CONTENT

DEPARTMENT OF BOTANY

The Department under DBT Star college scheme made an attempt to collect a plant material - *Aerva lanata* from Tirunevelli. The plant was identified and authenticated using Flora of Madras Presidency with voucher specimens being deposited Mount Carmel College herbarium. The plants were shade dried and stored in air tight container for further study.

*Ammania baccifera*Linn. (Lythraceae) is herbaceous plant and is popular substitute of *Aerva lanata* L. and is traditionally known as, Pashana beda. It has been widely used by ayurvedic practitioners for many pathological conditions.

Bentham and Hooker classification
Kingdom: Angiospermia
Class: Dicotyledons
Sub class: Polypetalae
Family: Lythraceae
Genus: Ammania
Species: baccifera

Common name: Monarch red stem
Tamil: Kal-l-uruvi
Sanskrit: Agnibuti
Hindi: Dadmari
Kanada: Kaadugida
Telugu: Agnivendapaku
Malayalam: Nirumelneruppu
Bengali: Banmarich
Marathi: Dadmaria

TRADITIONAL USES

The plant is considered bitter, acrid and used in the treatment of rheumatic pains, intermittent fevers and hepatic eruptions. The leaves of the plant are used to raise the blister in rheumatism when applied to the skin for half an hour or little longer. The fresh bruised leaves are used as rubifacient and external remedy for ringworm and other skin diseases. The plant contains vitamin C and tannins. Roots contain betulinic acid and lupeol; leaves contain lawsone, ellagic acid, quercetin, hentriacontane, dotriacontanol and ß-sitosterol glucoside and fruits contain triacontan-1, 30- diol (Gopalakrishnan *et al.,* 2010) .

MACROSCOPIC CHARACTERS

Habit: It is an erect or procumbent herb up to 40 cm tall..
Leaves: Leaves simple, opposite - decussate2-3 x 0.5 – 0.6 cm on main stem, linear oblong, sessile, leaf base attenuate to cuneate; petiole 1 -1.5 mm long.
Inflorescence: The flowers are borne on in dens axillary clusters.
Flower: Flowers 4 – 5 merous, greenish white or purple 1.2 mm long very small. Pedicel 2 mm long, Calyx tube 1-2 mm log, campanulate, lobes 4, 1 – 1.5mm long, triangular. Petals

absent. Stamen 4; filaments c. 0.5 mm long. Ovary c. 1 mm in diameter, globose, 4 -5 locular, ovules many, stigma capitate.

Fruits: Fruit a capsule, 1 – 2 mm long, globose, exceeding calyx tube. Seeds brownish concavo – convex.

Distribution: This species commonly found in paddy fields and other wetlands. It is distributed in Tropical Africa, Asia, Europe and Australia.

A. Habit of Aerva lanata B: Close – up of plant C: Close – up of flower D: Stem section E. Calcium crystal of stem F: Prismatic crystals G: Phloem fibres

ORGANOLEPTIC CHARACTERS

No distinct odour was noticed, the plant powder was astringent in taste and was blackish brown coarse powder.

POWDER MICROSCOPY:

The powder shows rosette and prismatic crystals and lignified fibers.

ANATOMY OF STEM:

Stem is quadrangular, winged on angles. Epidermis covered with thick cuticle followed by 1-2 layers of chlorenchymatous cortex. This is followed by parenchymatous cortex with prominent air spacesand few crystals. Endodermis and pericycle not distinct in young stem. Vasculature in the form of continuous ring; some cells of outer phloem becoming lignified. Pith large, parenchymatous; sphaeraphides present.

FLOURESCENCE ANALYSIS:

The use of fluorescence can be very useful adjunct to botanical pharmacognosy, since it can be applied as a rapid and easy test to verify certain identification of the botanicals. The fluorescent property of the powdered drug extracts taken in different solvent systems were analyzed under Visible and UV long light (365 nm). Specimens were recorded either as fluorescent (with color and intensity) or not fluorescent and their responses are Tabulated in the Table 1.

Table 1: Fluorescence properties of the extract of ***Ammania baccifera***in various solvents

S.No.	Treatment	Visible light	UV light (365 nm)
1.	***Ammania baccifiera*** Powder	Light green	Fluorescent green
2.	1 N HCl	Green	Reddish orange
3.	Concentrated H_2SO_4	Green	Purple
4.	50% H_2SO_4	Green	Orange
5.	Concentrated HCl	Olive green	No fluorescence
6.	Acetic Acid	Green	Brick orange red
7.	Petroleum Ether	Green	Orange red
8.	Acetone	Green	Orange red
9.	Chloroform	Greenish brown	Fluorescent green
10.	Methanol	Blackish brown	No Fluorescence
11.	Ethanol	Brownish black	No Fluorescence
12.	Ammonia	Yellow green	Parrot green
13.	Nitric acid + Ammonia	Yellowish cream	Leaf green
14.	1N Ferric chloride	Green	Fluorescent green
15.	40% Sodium hydroxide + 10% Lead acetate	Very light green	Light orange
16.	50% Nitric Acid	Light green	Leaf green
17.	Concentrated Nitric acid	Light green	Dark Green
18.	1N Sodium hydroxide (Alocholic)	Leaf green	Reddish brick red
19.	1N Sodium hydroxide (Aqueous)	Yellow green	Light brick red

