DST

INSPIRE INTERNSHIP SCIENCE CAMP

November 24 to 28, 2017

Sponsored by

Department of Science & Technology, Govt. of India
New Delhi

SOUVENIR

Organized by

GOVT. V.Y.T.PG. AUTONOMOUS COLLEGE, DURG C.G.

(REACCREDITED BY NAAC WITH "A+" GRADE III-CYCLE)
(SELECTED FOR UGC "CPE" SCHEME PHASE-III)
(INCLUDED IN STAR COLLEGE SCHEME OF DBT, NEW DELHI)
(AWARDED 1st RANK BY DEPARTMENT OF HIGHER EDUCATION, C.G. GOVT. UNDER PANCHMUKHI YOJANA)
(SELECTED FOR PREPARATION OF NATIONAL HIGHER EDUCATION QUALIFICATION FRAMEWORK BY MHRD, NEW DELHI)
2017

STATUE OF SWAMI VIVEKANAND IN COLLEGE CAMPUS

OUR COLLEGE CAMPUS

DST

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SOUVENIR

Principal & Coordinator
Dr. S.K. Rajput

Assistant Coordinators
Dr.Anil Kumar
Dr. Ajaya Singh
Dr. Prashant Shrivastava

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Contents

From the Principal's Desk

With a glorious history of 59 years Govt. V.Y.T. PG. Autonomous College, Durg has scaled new heights in academics, sports and cultural activities. The college has carved a niche for itself on the academic map of India, being accredited **A+** by NAAC Bengaluru. It has now become a centre of excellence for students from rural and urban areas.

The college is known for its excellent infrastructure with state of art science labs for research and teaching. At present the college caters more than 5000 students from different streams.

The college is privileged to organize the prestigious **INSPIRE Science Internship Camp** for the second time from 24th to 28th November 2017. INSPIRE (Innovation in Science Pursuit for Inspired Research) is an innovative programme developed, managed and sponsored by the Department of Science & Technology, New Delhi, to attract talent to the excitement and study of science at an early age, and to help the country build the required critical resource pool for strengthening, expanding the science & technology system and research & development base. With the above aim in mind the college has invited the toppers and meritorious students of Chhattisgarh from the various boards like CGBSE, ICSE and CBSE. About 70% of the participants are from the remote areas of Chhattisgarh like Surajpur, Bacheli, Dantewada, Kawardha, Sukma, Bhanupratapur, Vishrampur, Sarguja, Korba and Jagdalpur. The basic segment of the camp will include lecture-cum-interactive sessions by national and international mentors of repute in their subjects like Physics, Chemistry, Botany, Zoology, Mathematics, Geology, Microbiology and Biotechnology. In consonance with the vision of digital and clean India, various competitions will be organized during the camp. Students who participated in the camp organized last year passed their examination with flying colours. Through this camp the aim of DST to inspire students in the field of basic sciences and to incline them towards scientific research is fulfilled.

I hope the students will get a boost to their inclination towards basic sciences and are able to form an even clearer picture about their career path. Above all I wish participants gain knowledge and cherish great memories.

Good luck to one and all !

(Prof. S.K. Rajput)
Principal
Tel. 0788-2359688
Mob. 9425211073
E.mail- skchem4450@yahoo.com

About Inspire....

The strength of the innovation infrastructure of a nation has enormous significance in the competition among emerging knowledge economies. The realization of Vision 2020 calls for action and a well designed innovation infrastructure.

Generation and nurturing of a human talent pool capable of utilizing and developing first principles in science is both a pre-condition and integral part of such an innovation infrastructu re. An India specific model for attracting talent with an aptitude for research and innovation, for a career in Basic & Natural sciences is required. INSPIRE is an innovative programme developed by the Department of Science & Technology to attract talent to the excitement and study of science at an early age, and to help the country build the required critical resource pool for strengthening and expanding the S&T system and R&D base. It is a programme with long term foresight.

"Innovation in Science Pursuit for Inspired Research (INSPIRE)" is an innovative programme sponsored and managed by the Department of Science & Technology for attraction of talent to Science. The basic objective of INSPIRE is to communicate to the youth of the country the excitements of creative pursuit of science, attract talent to the study of science at an early age and thus build the required critical human resource pool for strengthening and expanding the Science & Technology system and R&D base.

A striking feature of the programme is that it does not believe in conducting competitive exams for identification of talent at any level. It believes in and relies on the efficacy of the existing educational structure for identification of talent.

College At A Glance

Government Vishwanath Yadav Tamaskar Post-Graduate Autonomous College, Durg is a leading higher education institution in Chhattisgarh. It is affiliated to Durg University, Durg. The college has been conferred with the status of autonomy by the UGC since 1989. The college accredited with **grade "A^+" (with CGPA of 3.58)** by NAAC in Third cycle, and has been recognized by UGC as **'College with Potential for Excellence' (CPE)**, receiving the grant under IIIrd Phase of the scheme. Five departments from faculty of Science and one from Social Science have been identified by UGC under CPE scheme as highly rated departments. The institute has been shortlisted and recognized under **DBT Star College Scheme** by the Department of Biotechnology (DBT) Govt. of India, under this scheme 6 departments from faculty of Science have been selected for providing financial support. The department of Chemistry was recognized under **Funds for improving Science and Technology Infrastructure (FIST)** Scheme by department of Science and Technology, Govt. of India. The college has the distinction of being one of the 20 prominent institutions across the country to have been selected for providing suggestions on **National Higher Education Qualification Framework (NHEQF)** of India.

The college offers UG and PG courses in Science, Arts and Commerce streams, equipped with 21 teaching departments, including 16 PG departments, 104 faculty members and 14 recognized research centres, namely Hindi, English, History, Political Science, Sociology, Economics, Commerce, Physics, Chemistry, Botany, Zoology, Geology, Mathematics, and Biotechnology. Department of Physics, Chemistry, Maths, Botany, Microbiology, Biotechnology, Geology have research collaborations with national & international institutes of high repute. Many of the departments render paid as well as free consultancy services for sharing their knowledge resources for the benefit of institutions and society. The college houses study centres of IGNOU and Pt. Sundarlal Sharma Open University.The college had a humble start with just two rooms that hosted. Arts and Science faculty, at the local *Hindi Bhawan*. The foundation stone of the present building was laid by the then Chief Minister of Madhya Pradesh Dr. Kailash Nath Katju in November, 1958. It was shifted to its present campus of 21.75 acres, in 1962. Since then the college is continuously growing in terms of infrastructure and learning resources in its journey towards excellence.

The college served as a major resource to provide man-power to Bhilai Steel Plant. This led to a breakthrough in socio-economic transformation of this region. Presently the college is one of the biggest Govt. Colleges in Chhattisgarh, a **Lead College** of Durg district that provides administrative and academic support and guidance to 56 colleges of the district. The college has student strength of 5248 in the current session. It holds the unique opportunity of being a mixed bowl of urban, tribal & rural students, majority of them being first generation learners. **The college, since its inception, is serving the society in a significant way by providing higher education to first generation learners.**

This institution holds high repute in the field of academics as well as in sports. A large number of students from this college are holding prestigious and distinguished positions. Many of them are serving the society with their significant contribution in the field of administration, public services, education, art and literature, sports, business and entrepreneurship.

The institute has excelled in the field of research, consultancy, extension and collaboration remarkably in the last five years. Our faculty have organized 58 National and International Conferences, successfully completed 47 major and minor research projects. They have published 16 Books and contributed in editing works of various journals apart from acting as members of Editorial Boards of 24 journals. Our faculty have participated in 780 Seminars, Symposia and Conferences and published 432Internation, 168 National research papers in peer reviewed high impact factor journals. 221 research students have been enrolled in last five years

under the supervision of 38 research guides for pursuing their Ph.D. Faculty have also signed and are working under purview of 06 MoUs and 06 foreign visits.

The research scholars have bagged a number of fellowships conferred by various agencies viz.-- DST-Women Scientist Fellowship, UGC-Post Doctoral Fellowship, Maulana Azad Fellowship, Rajiv Gandhi National Fellowship, Indira Gandhi Single Girl Child Fellowship, CSIR-UGC-NET-JRF Fellowship, GATE and Fellowship of Biotech Consortium of India Limited. At state level also they have awarded with **Young Scientist Award**, Best Paper Presentation Award etc. The college is solitary institution amongst hundreds of colleges in Chhattisgarh and M.P. selected under **Star College Scheme** by Deptt. of Biotechnology, Govt of India.

The College has a well defined and independent system for student support and mentoring. The system works in close association with all the stakeholders to ensure all round development of the students. The Parent Teacher Student Association (PTSA) has been formed where teachers are assigned 70 to 80 students and act as mentors to them. The Institution also engages students in various extracurricular activities, the most popular amongst them being sports, cultural activities, NCC, NSS, and Youth Red Cross. Students are also actively engaged in winning laurels at various seminars, conferences and workshops at national and international levels.

To orient and engage one of the largest group of community is not an easy task, so the college fraternity has taken initiatives to inculcate awareness and also sensitize the community towards societal issues through Innovative Practices under the auspices of **Academia-Community Interface Programme (ACIP).**

For better academic and administrative functioning, the institution has introduced a variety of best practices, amongst these three best practices are:

1) ***Academic Mentoring of Schools (AMS)*****:** This practice was introduced in 2011 keeping in view to promote collaborative engagements between the institution and the government schools in the neighbourhood. The objective behind adopting it aims at transferring of academic expertise and skilled resources and provide institutional assistance to upgrade and facilitate these schools with good academic and intellectual help to empower them to keep pace with the fast changing global and local scenario.

2) ***Promotion Of Quality Culture Amongst Colleges (PQCC):*** Promotion of Quality Culture amongst Colleges was initiated and introduced with an aim and desire to build a "knowledge Society" around creating quality consciousness among the colleges in the state. The world has transformed into a global village. Upcoming market economies, new technologies and emerging trends set a challenge to educational institutions. In order to meet these challenges and thrive, sharing of knowledge and expertise has become the dire need of all the institutions. The college has taken a lead by implementing this practice successfully. Various efforts at developing strategies and measures for implementation of quality education and quality culture within campuses have also been assured through the formation of the '**District Quality Circle'.**

3. ***Efforts to resolve societal problems*** – Our college has under taken initiatives for various problem of society with the aim to serve society. We are working for various societal problems viz. Sickle cell anamia, Thalassemia, organic and inorganic pollution analysis, monitoring of river health of the state, training to youth for their career like mushroom cultivation.

DST
INSPIRE INTERNSHIP SCIENCE CAMP 2017
List of Committees

Programme coordinator- Dr. S.K. Rajput, Principal
Assistant Coordinator – Dr. Anil Kumar, Professor Zoology
Assistant Coordinator – Dr. Ajaya Singh, Professor Chemistry
Assistant Coordinator – Dr. Prashant Shrivastava, Assistant Professor Geology

Core Committee

Name	Department	Contact Number
Dr. S.K. Rajput	Principal	94252-11073
Dr. M. A. Siddhiqui	HOD ,Maths	9827173652
Dr. Anupama Asthana	HOD, Chemistry	98271-62574
Dr. Jagjeet Kaur Saluja	Professor, Physics	99777-17571
Dr. Ranjana Shrivastava	HOD, Botany	94792-27004
Dr. Pragya Kulkarni	Asstt. Professor, Botany	98261-42086
Dr. Rakesh Tiwari	Asstt.Professor, Mathematics	98265-23228

Sub Committee

Reception

Name	Department	Contact Number
Dr. Sheela Agrawal	Professor & Head, Hindi	98269-85252
Dr. M.A. Siddhiqui	Professor & Head, Maths	9827173652
Dr. Meeta Chakraborty	Professor & Head, English	98264-53405
Dr. O.P.Gupta	Professor & Head, Commerce	99261-70704
Dr. Rajendra Choubey	Professor & Head, Sociology	98271-95449
Dr. Anil Kashyap	Professor, Chemistry	98279-58247
Dr. Purna Bose	Professor & Head, Physics	94252-46227
Dr. Kanti Choubey	Professor & Head, Zoology	94241-08171
Dr. I.S. Chandrakar	Professor & Head, Geography	
Dr. Ranjana Sharma	Asstt. Professor Geography	94062-41558
Dr. Gayatri Pandey	Asstt. Professor Botany	9827471009
Dr. S.D. Deshmukh	Head, Geology	9329112268

Shri Vinod Ahirwar	Librarian	94241-14401
Shri Abdul Mehmood	Sports officer	9893810236

Scientific Sessions

Name	Department	Contact Number
Dr. Alka Tiwari	Professor, Chemistry	74155-14000
Dr. Padmavati	Professor, Maths	9525557653
Dr. Anil kumar	Professor, Zoology	98274-91253
Dr. Ajaya Singh	Professor, Chemistry	94062-07572
Dr. G.S.Thakur	Asstt. Professor, Botany	94076-07847
Dr. S.D. Deshmukh	Asstt. Professor, Geology	9329112268
Dr. Sunitha Mathew	Asstt. Professor, Chemistry	94241-08409
Dr. Anita Shukla	Asstt. Professor, Physics	97556-34741
Dr. Usha Sahu	Asstt. Professor, Zoology	75871-68720

Application receiving/Selection of participants/Printing etc.

Name	Department	Contact Number
Dr. Prashant Shrivastava	Asstt. Professor, Geology	98271-78920
Dr. Sanjay Das	Asstt. Professor, Geography	75873-08022
Dr. Alka Mishra	Asstt. Professor, Zoology	79877-76939
Dr. Abhishek Kumar Misra	Asstt. Professor, Physics	94517-57987
Prof. Dileep Sahu	Asstt. Professor, Comp. App.	79873-09098
Dr. Anshumala Chandangar	Asstt. Professor, Economics	90091-09019

Inauguration/valedictory and library visit

Name	Department	Contact Number
Dr. Anupama Asthana	HOD, Chemistry	98271-62574
Dr. Jagjeet Kaur Saluja	Professor, Physics	99777-17571
Dr. Upma Shrivastava	Asstt. Professor, Chemistry	89627-82515
Dr. Gayatri Pandey	Asstt. Professor Botany	9827471009

Dr. K. Padmavati	Asstt. Professor Economics	94241-31422
Dr. Anupama kashyap	Asstt. Professor, Chemistry	98279-58247
Dr. Neeru Agrawal	Asstt. Professor, Zoology	94061-18050
Dr. Jyoti Dharkar	Asstt. Professor, History	98262-34240
Shri Vinod Ahirwar	Librarian	94241-14401

Accommodation (Durg and Bhilai)

Name	Department	Contact Number
Dr. O.P. Gupta	Professor & Head, Commerce	99261-70704
Dr. A.K. Khan	Professor, Economics	98274-70364
Dr. Anil Kashyap	Professor, Chemistry	98279-58247
Dr. Sapana Sharma	Asstt. Professor, Sociology	98934-67679
Dr. Vinod Sahu	Asstt. Professor, Maths	94241-09573

Food & Catering

Name	Department	Contact Number
Dr. Abhinesh Surana	Professor, Hindi	98274-92040
Dr. Shankar Nishad	Professor, Hindi	90396-30820
Dr. Rakesh Tiwari	Asstt. Professor, Mathematics	98265-23228
Dr. Nutan Rathore	Asstt. Professor, Chemistry	94061-17335
Dr. Upma Shrivastav	Asstt. Professor, Chemistry	89627-82515
Dr. Sushma Yadav	Asstt. Professor, Geography	98934-15886
Dr. Prerna Kathane	Asstt. Professor, Chemistry	98266-72649
Dr. Deo Prakash Dubey	Asstt. Professor, Law	96919-42739

Audio visual/Photography

Name	Department	Contact Number
Dr.V.S. Geete	Asstt. Professor, Chemistry	94252-44857
Prof. Dileep Sahu	Asstt. Professor, Comp. App.	79873-09098

Finance/T.A./D.A. Payment to resources persons/students

Name	Department	Contact Number
Dr. H.P. Singh Saluja	Professor, Commerce	98263-39195
Dr. Shikha Agrawal	Professor, Economics	98279-35586
Dr. S.D. Deshmukh	Asstt. Prof. of Geology	9329112268
Dr. Anita Shukla	Asstt. Prof. of Physics	97556-34741
Dr. Usha Sahu	Asstt. Professor, Zoology	75871-68720
Dr.Tarlochan Kaur	Asstt. Professor, English	98278-95972
Shri Radhe Lal Yadav	Head Clerk	93004-14459
Shri Satyendra Soni	Account Section	93038-11125

Medical Aid/Health Service

Name	Department	Contact Number
Dr. O.P. Gupta (NCC)	Professor & Head, Commerce	99261-70704
Dr. Prachi Singh	Asstt. Professor, Maths	94791-74050
Dr. Sapana Sharma (NCC)	Asstt. Professor, Sociology	98934-67679
Dr. Meena Maan (NSS)	Asstt. Professor, English	98279-46117
Dr.Tarlochan Kaur (YRC)	Asstt. Professor, English	98278-95972
Dr. Rachita Shrivastava	Asstt. Professor, Psychology	8882239226

Media Publicity/Press

Name	Department	Contact Number
Dr. Prashant Shrivastava	Asstt. Professor, Geology	98271-78920
Dr. Anupama kashyap	Asstt. Professor, Chemistry	98279-58247

Water, Generator, Electricity, Sound, Seminar Hall preparation

Name	Department	Contact Number
Dr. Shankar Nishad	Professor, Hindi	90396-30820
Dr. S.R. Thakur	Asstt. Professor, Commerce	94255-57121
Prof. Durgesh Kotangale	Asstt. Professor, Computer Science	9329880989

Shri Vinod Ahirwar	Librarian	94241-14401
Shri Abdul Mehmood	Sports Officer	98938-10236
Shri Radhe Lal Yadav	Head Clerk	9300414459
Shri Ramji Netam	Store Keeper	-

Cultural Programme

Name	Department	Contact Number
Dr. Anupama Asthana	HOD, Chemistry	98271-62574
Dr. K. Padmawati	Asstt. Professor Economics	94241-31422
Dr. Jyoti Dharkar	Asstt. Professor, History	98262-34240
Dr. Meena Maan	Asstt. Professor, English	98279-46117
Dr.Tarlochan Kaur	Asstt. Professor, English	98278-95972
Dr. Alka Mishra	Asstt. Professor, Zoology	79877-76939

Momento/Welcome/Certificate Writing/Certificate Distribution

Name	Department	Contact Number
Dr.V.S. Geete	Asstt. Professor, Chemistry	94252-44857
Dr. Sunitha Mathew	Asstt. Professor, Chemistry	94241-08409
Dr. K. Padmawati	Asstt. Professor Economics	94241-31422
Dr. Jyoti Dharkar	Asstt. Professor, History	98262-34240
Ms.Mausumi Dey	Asstt. Professor, Zoology	95849-34627

Lab Visit Committee

Name	Name of Lab	Contact Number
Dr. M.A. Siddhiqui	Mathematics lab	9827173652
Dr. Anupama Asthana	Chemistry lab	98271-62574
Dr. Purna Bose	Physics lab	94252-46227
Dr. Jagjeet Kaur Saluja	Computer lab	99777-17571
Dr. Ranjana Shrivastava	Botany lab	94792-27004
Dr. Kanti Chaubey	Zoology lab	94241-08171
Dr. Anil Kumar	Biotechnology Lab	98274-91253

Dr. Pragya Kulkarni	Microbiology Lab	98261-42086
Dr. S.D. Deshmukh	Geology Lab	9329112268

