffic Composition	Mixed with high % non-motorised	2	
	Mixed	1	
	Motorised Only	0	
Separation of Roadways	Yes	1	
	No	0	
Intersection Density	High	1	
	Moderate	0	
Parked Vehicles	Present	0.5	
	Not Present	0	
Ambient Luminance	High	1	
	Moderate	0	
	Low	-1	
Visual Guidance / Traffic Control	Poor	0.5	
	Moderate/Good	0	
Sum			
Roadway Lighting Class M (6 - Sum):			

The first step is to find out lighting classes of the road after referring CIE-115:2010 as given below:

2nd: After determining the Lighting class, the lighting parameters (including luminance) can be obtained from this table. It is to be noted this table gives a fair idea how the evenness of lighting (luminance uniformity) gets disturbed in wet conditions. This is the new addition over the 1995 version of the same standard.

When the road surface is wet, it behaves more like a specular than a diffuse reflector. The brighter parts of road diminish in area and increase in luminance, and the converse is true for the darker areas. The result is that the uniformity of luminance is severely degraded and the

visibility on a larger portion of the road is adversely affected. In those cities/towns where the road is wet or moist for a considerable portion of time, it is recommended that a light distribution which minimises this deleterious effect is selected. CIE 47-1979 gives details for calculating U_0 for wet condition.

Table -3: Roadway Luminance requirement (adapted from CIE 115:2010)

Lighting Class	Road Surface			Threshold Increment	Surround Ratio	
	Dry		Wet			
	Luminance (cd/m ²)	U_0	U_1	U_0	%	R_s
M1	2.0	0.4	0.7	0.15	10	0.5
M2	1.5	0.4	0.7	0.15	10	0.5
M3	1.0	0.4	0.6	0.15	15	0.5
M4	.75	0.4	0.6	0.15	15	0.5
M5	0.5	0.35	0.4	0.15	15	0.5
M6	0.3	0.35	0.4	0.15	20	0.5

Step2- Determine the street profile and other installation/Design parameters for lighting design

These parameters include -

- Roadway width,
- Type of Arrangement: (a) One sided, (b) Staggered (c) Central Verge (d) Opposite etc.
- Luminaire Mounting height, overhang, luminaire tilt.
- Calculation grid, Observer position for Luminance calculation.

Step 3- Obtain Complete photometric documentation (Photometric File) of the selected luminaire characteristics

This file is generated after performing the photometric test of the luminaire (in actual burning position) using Mirror Gonio-photometer equipment. It is the responsibility of the Luminaire manufacturer to furnish the details and IES files.

The luminaire photometric measurement data can be stored in terms of various electronic file formats such as

- IESNA file format (abbreviated as IES file)
 - IESNA 1986
 - IESNA 1991
 - IESNA North America 1995
 - IESNA North America 2002
- CIBSE Technical Memorandum TM14
 - CIE Format
 - EULUMDAT Format
 - EULUMDAT/2 Format

Step 4- Calculate Photopic luminance (cd/m²)

Use any one of the lighting design software as discussed earlier and calculate the Photopic luminance values at different points based on observer position and derive the Average photopic Luminance, longitudinal uniformity

(U_o) and Overall Uniformity ratio (U_l).

Step 5- Convert Photopic Luminance to Mesopic Luminance

1. Find out the lamp and select S/P ratio (which is linked with colour temperature) of the lamp used. It is likely in future that the S/P will be furnished by manufacturer.
2. Refer to Table 1 to determine the increase or decrease in the Mesopic luminance based on the lamp used by simple interpolation for each grid point. In general, lamps with a relatively high output in the short wavelength region result in decreased (photopic) luminance values.
3. After applying the above formula at all individual calculation points, the average value will result in average Mesopic luminance of the street lighting installation. Note that the Mesopic Luminance adjustment factor must be applied to each individual calculation point and cannot be generally applied to the average Photopic luminance.

Example:

Let us take a typical case study of comparing 70 W HPSV Street Lighting Luminaires with 33 W LED luminaires with lens optics under identical installation parameters.

