

**DEPARTMENT OF PHYSICS**  
**T.M. GOVT. COLLEGE TIRUR**  
**REPORT OF ACTIVITIES 2022-23**

## **INTRODUCTION**

The Department of Physics was started in the year 2004 with the introduction of B.Sc. Physics course with an intake of twenty eight students. Now the intake of students in B.Sc. Physics course is increased to thirty. The department has a well equipped and furnished spacious laboratory with a darkroom for light experiments, and a sophisticated telescope for night sky watching. The Department has four permanent teachers actively engaged in research activities. Many students after competing B.Sc. Physics, go for higher education in premier institutes like National Institute of Technology, Central Universities, in recent years. The department offers open course in Non conventional Energy Resources for fifth semester degree students of other departments. The complementary courses for B.Sc. Physics are Mathematics and Computer Science.

### **Courses offered in 2022-23**

#### **1. B.Sc. Physics**

#### **2. Complimentary Physics for B.Sc. Maths**

Seats allotted to B.Sc. Physics in 2022-23	– 41
Total students admitted to B.Sc. Physics in 2022-23	- 41
Students admitted in open category	- 18
Students admitted in reservation category	- 23
APPROVED TEACHING POSTS	- 4
APPROVED NON TEACHING POST	- 1
NUMBER OF GUEST TEACHERS	- 1

## **ADD-ON COURSES**

1. “Introduction to Scientific Computing” with 30 hours
2. “Energy harvesting from Renewable Resources” with 30 hours

## **CERTIFICATE COURSES**

### **1. MATERIALS SCIENCE WITH 30 HOURS**

## **BRIDGE COURSE**

### **1. Foundation course in Physics and Computer Science**

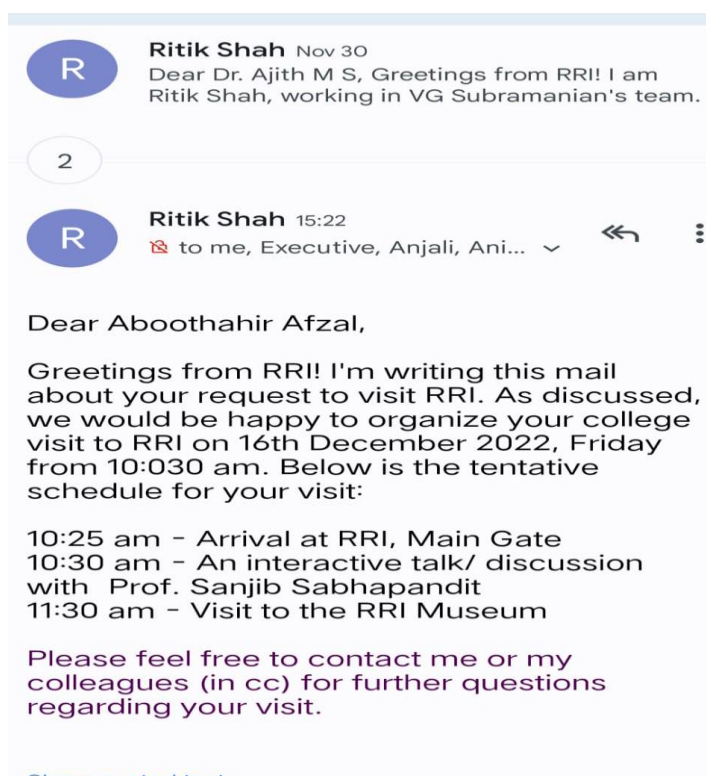
This Annual Report provides an extensive summary of the activities at the Department of Physics T.M. Govt. college Tirur, during the year 2022-23. Physics department had many activities involving staff and students in the academic year 2022-2023 under the leadership of Dr.Aboothahir Afzal. The college reopened on June 1<sup>st</sup> 2022 after summer vacation. The classes for II year and III year B.Sc. Physics started. There were no transfers for the teachers this year. The faculty in Physics department are Dr.Aboothahir Afzal, HOD, Smt. Jayashree , Smt. Soumya and Smt. Asha. Smt. Jayashree is the class tutor of III B.Sc. Physics and Smt. Soumya .C is the class tutor of II B.Sc. Physics. Smt. Asha is given admission in charge for I B.Sc. Physics.Dr.Aboothahir Afzal was on deputation duty under ministry of minority affairs Govt. of India for Haj duty from May 19,2022 to August 2, 2022. During this period Smt. Jayasree was HOD.