Leader of Sub groups

Group	Group Name	Prof. In charge	Associate In charge
Group-A	Dr. A.P.J. Kalam Group	Dr. Sanjay Kumar Das	Dr. Mousmi Dey
Group-B	B1-Dr. Vikram Sarabhai Group	Dr. Shakeel Hussain	Dr. Usha Sahu
Group-C	C1-Dr. C.V.Raman Group	Dr. G.S. Thakur	Dr. Mercy George
Group-D	D1-Dr. Meghnath Saha Group	Dr. Vinod Sahu	Dr. K. Padmavati

Committee for conducting MCQ Test

Name	Department	Contact Number
Dr. Jagjeet Kaur Saluja	Professor, Physics	99777-17571
Dr. Ajay Pillai	Asstt. Prof. of Chemistry	94252-45612
Dr.V.S. Geete	Asstt. Professor, Chemistry	94252-44857
Dr. Vinod Sahu	Asstt. Professor, Maths	94241-09573
Dr. Rakesh Tiwari	Asstt.Professor, Mathematics	98265-23228
Dr. Mausmi Dey	Asstt. Professor, Zoology	95849-34627
Dr. Shriram Kunjam	Asstt. Professor, Botany	94063-78794
Dr. Vijay laxmi Naidu	Asstt. Professor, Botany	
Dr. Alka Mishra	Asstt. Professor, Zoology	79877-76939
Dr. Abhishek Kumar Misra	Asstt. Professor, Physics	94517-57987

Committee for conducting Essay Writing and Student feedback collection

Name	Department	Contact Number
Dr. Anupama Asthana	HOD, Chemistry	98271-62574
Dr. Kanti Choubey	Professor & Head, Zoology	94241-08171
Dr. Sandhya Agrawal	Asstt. Professor, Anthropology	9893832339
Dr. Upma Shrivastava	Asstt. Professor, Chemistry	89627-82515

Dr. S.D. Deshmukh	Geology Lab	9329112268
Dr. Anupama kashyap	Asstt. Professor, Chemistry	98279-58247
Dr. Jyoti Dharkar	Asstt. Professor, History	98262-34240
Dr. Anshumala Chandangar	Asstt. Professor, Economics	90091-09019

Help desk/Registration counter (Members will be present at 8.00 AM on 24th Nov. 2017 in Library reading room for students registration)

S.No.	Group Name	Professor Incharge
1	Group A - **Dr. A.P.J. Kalam Group**	Dr. Sandhya Agrawal
		Dr. Sanjay Das
		Dr. Mousmi Dey
		Ku. Kavita Prasad
2	Group B - **Dr. Shanti Swaroop Bhatnagar group**	Dr. Prachi Singh
		Dr. Shakeel Hussain
		Dr. Usha Sahu
		Shri Deepak Das Manikpuri
3	Group C - **Dr. C.V.Raman Group**	Dr. Anita Shukla
		Dr. G.S. Thakur
		Dr. Mercy George
		Ku. Nisha Bhoi
		Shri Chandan Tamrakar
4	Group D - **Dr. Meghnath Saha Group**	Dr. Vinod Sahu
		Dr. Anupama Kashyap
		Shri Komal Singh Verma
		Ku. Rimjhim Meshram
		Ku. Nidhi Sharma

Committee for Trip to Maitri Garden Bhilai on 25.11.2017 (After Lunch)

Group A

Name	Department	Contact Number
Dr. Shakeel Hussain	Assitt. Professor, Pol. Science	83197-35275
Dr. Alka Mishra	Asstt. Professor, Zoology	79877-76939
Shri Komal Singh Verma	Geology	88390-21638

Group B

Name	Department	Contact Number
Dr. G.S.Thakur	Asstt. Professor, Botany	94076-07847
Dr. Neeru Agrawal	Asstt. Professor, Zoology	94061-18050
Ku. Nidhi Sharma	Asstt. Professor, Maths	

Group C

Name	Department	Contact Number
Dr. L.K. Bharti	Asstt. Professor, Economics	94242-79195
Dr. Usha Sahu	Asstt. Professor, Zoology	75871-68720
Dr. Deo Prakash Dubey	Asstt. Professor, Law	96919-42739

Group D

Name	Department	Contact Number
Dr. Sapna Sharma	Asstt. Professor, Sociology	98934-67679
Dr. Rakesh Tiwari	Asstt. Professor, Mathematics	98265-23228
Prof. Dileep Sahu	Asstt. Professor, Comp. App.	79873-09098

Committee for Trip to Science Centre Raipur on 26.11.2017 (After Lunch)

Group A

Name	Department	Contact Number
Dr. Prashant Shrivastava	Asstt. Professor, Geology	98271-78920
Dr. Alka Mishra	Asstt. Professor, Zoology	79877-76939
Dr. Anshumala Chandangar	Asstt. Professor, Economics	90091-09019

Group B

Name	Department	Contact Number
Dr. S.D. Deshmukh	Asstt. Professor, Geology	9329112268
Dr. Nutan Rathod	Asstt. Professor, Chemistry	94061-17335
Shri Vinod Ahirwar	Librarian	94241-14401

Group C

Name	Department	Contact Number
Dr. Sanjay Das	Asstt. Professor, Geography	75873-08022
Dr. Upma Shrivastava	Asstt. Professor, Chemistry	89627-82515
Dr. K. Padmavati	Asstt. Professor Economics	94241-31422

Group D

Name	Department	Contact Number
Dr. Vinod Sahu	Asstt. Professor, Maths	94241-09573
Dr. Jyoti Dharkar	Asstt. Professor, History	98262-34240
Dr. Abhishek Kumar Misra	Asstt. Professor, Physics	94517-57987

Committee for Collection of Mentors Feedback Form & Students Feedback Form

Name	Department	Contact Number
Dr. Qamar Talat	Professor, English	94255-65387
Dr.V.S. Geete	Asstt. Professor, Chemistry	94252-44857
Dr. Anita Shukla	Asstt. Professor, Physics	97556-34741
Dr. Abhishek Kumar Misra	Asstt. Professor, Physics	94517-57987

Transportation Committee for Raipur Airport for Resource Persons

Name	Department	Contact Number
Dr. H.P. Singh Saluja	Professor of Commerce	98263-39195
Dr. S.D. Deshmukh	Asstt. Professor, Geology	9329112268
Dr. Shriram Kunjam	Asstt. Professor, Botany	94063-78794
Prof. Dilip Sahu	Asstt. Professor, Comp. App.	79873-09098
Dr. Deo Prakash Dubey	Asstt. Professor, Law	96919-42739

Committee for Night Stay at Rishi Raj Mangalam Ganjpara Chowk Durg

Name	Department	Contact Number	Date of Stay
Dr. Upma Shrivastava	Asstt. Professor, Chemistry	89627-82515	24.11.2017
Prof. Dilip Sahu	Asstt. Professor, Comp. App.	79873-09098	
Dr. Jagjeet Kaur Saluja	Professor, Physics	99777-17571	25.11.2017
Dr. Abhishek Kr Misra	Asstt. Professor, Physics	94517-57987	
Dr. Meena Maan	Asstt. Professor, English	98279-46117	26.11.2017
Dr. Deo Prakash Dubey	Asstt. Professor, Law	96919-42739	
Prof. Durgesh Kotangale	Asstt. Professor, Computer Science	9329880989	27.11.2017
Dr. Alka Mishra	Asstt. Professor, Zoology	79877-76939	

Govt. V.Y.T. PG. Autonomous College, Durg (C.G.)

Tentative Time Table of Activities

INSPIRE Internship Science Camp

Nov. 24 -Nov. 28, 2017

Time	24 November	Time	25 November	26 November	27 November	28 November
8.30 to 9.30 AM	Break Fast	8.00 to 9.00 AM	Break Fast	Break Fast	Breakfast	Breakfast
10.00 AM to 11.30 AM	Inaugural Session 1. Dr. N.P. Dixit 2. Dr. Subramanian	9.00 to 10.30 AM	Lecture (Dr. Ali Mahamamad)	Lecture (Dr. Kishor Chikhaliya)	Lecture (Dr. M.M. Chaturvedi)	Lecture (Dr. N.P.Dixit)
		10.30 to 12.00 AM	Lecture (Dr. Dharmendra Singh)	Lecture (Shri Asim Paul)	Lecture (Dr. T.N. Singh)	Lecture (Dr. Amitabh Chattopadhyay)
11.30 to 12.00 Noon	High Tea	12.00 to 1.30 Noon	Lecture (Dr. Vijay Gupta)	MCQ Test	12.00 to 1.00 PM Essay Competition	Lecture (Honorable Shri Shekhar Dutt)
		1.30 to 2.30 PM	**Lunch**	**Lunch**	**1.00 PM to 2.00 PM Lunch**	**Lunch**
12.00 to 1.30 PM	Lecture (Dr. Gulshan Relhan)	2.30 to 3.30 PM	**Lab Visit**	**Visit to Science City Raipur**	2.00 to 3.00 Lecture (Dr. Sanjay Dhoble)	**2.30 to 3.30 PM** Collection of Feedback from students & Distribution of T.A. to students
			Eye Check-up of students			
1.30 to 2.30 PM	**Lunch**	3.30 PM	**Visit to Maitri Bagh, Bhilai**		3.00 to 5.00 PM Lab Visit	3.30 PM Valedictory function
2.30 to 4.00 PM	Lecture (Dr. Vijay Mendulkar)				5.00 to 6.30 PM Cultural Programme	
4.00 to 4.15 PM	Tea					
4.15 to 5.30 PM	Lab Visit					
8.00 PM	**Dinner**	8.00 PM	**Dinner**	**Dinner**	**Dinner**	**Dinner**

** to be modified according to the availability of mentors/resource persons

List of Keynote Speakers

S. No	Name of Speaker & Phone number	Address	Topic	Date
1	Dr. K. Subramaniam	Director General, Chhattisgarh Council of Science and Technology, Raipur	Inaugural Address	24.11.2017
2	Dr. Gulshan Relhan 09223228002	Bhabha Atomic Research Center (BARC), Mumbai	Some Of The Significant Contributions Made In The Last Century	24.11.2017
3	Dr. Vijay Mendulkar 09205475013	Department of Botany, Institute of Science, Mumbai	Bioplastics – The Next Generation Biopolymers	24.11.2017
4	Dr. Ali Mohammad 09897785425	Department of Applied Chemistry, Faculty of Engineering and Technology, Aligarh Muslim University, Aligarh	Micellar Thin Layer Chromatography	25.11.2017
5	Dr. Dharmendra Singh 09897060088	Electronics and Communication Engineering IIT ROORKEE	Possibility Of Water On Moon Surface: A Special Effort Of Chandrayaan-I	25.11.2017
6	Dr. Vijay Gupta 09910121171	Department of Mathematics, NSIT, New Delhi		25.11.2017
7	Dr. Kishor Chikhaliya 09427155529	Department of Chemistry, School of Science, Gujrat University, Ahmedabad	Classification, Characteristics, Solubility And Biochemical Function Of Vitamin	26.11.2017
8	Shri Asim Paul	New Civic Center Bhilai	Mathematical Computation Tricks	26.11.2017
9	Dr. M.M. Chaturvedi 09968468700	Department of Zoology, University of Delhi, Delhi	Understanding The Design Of Living System	27.11.2017
10	Dr. T.N. Singh 09819864622	Department of Earth Sciences, Indian Institute of technology Bombay	Energy, Environment And Climate In Relation To Growth Of India	27.11.2017
11	Dr. Sanjay Dhoble	RTM Nagpur University Campus, Nagpur	Importance Of Eco-Friendly LEDs And Their Applications	27.11.2017
12	Dr. N.P.Dixit	Vice Chancellor of Durg University, Durg	-	28.11.2017
13	Dr. Amitabh Chattopadhyay 09849803092	Centre for Cellular and Molecular Biology, Uppal Road, Hyderbad	-	28.11.2017
14	Shri Shekhar Dutt 09810222250	Ex Governor, Chattisgarh	-	28.11.2017

SOME OF THE SIGNIFICANT CONTRIBUTIONS MADE IN THE LAST CENTURY

Dr. Gulshan Relhan

Bhabha Atomic Research Center (BARC), Mumbai

- **Marie Curie**: Best known for the discovery of Po & Ra—Won 2 Nobel Prizes in Physics (1903) & Chemistry (1911)
- **Roentgen:** Discovered X-rays- a momentous event that revolutionized in the field of Physics and medicine (**first recipient of Nobel prize in physics)**
- **Haber –Bosch**: that led to the production of nitrogenous fertilizers which could sustain the growth in food production that was needed to feed billions.
- **OTTO HAHN** (Berlin) -discovered **nuclear fission** for harnessing energy from atom
- **ENRICHO FERMI** (Italy) -made **transuranic elements** and made first reactor critical
- **Dr. C.V. RAMAN** who discovered **scattering of radiation**
- **RICHARD FEYMANN** : the great vision of RICHARD FEYMANN revolutionized our view of micro world and led to the concept of **" Nano Technology & Nano Sciences'**
- **ALBERT EINSTEIN** -another important innovation by **ALBERT EINSTEIN – for Mass energy Relationship ($E=mc^2$)**

SOME OF THE INNOVATIONS IN THE PRESENT CENTURY

- ***Discovery of God's particle (Higgs boson)***- led to understand the creation of universe
- ***INDIA'S MISSION TO THE MARS*** - ISRO LAUNCHED THE MARS ORBITER MISSION(MOM) on 5th NOVEMBER 2013 **and** ISRO successfully inserted its low cost MOM-spacecraft or MANGALYAAN into orbit around the red planet in its very first attempt on 24th September 2014 at 7.17 a.m

FUTURE CHALLENGES-MOTIVATION FOR YOUNG SCIENTISTS

WATER SPLITTING AT ROOM TEMPERATURE? - To produce H_2 as a source of energy using photo catalysis

TARGET DRUG DELIVERY SYSTEM –

Targeted drug delivery system can improve the outcome of the Cancer Chemotherapy by allowing preferential distribution of the drug to the cancer cell and reduce undesirable effects on target tissues. The major aspects of the target drug delivery system is the nature of the career - The efforts are being made to develop a stable, nontoxic, biodegradable, prolonged release of Solid Lipid Nanoparticulate drug delivery system for the site specific targeting of drugs

SUSTAINABLE DEVELOPMENT

The conventional used fossil fuels viz. coal, oil, natural gas etc. are at present the major energy resources contributing to electricity generation resulting in release of CO_2 and other greenhouse gas emissionscausing global warmimg and climate change. ***It is therefore big challenge for all scientists, engineers, energy planners and managers to explore every possible non-fossil fuel based option such as nuclear (both fission & fusion) and renewable like solar, hydro, wind etc.*** It becomes therefore extremely important to explore every possible non-fossil fuel based option available and commercially viable and environmentally clean such as:

NUCLEAR (Fission & Fusion)
HYDROGEN
RENEWABLES (Solar, hydro, wind, bio-mass)-

In view of increasingly energy demand, irreversible climate change and depleting fossil fuel resources we are now turning to the solar energy. There is a big challenge for scientists to tap this huge potential source of energy.

BIOPLASTICS – THE NEXT GENERATION BIOPOLYMERS

Prof. Vijay D. Mendhulkar

Head, Department of Botany, 15-Madame Cama Road,

Institute of Science, Mumbai

ABSTRACT

Synthetic polymers commonly referred to as plastics have been a significant invention of last century and since then have been used as a replacement for glass, wood, paper and metals. They are widely used in industries as well as for domestic purposes. These plastics exhibit "short lived" applications such as packaging and these represent the major part of plastic waste. However, synthetic plastic are recalcitrant in nature and thereby accumulate in the environment over a period of time. Because of their persistence in the environment, society has now become more sensitive and educated to the impact of discarded plastic on the environment, including harmful effects on wildlife and on the aesthetic qualities of cities and forests. High cost of solid waste disposal and the potential hazards from waste incineration such as emission of dioxin from PVC, makes synthetic plastic disposal a waste management problem. Consequently, there has been growing scientific interest in the development of biodegradable polymeric materials as an environment friendly alternative to plastics, which can retain the desired physical and chemical properties of conventional synthetic plastics; as a solution towards the grave problem of plastic waste disposal.

Bioplastics are a form of polymers derived from renewable biomass sources such as organic waste, vegetable oil, cornstarch, pea starch unlike fossil-fuel plastics derived from petroleum. Bioplastics provide the dual advantages of conservation of fossil resources and reduction in pollution, which make them an important innovation of sustainable development. Bioplastics can play a vital role as an environment friendly, biodegradable alternative to conventional plastics.The talk will be centred towards discussing the different types of bioplastics which can be synthesized, their production strategies and future scope of research in bioplastic production.

MICELLAR THIN LAYER CHROMATOGRAPHY

Ali Mohammad

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ABSTRACT

Thin layer chromatography (TLC) with surfactants supported aqueous systems has expanded the scope of analytical chemistry to provide efficient separations of mixtures containing neutral as well as charged compounds. Due to the presence of both hydrophobic and hydrophilic groups in the same molecule of surfactant, highly conducive environment for achieving unique analytically important separations of organic and inorganic species of identical nature is created. The capability of simultaneously separating molecular as well as ionic solutes is the fascinating advantage of surfactants for justifying their excellent performance in chromatography. Furthermore, TLC is enjoying popularity because of its versatility, simplicity, cost effectiveness, reasonable sensitivity, high selectivity and wider choice of mobile as well as stationary phases. To develop efficient environmentally benign TLC procedures for achieving analytically difficult separations, attractive features of surfactants and TLC have been coupled as (i) modification of mobile phase with aqueous micellar solutions of surfactants, (ii) modification of the mobile phase with molecular solutions of ionic surfactants and (iii) direct modification of stationary phase by impregnating with surfactants.

The developed surfactant modified TLC systems with the use of surfactants in the form of micelles have been utilized for on-plate differentiation of chemically similar organic (amino acids, vitamins, nucleobases) molecules and inorganic (heavy metal cations) with preliminary separation from their multi-component mixtures, avoiding the use of volatile organic solvents (VOS).The proposed TLC methodologies involving the use of surfactants as separation promoters to achieve novel separations with minimal or without use of VOS are within the frame-work of green analytical methods.

Green Solvents in Environmental Pollution Control

Ali Mohammad

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ABSTRACT

Because of the increasing day-to-day environmental problems, search for environmentally benign green-solvents has been the top priority of chemists working in the area of organic synthesis, drug analysis and analytical separation. As regard to chromatography, the emphasis has been to develop green methods either by modifying existing methods or by introducing new methodologies in order to reduce the use of hazardous volatile organic solvents. In this direction, certain water based and mixed-organic solvent systems have been identified as green eluents for thin layer chromatographic analysis of pharmaceutically important bio-organic molecules and surfactants in our laboratory. The detailed worked-out green thin layer chromatographic procedure using water (greenest solvent), aqueous urea solution and mixed aqueous-organic eluents for on-plate identification with preliminary separation of biomolecules as well as surface active agents will be discussed. The analytical efficiency of identified green solvents has been tested by determination of limit of detection of resolved analytes on TLC plates coated with different types of adsorbents. The chromatographic performance of green thin layer chromatographic methods developed in our laboratory matched with those reported in literature using environmentally non-acceptable toxic mixed aqueous-organic solvents as eluents.