Table 4

Installation Parameter			Remarks:
Installation Parameter	HPSV System	LED System	
Mounting Height	6m	6m	A q ₀ (Average luminance coefficient) default value of 0.07 is often given for typical roadway surfaces; Please see CIE 115:2010.
Spacing	18m	18m	
Arrangement	One-sided	One-sided	
Angle of Tilt	10°	10°	
Road width	7m	7m	
Street surface Coating	R3 (q ₀ = 0.07)	R3 (q ₀ = 0.07)	
Maintenance Factor	0.70	0.90	

Design Parameter			Such surfaces are typically asphalt roads with aggregate composed of a minimum of 60% gravel, greater than 10mm in size, with a mode of reflectance that is "mixed" (diffuse and specular).
Observer position	60 m Away from roadway (longitudinal)	1.75m away from road edge (Transverse)	
		1.5m above the road surface (Eye level)	

S/P ratio	0.45	2.25	The value of 0.07 can also characterize an asphalt road surface with 10- 15% artificial brightener in aggregate mix.
Lamp wattage	70W	29W	
Total wattage	83W	33 W	
Lamp Lumen	5600	*2650lm (luminaire lumen output)	*LED luminaire always expressed as Luminaire Lumen
Luminaire	72%	**80 lm/W	** LED luminaire

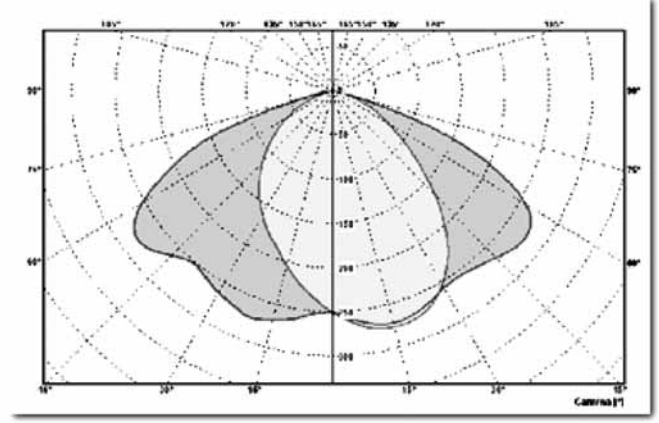


Fig:5: This is the Light distribution of 70W HPSV Street Lighting luminaire with POT Optics and using 70W tubular lamp:

IES file of this luminaire has been considered while calculating the lighting parameters.

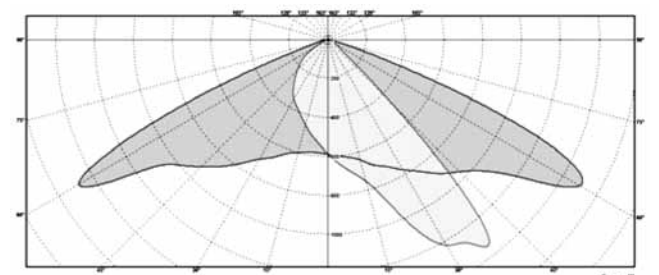


Fig 6: This is Light distribution of 33W LED Street Lighting luminaire with secondary optics (with Lens optics).

IES file (based on absolute photometry) of this luminaire has been considered while calculating the lighting parameters.

Table 5: Lighting Analysis

Street Lighting System	Calculated Photopic Luminance			Converted Mesopic Luminance			Calculated Photopic Illumination Level (lux)	Equivalent Mesopic Illumination level (Derived by extrapolation) (lux)
	Average Luminance (cd/m ²)	Overall Uniformity (U _o)	Longitudinal Uniformity (U _l)	Average Luminance (cd/m ²)	Overall Uniformity (U _o)	Longitudinal Uniformity (U _l)		
70W HPSV	0.70	0.60	0.80	0.64	0.53	0.79	13	11.88
33W LED	0.64	0.72	0.81	0.75	0.74	0.82	11	12.89

Conclusion:

1. The above results clearly demonstrate that the average Photopic luminance (cd/m²) for HPSV street lighting

system dropped by 8.57% when converted to Average Mesopic luminance value, whereas the average photopic luminance for LED street lighting system, ameliorates by 17.18% for corresponding average mesopic luminance.

2. Moreover, it is interesting to note that the Equivalent illuminance level calculated for mesopic vision increases by 17% from its corresponding photopic illuminance level for the LED streetlight system whereas for the HPSV system it decreases by 8.6%.
3. It also shows in LED system U0 increases by 2.8% and U1 increases by 1,23%.
4. Thus it conclusively establishes that while the LED is evaluated under Mesopic photometry, its performance (all lighting parameters) improves.
5. It indicates a possibility of around 50% Energy saving can be achieved by replacing the HPSV system with LED. But it cannot be generalised and should not be used as a "catch all Solution ". Each case has to be studied in minute detail before taking a decision.
6. The first limitation of this calculation is consideration of MF of 0.9 and 0.7 for the LED and HPSV system respectively. It is necessary that these are evaluated by field testing.
7. The second limitation is that this calculation is for an M4 type Road with narrow width (7mtr)
8. However, it concludes that street lighting evaluation calls for the lighting design calculation for Mesopic vision instead of the prevailing Photopic vision. One of pre-requisites of LED Street Lighting is the optics and full photometric data. In the absence of these it may be lead to disaster which is not uncommon today.