In addition to the regular teaching and internal evaluation works, the department conducted the following activities in the academic year 2022-23. During this academic year, major achievements include signing of MoU with MES Ponnani College was signed and one research paper was published in international journal by the faculty.

# ACTIVITIES FOR 2022-23

## 1. Study tour for III B.Sc. Physics

Thirty seven students of III B.Sc. Physics and two faculty of the Physics department went for study tour to Raman Research Institute Bangalore and Indian Institute of Science Bangalore on 16-12-2022. The students interacted with the scientists in RRI and visited Raman Museum. Dr.Ritik Shah scientist in RRI gave a lecture to the students on the topic 'Statistical Physics'. In addition, the students visited Chikmangalur, Dandeli and Gokarnaand returned to college on 20-12-2022. Gowtham of III B.Sc. Physics was the student coordinator of the tour.and Dr.Aboothahir Afzal was the staff coordinator of the tour. The students got good exposure from the tour.





## **SPACE WEEK CELEBRATIONS**

Poster making competition was conducted as part of space week celebrations on October 4-10,2022. Around 30 students participated in the program.

**Space Week Celebrations**  
October 4 - 10, 2022

**Department of Physics  
&  
Science club**  
JOINTLY ORGANISING

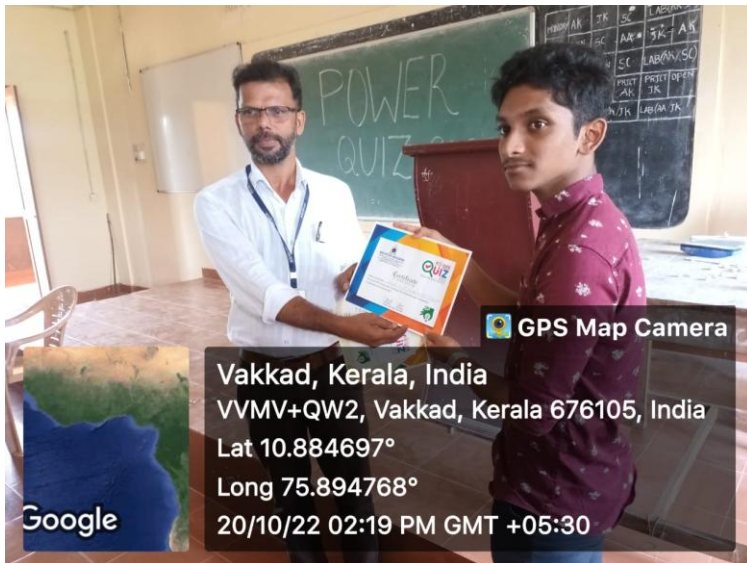
**CONTESTS**

1. Documentary Making
2. Poster Making
3. Quiz Competition

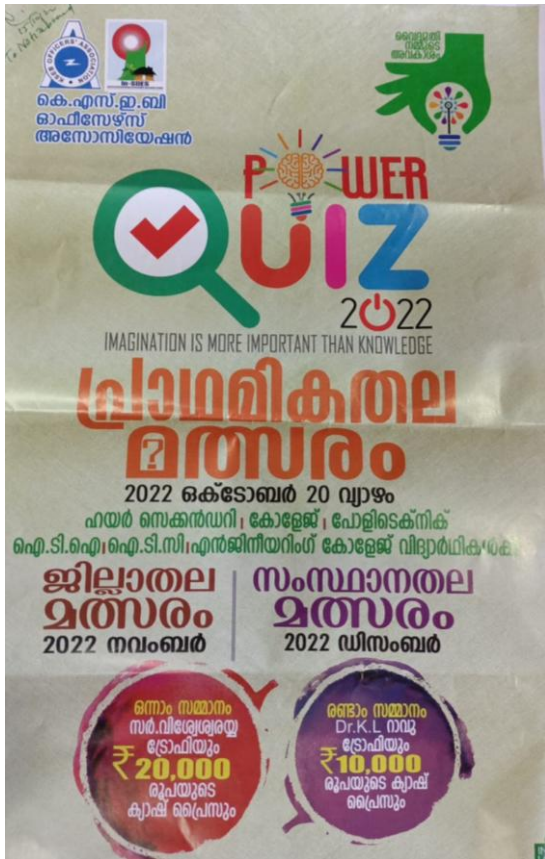
**THUNCHAN MEMORIAL GOVERNMENT COLLEGE  
TIRUR**

## POWER QUIZ

KSEB officers Association Vettom organized a power quiz on 20-10-2022 in the college. Around 20 students participated in the quiz and the winners were given prizes and chance to participate.