POSSIBILITY OF WATER ON MOON SURFACE: A SPECIAL EFFORT OF CHANDRAYAAN-I

Dharmendra Singh

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Microwave Imaging & Space Technology Lab

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ABSTRACT

Mini-SAR (Synthetic Aperture Radar) was the first polarimetric imaging system designed to map the lunar surface. It was based on hybrid-Polarimetry principle and used frequency was 2.38 GHz. Polarimetry is a special feature of RADAR by which the information about targets like shape, orientation etc can be guessed. The hybrid Polarimetry gives Stokes parameters and these Stokes parameters can be used to calculate various derived child parameter which can be further used to classify lunar surface based on surface roughness and other properties. A common practice in classification of surface using satellite image data analysis is assuming pixels distribution of satellite images as Gaussian distribution, which is reasonably correct when target surface has higher diversity as in case of earth surface or where geographical structures are small in size compared to image resolution. However, if image resolution is too high or surface diversity is much lesser this assumption fails, as in case of Mini-SAR images of lunar surface obtained by Chandrayaan-I. It was proposed to study this on the basis of Circular Polarization Ratio (CPR), but is observed that only CPR is not sufficient to characterize the lunar surface. So, a statistical study of Mini-SAR images is required to determine best fit density function for pixel distribution. Pixel-wise analysis of Mini-SAR imagery is generally complicated due to the presence of speckle and requires that statistical modeling methods are employed. It is well known that there are circumstances, where radar complex scattering coefficients are non-Gaussian in distribution. For this reason, various non- Gaussian models have been proposed to represent SAR data and many of these have been extended to the polarimetric SAR (PolSAR) case but not for Mini-SAR images. This study investigates best fit distribution function for obtained images from Mini-SAR for different regions. In this study circular polarization ratio (CPR), a derived child parameter from Mini-SAR data is fitted to see how fitting of density function is

working. CPR is ratio of power received in left sense polarization to right sense polarization. Value of CPR>1 represents rough regions as well as regions having buried ice deposits. Moon has very large surface area (~84%) covered by craters, these craters shows abnormal behavior of CPR value. A large area gives CPR>1, So it is important to segregate physical behavior of moon surface on the basis of CPR as well as other parameters, so study of different regions of moon is carried out to analyze distribution behavior of CPR pixels.

UNDERSTANDING THE DESIGN OF LIVING SYSTEM

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ABSTRACT

"There is no such thing as Applied Science, only application of Science" said the famous microbiologist, **Louis Pasteur**. Basic Science is a Great Science, while the application of science is a ***Big Science***, a term coined by **Alvin Weinberg** in 1961. Though word science is shared in both types, but both are effectuated with different passion. Great science focuses on understanding the basic fundamental of science. It is done in the quest for comprehension of science or simply putting, for the heck of doing science. The famous Philosopher Karl Popper has said ***"Science may be described as systematic oversimplification"***. The Big Science, which is expensive and high-cost driven, is done under pressure and is always market driven. Big Science attracts young and novice minds with its money and reward driven nature having a little contribution in understanding of science. I will elaborate this in the first part of my lecture, and impress upon the importance of basic science taking examples from biological Sciences.

In the second part of my lecture, I will discuss the Understanding the design of Living System. Design of a living system though very beautiful, but as on face value looks a very complex system- which is composed of several interrelated and interdependent components. Since we biologists can't define life, we end up describing and differentiating it into different systems. This endless description of facts about different components of life becomes very repetitious and boring. It fails to quench as well as instigate curiosity of young minds about the essence of design of the living system.

Life is made of lifeless molecules, no individual molecule has life in it. On the other hand, on studying the designing part of life and simplifying its different components one gets intrigued who has designed the system. Also a thought comes probably somebody like God has created this intelligent designing, but actually this is not a case. Then the question comes, how does property of living system emerge out of this system made of lifeless molecules? The property of living system is an ***Emergent Property*** that arises due to specific interactions among these molecules. The specific interactions among these undirected lifeless molecules unites to constitute a system which is self-***organizing and self-duplicating,*** which are the hallmarks of any living system or simply, minimum essentials of any living system. I will explain during course of lecture that it is Evolution that drives the stochastic design and not the Creation.

ENERGY, ENVIRONMENT AND CLIMATE IN RELATION TO GROWTH OF INDIA

Dr. T.N.Singh
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ABSTRACT

Energy requirement is always high to sustain for the development of a nation. Rapid urbanization and escalating industrial advancement leads to higher energy consumption and demand. Now per capita consumption of energy will be the yard stick for estimating development and placing the country in the world map. Irrespective of increased production rate and pressure for curbing energy demand gap, India will continue to experience an energy shortfall. This gap has widened since 1985 and subsequently, country has become net importer of coal to minimize the gap. Government of India tried to improve per capita consumption but main focus is to eradicate poverty.

Though India is place at fast developing nation, nearly 22% of the population did not access to proper electricity and many have not seen still light. Nearly 50 lakh people still depend on solid biomass for their day to day activities. It indicates that the country has a long go to achieve the energy security. However, the government is driving towards the target of providing electricity to all by 2022. Being 3rd largest consumer of energy in the world having 0.3% global resources, 0.7% gas reserve of globe, still we have great hope and faith in our own resources of energy like coal, oil/gas, hydro-power, nuclear, as well as non-conventional sources like wind, solar, biogas, geothermal, Tidal etc.

As we know, India produce maximum electricity from thermal power plant (55%) followed by oil/gas (30%) and rest other by hydropower, nuclear power as well as non-conventional energy sources. Being a coal centric energy producing nation, much stress has been put globally to reduce the increasing trend of carbon load in to the atmosphere and decrease the risk of global warning. It is reported that the amount of CO_2 in the atmosphere was 280 ppm until 10000 years ago. But, the start of industrial revolution has marked the gradual increment of $CO_2$and the global average has escalated above 432 ppm for the first time in 2016. This trend will continue to hold so, even at faster rate considering the increment in energy utilization. The last 40 years have witnessed a faster increase in the CO_2 as much as 40%. This increase has enhanced the natural heat trapping capability of the earth's atmosphere. Also, other greenhouse gases like methane which is more than 20 times as effective as CO_2has also affect the trapping heat in the atmosphere. These continuous and increased injection of greenhouse gas footprints into the atmosphere many natural calamities such as rising sea level, change the precipitation and local climate conditions, acid rain, alteration of forest and crop yield, natural disasters, destabilization of ocean currents etc.

Considering these concerns, it is high time to look into the alternatives so that we could compensate the global warming without impacting the energy production and human development. Also, such remedial measures will effect for better and sustainable life without compromising the need of energy. Recent alternatives for energy production are being focused on solar power, wind energy, biogas, geothermal etc.

Energy, being a strategic commodity plays a significant role in economic development of a country. India is blessed with natural resources like coal. The total reserve is 308.20 billion tones. It has increased 0.7% during the year 2015 -16. However, lignite reserve is 44.59 billion tons. This is waiting for proper scientific exploration. Crude oil reserve is 621.10 million tones up to year 2016. Its distribution is 39.79% in western offshore followed by Assam (25.89%), whereas the maximum reserve of natural gas is in the eastern offshore (36.79%) compared to western offshore reserve (23.95%). The gas reserve stood 1227.23 billion cubic meters (BCM) as on 2016.

There is high potential for generation of renewable energy from various sources. The total potential is about 1198856 MW. The contribution of wind power is 8.57% up to 80 m high hub, 25.21% from 100 m high hub, small hydropower provides 1.65% with biomass and biogas contributing 1.46% and 0.42% respectively. With proper scientific input and investigations, up to 62.48%energy can be generated even from waste.

Considering these situations, there is a requirement to establish a balance among energy generation, environment and associated climate change. Also, our focus should be on developing low cost, high efficiency and low carbon emission energy for progress, prosperity and profitability of growing nation to meet the need of the people for a better and sustainable future.

IMPORTANCE OF ECO-FRIENDLY LEDS AND THEIR APPLICATIONS

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Abstract

With the International Year of Light in 2015, light-based technologies gained lot of recognition from worldwide considering its importance for the future development of global society on many levels. Currently, the most significant and popular device among the light-based technologies are the light-emitting diodes (LEDs) which provides a direct transfer of electrical energy into light. It is foreseen as the ultimate lamp in the future surpassing all other conventional sources that have proven their inefficiency in maximum conversion of electrical energy into light. LEDs have proved to be of vital importance for the existing and future challenges such as sustainable development, energy and community health, as well as for improving the quality and standard of life. Currently lighting accounts for 30% of the electricity produced in India and 7% of the global primary energy expenditure. LEDs form the fourth generation of lighting. The first generation of lighting included kerosene and oil lamps which emitted huge amounts of pollutants hazardous to human health. In addition, it leads to various fire hazards that may ultimately incur severe burns to humans and other properties. The second generation lighting was the era of incandescent lamps based on heating of tungsten filament, which gave low luminous output. It converts only 10% of electricity consumed into light with remaining 90% as heat emission. Almost half tonne of CO_2 emission is estimated to occur due to its use. The third generation lighting started with the arrival of CFL lamps, which consumed 4 times less electricity compared to that consumed by the tungsten filament bulbs. This gave better light output but suffered from the hazards of mercury. The fluorescent tubes contain 10-15 mg of mercury, whereas CFL lamps contain 2.5 mg of mercury. As these lamps are mercury-based, they are not eco-friendly for domestic use.

The need to develop mercury-free lighting with high luminous output and low power consumption paved way for the fourth generation lighting based on LEDs. LEDs have high luminous efficacy compared to other conventional sources of lighting. They are approximately 80-90% power saving compared to other conventional sources of lighting.

They are mercury-free and do not pose any possible threat to the environment. They are free from any type of hazardous emission and are extremely eco-friendly source of lighting. LED lamps have a working life time of about 1 lakh hours. This is enormously large compared to the 1000 hours and 10,000 hours life time of tungsten filament bulbs and CFL lamps respectively. The consumption of electricity for lighting has increased dramatically in the last few decades. Hence, there is a drive to reduce the energy consumption by replacing the inefficient lighting systems with the more efficient and eco-friendly LED lamps. In India, government has taken initiative through the Domestic Efficient Lighting Programme (DELP) to reduce the prices of LED lamps and make it available at cheap prices. The vision viewed by Shri. Piyush Goyal, Minister of State with independent charge for Power, Coal and New & Renewable Energy, is that 77 crore tungsten filament bulbs and 35 million street lights in the country shall be replaced by LED bulbs within three years.

Though LEDs are the latest entrants in the field of lighting, they have strongly surpassed other light sources with their attractive and magnificent features. They are inherited with loads of merits and are promising candidates to future's low budget scheme on lighting. LEDs produce more light per watt than do incandescent bulbs; this is useful in battery powered or energy saving devices. LEDs can emit light of an intended colour without the use of colour filters that traditional lighting methods require, which proves to be more efficient and can lower initial costs. The solid package of the LED can be designed to focus its light. Incandescent and fluorescent sources often require an external reflector to collect light and direct it in a usable manner. When used in applications where dimming is required, LEDs do not change their colour tint as the current passing through them is lowered, unlike incandescent lamps, which turn yellow. LEDs are ideal for use in applications that are subject to frequent on-off cycling, unlike fluorescent lamps that burn out more quickly when cycled frequently, or High-intensity discharge (HID) lamps that require a long time before restarting. LEDs, being solid state components, are difficult to damage with external shock. Fluorescent and incandescent bulbs are easily broken if subjected to external shock. LEDs can have a relatively long useful life. Even after completing its stipulated working hours, LED lamps continue to illuminate, but at a lower intensity. Their long lifespan makes it highly reliable. They don't require any type of maintenance throughout their lifetime. LEDs mostly fail by dimming over time, rather than the abrupt burn-out of incandescent or HID bulbs. This provides extra safety for any area illuminated by LEDs. Even if the LEDs dim over time, they never fail completely like HID sources before needing to be replaced. LEDs need to be replaced only after they reach 30% lumen depreciation. It normally takes 17-20

years for quality LEDs to reach this stage of depreciation. LEDs light up very quickly. They do not need a starter or a ballast to start its operation. Being low voltage electronic components with simple mechanism, they are easily operated with simple and cheap solutions. They are very efficient even in harsh conditions. A typical red indicator LED will achieve full brightness in microseconds. LEDs used in communications devices can have even faster response times. LEDs can be very small and are easily populated onto printed circuit boards. LEDs operate in weak current electrical and electronic systems at low input voltage and are potentially safe to use. LEDs do not contain mercury, unlike compact fluorescent lamps and hence are stated as environment-friendly. They are featured with absence of harmful ultraviolet and infrared emissions, minimum heat emission and non-breakable glass tubes. They are mechanically robust and resistant to vibrations and impact. They are moisture-resistant electronic components able to operate at high humidity with no change in operating parameters. Low power consumption reduces the load on power stations which in turn reduces harmful emission in the atmosphere and this acts as a prerequisite for mitigation of the global greenhouse effect. Their features indirectly benefit the global environment and they are fully recyclable. Another important advantage is that LEDs are available in many colours and they do not need any type of filter to sort out different colours. Different combinations between monochrome LEDs can emit light with adjustable colour, including white. LED luminaires can produce light in the entire colour temperature range including colour temperature which is unachievable by conventional lamps. They emit light with constant temperature regardless of its intensity. Various LED bodies allow varied spatial distribution of illumination which may be either uniform distribution in all directions or concentrated into a narrow shaft of light. As opposed to conventional lights, there are no complex mirror-lenses and reflector structures leading to loss of light. Also, their miniature size allows for very compact light sources with low material consumption and aesthetic lighting fixtures. The volume of the emitting zone of the powerful white LED is several thousand times smaller than that of conventional lamps. Due to low operating temperature and the nature of the materials employed, LEDs are found to be fire safe.

The improving performance of LEDs, since 1984, showed sustainable progress in the lighting systems from red-only LED arrays to high density, multi-colour LED chip-on-board technologies. The development of blue–green LEDs based on aluminum gallium indium nitride (AlGaInN) in the early 1990s led to progress in lighting and display industries due to availability of low-voltage light sources in all the three primary colors (red, green and blue) which helped in direct penetration into multi-billion dollar markets in indoor agricultural

production as well as medical treatment and phototherapy. Solid state lighting is currently emerging as the new alternative lighting achieved by an eco-friendly, energy efficient, new green technology, where illumination is obtained through semiconductor devices like light-emitting diodes (LEDs), organic light-emitting diodes (OLEDs) or light-emitting polymers (LEPs)

In 2014, Prof. Isamu Akasaki, Prof. Hiroshi Amano, and Prof. Shuji Nakamura received Nobel Prize in Physics for the invention of blue LED and their contributions to develop energy-efficient white light sources. This discovery turned out to be a huge breakthrough in the production of white light emitting diodes. Until then, it was not possible to directly obtain white light from LEDs. White light can be obtained by either mixing the red, green and blue coloured LEDs or by mixing the blue and yellow coloured LEDs. Another way is to use white phosphor materials which can be suitably excited using a blue LED. In all the above cases, a blue LED is a must to obtain white light. This signifies its active role in white light emission. However, the sophisticated requirements to grow semiconductor crystals placed LED as a high cost lighting source. Production of phosphor materials for LEDs are much simpler and cheap compared to crystal growth. Phosphor materials include Aluminates, Borates, Fluorides, Nitrides, Oxides, Phosphates, Sulfates, Sulfides, Titanates, Tungstates, Vanadates, Silicates and these can be synthesized by Co-precipitation method, Solid state diffusion, Sol-gel method, Combustion method, Wet chemical method, Acid method, etc.

Currently, serious research on synthesis and development of eco-friendly LED materials is in progress at Department of Physics, RTMNU, Nagpur, with a view to boost the new generation lighting. Most of the research is carried out under the dynamic leadership and able-guidance of Dr. Sanjay J. Dhoble, Associate Professor, Department of Physics, RTM Nagpur University. His laboratory aims to develop eco-friendly phosphors for LED at reasonably lower costs. Unlike many sophisticated and well-equipped laboratories, the laboratory at Department of Physics has some limited resources. But their synthesis methods do not involve the use of very high temperatures or inert gas atmospheres, thereby, making the synthesis expenses very cheap.

LED based lighting has several applications such as house and street lighting, indicator lamps and displays, etc. LED based lighting Technology requires a low operating voltage, between three to nine volts, so it could be powered by solar energy or batteries in areas where electricity is not available. This proves the possibility of efficient lighting arrangements for rural areas at a reduced expenditure. Development of more efficient and advanced materials will boost the LED market globally. Several studies confirmed that use of LED lighting for

household and street lighting can save 22% electricity. With solid state lighting becoming prominent in the society, a huge amount of energy will be saved and this will indirectly release enormous pressure of energy production from the power plants. Their low maintenance expenses added with their long durability, their resistance to shocks and vibrations, usability over a wide range of temperatures, less power consumption, safety, portable compact size, etc. make them promising candidates for the new generation lighting. Power saving materials reduces the expenditure for generation for electricity by lowering the energy demands. Less consumption of electricity for lighting purposes drastically reduces the load on power stations. This energy saved can be utilized for other productive industries such as agriculture, which in turn will boost the economy of the nation. Optical communication industry has also gained through this technology and it is possible to obtain data transfer at very high speeds. Data rate in the gigabyte range can be achieved with the visible light communication (VLC) system. Biomedical field has been boosted with better diagnostic and treatment methods using LEDs, especially its applications in treatment using phototherapy has given reasons to smile for many. Cultivation of crops in space can be initiated using LED lamps to obtain food for survival in space journeys. Still much research must be focused to improve the crop yield by adjusting the wavelength of light emitted by LED lamps. With the advancement in technology, it will be possible to produce better phosphors for LEDs that will enlarge the field of applications from its current limits to newer and greater heights.

Excitements in Fluorescence Spectroscopy

Prof. Amitabha Chattopadhyay

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Fluorescence has emerged as a powerful tool in modern chemical and biological research due to high sensitivity, suitable time resolution, minimal perturbation, and multiplicity of measurable parameters. There are very few areas in contemporary research in chemistry and biology where some form of fluorescence-based measurements are not used. What makes fluorescence spectroscopy so useful in chemical and biological research? In my talk, I will focus on the fundamentals of fluorescence spectroscopy that makes it such an exciting tool and application of fluorescence spectroscopy to representative problems.

CLASSIFICATION, CHARACTERISTICS, SOLUBILITY AND BIOCHEMICAL FUNCTION OF VITAMIN

Kishor Chikhaliya

Department of Chemistry, School of Science, Gujrat University, Ahmedabad

ABSTRACT

Vitamin plays a very important role in life. Their classification, characteristics, solubility and biochemical function with reference to each structure will be discussed. Concept of reaction mechanism, effect of physical parameters in determining rate of reaction. Application of name reaction in preparation of various bioactive scaffold will be discussed. Application of transition metal in organic synthesis, it's effect of economy of reaction and green chemistry will be discussed with living current examples. HIV life cycle, important drug molecule of each stage, development of crystal structure of enzymes of some class and based on structure synthesis of drug molecule will be discussed.

GOLDEN RATIO

Dr. Vijay Gupta
Department of Mathematics, NSIT, New Delhi

Golden Ratio

In mathematics, two quantities are said to be in **golden ratio** if their ratio is the same as the ratio of their sum to the larger of the two quantities.

Expressed algebraically, for quantities a and b with $a > b > 0$,

$$\frac{a}{b} = \frac{a+b}{a} = \varphi$$

Its value in

$$\varphi = \frac{1+\sqrt{5}}{2} = 1.6180339887....$$

Proof. We have

$$\frac{a}{b} = \frac{a+b}{a} = 1 + \frac{b}{a} = \varphi$$

implying

$$1 + \frac{1}{\varphi} = \varphi$$

which gives the quadratic equation:

$$\varphi^2 - \varphi - 1 = 0$$

and its solution is

$$\varphi = \frac{1+\sqrt{5}}{2} = 1.6180339887....$$

Here we neglect negative sign as φ is the ratio between positive quantities and obviously positive.