References:

1. Recommendation for the Lighting of Roads for Motor and Pedestrian Traffic: CIE-195-1995.
2. Recommended System for Mesopic Photometry Based on Visual Performance System : CIE-191 :2010
3. SOLLIA:Street and Outdoor LED Lighting Initiative - Asia:Produced by International Institute for Energy Conservation (IIEC) - Asia International Institute for Energy Conservation (IIEC) - Asia.
4. Information from FördergemeinschaftGutesLicht
5. National Lighting Code 2010: Published by Bureau Of Indian Standard (BIS)

S Chakraborty,
Vice President (Technology)
Bajaj Electricals Limited

The 25 Top Trends that are Driving the Lighting Business

Ray Molony

Energy prices are rising

...because energy is getting scarce across the globe. Increased urbanisation, pressure to decarbonise and caution over nuclear following the Fukushima disaster make for a perfect storm. But it's music to the ears of lighting manufacturers...

The bulb is being banned

The incandescent lamp, an invention that has lasted largely unchanged since the 1880s, is finally making its exit thanks to parliaments across the world. Europe, the US, Brazil and even China are all getting in on the act.

Building regulations are getting greener

The reason Governments are getting on tough on new build? Because it's way easier than tackling the existing stock. The EU wants even wants buildings of the future to go to 'nearly zero'.

Daylight is increasing in buildings

After the oil crisis in 1973, fenestration became an element to minimised but now it's back with a vengeance and the all-glazed office building is now a given. All this has implications for lighting controls.

Controls are growing faster than the lighting market

Lighting controls is one of the hottest areas in lighting at the moment - some reports claim 20 per cent growth - and there's lots of innovation, especially with wireless and microwave technology and the digital protocol Dali.

Lighting's getting dynamic

Who says there should be 500 lux on the working plane, all day, every day? Natural light doesn't work like that. Lighting that changes in colour temperature and intensity throughout the day to match our circadian rhythm is a growth area.

Lighting is helping us get healthy

Research is identifying the links between lighting and health, especially with skin complaints and conditions such as SAD. It's a market that's ripe to be commercialised, and companies such as Philips are positioning themselves for leadership.

Lighting is being designed for people

Hasn't it always? Well no; recessed heavily-louved luminaires isn't 'designing for people', because it darkens the ceilings and the top of the walls, and creates shadows on faces. Now we're increasingly thinking of the whole environment.

There's growing awareness of the power of lighting

Thirty years, it would have been unusual for a client - a hotel operator, say - to have a strong opinion about the lighting. Now they increasingly appreciate the power of lighting to differentiate a brand and to create a mood.

Lighting pollution is moving up the agenda

About 15 years, the CEO of a major lighting manufacturer said of light pollution: "Who's going to listen to a bunch of astronomers?" But lobbying by the Campaign for Dark Skies and others has made sky-glow a big issue.

Street lighting is getting dimmed, and turned off

Once no-one thought of controlling street lighting; it was either turned on or off. Now cash-strapped local authorities are turning street lights off during the night to save money. The future will be smart controls that dim.

Lighting is increasingly a service

Once you bought lights, now you can buy 'lighting' from many of the larger suppliers. Instead of paying upfront for new lighting, clients can pay monthly fee in a myriad of new financing options that coming onto the market.

Miniaturisation is accelerating

Miniaturisation has always been a trend in the lighting business; low-voltage tungsten halogen is a great example. But with LEDs, the speed has become break-neck. The new Luxeon Z, for instance, is the size of the head of a match.

More form factors are emerging

With traditional technology, the number of form factors for luminaires was limited. Not so with LEDs. Increasingly, we'll start to see innovative new shapes and forms, such as Cree's dramatic Aeroblades, designed by Speirs + Major.

Lighting's location is moving

LEDs are allowing us to rethink 'where lighting lives' in a space. The small size, long life and low maintenance characteristics mean we can put lights in places we couldn't before, such as in handrails, to put illumination only where it's needed.

New players are entering

Enticed by the growth in LEDs, Toshiba, Samsung, Cree and LG are just some of the new names who have entered the lighting market in recent years to challenge the dominance of the so-called Big Three: Philips, Osram and GE.

Prices are falling

... and how. Massive overcapacity in LED manufacturing in China - encouraged by the government with tax breaks and incentives such as free land for factories - means prices are set to tumble over the next few years.