Highlights of the work done –

- The anatomical study of the above plant would highlight the attributes of this plant.
- The chemicals and stains purchased for the above stated purpose would be extended for practical sessions.
- The grant assisted and facilitated – field trip for the collection of specimen and also enabled students to get exposure in terms of taxonomical study of plants.

DEPARTMENT OF ELECTRONICS

INTRODUCTION

The programmes conducted under star college scheme by DBT were intended to inculcate technical skills and research culture among the students, teachers and technical staff.

Under the scheme, the Department labs were upgraded with latest skill based software (Software for PLCs) and high end equipments. The students and the faculty members were benefitted by these programmes.

By utilizing the grant under this scheme, the programmes conducted were made an attempt to bridge the gap between the industry and academia making the students industry ready.

Training Programme on PLC and SCADA

Under the scheme the Department conducted a **Two day workshop on 'Programming logic controllers and SCADA'** which will enable the students to find job opportunities in the industry.

A **programmable logic controller** (**PLC**), or **programmable controller** is an industrial digital computer which has been ruggedized and adapted for the control of manufacturing processes, such as assembly lines or robotic devices or any activity that requires high reliability control and ease of programming and process fault diagnosis.

They were first developed in the automobile industry to provide flexible, ruggedized and easily programmable controllers to replace hard-wired relays, timers and sequencers. Since then they have been widely adopted as high-reliability automation controllers suitable for harsh environments. A PLC is an example of a "hard" real-time system since output results must be produced in response to input conditions within a limited time, otherwise unintended operation will result.

Supervisory control and data acquisition (**SCADA**) is a system architecture that uses computers, networked data communications and graphical user interfaces for high-level process supervisory management, but uses other peripheral devices such as controllers and discrete PID controllers to interface to the process plant or machinery. The operator

interfaces which enable monitoring and the issuing of process commands, such as controller set point changes, are handled through the SCADA computer system. However, the real-time control logic or controller calculations are performed by networked modules which connect to the field sensors and actuators.

The Workshop was conducted in association with **PROLIFIC SYSTEMS AND TECHNOLOGIES PVT LIMITED** on 1st and 2nd March 2019. The target students were Final Year B.Sc students and M Sc Electronics students.

The key speaker was Mr. H S Shiva Shankar and the other resource persons were Ms. Megha and Ms. Ranjitha. Mr. H Shiva Shankar delivered introduction on PLCs and SCADA systems.

The training helped the students and faculty and gave them practical exposure as the sessions were hands-on technical sessions. The students worked on WPLsoft software to program PLC and IN Touch software for SCADA. SCADA and PLCs were challenging and interesting. Workshop enabled the students in terms of logical and analytical knowledge.

Outcome - students were able to perform experiments such as

- Constructing a ladder diagram
- Constructing logic gates using switches
- Solving logical problems

This paper is a part of **skill development programme**, which is in the curriculum.

Hands on training with S7-1200 PLC training kit

Training on Nanoscience and Technology

Under the DBT Star college scheme, a spin coating unit and chemical work bench were procured and a training program was conducted for undergraduate students on Nanoscience & Technology.

Session started with a lecture on "Introduction to Nanoscience and Technology". It covered Principles and fundamentals of Nanoscience. Different synthesis methods, characterization techniques and applications of nanotechnology were discussed. The students performed the following experiments

- Synthesis of Stannic Oxide (SnO_2) thin films on glass substrate using spin coating were prepared by the students.
- Synthesis of Magnesium Oxide (MgO) Nanoparticles were prepared by students.

Preparation of SnO_2 thin film on glass substrate using spin coating technique

Preparation of MgO nanoparticles using chemical synthesis method



Figure: Thin film prepared using spin coating

Chemical Workbench

Importance and Relevance of Chemical work bench

- *Laboratory workbench* includes UV light and water fixtures that enable students to set up their experiments in workbench itself.
- Different floor (Granite) is provided to perform varying levels of heat and *chemical* resistance, pH testing experiments. Chemical wet bench capture, contain and expel emissions generated by hazardous chemicals or chemical reactions. All laboratory experiments with chemicals should be done in chemical wet bench. While it is possible to predict the release of undesirable or hazardous effluents in most laboratory operations, surprises can always happen. Therefore, the chemical wet bench offers an extra measure of protection.