Alternate Form of Golden Ratio The equation $\varphi^2 = 1 + \varphi$ likewise produces the continued square root, or infinite surd, form:

$$\varphi = \sqrt{1+\sqrt{1+\sqrt{1+...}}}$$

Dividing a line segment by interior division

Dividing a line segment by interior division according to the golden ratio Having a line segment AB, construct a perpendicular BC at point B, with BC half the length of AB. Draw the hypotenuse AC. Draw an arc with center C and radius BC. This arc intersects the hypotenuse AC at point D. Draw an arc with center A and radius AD. This arc intersects the original line segment AB at point S. Point S divides the original line segment AB into line segments AS and SB with lengths in the golden ratio.

Laboratory visits

- Botany Department.....
- Biotechnology Department.....
- Chemistry Department.....
- Geology Department.....
- Mathematics Department.....
- Microbiology Department....
- Physics Department.....
- Zoology Department.....

DEPARTMENT OF BOTANY

Established in the year 1958 with undergraduate course and postgraduate course was started in the year 1972. The eminent professors of the department made great contribution in research field, Dr. S.K. Sharma in taxonomy, Dr. Choudhary in pathology, Dr. Karkoon in pathology microbiology, Dr. P.C. Panda in physiology and Dr. J.N. Verma in pathology. The department has well equipped laboratories with projection facilities. It has a track record of producing university rank holders who are pursuing education and research in the institutes of higher learning in India. The department organizes nature walks, field trips, botanical excursions, industrial visits.

Faculty

Name – Dr. Ranjana Shrivastava
Designation - Professor and Head

Name – Smt. Gayatri Pandey
Designation - Assistant Professor

Name - Dr. K.I. Toppo
Designation - Assistant Professor

Name - Dr. Shubha Gupta
Designation - Assistant Professor

Name - Dr. G.S. Thakur
Designation - Assistant Professor

Name - Dr. Pragya Kulkarni
Designation - Assistant Professor & Prof. Incharge Microbiology

Name - Dr. Shriram Kunjam
Designation - Assistant Professor

Name – Dr. Vijay Laxmi Naidu
Designation - Assistant Professor

Objective: Study the different stages of mitosis cell division on root tip

Materials required

a. Onion plant with root
b. Feulgen stain
c. 1 N HCl
d. Scissors
e. Forceps
f. Razor blade
g. Pasture pipette
h. 1.5 ml microfuge tubes
i. Dissection probe with wooden back
j. Microscopic slides and cover slips
k. Water bath
l. Light Microscope

Theory

A process by which a parent cell divides into two or more daughter cells is called cell division. Cell division is a small part of the cell cycle. In normal eukaryotic cells, the type of cell division is known as mitosis.

In eukaryotes, DNA replication is followed by a process called mitosis which separates the chromosomes in its cell nucleus into two identical sets, in two individual nuclei.. Mitosis is followed by cytokinesis. The process of Mitosis is divided into four stages: Prophase, Metaphase, Anaphase and Telophase.

Prophase: During this stage, the chromosomes super coil, condense and become visible for first time during the cell cycle. The spindle fibers start forming. The nuclear membrane starts disintegrating.

Metaphase: During this stage, the spindle fibers reach and attach to centromere of each sister chromatids. The chromosomes align along the center plane of the cell. The nuclear membrane disintegrates completely.

Anaphase: During this stage, the centromeres start splitting and the sister chromatids begin to migrating towards the opposite poles of the cell.

Telophase: During this stage, the chromosomes are clustered on the either end of the cell. The nuclear membrane starts reforming. The cell plate (new cell wall) starts to form between the two daughter nuclei. This will be followed by cytokinesis.

Mitotic Index

The percentage of cells undergoing mitosis or it is defined as the ratio of no. of cells in the dividing phase to the total number of cells observed. This will help to identify the region of most mitotic activities. Mitotic index helps us to quantify the cell division. Mitotic index decreases with increasing distance from root tip. That means gradual decrease in cell division as it moves from the zone of cell division to the zone of cell elongation. The meristematic region in the root tip is the actively growing region and thus the mitotic index is high.

$$\textbf{Mitotic index} = n/N \times 100$$

Procedure

Take the onion plant with newly sprouted roots and cut two root tips using scissors and transfer them into a plastic microfuge tube.

1. Fill 2/3 of the tube with 1N HCl using a dropper.
2. Place the tube in a 60°C water bath and incubate the tube for 12- 15 minutes.
3. Remove the tube from the water bath after the incubation.
4. Discard the HCl from the tube using a Pasture pipette to the running tap water.
5. Add some drops of distilled water into the tube and rinse the root. Then remove the water from the microfuge tube using the Pasture pipette. (Rinse the roots at least three times).
6. After the washing step add 2-3 drops of Feulgen stain into the tube with root tips and incubate the roots for 12-15 minutes. (During the incubation, the very tip of the root will begin to turn red as the DNA stains the numerous small actively dividing cells at the time).
7. After the incubation remove the stain using a Pasture pipette.
8. Again rinse the root tips with distilled water. (Rinse the roots at least three times).

9. Transfer a root from the tube to the centre of the microscopic slide and add a drop of water over it.
10. Take a razor blade and cut most of the unstained part of the root.
11. Cover the root tip with a cover slip and then carefully push down on the cover slide with the wooden end of a dissecting probe. (Push hard, but do not twist or push the cover slide sideways). The root tip should spread out to a diameter of about 0.5- 1cm.
12. Observe it under a compound microscope in 10x objective. Scan and narrow down to a region containing dividing cells and switch to 40x for a better view.

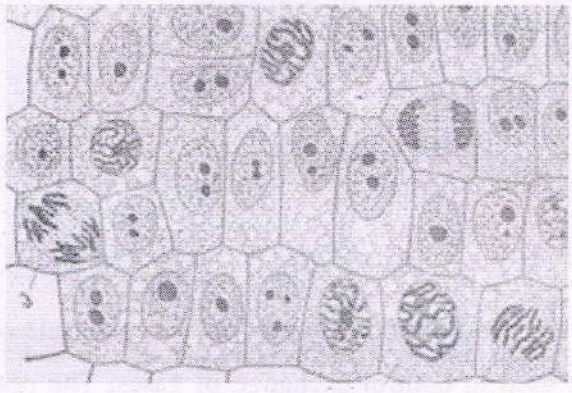


Figure- Mitosis in Onion Root Tip

Objective: To study the stomatal distribution on the upper and lower leaf surfaces and to calculate the stomatal index.

Materials Required:

a. Four O Clock plant
b. Glycerin
c. Safranin Solution
d. Forceps
e. Microscope
f. Glass slide
g. Coverslip
h. Blade
i. Watch glass

Theory

What is Stomata?

Stomata are minute pores found on the epidermis of leaves and young shoots of plants that are used to control exchange of gases. The pore is surrounded by a pair of specialised cells called the guard cells that are responsible in regulating the size of the opening.

Water is released through the stomata into the atmosphere in the form of water vapour through the process called transpiration. Besides this, the exchange of oxygen and carbon dioxide in the leaf also occurs through the stomata.

Distribution of Stomata

Distribution of stomata varies between monocots and dicots, between plant species, and between the underside and top side of the leaves on a plant.

Stomata are found more on plant surfaces thriving under higher light, lower atmospheric carbon dioxide concentrations and in moist environments.

Usually the lower surface of a dicot leaf has a greater number of stomata while in a monocot leaf they are more or less equal on both surfaces. In most of the floating plants, stomata are found only on the upper epidermis.

Calculation of Stomatal Index

The distribution of stomata on the upper and lower surfaces of the leaf can be studied by removing the peels of the leaf from the upper and lower surfaces and observing the same under a microscope.

The count of the number of stomata and epidermal cells in the microscopic field is taken and the stomatal index of each surface of the leaf can be calculated using the following formula:

$$\text{Stomatal index} = \frac{\text{No: of Stomata}}{\text{No: of Stomata + No: of epidermal cells}} \times 100$$

Procedure

- Pluck one fresh leaf of a four-o'clock plant.
- Take two watch glasses and pour some distilled water into the both watch glasses.
- Split the leaf from the four-o'clock plant obliquely.
- Take the peel from the upper surface of the leaf using the forceps.
- Place the peel into a watch glass containing water.
- Take another peel from the lower surface of the leaf using the forceps.
- Place the peel into the other watch glass containing water.
- Using a dropper, take few drops of Safranin solution and put it into the two watch glasses.
- Take two clean glass slides and place the leaf peel on the slides one by one, using a brush.
- Take a blade and cut a small rectangle or square piece from each peel.
- Take some glycerine using a dropper and put one drop of glycerine on both slides.
- Take a cover slip and place it gently on the peel with the help of a needle.
- Take the glass slide and place it under compound microscope.

- Observe under the microscope.
- Count the number of stomata in the peels of both upper and lower epidermis of the leaf appearing in the microscopic field.

Objective: To study the effect of CO_2 on photosynthesis.

Materials required: Wilmott's bubbler, water, twigs of *Hydrilla,* $NaHCO_3$, stopwatch etc.

Principle: The process of photosynthesis is affected by many factors. Blackmans law of limiting factor (1905) states that the rate of a process affected by a number of factors is limited by the pace of the slowest factor. Thus if all the other factors are kept constant, the factor affecting the rate is at minimum. The rate gradually increases with the increase in the amount of this factor till the rate becomes constant. The rate now does not increase even though the amount of this factor is increased because another factor has now become factor in the minimum.

Atmosphere has 0.03% CO_2 from where it is absorbed by the plants. Photosynthesis tolerates considerable fluctuations with the decrease and increase of CO_2, however, with the increase or decrease in the CO_2 concentration, corresponding increase or decrease in photosynthesis takes place. Higher concentration reduces the rate. *Hydrilla* being an aquatic submerged plant releases CO_2 in water which can be observed by evolution of bubbles in water. Rate of photosynthesis can be estimated by rate of evolution of bubbles in water.

Procedure:

1. A wide mouthed bottle is completely filled with tap water, a cork is then fitted at its mouth through which a glass tube wide at its open end is passed so as to dip its lower end in pond water, and thus a Wilmott's bubbler is prepared.

2. Another narrow glass tube open at both the ends is made into a bent jet and introduced into the first glass tube. The twigs of *Hydrilla* are tied at the lower end of this narrow glass tube inside the bottle.

3. The entire set up is kept under sunlight for photosynthesis to occur.

4. For studying the rate of photosynthesis different amount of sodium bicarbonate are added to the pond water.

Observation table:

S. No.	Concentration of $NaHCO_3$	Time taken for 5 bubbles
1.	00g	
2.	5.5g	
3.	1.0g	
4.	2.0g	
5.	3.0g	

Result:

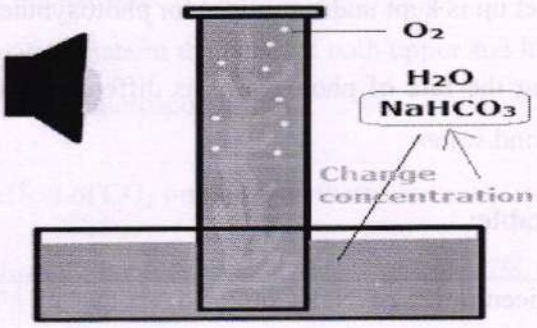
Conclusion:

The rate of evolution of oxygen bubbles is a measure of photosynthetic rate. When no salt is added, bubbles are not evolved. This shows that photosynthesis is not taking place. This is because tap water does not contain sufficient CO_2, the rate of photosynthesis increases with the addition of sodium bicarbonate because it increases the supply of CO_2. The increase in the rate continues till some other factor becomes limiting.

Precautions:

1. The apparatus should be made air tight so as not to allow air bubbles to escape.

2. Evolution of bubbles should be observed carefully.



Explanation

- The rate of photosynthesis **increases linearly** with increasing CO_2 concentration (from point A to B).
- The rate falls gradually, and at a certain CO_2 concentration it stays constant (from point B to C). Here a rise in CO_2 levels has **no effect** as the other factors such as light intensity become limiting.

Objective: Study of different medicinal plants and their uses.

The term "**medicinal plant**" includes various types of plants used in herbalism ("herbology" or "herbal medicine"). It is the use of plants for medicinal purposes, and the study of such uses.

Future of Medicinal Plants

Medicinal plants have a promising future because there are about half million plants around the world, and most of them their medical activities have not investigate yet, and their medical activities could be decisive in the treatment of present or future studies.

Characteristics of Medicinal Plants

Medicinal plants have many characteristics when used as a treatment, as follow:

- **Synergic medicine-** The ingredients of plants all interact simultaneously, so their uses can complement or damage others or neutralize their possible negative effects.

- **Support of official medicine-** In the treatment of complex cases like cancer diseases the components of the plants proved to be very effective.

- **Preventive medicine-** It has been proven that the component of the plants also characterize by their ability to prevent the appearance of some diseases. This will help to reduce the use of the chemical remedies which will be used when the disease is already present i.e., reduce the side effect of synthetic treatment.

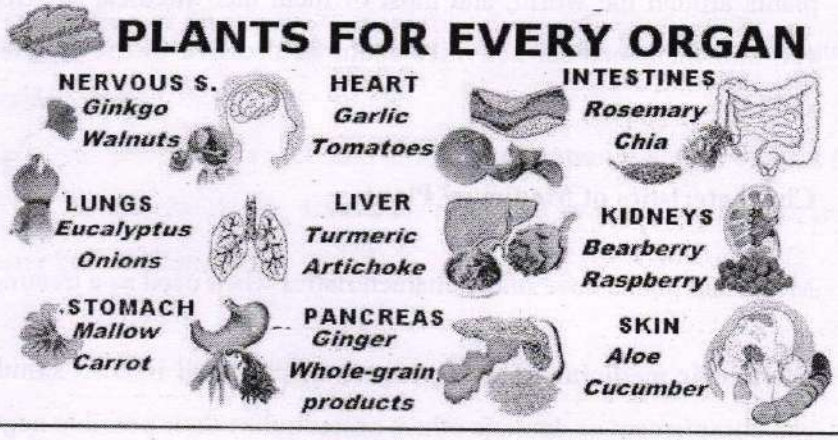
Recently, WHO (World Health Organization) estimated that 80 percent of people worldwide rely on herbal medicines for some aspect of their primary health care needs. According to WHO, around 21,000 plant species have the potential for being used as medicinal plants?

How to choose the suitable plants

It is very important to know **which plant is more interesting for each affected organ**. Although m medicinal plants can be used to cure diseases that affect different parts of the body, there are cer plants that are associated with a particular organ.

The reason for this is due to **its particular effectiveness in healing the organ** in question. For exa aloe vera is often associated with the skin, for its properties to regenerate and heal cuts, wounds, and other imperfections.

The following drawing shows some very famous plants and the corresponding organ with which th associated.



Conclusion

As our lifestyle is now getting techno-savvy, we are moving away from nature. While we cannot escape from nature because we are part of nature. As herbs are natural products they are free from side effects, they are comparatively safe, eco-friendly and locally available. Traditionally there are lot of herbs used for the ailments related to different seasons. There is a need to promote them to save the human lives.

LIST OF MEDICINAL PLANTS AND THEIR USES						
Botanical name	Family	Common name	Habit	Parts Used	Propagation	Medicinal Uses
Abelmoschus moschatus	Malvaceae	Musk bhendi	Herb	Stem Leaves Root	Seed/Stem cutting	Hysteria, Nervous disorder, Antispasmodic, Carminative, Scabies
Acorus Calamus	Acoraceae	Bach	Herb	Rhizom	Rhizome	Amnesia, Heart palpitations, Insomnia, Tetanus, bronchial asthma
Aloe vera	Liliaceae	Ghritkumari,	Herb	Leaves,	bud	Carminative, Skin disease, Purgative,
Anacyclus pyrethrum	Asteraceae	Akarkra	Herb	Root, Stem	Seed	Brain tonic, Paralysis, Headache, Epilepsy, Ophthalmia
Asparagus racemosus	Liliaceae	Shatavar	Herb	Tuber, Root	Seed/Tuber	Brain disease, Weakness, Smallpox, Eye tonic, Eye disease.
Catharanthus roseus	Apocynaceae	Sadabhar	Herb	Root, leaf	Seed	Diabetic mellitus, Hypertension leukemia
Centella asiatica	Apiaceae	Bramhi	Herb	Whole plant	Seed	Hysteria, Epilepsy,Appetite, Diarrhea, Filariasis,Skin disorder, wound cleaning,Chronic Ulcer Tuberculosis, Ulcer, Fever
Cissus quadrangularis	Vitaceae	Hadjod	Herb	:eaves, Stem	Stem cutting	Bone fractures, Cough, piles, Asthma, Scurvy Swelling, Digestive troubles, Wounds
Costus speciosus	Zingiberaceae	keokand	Herb	Leaves, Rhizome, Root	Seed/ Rhizome	Astringent, stimulant, Digestive, Fever, Cough, Worms, Skin disease
Curcuma longa	Zingiberaceae	Haldi	Shrub	Rhizome, Flowers	Seed/ Rhizome	Purgative, Astringent, Anthelmintic, Fever, Diarrhoea, itching

11	*Cymbopogon citrates*	Graminae	Lemon Grass	Herb	leaves, Grass oil	Stem cuttings	Stomachic to Diaphoretic, Diu Refrigerant,Ring , Antispasmo Stimulant,
12	*Gymnema sylvestre*	Periplocaseae	Gurmar	Shrub	Leaf, Root	Seed/Stem cutting	Swelling, Astring Diabetes, Glyco Snake bite
13	*Ixora coccinea*	Rubiaceae	jungle flame	Shrub	root,Flower. Fresh leaves	Seed	Dysentery,Diarr Colic pain, Ecze Wounds, Skin u
14	*Jasminum sambac*	oleaceae	Moghra	Herb	Leaf, Flower	Stem cutting	Anthelmintic, U Skin disease
15	*Jatropha curcas*	Euphorbiaceae	Safed arand	Shrub	Leaf Seed	Stem cutting	Scabies, Eczema, worm, Antiswe Depurative, Ca
16	*Mentha arvensis*	Lamiaceae	Pudina	Herb	Leaf	Stem cutting	Pheumatism Antispasmod Antiseptic, Carminatice Diu
17	*Vitex negundo*	Verbenaceae	Nirgundi	Shrub	Root, Leaves, Stem	Stem cutting	Joints pain, Arth Heardache, ulc Wound
18	*Withania somnifera*	Solanaceae	Ashwagandha	Shrub	Leaf, Root	Seed	Sedative, Nervin Insomnia, Carmi Anthelmint Abdominal pa Constipation, W Blood disorder, C
19	*Tagetus erecta*	Asteraceae	Genda	Herb	Leaf, Root	Stem cutting	Astringent, Antiseptic, Amenorrhoe Wounds, injurie ache
20	*Ocimum sanctum*	Lamiaceae	Tulsi	Herb	Leaf, Flower	Seed	insecticidal, Oed Chronic uice Earache, Abdon Pain Helminthi Pyorrhea, Blo purifier, Scabi Eczema, Ring w

DEPARTMENT OF BIOTECHNOLOGY

The Department of Biotechnology was established from the session 2005–2006 by the order no. 914/2005, dated 20/4/05 of Directorate of Higher Education, Govt. of Chhattisgarh, with both Undergraduate and Postgraduate programme and the programme was affiliated by Pt. Ravishanka Shula University, Raipur by order no. 914/Ace./Affl./2007, dated 17/5/2007. Pt. Ravishankar Shukla University, Raipur has recognized our department as Research Centre for Ph.D. Programme in 2011 by order no. 4371/Ace/Res/2011, dated 30/07/2011. Latter in 2012, the Department of Biotechnology, Govt. of India has granted us STAR College Programme.