Efficiencies are going up

LEDs have been following a much-documented trajectory which have seen efficiency to rise to around 100 lumens per watt. The scientists say there's no reason why this trend can't continue to over 200 lm/W.

Lamp companies are becoming lighting companies

The jargon for this is 'vertical integration'. In essence, manufacturers have realised that clients want 'solutions' to their lighting so lamp companies are either buying or creating luminaires and controls businesses so they can supply everything.

Lighting specialists are joining the design team

The lighting design profession has arrived, and practitioners are routinely accepted as another member of the design team. Their influence is growing too, and they getting involved earlier and earlier in the process.

Mis-selling is growing

The booming LED business is what economists call an 'asymmetric market' - the sellers know much more about the products than the buyers. So the latter emphasise 'hero numbers', the best characteristics of their kit and ignore the downsides.

There's a shortage of good people

Lighting professionals, especially sales people, are at a premium because new entrants want hires who understand lighting and have good relationships with customers. Until a new generation is trained up, there's not enough to around.

Product cycles are collapsing

The reason the global lighting exhibitions take place every two years is that traditionally, that's how long it took to innovate new kit. Now a new model of an LED product can be ready barely after the previous generation has shipped.

Product diversity is shrinking

Traditionally, there's been a wide version of technologies for light sources including mercury, induction, fluorescent, plasma, halogen and sodium, all with the quirks and applications. Soon there'll be just one.

The supply chain's getting skipped

Newer, LED luminaire makers and importers are increasingly ignoring the traditional lighting supply chain of specifier, wholesaler and installer and going straight to the client with their wares. And why not?

Ray Molony

Editor

Lux Review Magazine

Note: For more features like this, register for FREE copies of Lux Review magazine at www.luxreview.com

Your invitation to Lux Pacifica 2013

Bangkok will host the 7th quadrennial Lux Pacifica Conference from 6-8 March 2013. I am inviting you to attend this important regional event supported by the lighting design and scientific societies from around the Pacific Rim as well as from India and South Africa.

This is a great opportunity to meet colleagues from the region and to network with designers, educators, manufacturers, and students. An interesting papers and social program has been devised and Bangkok offers a host of cultural opportunities.

I hope to see you in Bangkok for this important event.

*Emeritus Professor Warren Julian
Chair, Lux Pacifica*

Topics of Submission

Papers are invited on any topic pertaining to the aim and scope of the conference that includes but is not limited to the following

- Light and culture
- Fundamental of lighting and daylighting
- Vision and Color
- Energy Efficiency
- Outdoor and Indoor Lighting
- Light and Health
- Light and Architecture, Lighting Design
- Lighting Fixtures
- Sources of Light and Control Systems
- LEDs and their application
- Irradiation Systems
- Light Measurements
- Standards of Lighting
- Optical devices, sensors and displays
- Radiometric of optical properties of materials

The Conference is tentatively planned as a full three-day programme from 6-8 March 2013. It will comprise keynote sessions, oral paper presentations and discussions. The official language of the Conference is English and it will be adopted in all the publications and presentations

For further information contact:

Dr. Acharawan Chutarat Acharawan.
chu@kmutt.ac.th
<http://www.luxpacifica.org/news/7th-lux-pacifica/>

As a member of ISLE I have great pleasure to inform you that I was recently conferred the Bharat Jyoti Award along with a certificate of excellence keeping in view my significant contributions in the field of MEP engineering services for the last 15 years, by the India International Friendship Society at a seminar on Economic Growth and National Integration in Newdelhi.



The function was held at India International Centre at Lodhi Road, New Delhi on the 29th August 2012. The award was given to me by the former governor of Tamilnadu and Assam, Dr. Bhishm Narayan Singh in presence of former governor of Jharkhand Mr. Syed sibtey Razi, former chief election commissioner Mr. Krishna Murti and former CBI Director Mr. Joginder Singh. It is my mission to harness the knowledge of MEP engineering services for the welfare of the society and I believe this award will encourage me to follow my green mission.

My Thanks to ISLE.

Gopal Shree Uday,
Senior Manage
MEP Engineering Services
Vatika Limited, Gurgaon.

OTHER NEWS

Light India 2012

Being the first joint exhibition between Elcoma and Messe Frankfurt, Light India was organised from 5th - 8th October 2012 at Pragati Maidan, New Delhi, with strong support from the Ministry of Power, Bureau of Energy Efficiency (BEE), Builders Association of India, Council of Architecture, Central Public Works Department (CPWD) and Global Lighting Association (GLA).

With an emphasis on energy efficient lighting technology, the exhibition played host to 187 exhibitors from China, Germany, India, Italy, USA and Japan. The show was spread across six halls covering an area of

13,800 square metres, and attracted a very large number of visitors which exceeded exhibitors' expectation in terms of visitor quality. This was India's largest lighting exhibition till date.