CONCLUSION

Department profusely thank DBT for funding under star college scheme. With this, the Department could upgrade the lab facilities and conducted training program. Consumables were utilized completely for the lab experiments and students were benefitted with additional skills and knowledge.

DEPARTMENT OF MICROBIOLOGY

DBT Star College scheme facilitated the Department to introduce two new and relevant papers for the under graduate students –

- Clinical Microbiology
- Microbial Ecology

New experiments have been introduced where students will be using new instruments like air samplers and new techniques in applied microbiology. The laboratory experiments are proposed to kindle the thought process in students and incline them towards research.
This paper would ultimately help the students to connect their learning experience to the 'real environment'.

Technical Details of the Programmes

ClinicalMicrobiology
Practicals – Paper 8

The practical sessions focused on simulated clinical samples and identification of potential pathogens.

It is vital that the students considers the mixed suspension as a real "clinical specimen" and process it accordingly. Depending on the provisional clinical diagnosis and the possible etiological agents, suitable culture media must be chosen. Before the suspension is cultured, it is essential to perform microscopic examinations such as Gram stain and hanging drop preparation. While Gram stained smear is compulsory for all the specimens (except non-cholera fecal specimen), hanging drop is applicable only to fecal specimens.

Students performing ABST tests

This involves reading the results of biochemical tests, performance of additional test to identify and confirm the isolate (as for pure culture) and interpret the antibiotic susceptibility report. Cultures were given to the students in various combinations as pathogens and commensals, which the students successfully identified after performing staining and various biochemical tests. Antibiotic susceptibility testing was done on all the pathogenic isolates from the sample given to the students.
E. coli ATCC 25922 , *S. aureus* ATCC 25923, *Klebsiella oxytoca* ATCC 700324, *E. faecalis* ATCC 29212, *Salmonella abony* NCTC 6017, *Micrococcus sps., S. epidermidis, Pseudomonas* sp. , *Bacillus* sp., *Klebsiella* sp.

MICROBIAL ECOLOGY
PRACTICALS – PAPER 8

Microbial Ecology is an elective paper that covers microbiology of soil, air and water. This paper includes chapters on how the microorganisms interact with the three parts of the biosphere – lithosphere, atmosphere and hydrosphere and how they interact with each other within their habitat.

The students learn how these microorganisms survive in these habitats and what influence they have on the environment. The positive and negative outcomes of the microbial activities in these regions are discussed. Extensive research has been going on topics like mycorrhiza, waste water treatment, bioleaching, biodegradation, biofertilizers and biopesticides, hence these core topics can be taken up by the students for further studies.

Microbial Ecology is a vast topic that opens paths to many research areas. Microorganisms have a great influence on the environment and hence on the plants, animals and humans. This paper would guide the students to solve current environmental issues and those which would develop in the future.

Estimation and comparison of Microflora found in air through air exposure method at railway stations and metro stations in bangalore, india

An attempt was made to isolate and study airborne microorganisms in Metro and Railway stations of Bangalore by Exposure Plate Technique.

Initially one set of plates were exposed inside the train for a time duration of 5 minutes. The amount of bacterial culture and fungal culture that grew on both the plates were very few accounting to about 68 cfu/ml in NA and to about 26 cfu/ml in PDA since the plates were exposed for a very short period of time. Some of the notable bacteria are gram positive and negative cocci and gram negative bacilli and some of the notable fungi are fungal colonies which are white with green center and black spores showing a raised appearance.

The second set of plates were exposed for a time period of 10 minutes. The amount of bacterial and fungal growth was considerably higher than that of the plates exposed for 5 min .the amount of bacterial culture and fungal cultures that grew on NA is 235 cfu/ml and 35 cfu/ml in PDA . some of the notable bacteria and fungi are gram positive and negative cocci and gram positive bacilli and some of the notable fungi are fungal colonies which are white with green center with a raised appearance.

The third set of plates were exposed for a time span of 15 minutes . The amount of bacterial and fungal cultures grew in large numbers containing the highest number of colonies. The amount of bacterial and fungal cultures that grew on both the plates

accounted up to 266cfu/ml in NA and 39 cfu/ml. The advantage of exposing the plates for a longer period of time span is that a microorganism is more likely to be deposited on to the surface off a agar plate some during exposure rather than at the start of the exposure time . some of the notable bacterial and fungal colonies in both the plates are gram positive and negative cocci and fungal colonies which are white and cream in colour with a raised and flat surface respectively .

Hence it can be concluded that Metro stations which appear clean and hygienic, do in fact harbor more microorganisms than the Railway station which do not appear as clean. Steps should be taken to ensure better ventilation systems, better sanitization, and prevention of moisture retention at metro stations to prevent damage to public health.