The aim and objective of the department is to nurture youth of the state for scientific exploitation of natural resources in sustainable manner, to explore health problem of the state and to protect environment and Biodiversity of the state by the help of tools and techniques of Biotechnology. To fulfill the mission of exploration of natural resource, existing health cause and environmental protection, the department has initiated skill development among youngsters of the state by UG, PG and Ph.D. programme.

With the aim of above mission and vision the department is organizing UG, PG, Ph.D programme in close collaboration of various international, national institutions and industrial houses, so that we may provide skilled human resource to the academic and industrial houses for overall growth of Chhattisgarh state and finally Nation.

Faculty

Name - Dr. Anil Kumar

Designation - Professor of Zoology (Prof. Incharge Biotechnolgy)

DNA Isolation from Plant

Principle

Good quality DNA is a prerequisite for all experiments of DNA manipulation. All plant DNA extraction protocols comprise of the basic steps of disruption of the cell wall, cell membrane and nuclear membrane to release the DNA into solution followed by precipitation of DNA while ensuring removal of the contaminating biomolecules such as the proteins, polysaccharides, lipids, phenols and other secondary metabolites.

Reagents Required

- Extraction(CTAB) Buffer
  1.4 M Na Cl
  100 mM Tris (pH 8.0)
  20 mM EDTA (pH 8.0)
  2% Mercaptoethanol
  2% CTAB
  Adjust all to pH 5.0 with HCL and make up to 100 ml with H2O.
- Chloroform : Isoamyl alcohol (24:1)
- RNase A (10mg / ml)

- 70% Ethanol
- 1X TE Buffer

Protocol

- Take 1 gm of fresh leaves and keep in deep freezer for 1 hours.
- Crush in mortar pestle by applying CTAB.
- Centrifuge at 14,000 rpm for 15 min.
- Transfer supernatant to fresh eppendorf tubes and add 700µl Chloroform : Isoamyl alcohol (24:1).
- Again centrifuge at 14,000 rpm for 15 min.
- Three layers forms, transfer first layer to fresh eppendorf tubes.
- Add chilled ethanol, cloudy appearance seen.
- DNA precipitates, remove alcohol and dry the pellet.
- Dissolve in TE buffer and preserve at 4°C.

Plant Tissue Culture (Surface Sterilization, Media Preparation and Micropropagation)

Surface Sterilization

Explants surface sterilization:

- Explants washed with sterile water.
- Explants washed with 70% alcohol for 30 seconds.
- Washed with sterile distilled water for 2 or 3 minutes.
- The explants washed with 0.01% mercuric chloride + Tween 20 (1 or 2 days) for 10 minutes .
- Then washed with sterile distilled water four times.

First time	-	4 minutes
Second Time	-	4 minutes
Third Time	-	4 minutes
Fourth Time	-	12 minutes

Explants surface sterilization is over. Then the explants were inoculated in the appropriate media.

Media Preparation

The basal medium is formulated so that it provides all of the compounds needed for plant growth and development, including certain compounds that can be made by an intact plant.

MS NUTRIENTS STOCKS

Nutrient salts and vitamins are prepared as stock solutions (20X or 200X concentrat required in the medium) as specified. The stocks are stored at 4° C. The desired concentrated stocks is mixed to prepare 1 liter of medium.

Murashige T & Skoog F (1962) A revised medium for rapid growth and bioas tobacco tissue cultures. Physiol. Plant 15: 473-497

MS major salts	mg/1 L medium	500 ml stock (20X)
1. NH_4NO_3	1650 mg	16.5 gm
2. KNO_3	1900 mg	19 gm
3. $Cacl_2.2H_2O$	440 mg	4.4 gm
4. $MgSO_4.7H_2O$	370 mg	3.7 gm
5. KH_2PO_4	170 mg	1.7 gm

MS minor salts	mg/1 L medium	500 ml stock (200X)
1. H_3BO_3	6.2 mg	620 mg
2. $MnSO_4.4H_2O$	22.3 mg	2230 mg
3. $ZnSO_4.4H_2O$	8.6 mg	860 mg
4. KI	0.83 mg	83 mg
5. $Na_2MoO_4.2H_2O$	0.25 mg	25 mg
6. $CoCl_2.6H_2O$	0.025 mg	2.5 mg
7. $CuSO_4.5H_2O$	0.025 mg	2.5 mg

MS Vitamins	mg/1 L medium	500 ml stock (200X)
1. Thiamine (HCl)	0.1 mg	10 mg
2. Niacine	0.5 mg	50 mg
3. Glycine	2.0 mg	200 mg
4. Pyrodoxine (HCl)	0.5 mg	50 mg

Iron, 500ml Stock (200X)
Dissolve 3.725gm of Na_2EDTA (Ethylenediaminetetra acetic acid, disodium salt) in 250ml dH_2O. Dissolve 2.785gm of $FeSO_4.7H_2O$ in 250 ml dH_2O Boil Na_2EDTA solution and add to it. $FeSO_4$ solution gently by stirring.

PLANT GROWTH REGULATOR STOCK

The heat-labile plant growth regulators are filtered through a bacteria-proof membrane (0.22 µm) filter and added to the autoclaved medium after it has cooled enough (less than 60° C). The stocks of plant growth regulators are prepared as mentioned below.

Plant Growth Regulator	Nature	Mol. Wt.	Stock (1 mM)	Soluble in
Benzyl aminopurine	Autoclavable	225.2	mg/ ml	1N NaOH
Naphtalene acetic acid	Heat labile	186.2	mg/ ml	Ethanol

The desired amount of plant growth regulators is dissolved as above and the volume is raised with double distilled water. The solutions are passed through disposable syringe filter (0.22 µm). The stocks are stored at –20° C.

Micropropagation

The totipotency of plant cells and tissues form the basis for *in vitro* cloning i.e. generation or multiplication of genetically identical plants in *in vitro* culture. This rapid multiplication allow breeders and growers to introduce new cultivars much earlier than they could by using

conventional propagation techniques. Micropropagation can also be used to establish and maintain virus free plant stock.

Explant → Surface Sterilization → Inoculation → Subculture → Plant Development → Hardening

Phytocompounds Detection

Principle

Plants are commonly used source of natural products. Medicinal plants contain organic compounds producing definite physiological action on the human body and these bioactive substances include tannins, alkaloids, carbohydrates, terpenoids, steroids and flavonoids Phytochemicals are natural compounds in the medicinal plants having defense mechanism.

Protocol

1. Test for Cardiac Glycosides

0.5 ml of each extract was treated with 0.2 ml glacial acetic acid then 1drop of 3.5% ferric chloride ($FeCl_3$) was added to the solution. This was layered with 1 ml of concentrated H_2SO_4. A reddish brown ring was occurred at the interface indicates the presence of cardiac glycosides.

2. Test for Terpenoids

0.5 ml of plant extract was added to the test tube then 2 ml of chloroform was mixed to the solution. 3 ml of concentrated H_2SO_4 was added carefully from the wall of the test tube, to form a lower layer. Occurrence of reddish-brown colour at the interface indicates the presence of terpenoids.

3. Test for Steroid

0.5 ml of extract was dissolved in 3 ml of chloroform. The solution was filtered, 2ml of concentrated H_2SO_4 was added to the filtrate to form a lower layer. A reddish- brown colour ring at the interface indicates the presence of steroid.

4. Test for Flavonoid

0.5 ml c extract and 5 ml distilled water was added to test tube then it was filtered.5ml of diluted ammonia solution was added to the filtrate then concentrated H_2SO_4 was added. A yellow coloration indicated the presence of flavonoid. The yellow colour disappeared on standing.

Mitotic Index

Principle

Mitotic index is the measure for proliferation status of a cell population. It is defined as the ratio between number of cells in mitosis and total number of cells. This will help to identify the region of most mitotic activities. Mitotic index helps us to quantify the cell division. Mitotic index decreases with increasing distance from root tip, that means gradual decrease in cell division as move from the zone of cell division to zone of cell elongation. The meristematic region in the root tip is the actively growing region and thus the mitotic index is high.

Protocol

- Allow the roots of onion to grow and when it is grown up to 3cm length, the roots are cut.
- After cutting, roots were transferred into fixative (carnoy's fixative 10ml of glacial acetic acid + 60ml absolute ethyl alcohol+ 30ml chloroform).

- Root tips were then washed in distilled water for 1-2 minutes. After washing, the root are transferred into 1N HCl for 20minutes.
- After that the root tips were stained with aceto-carmine stain (2gm carmine + 45ml glacial acetic acid, make up it with 100ml distilled water) for 30min.
- 1drop of 1% glacial acetic acid (1ml glacial acetic acid + 99ml distilled water) was applied and covered with cover slip and observed under microscope at 40x magnification.
- Mitotic index is calculated using formula given below –

$$\frac{\text{No. of cells in mitosis}}{\text{Total no. of cells}} \times 100$$

DEPARTMENT OF CHEMISTRY

GOVT. V. Y. T. PG Autonomous College, Durg (CG)

INSPIRE LAB VISIT *(24th – 28th Nov. 2017)*

Time: 2.30 pm – 4.30 pm

VISIT PLAN

- Demonstration of advanced experiments
- Glass Apparatus Exhibit
- Virtual Tour of Instrumentation Lab

Demonstration of Advanced Experiments

Analytical Chemistry	•Food Adulteration detection and pH determination
Nano & Polymer Chemistry	•Synthesis of nanoparticles & polymer beads and its application
Electro & Thermochemistry	•Silver tree and Chemical volcano exhibit
Biochemistry	•Isolation of casein from milk

Glass Apparatus Exhibit

Display of glasswares	• Various types of tubes- ignition, test, boiling, graduated •Various types of pipettes, burettes, flasks, beaker •Miscellaneous - desiccator, thieles tube, centrifuge tubes
Display of assemblies	•Various types of distillation assemblies, condensors •Kjeldahl assembly, soxhlet extractor
Display of glass apparatus	•Landsberger, Man Singh Survismeter •Ostwald Viscometer, Stalagmometer, pyknometer

Virtual Tour of Instrumentation Lab

Advanced Instruments	•AAS, FTIR, GC, UV-Visible spectrophotometers •Flame photometer, Polarograph, Tensiometer
Simple Instruments	•Visible Spectrophotometer, pH meter, •Conductometer, Turbidimeter, Polarimeter
Miscellaneous instruments	•BOD incubator, Electrophoresis, ELISA reader •Shaker, magnetic stirrer

Expt. 1: Detection of adulterants in given food samples

The deliberate contamination of food material with low quality, cheap and toxic substance is called food adulteration and substance which lowers or degrades the quality of food material is called an adulterant. Traders use for their economic benefit but it

effects the health of the population hence effort must be made is check the food items is save people from it had effects.

Detection of adulteration is following food items will be demonstrated – Vanaspati in ghee, Argimone oil in edible oil, Metalin yellow in pulses, Turmeric powder and chilli powder.

Expt. 2: Determination of pH of products used in our daily life using pH meter

Requirements: pH meter, buffer solutions, different sample solutions

The pH scale is a measure of the strength of an acid or base. pH is equal to the negative logarithm of hydrogen ion concentration. Acid has pH ranging from 0 – 7, base 7-14 and pH 7.0 indicates neutral. Most life processes can occur within narrow range of pH. For eg. pH of blood is 7.2-7.4, food crops grow best at pH 7-7.8, saliva is slightly alkaline while stomach has highly acidic pH. Acids and bases come into play in everyday life in everything from digestion of foods we eat to the medicines we take and even cleaning products we use.

Calibrate pH meter with buffer solutions (pH – 4.0, 7.0 and 9.2). Dip the electrode in the sample provided and note down the pH. The pH of 7.0, below 7.0 and above 7.0 indicates that the sample is neutral, acidic and basic respectively.

Expt. 3: Green synthesis of silver nanoparticle from leaf extract of neem and its characterization

Requirements: 0.01 M Silver nitrate, neem leaf extract

Prepare 0.01M $AgNO_3$ and leaf extract. Collect the leaves and wash them with double distilled water and rinse off the extra water. Cut the leaves in small pieces and boil with double distilled water at 50-70°C for 30 min. Filter the extract using Whatmann filter paper, and collect them in clean and dried conical flask.

Mix the leaf extract and $AgNO_3$ solution in 1:1 ratio Stir it for 30 sec. The colour of solution turns green to yellowish brown, which indicate the formation of silver nanoparticles. Nanoparticle synthesis was confirmed by taking UV-visible spectra. The characteristics peak is obtained around 400-480 nm, which conform the formation of silver nanoparticle.

Fig. 1: Leaf extract

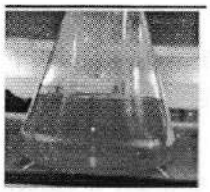


Fig. 2: Ag nanoparticle solution

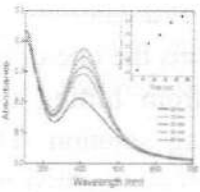


Fig.3 : UV-Visible spectra of Ag nanoparticle

Expt. 4: Preparation of calcium alginate beads and adsorption of dye onto the polymer bead

Requirements: Sodium alginate, calcium chloride, methylene blue (MB) dye

Prepare 100 cm^3 of 3% solution of sodium alginate by dissolving 3 g of sodium alginate in distilled water and make up the volume to 100 cm^3 with distilled water. Slowly drip the viscous alginate solution through a needle of syringe into a beaker containing 200

cm^3 0.2 M $CaCl_2$. Beads are then washed 5-8 times with distilled water and stored in distilled water.

Prepare 50 mg/l aqueous solution of MB dye solution. Take a known aliquot of dye, dilute it to 10 ml with distilled water and add known amount of beads (0.1 g) into it with mechanical stirring at 250 rpm. Take small aliquot of the content at equal time interval and measure the absorbance using spectrophotometer. Thus dyes and other toxicants can be removed by adsorption method.

Sodium alginate solution (1.5%) was prepared by dissolving 1gm of sodium alginate in 100 ml of hot distilled water with stirring until the solution become homogenous. For preparation of beads, the prepared viscous solution was injected in the encapsulator, where it has the ability to charge the surface of the beads. The voltage applied lies in the range of 400-1700 V. This surface charge transforms the one-dimensional droplet chain in a funnel-like multiline stream. This prevents beads from hitting each other in flight, and from hitting each other as they enter the hardening solution. The process has been described in Figure 1.Sodium alginate solution (1.5%) was prepared by dissolving 1gm of sodium alginate in 100 ml of hot distilled water with stirring until the solution become homogenous. For preparation of beads, the prepared viscous solution was injected in the encapsulator, where it has the ability to charge the surface of the beads. The voltage applied lies in the range of 400-1700 V. This surface charge transforms the one-dimensional droplet chain in a funnel-like multiline stream. This prevents beads from hitting each other in flight, and from hitting each other as they enter the hardening solution. The process has been described in Figure 1.Sodium alginate solution (1.5%) was prepared by dissolving 1gm of sodium alginate in 100 ml of hot distilled water with stirring until the solution become homogenous. For preparation of beads, the preparedviscous solution was injected in the encapsulator, where it has the ability to charge the surface of the beads. The voltage applied lies in the range of 400-1700 V. This surface charge transforms the one-dimensional droplet chain in a funnel-like multiline stream. This prevents beads from hitting each other in flight, and from hitting each other as they enter the hardening solution. The process has been described in Figure 1Sodium alginate solution (1.5%) was prepared by dissolving 1gm of sodium alginate in 100 ml of hot distilled water with stirring until the solution become homogenous. For preparation of beads, the prepared viscous solution was injected in the encapsulator, where it has the ability to charge the surface of the beads. The voltage applied lies in the range of 400-1700 V. This surface charge transforms the one-dimensional droplet chain in a funnel-like multiline stream. This prevents beads from hitting each other in flight, and from hitting each other as they enter the hardening solution. The process has been described in Figure1Sodium alginate solution (1.5%) was prepared by dissolving 1gm of sodium alginate in 100 ml of hot distilled water with stirring until the solution become homogenous. For preparation of beads, the prepared viscous solution was injected in the encapsulator, where it has the ability to charge the surface of the beads. The voltage applied lies in the range of 400-1700 V. This surface charge transforms the one-dimensional droplet chain in a funnel-like multiline stream. This prevents beads from hitting each other in flight, and from hitting each other as they enter the hardening solution. The process has been described in Figure 1

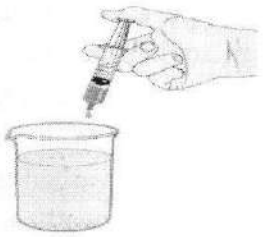


Fig. 4: Preparation of beads

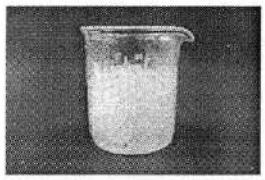


Fig. 5: Polymer beads

Expt. 5: Study of displacement of metals based on electrochemical series

Requirements: Copper wire, silver nitrate, jar

The potential of an electrode at a given temperature depends upon the concentration of the ions in the solution in which the electrode is dipping The term standard electrode potential is used to designate that potential which is obtained when the concentration or the activity of the ions in the solution in which electrode is dipped is unity and the temperature is 25°C. It is denoted by symbol E°.

The standard electrode potential of the electrode can be determined by coupling the electrode with standard hydrogen electrode as reference electrode whose potential has been arbitrarily taken as zero. The standard electrode potential of various electrodes have been seen determined and arranged in a tabular form in the increasing order of their values, known as electrochemical series. There are several applications of electrochemical series. With the help of electrochemical series we can study the displacement of metal having small negative or positive reduction potential from solution. Deposition of silver on copper in silver tree formation is based on the following half reactions:

$$Cu \rightarrow Cu^{++} + 2e^- \qquad E° = +0.34$$

$$Ag + 2e^- \rightarrow 2Ag^+ \qquad E° = +0.80$$

$$Cu + Ag^+ \rightarrow Cu^{++} + 2Ag \qquad E° = +0.56$$

Expt. 6: Study of thermo-chemical reaction through chemical volcano

Requirements: Ammonium dichromate, match box

In a chemical reaction, two or more chemicals react to give one or more products along with absorption and evolution of heat energy. A reaction in which energy is absorbed is called endothermic reaction and in which energy is evolved is called exothermic reaction.

The decomposition of ammonium dichromate is an interesting exothermic chemical reaction. The ammonium dichromate glows and emit spark as it decomposes and produce green chromium oxide ash. It looks like eruption of volcano (Lava).

$$(NH_4)_2Cr_2O_7 \rightarrow Cr_2O_3 + 4H_2O + N_2$$

Expt. 7: Isolation of Casein from milk by isoelectric precipitation

Requirements: Skimmed milk, Acetic acid, Sodium acetate, Solvent (Ethanol, diethyl alcohol)

Casein, the phosphoprotein of milk is separated from other protein by isoelectric precipitation i.e, by adjusting the pH of milk to its isoelectric pH (4.8).

Gently warm 20 ml of skimmed milk in a 100 ml beaker. While stirring with a glass rod add 2 ml acetic acid solution along with 2 ml sodium acetate solution. Stir the suspension and centrifuge for about 45 seconds. Decant the supernatant carefully and filter the suspension using a filtration unit connected to a suction pump (Buchner funnel fitted with Whatmann No 1 filter paper disc). The moist precipitate is washed thrice with 20-25 ml of distilled water to remove the salts. This is followed by two washes each with 20 ml of ethanol and diethyl ether. Transfer the cake to a clean watch glass and spread the material uniformly and allow it to dry at room temperature over night.