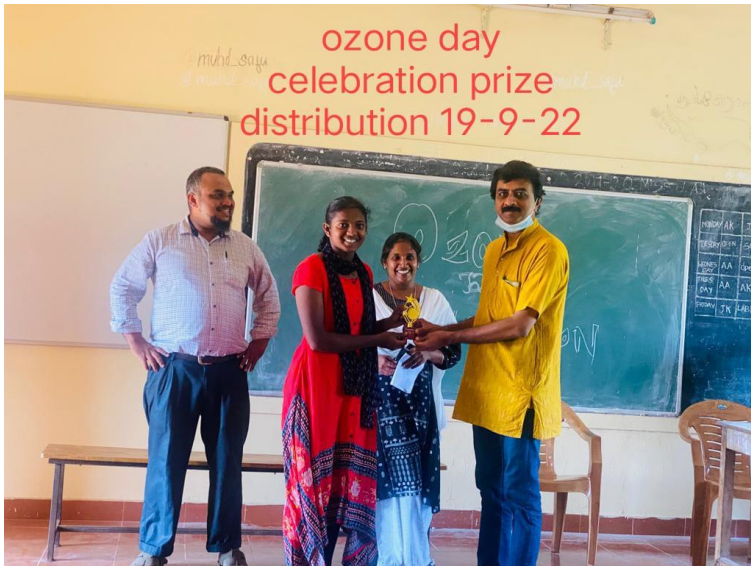


## Bridge course

Bridge course for first B.Sc. Physics students was conducted on several days by faculty. Foundation courses in Electronics lab, Mathematical Physics and Mechanics were discussed for the convenience of the students.



## OZONE DAY, POSTER PRESENTATION COMPETITION

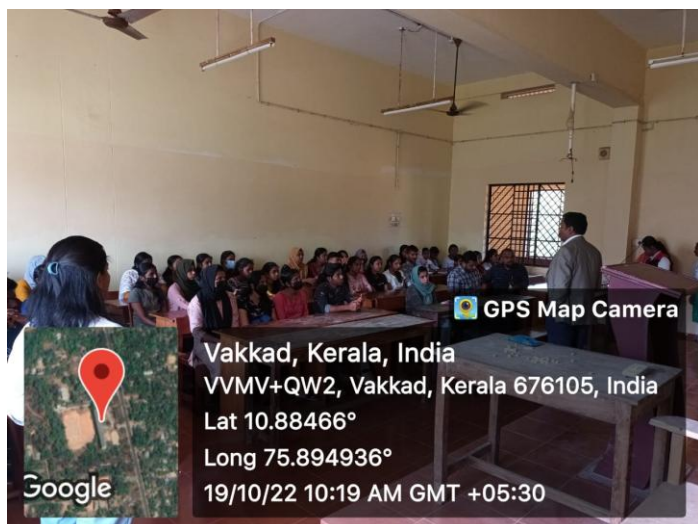




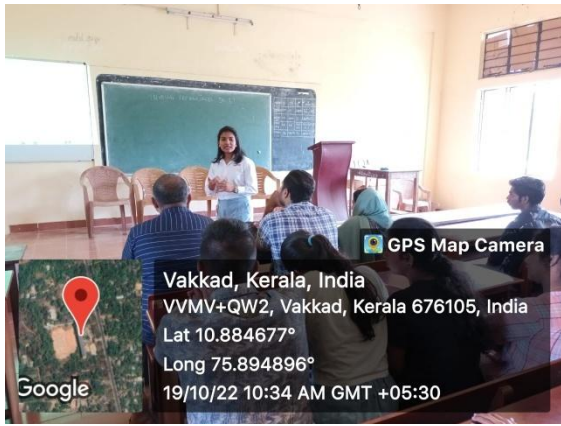
As part of Ozone day, poster presentation competition was conducted. Ozone day celebration was conducted and prize for poster presentation competition was distributed on 19-9-2022 by Principal Dr.Ajith M.S.Sreelakshmi of the III B.Sc. Physics got the first prize in the poster competition.