Comparative Study of influence of Biofertilizers on the Growth of Fenugreek and Mustard Plants

To investigate and compare the effects of bio-fertilizers (*Rhizobium* and *Azotobacter*) on the yield and growth parameters: height, root-shoot ratio, chlorophyll content and ammonia content of *Trigonellafoenum-graceum* (Fenugreek) and *Brassica nigra* (Black Mustard). The seeds of fenugreek and mustard were treated with bio-fertilizers and the results were recorded after 45 days and compared with a control.

Fig a): Mustard plants (Control, Biofertilizer- *Azotobacter*, Biofertilizer- *Rhizobium*)

Fig b): Fenugreek plants (Control, Biofertilizer- *Azotobacter*, Biofertilizer- *Rhizobium*)

Final Outcome

It has been observed that the plants treated with biofertilizers give a better yield as compared to the control. With respect to the control plants, the plants treated with biofertilizers were observed to have a greater height and larger leaf surface in both Fenugreek and Mustard. The chlorophyll content as well as ammonia concentration was seen to be higher in plants treated with biofertilizers, as expected, in comparison to the control. In conclusion, biofertilizers enhanced the growth parameters taken into account as compared to the control plants and hence have an advantageous role to play in agronomics and crop yield. When the plants inoculated with *Azotobacter* and *Rhizobium* were compared specifically, it was seen that Fenugreek inoculated with *Rhizobium* showed better growth and higher chlorophyll content because of its specificity towards leguminous plants(ex: Fenugreek) than nonlegumes (ex: Mustard). However with respect to ammonia content, Mustard plants inoculated with *Rhizobium* and *Azotobacter*, showed higher concentration as compared to Fenugreek plants inoculated with biofertilizers.

Industrial Visit – Dairy Classic Ice Creams Pvt Ltd. 2019.

These applied areas of Microbiology will make our students highly competent and meet the needs of their future employers in academics, industry and research.

Benefits – through introduction of the above stated papers

Extensive practical learning

The lab-focused nature of this course means students will gain maximum exposure to both the practical and theoretical aspects of a wide range of clinically relevant pathogens from human as well as environmental sources, helping develop practical skills that are valued by potential employers.

Various study options

Students can study either full-time or part-time on both the MSc and PGDip routes, enabling you to fit learning around your other commitments if needed.

Research experience

Students will typically carry out research projects within one of the microbiology research groups in hospitals, diagnostic labs, agricultural research institutes and industries.

In addition, students would develop the required knowledge, specialist practical skills and critical awareness needed to pursue a career in medical microbiology or applied environmental microbiology.

DEPARTMENT OF MATHEMATICS

The Department of Mathematics conducted a one day Workshop on 'MATLAB', which is a curriculum enhancement and enrichment programme – held on 6th March, 2019. The workshop was possible as the department is under DBT- Star college scheme.

Mr Pramodf Kumar Naik was the resource person , who is a Senior Application Engineer in CoreEL Technologies, Bangalore (Mathworks products).

About MATLAB:

The matrix-based MATLAB language is the world's most natural way to express computational mathematics. Built-in graphics makes it easy to visualize and gain insights from data. The desktop environment invites experimentation, exploration, and discovery. MATLAB helps in taking our ideas beyond the desktop. One can run his/her analyses on larger data sets, and scale up to clusters and clouds. MATLAB code can be integrated with other languages, enabling one to deploy algorithms and applications within web, enterprise, and production systems. MATLAB has many toolboxes which has standard tools for mathematical operations. These tools can be used for data analysis, data visualization, numerical computation and many other mathematical calculations.

TRAINING OVERVIEW:

The one day hands-on training was conducted to enhance the knowledge of students and faculty about MATLAB and its associated tools.

Workshops are an effective way for students to learn the concepts clearly and also for in-depth understanding with relevance in context. In addition to this it inspires us to put forth our creative skills. This workshop had two sessions, where the resource person gave the information on the given topics very effectively. It enabled us to understand the relevance and applications of MATLAB in the current global scenario.

In the first session a brief introduction about MATLAB and basic functions were given.

The second session was about hands on training on the following topics -

- Features of MATLAB R2018b
- Matrix arithmetic & numerical computation
- Data analysis & visualization
- Curve fitting and Symbolic math operations
- Statistical Analysis of data
- Machine learning algorithms

- Solving the ODE's & PDE's using MATLAB

The following were the toolboxes used during the training session:

- Symbolic Math Toolbox
- Partial Differential Equation Toolbox
- Statistics and Machine Learning Toolbox
- Curve Fitting Toolbox
- Optimization Toolbox

The specific objectives of the workshop were:

- Introducing the latest version of the software MATLAB R2018b
- Matrix arithmetic & numerical computation
- Analyzing and visualizing the data
- Curve fitting and Symbolic math operations
- Statistical Analysis of data
- Machine learning algorithms
- Solving the ODE's & PDE's using MATLAB

Feedback from students

The final year mathematics students attended the workshop and they received the workshop with utmost optimism.