DEPARTMENT OF GEOLOGY

Department of Geology was established in the year 1982 and the PG course (MSc. Geology) started in this department in the year 1987. Since then, the department has crossed many milestones of achievement in its journey towards excellence. Alumni of this department are serving the country with their knowledge of Geology in the capacity of Professor, Geologist entrepreneur, School teacher, consultant etc. Geology department is a recognized research centre for Doctoral Degree of Pt. Ravishankar Shukla University Raipur and at present two research scholars are pursuing their Doctoral Degree.

Faculty

Name - Dr. S.D. Deshmukh
Designation - Assistant Professor & Head

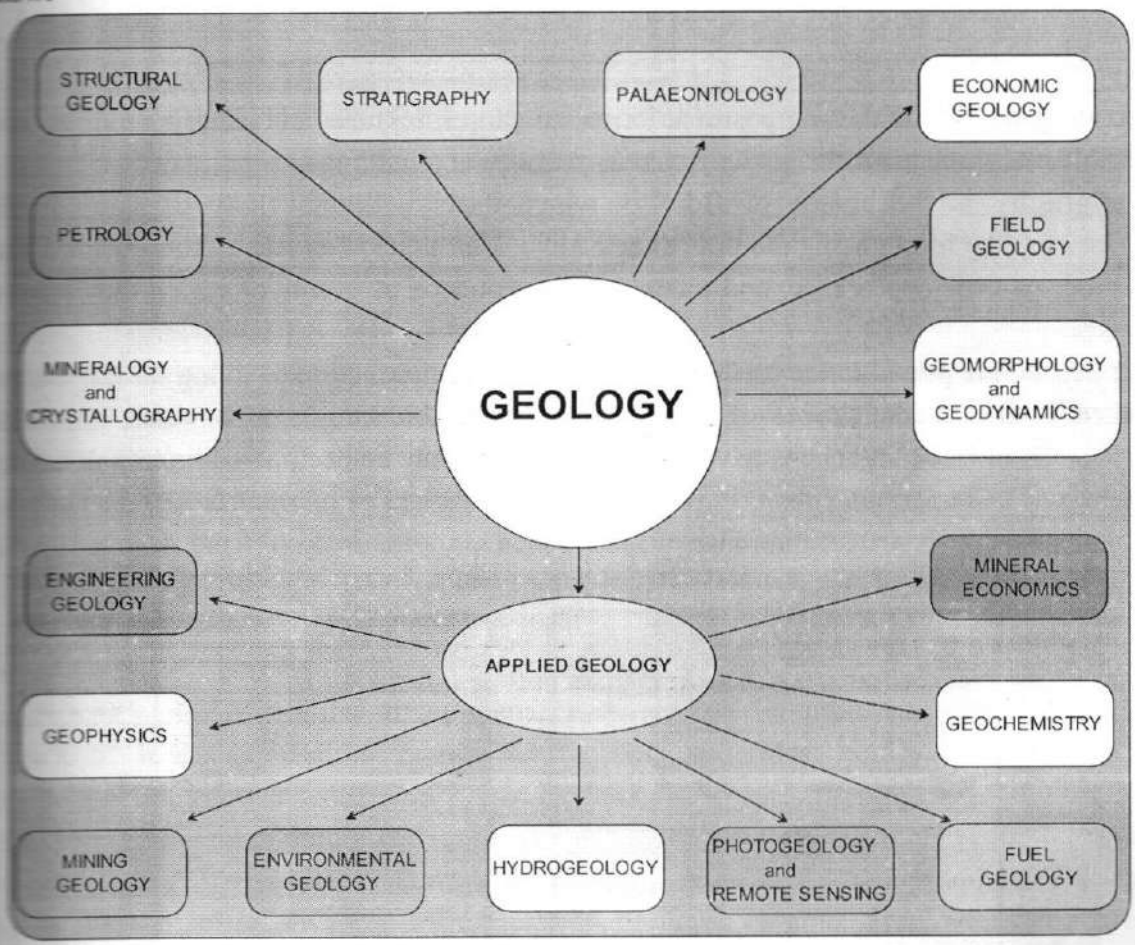
Name - Dr. Prashant Kumar Shrivastava
Designation - Assistant Professor

Name – Shri Komal Singh Verma
Designation – Guest Faculty

Name – Ku. Khushbu Yadav
Designation – Guest Faculty

THE STUDY OF THE EARTH

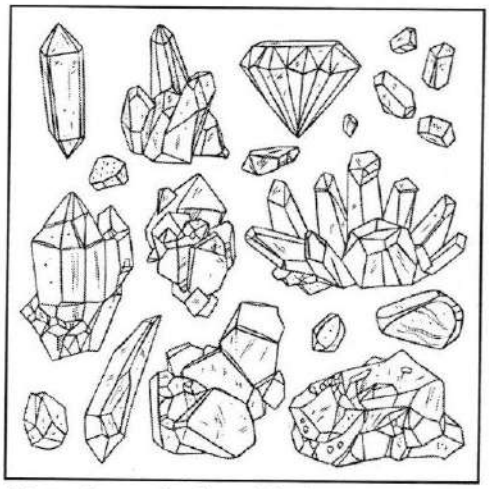
The subject of Geology is to trace the structural progress of our planet from the earliest beginnings of its separate existence, through its various stages of growth, down to its present condition. It seeks to determine the manner in which the evolution of the earth's great surface features has been affected. It unravels the complicated processes by which each continent has been built up. Man's inquisitiveness about, and his dependence on, environment and the processes contributing to its change form the basis of studies in Geology. The domain of Geology being very vast in its subject matter and scope, only the core branches are mentioned below.

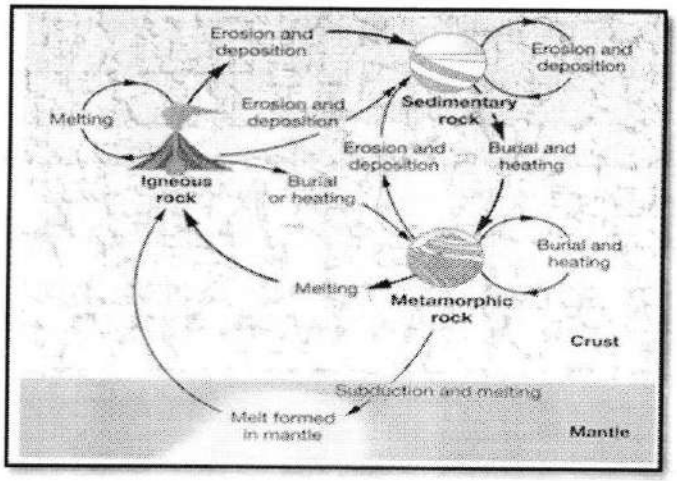


Physical Geology (Geomorphology) aims at the proper understanding of the processes which mould the surface of the globe through their ceaseless action through ages. A number of websites dedicated to learn about these processes and resultant landforms with beautiful images and illustrations can be visited on the web.

The scope of **Structural Geology** covers the study and interpretation of structures in rock masses, it also deals with the underlying principles and mechanism of formation of various structures and their relation to the tectonic processes.

Mineralogy is the branch of Geology that deals with the study of physical, chemical and optical properties of minerals. Minerals serve as the building blocks for rocks.

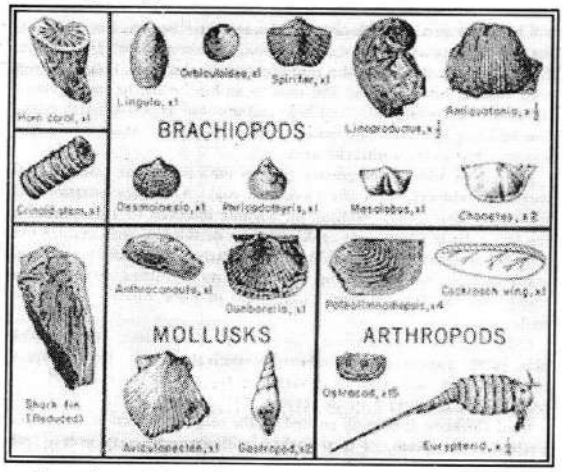


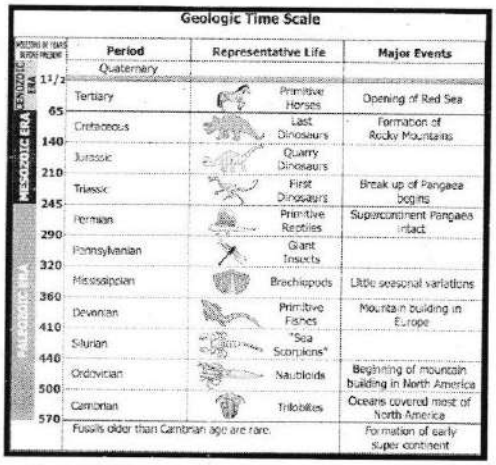


Petrology deals with the composition, forms, structures, textures and genesis of all the rocks divisible into three main classes i.e. igneous, sedimentary and metamorphic rocks.

Stratigraphy is the branch of Geology which deals with the study of rocks in four dimensions (the fourth being the time dimension). It arranges the rocks of the earth's crust in the order of their appearance, and interprets the sequence of events of which they form the records.

Each successive period in the earth's history, since the introduction of living things, has been marked by characteristic types of the animal and vegetable kingdoms, however imperfectly the remains of these organisms have been preserved or may be deciphered, materials exist for a history of life upon the planet. **Palaeontology**, the science of fossils (the remains of plants and animals) has revealed a number of facts concerning the evolution and migration of life forms through ages.





Geologic Time Scale

Millions of Years Before Present	Era	Period	Representative Life	Major Events
		Quaternary		
1 1/2	CENOZOIC ERA	Tertiary	Primitive Horses	Opening of Red Sea
65	MESOZOIC ERA	Cretaceous	Last Dinosaurs	Formation of Rocky Mountains
140		Jurassic	Quarry Dinosaurs	
210		Triassic	First Dinosaurs	Break up of Pangaea begins
245		Permian	Primitive Reptiles	Supercontinent Pangaea intact
290	PALEOZOIC ERA	Pennsylvanian	Giant Insects	
320		Mississippian	Brachiopods	Little seasonal variations
360		Devonian	Primitive Fishes	Mountain building in Europe
410		Silurian	"Sea Scorpions"	
440		Ordovician	Nautiloids	Beginning of mountain building in North America
500		Cambrian	Trilobites	Oceans covered most of North America
570		Fossils older than Cambrian age are rare.		Formation of early supercontinent

The study of mode of occurrence, geographic distribution and origin of various minerals and rocks of economic importance is the subject matter of **Economic Geology** .It comprises the study of ore minerals.

The study of geology is important for three main reasons: it reveals the deep history of the Earth, informs other sciences, and it is useful for economic purposes. Almost everything we utilize in our lives has something to do with Earth. Homes, streets, computers, toys, tools, and so on are likely made of materials obtained from the Earth. Although the sun is the ultimate energy source of Earth, we rely on "Earth" energy sources for our daily energy requirements (oil, carbon, nuclear energy obtained from uranium, etc). Geology science is of

paramount importance to locate those Earth energy sources, how to extract them from Earth more efficiently and at a lower cost, and with the smallest impact on the environment. Water, an important natural resource, is scarce in many parts of the world. The study of geology can help us find water resources underground to reduce the impact of water scarcity of people and civilization.

The study of geology also encompasses Earth processes which may affect overall civilization. An earthquake can destroy thousands of lives in a few minutes. Also, tsunamis, floods, landslides, droughts, and volcanic activity can have an enormous influence on civilization. Geologists study those processes and can recommend action plans to minimize damage in case such events will occur. For example, by studying flood patterns of rivers, geologists can recommend areas to avoid when building new cities, towns, and residential neighborhoods in order to prevent future damage. Earthquake science, although a very difficult area of study, can help minimize damage to life and civilization by estimating where earthquakes are most likely to occur (known as fault lines) and to recommend the type of technology to be used in the construction of buildings in these vulnerable areas.

LEARNING MODULES AT GEOLOGY LABORATORY

A. Identification of rocks and minerals: The rocks and minerals possess unique physical properties. Study of these physical properties of various rocks and minerals shall be done during the lab visit.

B. Study of optical properties of minerals using petrological microscope shall be carried out.

C. Study of geological features using aerial photographs with stereoscope shall be done.

DEPARTMENT OF MICROBIOLOGY

The department is running under self financing scheme since 2001 for UG classes and since 2005 for PG classes. The department maintains its mission for academic programme, involvement of students in day to day management for specific duties and adequate freedom to students. It has good infrastructure for teaching and research. There are two M.Sc. laboratories, one central instrument rooms, two PG classrooms and one UG laboratory etc.; Department is equipped with E classroom and has two up-to date configured computers with internet facility. Department houses, apart from regular and routine bacteriological equipments, variety of advanced instruments like column chromatography, electrophoresis facilities, Fermenters, high speed refrigerated centrifuge, Shaking incubator, laminar air flow stations, deep fridge and BOD incubators. The department have its own departmental library with Text books, Reference books, Xerox copies of out of print books, Soft copies of reference books etc. Apart from that, the department subscribes some research journals with high Impact factor. The souvenir and proceedings of Seminar and Conferences are also available to students to inculcate research aptitude among them.
The theory and practical syllabus for PG classes are annually reviewed and revised by the experts of board of studies members. In the first semester, the students study core microbiology including bacteriology, mycology, virology and Immunology etc. The second semester curricula covers basic concepts including biomolecules and metabolism, cell and molecular biology and techniques in microbiology and Biostatistics subsequently study of applied and modern microbiology including environmental, food, agriculture, aquatic microbiology, microbial genomics and metagenomics included in third and fourth semesters.

A unique feature of the curricula includes both theory and practical course for each papers and dissertation work in the fourth semester. Laboratory manual all the UG and PG Semester classes have been prepared in the department for the benefit of students. Class seminars and assignment work is regular practice of the department. Students are assigned to prepare day wise flow charts for practical exercises so as the experiments can be performed parallel to the theory course. Group discussions and Quiz is included in the teaching methods during the semester. Students of Sem. III go to various reputed research institutions to undertake project work for partial fulfillment of their course. The department has signed an MOU with Dept. of Microbiology, Govt. ERR college of Science, Bilaspur to undertake Project work at PG level.

Students are directed for R&D activities related to their courses. Extension camp and social awareness campaigns are regularly arranged in the department. VA Mycorrhizal, Rhizobium and Cyanobacteria based bio fertilizer formulations are being in progress in the department. The faculty members of the department participated in National and International seminars organized by different local and outstation institutions and published papers in peer reviewed journals.

Faculty

Name - Dr. Pragya Kulkarni
Designation - Asstt. Prof. Botany (Prof. In Charge Microbiology)

Name - Mrs. Rekha Gupta
Designation - Asstt. Prof.

Name - Mrs. Priti Mehta
Designation - Asstt. Prof.

"The science of microorganisms, including the study of Protozoans, Algae, Fungi, Bacteria, Cyanobacteria, Lichens Viruses, and Prions"

Study of Microorganisms includes their **growth** in laboratory conditions, **observations, record preparation, final identification** and **further related studies.**

Growth in laboratory includes –

- **Cleaning**
  The removal of visible soil and organic contamination from a device or surface, using either the physical action of scrubbing with a surfactant or detergent and water, or an energy-based process (for example, ultrasonic cleaners) with appropriate chemical agents
- **Sterilization**
  The use of physical or chemical methods to destroy all microbial life, including large numbers of highly-resistant bacterial Endospores
- **Decontamination**

The physical or chemical processes by which an object or area, contaminated with a harmful or potentially harmful microorganism, is made safe for handling or use. Such processes include physical removal of most contaminants, thermal destruction of biological activity (sterilization), chemical inactivation (biocidal process), or a combination of these methods

- **Disinfection**
  A generally less lethal process of microbial inactivation (compared to sterilization) that eliminates virtually all recognized pathogenic microorganisms but not necessarily all microbial forms (for example, bacterial spores)
- **Inoculation**
  Transfer of microorganisms either from their source or actively growing culture stored in laboratory
- **Culture**
  Actively growing, visible growth of microorganisms growing under laboratory condition

Scope of Microbiology

Food, Dairy and Agriculture Microbiology: Production of compost, management of diseases and study of role of microorganisms in food.

Fermentation and Industrial Microbiology: Production of Alcoholic and Non alcoholic beverages, Organic acids, antibiotics and Enzymes.

Medical Microbiology: Study of causes and consequences of infectious diseases and their prevention.

Microbial Biotechnology: "Use of microorganisms for welfare of mankind". Microbes as Tools for molecular biology studies, for synthesis of novel bio molecules and neutraceuticals, for production of monoclonal antibodies and study of immune disorders, as biosensors and intermediate for drug delivery

Glass wares used in microbiological laboratory

- Petri plates, Conical flask, Beaker, Measuring cylinder, Culture tube and Test tube, Pipette, Volumetric flask, Funnel, Watch glass, Microscope slide and cover slip

Tools of microbiological laboratory

- Inoculation needle and loop, Spreader, Spirit lamp or Bunsen burner, Forceps, Cotton, Aluminum foil, Immersion oil

Study of different types of Instruments and microscopes

- Chemical balance, Autoclave, Hot air oven, Laminar air flow, Incubator, Colony counter, pH meter, Centrifuge, Colorimeter, High resolution Compound Microscope

Primary Isolation using culture media

Microorganisms can be isolated from their natural sources as soil, water and air or any contaminated surface. They are allowed to grow on suitable growth media for revealing of their visible growth (culture) through pour plate or spread plate method. Individual colonies are then made pure by repeated sub culturing.

Culture Media

Synthetic, Semi synthetic or Natural medium prepared aseptically for growth of microorganisms.

Study the macroscopic features of microbial cultures

Cultural characteristics and distinguishing features of individual culture are compared with literature

- Bacteria – Colour, margin, elevation size of colony
- Cyanobacteria – Colour, pattern of growth
- Fungi – Colour, appearance, reverse colour, pattern of growth
- Lichens – Type of thallus, colour, sexual stage

Microscopic identification of microorganisms

- Bacteria: Gram staining and observation under microscope and biochemical tests
- Fungi: Simple staining and observation under microscope
- Cyanobacteria: Observation under microscope

Immunological studies

- Blood grouping test
- Serological test to study of antigen-antibody interaction

DEPARTMENT OF MATHEMATICS

- Department of Mathematics (Established in 1968) is a Star Performance Department declared By UGC under CPE Scheme.
- The month of August 1958 visualized the advent of the Department of Mathematics. With the modest start it gradually ascended to a fully fledged department and on the marvelous 54 years tenure the department has been recognized as an important one of the grand center of teaching and research in Mathematics.
- Post graduate classes came into existence in the year 1968.
- The department has been receiving acclaim as a research center under Pt. Ravishankar Shukla University, Raipur since last 18 years.
- The department has developed well equipped computational lab and research center with mathematical softwares.
- The Department is actively engaged in activities like Regional Mathematical Olympiad (RMO) which is the first phase of International Mathematical Olympiad (IMO). RMO is organized by HBCSE and NBHM.
- Every year workshops and examination of RMO are being conducted by Dr. Rakesh Tiwari.
- In January, 2012, a four days State level workshop for district coordinators and qualified students for Indian National Mathematical Olympiad INMO has been organized.
- The department has developed expertise in the fields of Approximation Theory, Fuzzy Topology, Fixed Point Theory, Wavelets etc.
- It is general trend of the department to stimulate and honour laborious and meritorious student to encourage them and in this connection every year a "Silver Medal" is being

conferred to the student who secures highest marks in M. Sc Mathematics Examination.