### **CAREER GUIDANCE CLASS FOR III BSC PHYSICS STUDENTS BY JETKING COMPUTER NETWORKING ACADEMY KOCHI on 19-10-2022**

Career awareness class for third B.Sc. Physics students was conducted by JETKING Academy Cochin on 19-10-2022. Opportunities in the field of computer hardware and networking was presented. Students got exposure to this field of networking due to this class.



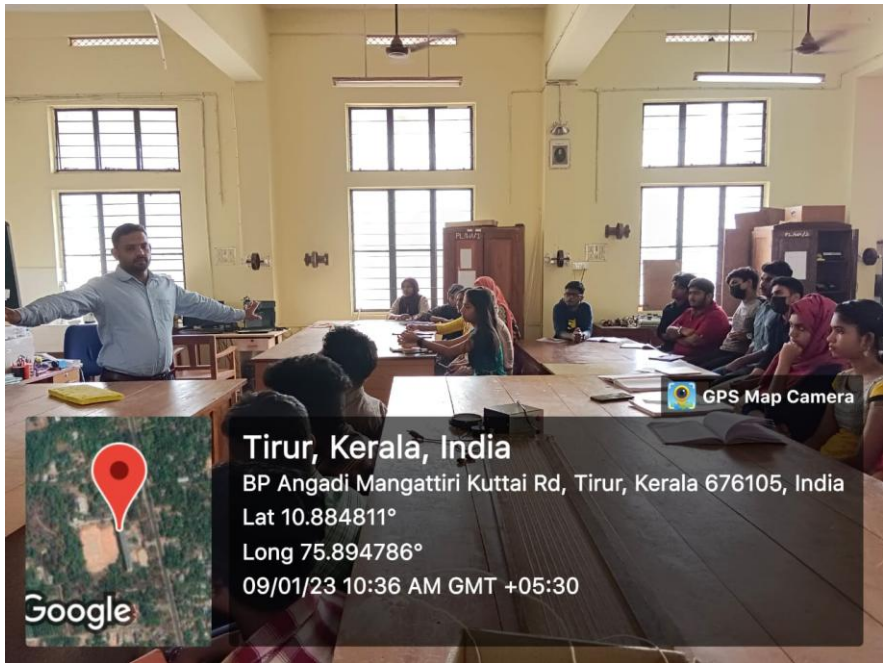
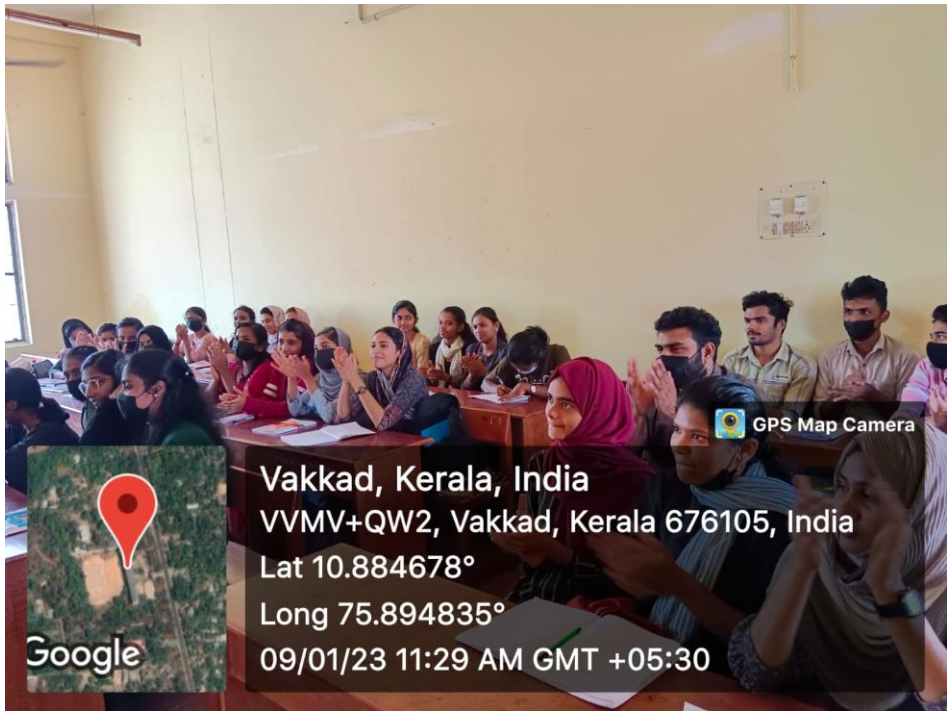