'Someone with no knowledge of MATLAB were also inclined to the workshop as Sir started with the basics.'

'The workshop covered the beginning of basic arithmetic calculations till interpolation and various other topics.'

'Insights given on Machine Learning and Deep Learning were very helpful and useful.'

'The workshop was a perfect mix of theory and practical application which made it very interesting.'

'We would like to thank the Mathematics Department for organizing the workshop for a better understanding of the topic. We sincerely thank the resource person for taking time from his busy schedule and make this workshop possible.'

GALLERY

DEPARTMENT OF CHEMISTRY

Science is progressing very rapidly in advanced studies, research and in its applications, hence the department of chemistry aims to equip students at the graduation level to pursue higher studies and take up research. To inculcate scientific temper in students, the department has given free choice to students to select their projects for their elective paper and explore with experimentation for which we require expensive chemicals. To meet this demand DBT funds for star college has been extremely useful and the department of chemistry is highly thankful to them. As there is an increasing need to meet global standards, experimentation in the lab gives them exposure to advanced researches. With the funds provided by DBT, chemicals required for different project work was purchased. It enabled students to understand the applicability and importance of the experiments and projects which motivated them for quality research.

A recurring amount of rupees 2 lakhs was used to purchase chemicals for both practical experiments and projects – undertaken by 600 plus students.

Glimpse of students working in the lab:

To kindle the interest of student to do research, the department of Chemistry arranged for industrial training at SAMI labs, Bengaluru. For the industrial training 6 girls were sent for a ***One day Training Program at SAMI Labs***. The cost of the training program was rupees ten thousand only.

Glimpse of their visit to the lab:

A one day awareness programme +_was organised on March 5th, 2019 by department of Chemistry for under graduate students titled "***Laboratory Safety measures***".

Glimpse of the Programme:

DEPARTMENT OF ZOOLOGY

The department of Zoology has been recognized as star college by DBT vide order No102/IFD/SAN/1600/2017-18 dated 12.07.2017.

The following activities for year **2018-19** are in continuation with the proposed list of topics, experiments and activities in the practical component of zoology syllabus from semester I to VI (throughout the curriculum).

Applied Physiology is the study of biological systems. It involves the application of the knowledge of physiological properties. Applied Physiology gives an advanced theoretical and practical understanding of the functioning of the nervous, muscular, respiratory and cardiovascular systems.

On 18th Feb 2019,**Dr Ashwini Priyanka**, Assistant Professor ,St John's medical college delivered a lecture on principles and use of sphygmomanometer, stethoscope and spirometer. Demonstration of blood pressure reading, pulse reading and ECG reading was done by Dr Ashwini for ***VI semester applied physiology students.***




Microtomy workshop was conducted in the year 2017-18, the knowledge and experience gained about micro technique procedure was applied and paraffin blocks were made and slides prepared for histo - pathological studies, which is a component of skill development.

Neurobiology is the study of cells of the nervous system and the organization of these cells into functional circuits that process information and mediate behavior. It is a sub discipline of both biology and neuroscience. The experiments conducted during the practical classes are as follows:

- **PPSI - Psycho-Physiological State Inventory**
  This is a questionnaire developed by Sanjay Vohra. It investigates the psychological and physiological experiences of an individual which will enable us to differentiate "Psychoneurotic" from a normal individual.
- **Hand-Grip Dynamometer and Steadiness Tester (HGD & ST)**
  This is an experiment which measures the impact of muscular fatigue on fine motor co-ordination of an individual.The test is conducted in 3 phases i.e.,Before fatigue, Inducing fatigue and After fatigue. The no. of errors and time taken shows the impact of fatigue on the fine motor co-ordination.
- **Benton Visual Retention Test (BVRT)**

This experiment was developed by Arthur Benton. This test is used to assess visual perception, retention and memory of an individual. The Number Correct score of an individual is used to interpret the level of visual retention of an individual.

- **Wechsler Memory Scale (WMS)**
  This is a clinical assessment test used to measure important memory functions for clinical diagnosis of memory impairments and neurodegenerative conditions.It is also used in educational and forensic settings. The test is conducted in various stages for various types of memory.
- **Performance Tests of Intelligence**
  The test is conducted as 2 sub tests. The performance quotient of intelligence denotes the presence or absence or organic brain pathology in right frontal regions of the brain.
- **Bilateral transfer**
- he effect of past learning on new learning is designated as transfer of learning. This experiment is used to study the effect of training the preferred hand on the performance of the non- preferred hand. The time taken and errors committed in the trails of the non - preferred hand is used to conclude whether the subject has a positive or a negative impact of the training.
- **Maze learning**
  There are 2 types of learning - Insight learning and Trial and error learning. The subject is given a maze with a systematic path which shows insight learning and a maze with a random path which shows trial and error learning. The time taken and the errors are used to arrive at a conclusion.