Coinciding with the exhibition was a two day conference on October 5 and 6. The conference, appropriately titled Redefining Light covered the areas of Sustainability, New Technologies, Humanising Lighting Indoors, The Future and Humanising Lighting Outdoors. The impressive list of speakers included Mr. Chip Israel, IESNA President who many ISLE members would remember from the Lux Pacifica 2002 Conference.

The ISLE stall at the exhibition attracted a number of enquiries about membership, educational opportunities and technical lectures.



Warren Julian and Chip Israel shaking a leg at the dinner

Photographs on page 18

MEMBERSHIP APPLICATIONS APPROVED BY GOVERNING BODY

New Members Admitted on 2nd August 2012

F.0764(L)	Ananth K. Shenoy 39/A, II Main Road Kempanna Layout Near Palace, Guttahalli Circle Bangalore 560 020	Fellow (Life)	Karnataka
F.0765(L)	Satish Panditrao Nanadikar Flat No. B-35 Srushti Coop Housing Soc. Ltd. Kothrud Pune	Fellow (Life)	Mumbai
F.0766(L)	Nilesh Prakash Kacheria Versalite Hitech Lighting Pvt. Ltd. 220 Khetwadi Main Road Tara Mansion, Ground Floor Mumbai 400 004	Fellow (Life)	Mumbai
F.0768(L)	Bibek Bandyopadhyay 7, Type V Flats Lodi Road New Delhi 110 003	Fellow (Life)	Delhi
M.1743(L)	Nimish Prakash Kacheria Versalite Hitech Lighting Pvt. Ltd. 220 Khetwadi Main Road Tara Mansion, Ground Floor Mumbai 400 004	Member (Life)	Mumbai
M.1744(L)	Pradeep Trimbak Bhogal Room No. 17, Mansarovar Hsg. Soc. Near Sai Baba Temple Chaitanya Nagar I.I.T. Market Powai Mumbai 400 076	Member (Life)	Mumbai
M.1745(L)	Pravin Shriram Kadam 2/11, Veer Jijamata Nagar R.C.F. Road, Near Vashi Gaon Chembur Mumbai 400 074	Member (Life)	Mumbai

M.1746	S. Victor Old No. 6/1B, New No. 13 Subaramania Koil Street Ramana Nagar, Perambur Chennai 600 011	Member	Chennai
A.1118(L)	Premal Dilip Shah Versalite Hitech Lighting Pvt. Ltd. 220 Khetwadi Main Road Tara Mansion, Ground Floor Mumbai 400 004	Associate (Life)	Mumbai
A.1119(L)	Nirav Pankaj Kacheria Versalite Hitech Lighting Pvt. Ltd. 220 Khetwadi Main Road Tara Mansion, Ground Floor Mumbai 400 004	Associate (Life)	Mumbai
A.1120(L)	Santosh Shankar Shetty Right Source No. 7, Ismail Chawl, Raheja Township Near Panchwati Bldg. No. 2 Malad (E) Mumbai 400 097	Associate (Life)	Mumbai
A.1121	Dimple Nehal Joshi 2B, 404, Neighbourhood Bldg. Lokhandwala Township Kandivli (E) Mumbai 400 101	Associate	Mumbai

Transfer of Grade

F.0767(L)	Deepak Gahlowt S1 & S2, Second Floor Abhishek Tower, D2 Commercial Complex Alaknanda New Delhi 110 019	Member (Life) From M.1100(L)	Delhi
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				S.1240	Ishtakar Khan	Student	Rajasthan
				S.1241	Neeraj Soni	Student	Rajasthan

S.1242	Shivendra Kumar	Student	Rajasthan	I.0164	D&M Building Products Pvt. Ltd. 3C-137, 1st Floor, 3rd Cross 2nd Main Road, Kasturi Nagar Bangalore 560 043	Institutional	Karnataka
S.1243	Jitesh Kumar	Student	Rajasthan				
S.1244	Anand Kumar Gupta	Student	Rajasthan				
S.1245	Aditya Kumar	Student	Rajasthan	IM.0164	Gitesh Agarwal D&M Building Products Pvt. Ltd. 3C-137, 1st Floor, 3rd Cross 2nd Main Road, Kasturi Nagar Bangalore 560 043	Institutional (Life)	Karnataka
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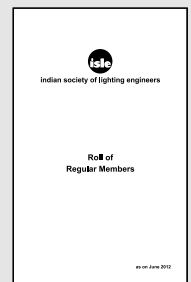
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