### **CAREER GUIDANCE CLASS BY SHEEN INTERNATIONAL FOR I year and III BSC STUDENTS on 9/1/23**

Mr.Rafi.K. Director of Sheen International interacted with third year and first year physics students on 9/1/2023 and given a class on higher educational opportunities and motivated them.





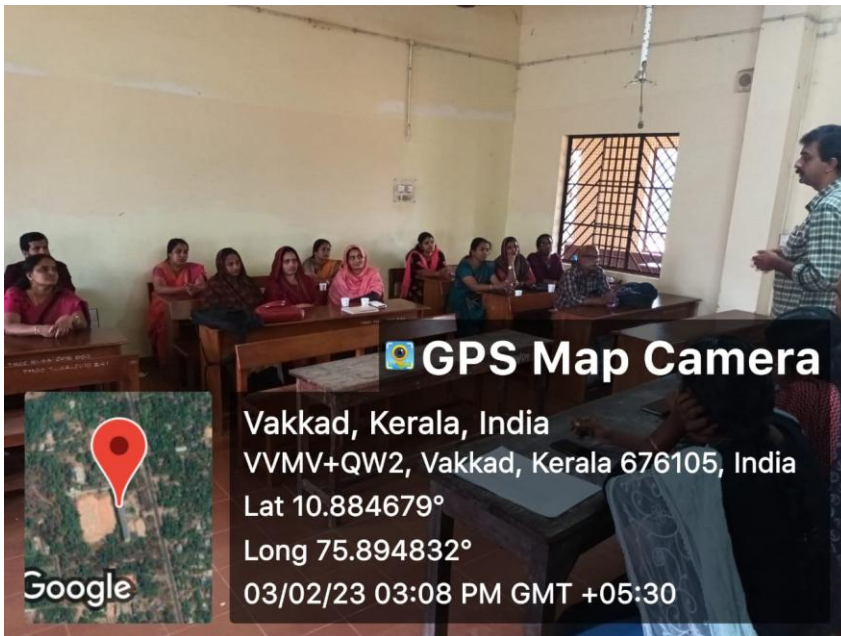


#### 4. Class PTA meeting for I, II and III B.Sc. on 3-2-2023 and 2-2-23

Conducted a class PTA meeting for II B.Sc. Physics students. 20 Parents participated in the meeting. Principal Dr.AJITH M.S. attended the meeting. Dr.Aboothahir Afzal HOD. of Physics presided over the meeting. Class tutor Mrs.Soumya.C. and other teachers of the department interacted with the parents.









## NATIONAL SCIENCE DAY CELEBRATIONS 2023

As part of National Science day celebrations , a visit to Center For Materials For Electronics Technology CMET was organized on 28-2-2023. 35 students from I year B.Sc. Physics and two teachers visited the labs in CMET Thrissur and interacted with the researchers there. As part of National Science day celebrations , a visit to Center For Materials For Electronics Technology CMET was organized in association with Science club on 28-2-2023. 33 students from I year B.Sc. Physics and maths and three teachers are visited the labs in CMET Thrissur and interacted with the researchers there. We have reached the lab around 10 AM . Dr. S. Sankaranarayan potty scientist of this lab gives an introduction class to our students. He explained all of their work in very well and that session is very effective to our students. After this session one of their staff accompanied by showing all the labs.





### **Night skywatch camp 2023**

A night skywatch camp was organized in Assabah Arts and Science college Valayamkulam in association with Department of Physics, T.M. Govt. College Tirur. The telescopes of the department were utilized for the same. Dr. Aboothahir Afzal was the resource person of the program. Former B.Sc. Physics student of our college Mr. Shahal was the technical assistant for handling the telescope. Principal of Assabah College Valayamkulam Dr. Mohamed Koya and HOD, Mrs. Bincy led the program. Around 50 students participated in the night skywatch camp.