Neurobiology Experiments Conducted




Ecology and Research Methodology

Water samples from different sources (bore well, pond, lake, river –Cauvery & Ganges) were analyzed for organic matter, oxygen content and salinity.

Microorganisms in different soil and water samples were identified. Detailed study of pond, lake and urban ecosystems was conducted. Field trip to Hebbal Lake was arranged to study lake ecosystem.

Sparrow Conservation Project –

Sparrow conservation lecture and nest making workshop was conducted on 28/02/2019 as part of National science day activity. School students ,teachers and college students participated . Mr J.N .Prasad eminent birder and naturalist conducted the workshop.

sparrow related 1.pdf

SPARROW CONSERVATION PROJECT – snapshots

FIELD TRIP TO RANGANATHITTU

Ranganathittu is a bird sanctuary in the Mandya District of Karnataka state. It is the largest bird sanctuary in the state, on the banks of the Kaveri River. Field trip was arranged by Dept. of Zoology for second and third year zoology students to observe and study different species of birds, animal inter-action and river ecosystem.

Snapshots of the Field Trip

Department of Physics

Introduction

Solid state physics, material science and Astrophysics are the topics discussed in paper VII and VIII in the VI semester for final year B.Sc. physics students of Physics, Chemistry, Mathematics (PCM), Physics, Mathematics, Computer science (PMC), and Physics, Mathematics, Electronics (PME) combination.

- As content enrichment programme in these two topics, two guest lectures were arranged.

One, on the topic 'Scale of the universe and unsolved problems in Astrophysics'delivered by Dr.Sujatha S, Director, M P . Birla Institute of Fundamental Research, Bengaluru.

The second guest lecture was on 'High pressure studies on materials' delivered by Dr.Dayana Lonappan, Dr. D. S. Kothari Post doctoral Fellow, Department of Instrumentation and applied physics, Indian Institute of Science, Bengaluru and Pre - doctoral Fellow, Hawaii institute of Geophysics, Hawaii, USA, currently, Lecturer in Physics, B.Sc.B.Ed integrated course, Mount Carmel College, Bengaluru,.

- In order to have a practical understanding of the topics taught in theory in'Astronomy and Astrophysics', the Inter-disciplinary course (IDC) in physics, a visit was organized for 30 of our IDC course students to view the sky theatre 3 D star show in Taramandal, the inflated planetarium, to view the exhibits in the space floor and also view the night sky through the telescope in Visvesvaraya Industrial and Technological museum (VITM), Bengaluru.

- To have better understanding of the topics taught in B.Sc. physics in the first two semesters, Mount Carmel bus facility was arranged to Visvesvaraya Industrial and Technological museum (VITM), Bengaluru, for 40 of our II semester B.Sc. physics students of Physics, Chemistry, Mathematics (PCM), and Physics, Mathematics, Electronics (PME) to view the exhibits on engines, electronics, space, solar energy, fun aspects of science, motion and also to watch the sky theatre 3D show on constellations in the inflated planetarium.

On 28thFebruary 2019, National science day

Guest lecture on Astrophysics

Resource person :Dr.Sujatha S, Director, M P . Birla Institute of Fundamental Research, Bengaluru.

Two hour lecture on the topic 'Scale of the universe and unsolved problems in Astrophysics was organized for 61students of 3rd year B.Sc. Physics in Mount Carmel College campus from 8.30 to 10.30am. The students were enlightened on the following aspects.

The talk mainly concentrated on the Astronomy related fields as forefront of science and technology; answering fundamental questions and driving innovation. Although "blue skies research" like astronomy rarely contributes directly with tangible outcomes on a short time scale, the pursuit of this research requires cutting edge technology and methods that can on a longer time scale, through their broader application make a difference.

Astronomy has and continues to revolutionize our thinking on a worldwide scale. In the past, astronomy has been used to measure time, mark the seasons, and navigate the vast oceans. As one of the oldest sciences astronomy is part of every culture's history and roots. It inspires us with beautiful images and promises answers to the big questions. It acts as a window into the immense size and complexity of space, putting Earth into perspective and promoting global citizenship and pride in our home planet. Several reports worldwide indicate that the major contributions of astronomy are not just the technological and medical applications, but a unique perspective that extends our horizons and helps us discover the grandeur of the Universe and our place within it.