- The Department brings out selected seminar papers of worth in the form of Magazine "Ganit Suman".
- It is noteworthy that one of the Libraries named "Dr. Radha Krishnan" is being run by the PG students with their own contribution. The library caters books of various streams like General knowledge, General Awareness, Health Personality Development, NET, GATE etc.
- Educational tour for PG students is also being organized by department every year. This types of tour aware the students with new and advanced academic development running in various institutes.

Faculty

Name - Dr. M. A. Siddiqui
Designation - Professor

Name - Dr. Padmavati
Designation - Professor

Name - Dr. Prachi Singh
Designation - Assistant Professor

Name - Dr. Rakesh Tiwari
Designation - Assistant Professor

Name - Prof. Vinod Sahu
Designation - Assistant Professor

Lab Visit –

1. Study of Mathematical models
2. Basic Geometry concepts
3. Discussion on Vedic mathematics
4. Visit to Dr. Radha Krishan Library
5. Brief introduction of Mathematical Olympiad
6. Latex programming

DEPARTMENT OF PHYSICS

The department was established in 1958, PG course was started in 1965. Very highly distinguished and learned professors were among the faculty. Originally the sanctioned faculty was 01 prof.+ 09 asst. prof. But now the setup has been changed to 01 prof. + 06 Asst. prof. At present two posts of Asst. Prof. are vacant. These posts are filled on contract basis from time to time. The adequacy is satisfied up to 80% only due to vacant positions; but due to the quality and competency of the faculty and available high level learning resources, and the healthy practices in knowledge transfer process, this deficiency is overcome.

Faculty

Name - Dr. P. Bose
Designation – Professor

Name – Dr. J.K. Saluja
Designation – Professor

Name - Smt. Anita Shukla
Designation - Assistant Professor

Name - Smt. Siteshwari Chandraker
Designation - Assistant Professor

Name – Dr. Abhishek Kumar Misra
Designation - Assistant Professor

Experiment Number 1

Variation of magnetic field at axis of circular coil

Object: To study the variation of magnetic field with the distance along the axis of current carrying circular coil using Stewart and Gee's apparatus.

Apparatus required: Stewart and Gee's type tangent galvanometer, a battery, a rheostat, an ammeter, a one way key, a reversing key (commutator) , connecting wires.

Formula:

If a current carrying coil is place in y-z plane then its axis will be x-axis. The magnetic field along the axis of coil is given by,

$$B = \frac{\mu_0 NI}{2} \frac{a^2}{(a^2 + x^2)^{3/2}} \qquad = (1)$$

Where, $\mu 0$ ($= 4\pi \times 10-7$) is the vacuum permeability, N is the number of turns of the field coil, I is the current in the wire, in amperes, a is the radius of the coil in meters, and x is the axial distance in meters from the center of the coil.

If θ is the deflection produced in magnetometer at a certain position on the axis of coil then

magnetic field at that point will be,

$B = H \tan\theta$ (2)

The equations (1) and (2) implies that the graph between x and $\tan\theta$ will give the variation of magnetic field at the axis of circular coil.

Figure and Circuit Diagram

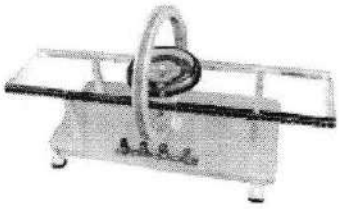


Fig 1. Tangent Galvanometer

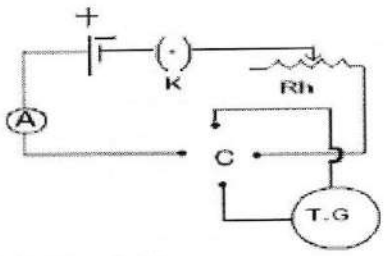


Fig 2. Circuit diagramme

Procedure:

1. Place the instrument in such a way that the arms of the magnetometer lie roughly east and west and the magnetic needle lies at the centre of the vertical coil. Place the eye a little above the coil and rotate the instrument in the horizontal plane till the coil, the needle and its image in the mirror provided at the base of the compass box, all lie in same vertical plane. The coil is thus set roughly in the magnetic meridian. Rotate the compass box so that the pointer lies on the 0-0 line.

2. Connect all the components as shown in circuit diagram.

3. Adjust the value of the current so that the magnetometer at central position gives a deflection of the order of 70^0-75^0. Note this magnetometer reading for the both directions of currents. This will give you θ value at x=0.

4. Now slide the magnetometer along the +axis of coil with an increment of 2cm and note the deflection of needle in magnetometer (both ends of needle position) for the both directions of current in coil. Record a number of observations. (x=0,2,4, 6, 8, 10, 12cm)

5. After this, repeat the point 4 for the magnetometer position along –axis of coil. i.e. repeat the observation by shifting the magnetometer in the opposite direction and keeping the current constant at the same value.

Observations

1. Least count of the magnetometer =
2. Current I =
3. Deflection in needle at x=0, (θ_0)=
4. *Tan* θ_0=

5. Table A: Deflection in magnetometer along +axis of coil.

Sr. No	Distance of needle from centre of centre, *x (cm)*	Deflection on East arm					*tan θ*
		Current in one direction		Current in reverse direction		Mean θ in deg.	
		θ_1	θ_2	θ_3	θ_4		
1.	2						
2.	4						
3.	6						
4.	8						
5.	10						
6.	12						
7.	14						
8.	16						

6. Table B: Deflection in magnetometer along -axis of coil.

Sr. No	Distance of needle from centre of centre, *x (cm)*	Deflection on East arm					*tan θ*
		Current in one direction		Current in reverse direction		Mean θ in deg.	
		θ_1	θ_2	θ_3	θ_4		
1.	2						
2.	4						
3.	6						
4.	8						
5.	10						
6.	12						
7.	14						
8.	16						

Plot in *x and tan θ: The plot of tan θ vs x will be found as shown in Fig 3.*

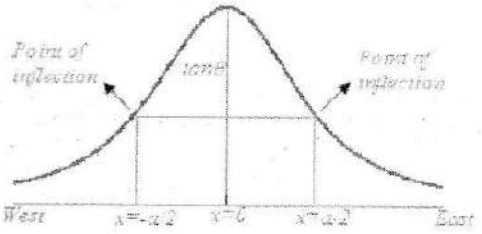


Fig. 3

Result: With help of the graph between tan θ and x, following points can be concluded.

1. The intensity of magnetic field is maximum at the centre and goes on decreasing as we move away from the centre of the coil towards right or left.

2. The point on the both side of graph where curve becomes convex to concave (i.e. the curve changes its nature) are called the point of inflection. The distance between the two points of inflexion is equal to the radius of the circular coil.

3. The radius of coil= distance between points of inflection=.....cm

Precautions:

1. There should be no magnet, magnetic substances and current carrying conductor near the apparatus.

2. The plane of the coil should be set in the magnetic medium.

3. The current should remain constant and should be reversed for each observation.

Experiment Number 2

Introduction

Galileo was the first person to show that at any given place, all bodies – big or small – fall freely when dropped, with the same (uniform) **acceleration**, if the resistance due to air is negligible. The gravitational attraction of a body towards the center of the earth results in the same acceleration for all bodies at a particular location, irrespective of their mass, shape or material, and this acceleration is called the **acceleration due to gravity**, g. The value of g varies from place to place, being greatest at the poles and the least at the equator. Because this value is large, bodies fall quickly to the surface of the earth when dropped, and so it is very difficult to measure their acceleration directly with considerable accuracy.

Therefore, the acceleration due to gravity is often determined by indirect methods – for example, using a **simple pendulum** or a **compound pendulum**. If we determine g using a simple pendulum, the result is not very accurate because an ideal simple pendulum cannot be realized under laboratory conditions. Hence, you will use two different compound pendulums to determine the acceleration due to gravity in the laboratory, namely the Bar pendulum and the Kater's pendulum.

Apparatus

Bar Pendulum
Small metal wedge
Spirit level
Telescope
Stop watch
Meter scale

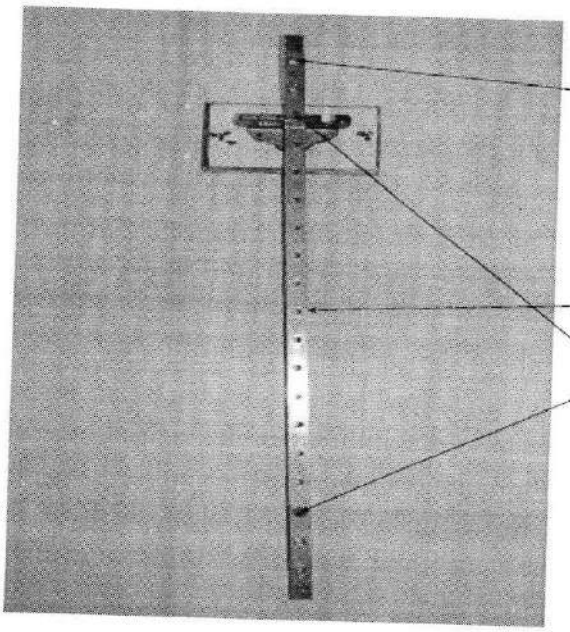
Theory

A bar pendulum is the simplest form of compound pendulum. It is in the form of a rectangular bar (with its length much larger than the breadth and the thickness) with holes (for fixing the knife edges) drilled along its length at equal separation.

If a bar pendulum of mass M oscillates with a very small amplitude θ about a horizontal axis passing through it, then its angular acceleration ($d2\theta/dt2$) is proportional to the angular displacement θ. The motion is **simple harmonic** and the **time period** T is given by

$$T = 2\pi\sqrt{\frac{I}{Mgl}}. \qquad (1)$$

where I denotes the **moment of inertia** of the pendulum about the horizontal axis through its **center of suspension** and l is the distance between the center of suspension and **center of gravity** (C.G.) of the pendulum.



- *Bar pendulum*
- A uniform rectangular metallic bar (~1m long), with holes drilled along its length (~5 cm apart)
- CG in the middle of the bar
- 2 knife edges symmetrically placed on either side of CG to suspend it at various distances from CG

Photograph of a typical bar pendulum

According to the theorem of parallel axes, if I_G is the moment of inertia of the pendulum about an axis through C.G., then the moment of inertia I about a parallel axis at a distance l from center of gravity (C.G.) is given by

$$I = I_G + Ml^2$$
$$= Mk^2 + Ml^2 \quad (2)$$

where k is the **radius of gyration** of the pendulum about the axis through C.G. Using Equation (2) in Equation (1), we get

$$T = 2\pi\sqrt{\frac{Mk^2 + Ml^2}{Mgl}}$$
$$= 2\pi\sqrt{\frac{k^2 + l^2}{gl}} \quad (3)$$
$$= 2\pi\sqrt{\frac{k^2/l + l}{g}}$$
$$= 2\pi\sqrt{\frac{L}{g}},$$

where L is the length of the equivalent simple pendulum, given by

$$L = \left(k^2/l + l\right) \quad (4)$$

Therefore,

$$g = 4\pi^2 \frac{L}{T^2} \quad (5)$$

The point at a distance L from the centre of suspension along a line passing through the centre of suspension and C.G. is known as the **centre of oscillation.**

Time period T will have minimum value when $l = k$ (using Equation (3)). Hence PQ = $2k$ (refer to Figure1).

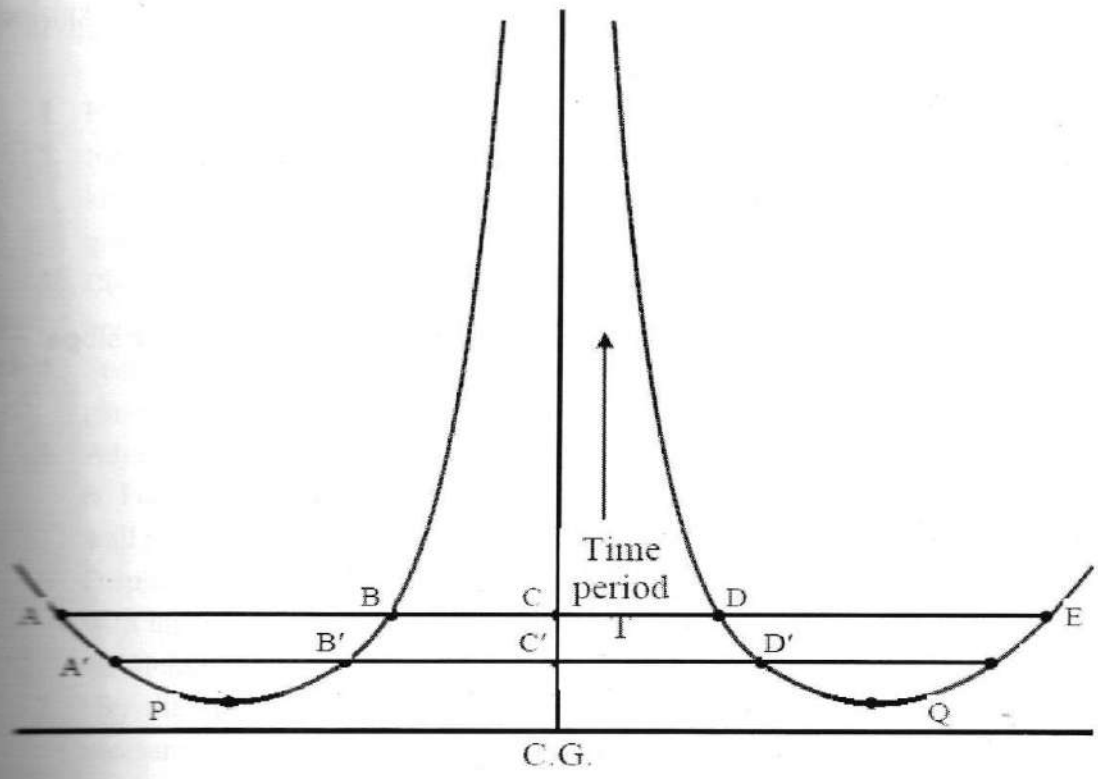


Figure 1: Expected variation of time period with distance of the point of suspension from center of gravity (C.G.)

Simplifying Equation (4), we get

$$l^2 - lL + k^2 = 0. \tag{6}$$

Equation (6) is a quadratic equation in l having two roots. If l_1 and l_2 are the two values of l, then by the theory of quadratic equations

$$l_1 + l_2 = L. \tag{7}$$

and

$$l_1 l_2 = k^2 \tag{8}$$

So we can write the solutions as

$$l = l_1, \qquad l = l_2 = \frac{k^2}{l_1} \tag{9}$$

Since both the sum and the product of the two roots are positive, for any particular value of l, there is a second point on the same side of C.G. and at a distance k^2/l from it, about which the pendulum will have the same time period. If a graph is plotted with the time period as ordinate and the distance of the point of suspension from C.G. as abscissa, it is expected to have the shape shown in Figure 1, with two curves which are symmetrical about the C.G. of the bar.

To find the length L of a simple pendulum with the same period, a horizontal line ABCDE can be drawn which cuts the graph at points A, B, D and E, all of which read the same time period. For A as the center of suspension, D is the center of oscillation (D is at distance $l_1+l_2=L$ of from the centre of suspension A). Similarly, for B as the center of suspension, E is the center of oscillation.

The measurements can also be used to determine g using Ferguson's method as explained below.

Ferguson's method for determination of g

Using Equations (5) and (6) we get

$$l^2 = \frac{g}{4\pi^2} lT^2 - k^2.$$

A graph between l^2 and lT^2 should therefore be a straight line with slope $\frac{g}{4\pi^2}$ as shown in Figure 2. The intercept on the y-axis is $-k^2$.

Acceleration due to gravity, $g = 4\pi^2 \times$ slope

Radius of gyration, $k = \sqrt{\text{(intercept)}}$

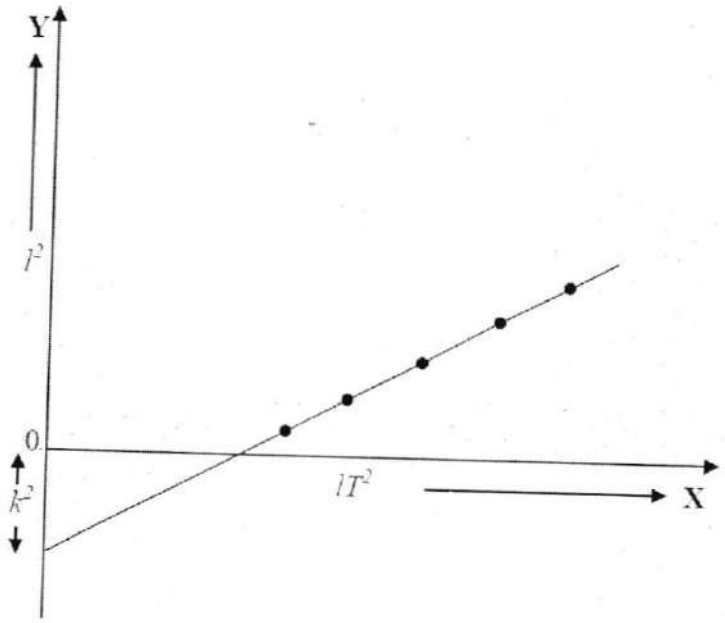


Figure 2: Expected form of the graph between l_2 and lT^2.

Learning Outcomes

This experiment will enable you

1 To determine the acceleration due to gravity (g) using a bar pendulum.
2 To verify that there are two pivot points on either side of the centre of gravity (C.G.) about which the time period is the same.
3 To determine the radius of gyration of a bar pendulum by plotting a graph of time period of **oscillation** against the distance of the point of suspension from C.G.
4 To determine the length of the equivalent simple pendulum.

Procedure

1 Balance the bar on a sharp wedge and mark the position of its C.G.
2 Fix the knife edges in the outermost holes at either end of the bar pendulum. The knife edges should be horizontal and lie symmetrically with respect to centre of gravity of the bar.
3 Check with spirit level that the glass plates fixed on the suspension wall bracket are horizontal. The support should be rigid.
4 Suspend the pendulum vertically by resting the knife edge at end A of the bar on the glass plate.
5 Adjust the eye piece of the telescope so that the cross wires are clearly visible through it. Focus the telescope on the lower end of the bar and put a reference mark on the wall behind the bar to denote its equilibrium position.
6 Displace the bar slightly to one side of the equilibrium position and let it oscillate with the amplitude not exceeding 5 degrees. Make sure that there is no air current in the vicinity of the pendulum.
7 Use the stop watch to measure the time for 30 oscillations. The time should be measured after the pendulum has had a few oscillations and the oscillations have become regular.
8 Measure the distance *l* from C.G. to the knife edge.
9 Record the results in Table 1. Repeat the measurement of the time for 30 oscillations and take the mean.
10 Suspend the pendulum on the knife edge of side B and repeat the measurements in steps 6 -9 above.
11 Fix the knife edges successively in various holes on each side of C.G. and in each case, measure the time for 30 oscillations and the distance of the knife edges from C.G.

Observations

Table 1: Measurement of *T* and *l*

Least count of stop-watch = ...sec.

S. No.	Side A up					Side B up				
	Time for 30 oscillations (t) 1	2	t (mean)	$T=t/30$ (sec)	l (cm)	Time for 30 oscillations (t) 1	2	t (mean)	$T=t/30$ (sec)	l (cm)
1										
2										
3										
4										
5										
6										
7										
8										
9										

Calculations

Plot a graph showing how the time period T depends on the distance from the center of suspension to C.G. (l). Figure 1 shows the expected variation of time period with distance of the point of suspension from C.G.