## **CAMPUS VISIT OF SMM HIGHER SECONDARY SCHOOL STUDENTS TO OUR COLLEGE**

Plus one students of SMM HIGHER SECONDARY SCHOOL Tanur visited our college on 21-2-2023 as part of campus visit. Dr. AJITH M.S. Principal inaugurated the program . Dr. HILAL, (ARABIC ), Dr. Vinod Kumar( Maths) interacted with the students. Dr. Aboothahir Afzal HOD Physics welcomed the students and the students spent some time in the Physics lab. The students got benefited and motivated by the career guidance classes by the profsors of our college. Dr.Ashraf KT., English teacher of the school accompanied the



students.

## **RESEARCH ACTIVITIES**

Dr.Aboothahir Afzal published a paper in international Journal Research in Chemistry on February 7<sup>th</sup> 2023. As part of MoU, 12 third B.Sc. Physics students are doing their project in MES Ponnani College under the guidance of Dr.Jayakrishnan. Assistant professors of the department Smt. Soumya and Smt. Asha are doing their part time Ph.D. in University of Calicut. Dr.Aboothahir Afzal got Ph.D. guideship in Research centre in Physics department of Govt. Arts and Science College Calicut. Mrs.Soumya published a paper in international journal.





Contents lists available at ScienceDirect

Results in Chemistry

journal homepage: [www.sciencedirect.com/journal/results-in-chemistry](http://www.sciencedirect.com/journal/results-in-chemistry)

## Computational studies on anticancerous Camptothecin and its derivative Camp-10 by Density Functional Theory

Sourav Baiju<sup>a</sup>, Aboothahir Afzal<sup>b,c,\*</sup>, M. Shahin Thayyil<sup>d</sup>, Jamelah S.Al-Otaibi<sup>d</sup>, Syed Kashif Ali<sup>e</sup>

<sup>a</sup> Department of Physics, School of Advanced Sciences, VIT, Vellore, India

<sup>b</sup> Department of Physics, T.M. Govt. College, Tirur, Kerala, India

<sup>c</sup> Department of Physics, University of Calicut, India

<sup>d</sup> Department of Chemistry, College of Science, Princess Nourah bint Abdulrahman University, Saudi Arabia

<sup>e</sup> Department of Chemistry, College of Science, Jazan University, Jazan 45142, Saudi Arabia

### ARTICLE INFO

#### Keywords:

DFT  
Camptothecin  
Adsorption studies  
Anti-cancerous  
Drug delivery  
Molecular docking

### ABSTRACT

Camptothecin, derived from the bark and stem of a tree, *Camptotheca Acuminata* is popularly known for its excellent anti-cancer activity against many types of tumours. In this paper, a comprehensive quantum computational analysis of Camptothecin (CPT) and its recently found derivative Camp-10 is done with the help of Density Functional Theory (DFT) using Gaussian 09, whereas the molecular docking studies were performed by using Glide module (Rigid Receptor Docking) using Schrödinger Maestro software package (Version 9) for understanding the drug protein interactions. FTIR and Raman spectra obtained by DFT method of both title molecules are in agreement with the reported values. From the frontier Molecular Orbitals (FMO) calculations, the global chemical descriptors were determined for both title molecules. Electrostatic potential mapping (MEP), and Natural bond orbital analysis (NBO) were carried out, and found that Camp-10 is more active than CPT. Finally, drug delivery applications of both CPT and Camp-10 were studied on both Graphene and Nitrogen-doped Graphene. The adsorbed structures of the title molecules were also analysed using DFT method to understand their thermal properties, adsorption energies, and polarizabilities. Camp-10 exhibit a lower value of adsorption energy in both adsorbed configurations compared to CPT. Molecular docking studies revealed that Camp10 binds stronger towards intercellular topoisomerase I, compared to CPT.

### Introduction

Natural compounds have several applications both within and beyond the pharmaceutical industry since they have such a wide spectrum of chemical and physical characteristics [1]. These natural extracts may come from marine organisms, fungi, or plants. It is now assumed that several of these compounds act in protection against an outside predator's attack or the plant's toxic or carcinogenic effects [2]. However, it is not widely understood how these compounds function. With the new computational formulations, technologies, and methods like the Density Functional Theory (DFT), the characterization of these above-mentioned properties has become possible [3]. These calculations are a potential method to understand the function of these natural extracts and possibly find applications in different disciplines [4].