On a more pressing level, astronomy helps us study how to prolong the survival of our species. For example, it is critical to study the Sun's influence on Earth's climate and how it will affect weather, water levels etc. Only the study of the Sun and other stars can help us to understand these processes in their entirety. In addition, mapping the movement of all the objects in our Solar System, allows us to predict the potential threats to our planet from space. Such events could cause major changes to our world, as was clearly demonstrated by the meteorite impact in Chelyabinsk, Russia in 2013.

Teaching astronomy to our youth is also of great value. It has been proven that pupils who engage in astronomy related educational activities at school or college are more likely to pursue careers in science and technology, and to keep up to date with scientific discoveries. This does not just benefit the field of astronomy, but reaches across other scientific disciplines. Astronomy is one of the few scientific fields that interacts directly with society. Not only transcending borders, but actively promoting collaborations around the world.

The talk had outlined both the tangible and intangible reasons that astronomy is an important part of society. Although the talk focused mainly on the technology and knowledge transfer, perhaps the most important contribution is still the fact that astronomy makes us aware of how we fit into the

vast Universe, how much we have understood about our surroundings and yet there are many more questions that are left unanswered.

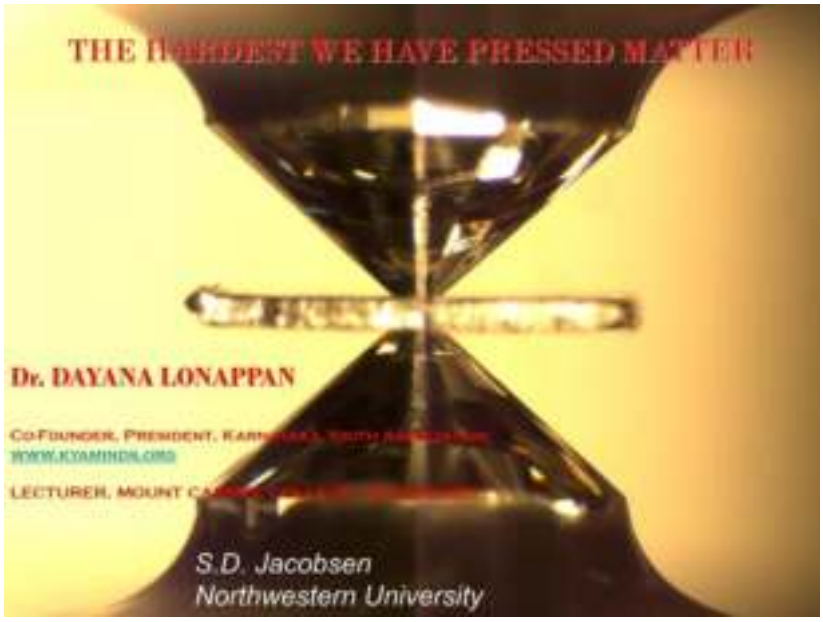
Dr. Sujatha S. delivering the lecture and interacting with the students

On 7thMarch2019

Guest lecture on Material science

Resource person: Dr.DayanaLonappan, Dr. D. S. Kothari Post Doctoral Fellow, Department of Instrumentation and applied physics, Indian Institute of Science, Bengaluru, currently, Lecturer in Physics, B.Sc.B.Ed integrated course, Mount Carmel College, Bengaluru,

One hour lecture on the topic 'High pressure studies on materials'was organized for 61 students of 3rd year B.Sc. Physics in Mount Carmel College campus from 8.30 to 9.30am.



The students were enlightened on the following aspects and the opportunities available for research in material science and related fields in physics.

Production of High Pressures in a laboratory and its applications to material science.

Study of materials at very high pressures is one of the well-established methods to study matter under extreme conditions. Application of pressure can bring about significant changes in the bonding character and consequently in the structural and physicochemical properties of the materials. High-pressure and high-temperature conditions can help simulate the physical conditions inside the earth, planets, and super-earth, synthesize new materials with exotic properties, etc.

In a laboratory, ultra- high pressures (~tera pascals) can be generated using a diamond anvil cell. When a metal gasket is compressed between the culets of two gem quality diamonds set in opposed anvil configuration, very high pressure is generated on a sample in the gasket hole. This talk dealt with several aspects of high-pressure science, methods of pressure generation, different diagnostic methods employed for studying high-pressure and high temperature phenomena, and a few studies showing the structural changes in the materials brought about by its application.

Effect of pressure on materials

Pressure of about 100 GPa increases the free energy by 3-4 eV whereas the increase in the free energy is only a fraction of an eV even at the melting point of the system….

Lattice effects

Electronic effects

1)Decrease in interatomic distances or increase in density.

2)Increase in free energy, phase transitions.

3)Lattice becomes stiffer with pressure, the Debye temperature also increases leading to a change in the phonon spectra.

1) Decrease in interatomic distances, overlap of outer electronic orbitals.

2) Broadening of electronic energy bands.

3) Shifting of energy bands with respect to the Fermi energy E_f.

4) Shifting of the Fermi level itself to higher values

The talk was an eye opener to the students and it created in them an interest to pursue higher studies and research in material science and the related fields in physics..

Visit to Visvesvaraya Industrial and Technological museum (VITM), Bengaluru

6th March 2019

Visit to Visvesvaraya Industrial and Technological museum (VITM) was arranged on 6th March 2019 from 3 to 7 p.m for 30 Arts, Commerce, Management and Applied sciences students of'Astronomy and Astrophysics'Inter-disciplinary course (IDC) in physics.

Resource persons :Dr.Sujatha S, Director, M P . Birla Institute of Fundamental Research, Bengaluru.and Research Associate, Krisnakumar Kowshik

- 3:00 to 4:00 pm – Visit to Taramandal (Inflated planetarium) at VITM for 3D star show.
- 4:00 to 5:00 pm –Space floor activitiesat VITM&Demonstration of launch of PSLV and GSLV (models of Sriharikota launch station).
- 5:00 to 6:00 pm – Description of telescope operation.
- 6:00 to 7:00 pm – Night sky viewing of stars through telescope as well as unaided eye.

Space floor activities at VITM and viewing of exhibits

Demonstration of launch of PSLV and GSLV (models of Sriharikota launch station)

Night sky viewing of stars through telescope

Visit to Visvesvaraya Industrial and Technological museum (VITM), Bengaluru,

14th March 2019

Mount Carmel bus facility was arranged on 14th March 2019 for 40 of our I B.Sc. PCM and PME students to visit the Visvesvaraya Industrial and Technological museum (VITM), Bengaluru along with the physics faculty in order to view the working models and study the industrial applications of the topics taught in the theory syllabus.

I B.Sc. physics students at Visvesvaraya Industrial and Technological museum (VITM)

and At Taramandal for the sky theatre 3 D show on 'Constellations'

Students understanding the practical applications of physics in the 'Science is fun' floor

Visit to VITM was an enriching, entertaining and learning experience and it widened their knowledge about the practical applications of concepts in physics

Acknowledgement

We would like to profusely thank DBT for assisting us with funds under the star Department Scheme. The sanctioned fund is completely and rationally utilized for enhancing the facilities in the above stated departments. The same has enabled updation of software, lab facilities and introduction of relevant cum current papers into the curriculum. Looking forward for continued support from the funding agency.

Dr. Sr. Arpana

Principal

SUMMARY

Mount Carmel College has been granted the star college status in 2017 (Ref. No. BT/HRD/11/04/2017) from DBT, Ministry of Science & Technology, Government of India for seven Under Graduate Science Departments (Botany, Chemistry, Electronics, Mathematics, Microbiology, Physics and Zoology).

The funding by DBT is greatly appreciated by the College, as it has been of immense help in upgradation, enhancement of the respective department's curriculum. This was possible due to imbibing more practical sessions into the curriculum, organizing workshops / hands-on training in recent developments in the subject domain, industrial visits etc.

The Department of Botany made an attempt to collect a rare plant material from Tirunelveli (Tamil Nadu) – the traditional uses, microscopic attributes were highlighted. The anatomical study was possible, which was the outcome of the field trip and students got a good exposure of the local flora.

Department of Electronics conducted a 2 day workshop on PLC and SCADA, which basically aimed at bridging the gap between academia and industry, which would enhance employability of the students. Yet another training programme was possible, which strengthened the students on the practical applications of nano science and technology.

Department of Microbiology introduced practical papers which improved the students practical skills, would provide them with various study options and also kindled their research temper. The students were also taken for an industrial visit to Dairy Classic Ice creams Pvt. Ltd and Green Dairy Farm (Cheese production Unit).

Department of Mathematics organized a workshop on MATLAB – which is a curriculum enhancement and enrichment programme. It enabled the students to understand the relevance and applications of MATLAB in the current global scenario.

Department of Chemistry arranged for a one day industrial training programme at SAMI labs, Bengaluru, that enhanced student's scientific temper, gave them a bird's eye view into applications of chemistry. An awareness programme was also organised on Laboratory Safety measures.

Department of Zoology buzzed with activities right from lectures on applied physiology, workshops on microtomy and neurophysiology to an awareness initiative on sparrow conservation and eco-diversity field trips, which was well appreciated by well known ornithologists and academicians around.

The above stated departments fulfilled their targets for the year and the funds were rationally and prudently utilized. The departments in specific and the college in general would like to profusely

thank DBT for their generous financial support extended during the last two financial years. Looking forward for your continuous support in order to accomplish greater goals in the near future.

Dr.Uma V
Co-Ordinator,
DBT – Star College Scheme
Mount Carmel College