Many natural alkaloids have been proven to have anti-tumor

properties [5]. Some of them are already in use as anti-tumor agents. Exploring the medical applications of these compounds which are extracted or produced from native plant species helps in improving the understanding and allows us to explore new possibilities to improve their medical and pharmacological applications. Their biosynthesis and pharmacological effects differ from compound to compound, and as a result, so do the study focuses [6]. While some research is concentrated on cancer prevention [7,8], other research is concentrated on cancer chemotherapy [9,10].

Camptothecin (CPT) is one of the potential anti-cancerous compound which requires a lesser concentration to have significant anti-tumor activity and it was found to be active against Leukaemia [11] and walker carcinosarcoma [2,12,13]. It is a pentacyclic-ringed indole alkaloid that is very unsaturated. Treatment with alkali yields a lactone sodium salt which is water soluble, and acidification results in the

\* Corresponding author.

E-mail address: [abahyn@gmail.com](mailto:abahyn@gmail.com) (A. Afzal).

<https://doi.org/10.1016/j.rechem.2023.100637>

Received 12 October 2022; Accepted 2 February 2023

Available online 7 February 2023

2211-7156/© 2023 The Author(s). Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Memorandum of Understanding (MOU)

The department of Physics signed MOU with departments of Physics of Grace Valley College Maravattam and MES Ponnani College, and with SMM Higher secondary school Tanur. As part of MoU, workshop on Python programming was conducted in Grace valley college and some III B.Sc. Physics students did project in MES Ponnani College.



കേരളം കേരल KERALA

DD 168914

### MEMORANDUM OF UNDERSTANDING

between

Department of Physics, Grace Valley College of Arts & Science, Maravattam,

and

Department of Physics, T.M. Govt. College, Vakkad P.O. Tirur, PIN-676502





Principal,  
Grace Valley College of arts &  
science, maravattam.  
Chengottoor P.O.,  
PIN - 676503  
Kerala, India.

Principal,  
T.M. Govt. College,  
Vakkad P.O.,  
Tirur,  
Malappuram district  
PIN - 676502,  
Kerala, India.

Name and dated signature of first party:



  
**Dr. K. MUNAVAR JASIM**  
PRINCIPAL  
**Grace valley**  
College of Arts & Science  
Maravattam-676503

Name and dated signature of second party:



  
**Principal,**  
**T.M. GOVT COLLEGE**  
**TIRUR**





കേരളം കേരल KERALA

DP 167080

**MEMORANDUM OF UNDERSTANDING**

**PG & RESEARCH DEPARTMENT OF PHYSICS,  
MES PONNANI COLLEGE, PONNANI**

**AND**

**DEPARTMENT OF PHYSICS, T.M. GOVT. COLLEGE TIRUR**

This Memorandum of Understanding (herein after referred to as MoU) is entered into on 30<sup>th</sup> January 2023 by PG & Research Department of Physics, MES PONNANI COLLEGE, Ponnani, and Department of Physics, T.M. Govt. College, Tirur. The scope of the MoU, the roles and responsibilities of the parties of the MoU are given below:

*[Signature]*  
Principal,  
T.M. GOVT COLLEGE  
TIRUR

THUNGHAN MEMORIAL GOVT COLLEGE  
Date: .....  
P.O. VAKKA,  
TIRUR

*[Signature]*  
Assistant Professor  
in charge of the Principal  
MES Ponnani College  
Ponnani South - 679 586

M.E.S PONNANI COLLEGE  
P.O.  
PONNANI SOUTH  
679 586

SUB TREATY  
9 JAN 2023  
TIRUR

നമ്പർ: 12544. വീറ്: 100.

തീയതി: 19. 01. 23.

അംഗം/ഒരുപാട്: തിരുർ.

പേര്: അബ്ദുൽ ഹമീദ്, ടി.എം.ജി. കോളേജ്, തിരുർ.

TANUR SRO VENDOR  
AP IBRAHIM  
L No: B8/13626/7P

**The** activities report is submitted on 31-03-2023 to the principal of our college.

Thanking you

Dr. Aboothahir Afzal  
Assistant professor physics  
Department of physics  
Thunchan Memorial Govt. College , Tirur