Acceleration due to gravity (g)

Draw horizontal lines on the graph corresponding to two periods, T_1 and T_2 , as shown in Fig1.

For the line ABCDE

L_1=(AD+BE)/2= ..... cm.

T_1 = ...sec.(corresponding to point C)

Hence, using the formula for g as given in Equation (5),

g = ...cm/sec^2.

For the line A'B'C'D'E'

L_2=(AD+BE)/2= ..... cm.

T^2 = ... sec. (corresponding to point C')

Hence, g = ...cm/sec^2.

Radius of gyration (k)

Let l_1 = ½ (AC + CE) = ½ AE,

and l_2 = ½ (BC + CD) = ½ BD.

Calculate the radius of gyration using the expression

$k = \sqrt{l_1 l_2}$ = ...cm.

Calculate another value for k from the line A'B'C'D'E':

k' = ...cm.

Hence, the mean value for radius of gyration about C.G. is

$$k_{mean} = ½(k + k') = ...cm.$$

Also, the mean length corresponding to minimum time period is $PQ = 2k$.

If M is the mass of the bar pendulum, the moment of inertia of the bar pendulum is obtained using the equation

$$I = Mk^2$$

Make the following table for calculated values of l^2 and lT^2 corresponding to all the measurements recorded in Table 1.

Table 2: Calculated values of l^2 and lT^2

S. No.	Side A up		Side B up		Mean values	
	l^2 (cm^2)	lT^2 ($cm\ sec^2$)	l^2 (cm^2)	lT^2 ($cm\ sec^2$)	l^2 (cm^2)	lT^2 ($cm\ sec^2$)
1						
2						
3						
4						
5						
6						
7						
8						
9						

Plot a graph of l^2 against lT^2 (as shown in Figure2) and determine the values o the slope and the intercept on the l^2 axis.

Slope of the graph = ... cm/sec^2.
Intercept = ... cm^2.
Acceleration due to gravity $g = 4\pi^2 \times$ slope = ... cm/sec^2.
Radius of gyration, $k = \sqrt{\text{(intercept)}}$ ..... cm^2.

Estimation of error

Maximum log error

Using Equation (5)

$$g = 4\pi^2 \frac{L}{T^2}$$

Taking logarithm on both sides and differentiating, we have

$$\frac{\Delta g}{g} = \frac{\Delta L}{L} + \frac{2\Delta T}{T}$$

$$\Rightarrow \Delta g = g\left(\frac{\Delta L}{L} + \frac{2\Delta T}{T}\right),$$

where ΔL and ΔT are the least counts of distance and period axes of the graph

Results

The acceleration due to gravity, g = -------- cm/s^2
Actual value = --------- cm/s^2
Percentage error = -------- %
Maximum log error = --------- cm/s^2
The radius of gyration about the axis of rotation = ------- cm.
The M.I. of the pendulum about the axis of rotation = ---- gcm^2.

Experiment Number 3

MEASUREMENT OF VISCOSITY BY THE STOKES METHOD

OBJECT

To measure coefficient of the dynamic viscosity of the glycerine and ricine oil with a Stokes viscometer. Evaluate the error of measurements.

Compare your results to the accepted value.

THEORY

Viscosity is a measure of the resistance of a fluid which is being deformed by either shear stress or tensile stress. Viscosity describes a fluid's internal resistance to flow and may be thought of as a measure of fluid friction. For example, high-viscosity felsic magma will create a tall, steep stratovolcano, because it cannot flow far before it cools, while low-viscosity magic lava will create a wide, shallow-sloped shield volcano. All real fluids (except superfluids) have some resistance to stress and therefore are viscous, but a fluid which has no resistance to shear stress is known as an ideal fluid or inviscid fluid. Viscosity coefficients can be defined in two ways:

Dynamic viscosity, also absolute viscosity, the more usual one. The SI physical unit of dynamic viscosity is the pascal-second (Pa·s), (equivalent to N·s/m2, or kg/(m·s)). The usual symbol for dynamic viscosity used by mechanical and chemical engineers — as well as fluid dynamicists — is the Greek letter mu (μ).

Kinematic viscosity is the dynamic viscosity divided by the density (units m^2/s).

Accepted values of the dynamic viscosity of some selected liquids and gases for temperatu of 20°C and pressure 1.10^5 Pa.

Liquid	mPa.s	Gas	μPa.s
Glycerine	1480	Neon	32.1
Ricine oil	989	oxygen	20.8
Mercury	1.554	air	18.6
Water	1.002	hydrogen	9.0

Free fall in a viscous liquid

Determination of dynamic viscosity in a Stokes viscometer is based on a study of free fall of an iron ball in examined fluid. There are three forces acting on the ball: $\boldsymbol{F_g}$ – gravitational force, $\boldsymbol{F_r}$ – force of resistance and $\boldsymbol{F_b}$ – buoyant force.

Gravitational force can be evaluated by $\boldsymbol{F_g} = m\boldsymbol{g}$,

Where m is mass of the ball and $\boldsymbol{g}$ is a vector of acceleration due to gravity.

Buoyant force can be evaluated form the Archimedes' principle like mass of particular volume of water displaced by the ball.

$$\boldsymbol{F_b} = -m_{fluid}\boldsymbol{g} = -4/3\ \pi r^3 \rho \boldsymbol{g},$$

Where r is radius of the ball and ρ is density of it.

Force of resistance is evaluated by the Stokes law $\boldsymbol{F_r} = -6\pi\mu\rho\boldsymbol{v}$, where v is velocity of the ball.

Equation of motion of the ball can be written as

$$m\ d\boldsymbol{v}/dt = F_g + F_b + F_r = (m - 4/3\ \pi r^3 \rho)\boldsymbol{g} - 6\pi\mu\rho\boldsymbol{v}$$

Simplifying the vector equation into the vertical direction and assuming the initial velocity to be zero we obtain

Now we can apply two substitutions $\alpha = g(1 - \rho/\rho_{ball})$ and $\beta = 9\mu/(2r^2\rho_{ball})$

obtaining

$$\frac{dv}{dt} = \alpha - \beta v \quad \Rightarrow \quad \frac{dv}{\alpha - \beta v} = dt \quad \Rightarrow \quad \int_0^v \frac{dx}{\alpha - \beta x} = \int_0^t dy$$

By integrating we have

$$t = \left[-\frac{1}{\beta} \ln|\alpha - \beta x| \right]_0^v = \frac{1}{\beta} \ln\left| \frac{\alpha}{\alpha - \beta v} \right| \quad \Rightarrow \quad v = \frac{\alpha}{\beta}\left(1 - e^{-\beta t}\right) = v_\infty\left(1 - e^{-\beta t}\right)$$

The last formula tells us that the ball velocity exponentially raises to the value

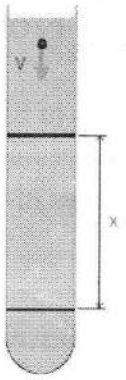
$$v_\infty = \frac{2gr^2(\rho_k - \rho)}{9\eta}. \qquad [1]$$

$$m\, dv/dt = (m - 4/3\ \pi r^3\rho)g - 6\pi\mu\rho v$$

Stokes viscometer.

Viscosity is measured with various types of viscometers. The theory of the Stokes viscometer is based on the study of the free fall of the ball in investigated liquid.

Where g is acceleration due to the gravity, r is the radius of the ball, ρ_{ball} is the density of the



The Stokes viscometer is usually a transparent cylinder filled with the investigated liquid in which we measure the time of the free fall of the ball Δt between two marks at a distance $x = \Delta L$. The ball is made from the suitable material, e.g. iron or steel. Taking into account a simple formula for the final velocity $v_\infty = \Delta L/\Delta t$ and considering the equation [1] we finally obtain formula for the dynamic viscosity:

$$\mu = \frac{2}{9} g r^2 (\rho_{ball} - \rho) \frac{\Delta t}{\Delta L},$$

material of the ball, ρ is the density of the investigated liquid, Δt is the time of the free fall of the ball between the two rings placed at the distance ΔL.

(Density of the glycerine ρ = 1261 kg/m3, density of the ricine oil ρ = 960 kg/m3, density of the balls ρb_{all} = 7860 kg/m3).

PROCEDURE

The method of measurement is the same for both glycerine as well as for ricine oil.

1 Place 12 balls into the Petri dish. Measure the diameter of each ball.
2 Determine the probable mass of the Petri dish together with the balls, using the balance weight.
3 Determine the mass of the balls using the analytical weigh in such a way that first of all you will weigh the mass of the Petri dish with the balls and then the mass of the dish without the balls.
4 On the walls of the measuring cylinders are placed two rubber rings between you will measure the time of the fall of the balls in the liquid. Adjust the distance between these rubber rings in such way that the upper ring will be placed at least 5 cm below the surface of the liquid.
5 Using the stopwatch measure the time of the fall of each ball between the upper and lower rubber rings. Eliminate the smallest and the biggest values.
6 Using the densitometer measure the density of each liquid.
7 Taking into account strong dependence of the viscosity on temperature read the value of temperature and specify this temperature at the conclusions of your lab report.
8 Compare your results of the measurement of the viscosity with the accepted values.

Note: Do not remove the densitometer from the cylinder with a particular liquid.

Experiment Number 4

P-N JUNCTION DIODE CHARACTERISTICS

Objective:

1. To plot Volt-Ampere Characteristics of Silicon P-N Junction Diode.
2. To find cut-in Voltage for Silicon P-N Junction diode.
3. To find static and dynamic resistances in both forward and reverse biased conditions for P-N Junction diode.

Hardware Required:

S. No	Apparatus	Type	Range	Quantity
01	PN Junction Diode	IN4001		1
02	Resistance		1k ohm	1
03	Regulated power supply		(0 – 30V)	1
04	Ammeter	mC	(0-30)mA, (0-500)μA	1
05	Voltmeter	mC	(0 – 1)V, (0 – 30)V	1
06	Bread board and connecting wires			

Introduction:

Donor impurities (pentavalent) are introduced into one-side and acceptor impurities into the other side of a single crystal of an intrinsic semiconductor to form a p-n diode with a junction called depletion region (this region is depleted off the charge carriers). This region gives rise to a potential barrier $V\gamma$ called **Cut- in Voltage**. This is the voltage across the diode at which it starts conducting. The P-N junction can conduct beyond this Potential. The P-N junction supports uni-directional current flow. If +ve terminal of the input supply is connected to anode (P-side) and –ve terminal of the input supply is connected to cathode (N-side), then diode is said to be forward biased. In this condition the height of the potential barrier at the junction is lowered by an amount equal to given forward biasing voltage. Both the holes from p-side and electrons from
n-side cross the junction simultaneously and constitute a forward current (**injected minority current** – due to holes crossing the junction and entering N-side of the diode, due to electrons crossing the junction and entering P-side of the diode). Assuming current flowing through the diode to be very large, the diode can be approximated as short-circuited switch. If –ve terminal of the input supply is connected to anode (p-side) and +ve terminal of the input supply is connected to cathode (n-side) then the diode is said to be reverse biased. In this condition an amount equal to reverse biasing voltage increases the height of the potential barrier at the junction. Both the holes on p-side and electrons on n-side tend to move away from the junction thereby increasing the depleted region. However the process cannot continue indefinitely, thus a small current called **reverse saturation current** continues to flow in the diode. This small current is due to thermally generated carriers. Assuming current flowing through the diode to be negligible, the diode can be approximated as an open circuited switch. The volt-ampere characteristics of a diode explained by following equation:

$I = I_0(Exp(V/\eta V_T)-1)$

I=current flowing in the diode

I_0=reverse saturation current

V=voltage applied to the diode

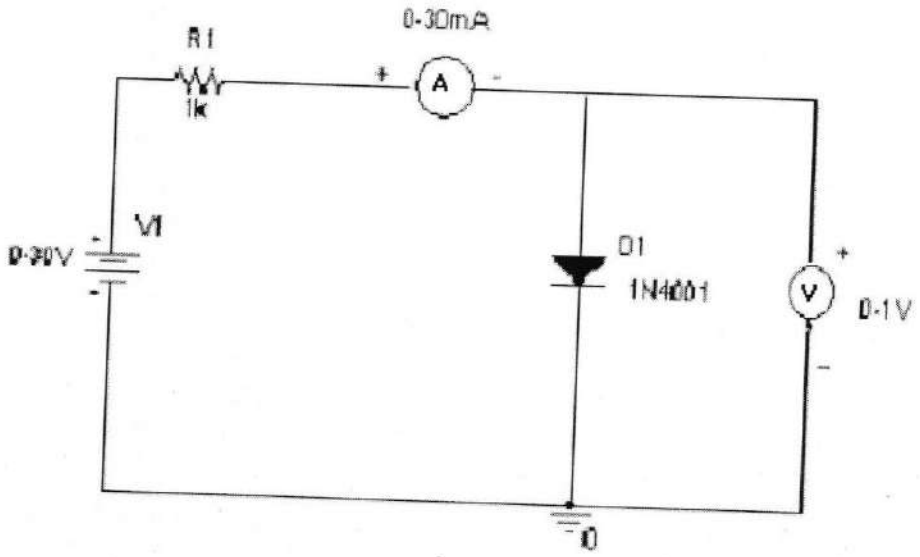
V_T=volt-equivalent of temperature=kT/q=T/11,600=26mV(@ room temp).

η=1 (for Ge) and 2 (for Si)

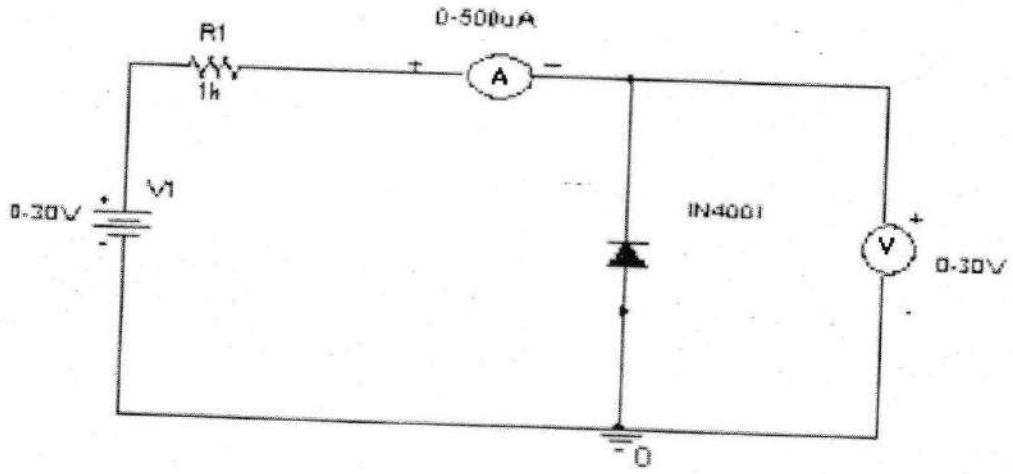
It is observed that Ge diode has smaller cut-in-voltage when compared to Si diode. The reverse saturation current in Ge diode is larger in magnitude when compared to silicon diode.

Circuit diagram:

Forward Bias



Reverse Bias



Precautions:

1. While doing the experiment do not exceed the ratings of the diode. This may lead t damage of the diode.
2. Connect voltmeter and Ammeter in correct polarities as shown in the circuit diagram.
3. Do not switch **ON** the power supply unless you have checked the circuit connections as pe the circuit diagram.

Experiment:

Forward Biased Condition:

1. Connect the PN Junction diode in forward bias i.e. Anode is connected to positive of the power supply and cathode is connected to negative of the power supply.
2. Use a Regulated power supply of range (0-30) V and a series resistance of 1kΩ.
3. For various values of forward voltage (V_f) note down the corresponding values of forward current(I_f) .

Reverse biased condition:

1. Connect the PN Junction diode in Reverse bias i.e. anode is connected to negative of the power supply and cathode is connected to positive of the power supply.
2. For various values of reverse voltage (V_r) note down the corresponding values of reverse current (I_r).

Tabular column:

Forward Bias:

S. No	V_f (volts)	I_f (mA)

Reverse Bias:

S. No	V_r (volts)	Ir (μA)

Graph (instructions)

1. Take a graph sheet and divide it into 4 equal parts. Mark origin at the center of the graph sheet.
2. Now mark +ve x-axis as V_f
-ve x-axis as V_r
+ve y-axis as I_f
-ve y-axis as I_r.
3. Mark the readings tabulated for diode forward biased condition in first Quadrant and diode reverse biased condition in third Quadrant.

Graph:

Calculations from Graph:

Static forward Resistance $R_{dc} = V_f/I_f\ \Omega$

Dynamic forward Resistance $r_{ac} = \Delta V_f/\Delta I_f\ \Omega$

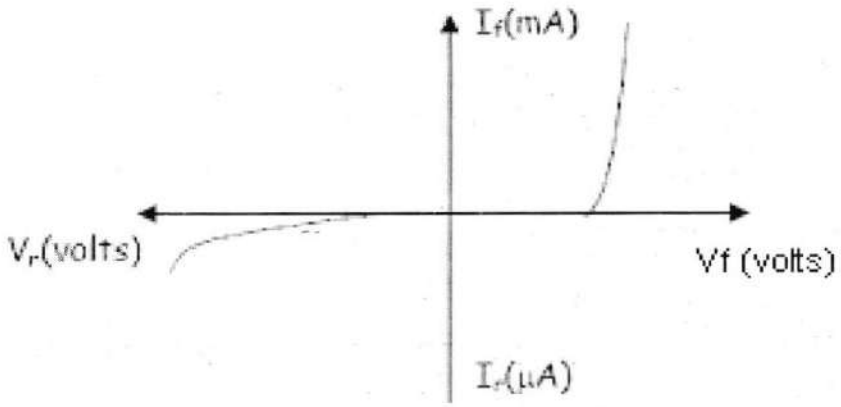
Static Reverse Resistance $R_{dc} = V_r/I_r\ \Omega$

Dynamic Reverse Resistance $r_{ac} = \Delta V_r/\Delta I_r\ \Omega$

Result:

Thus the VI characteristic of PN junction diode is verified.

1. Cut in voltage = ... V
2. Static forward resistance = ... Ω
3. Dynamic forward resistance = ... Ω



DEPARTMENT OF ZOOLOGY

The Department of Zoology in one of the oldest Department of Govt. V.Y.T.P.G.Auto. College with started from the inception of the college in 1958 it has remained a landmark of excellence ever since P.G course started in the year 1965. The department offers B.Sc. with Zoology, chemistry , botany Zoology , Biotech & chemistry, Zoology, Anthropology and chemistry ,Zoology, Geology and chemistry,Zoology , Biochemistry & chemistry combinations beside M.Sc in Zoology and biotechnology. Ph.D programmme in the area of biodiversity, toxicity, Environmental Biology, Fly Ash Toxicity, Histopathology and Reproductive Biology ,Endocrinology and Genetic has been carried out since the department become research centre in the year 1970 In consonances with its mission to promote on intellectual climate in this region, the department too kinitative in the formation of the Zoological society Chhattisgarh which came into existence in 2015. The Department is also known for its high standards of research. 13 Doctorate degrees have been awarded so for. Besides providing workspace for researches the department. Houses a well – equipped lab and library with around 700 book's. Research journals are available in the central library of the college the department has under taken minor and major research project's supported by funding agencies such as UGC & CG cost. It has also organized UGC CG cost founded two national conferences. Several research papers have been published in various national and international journals by the faculty a part from publication of a book on Entomology by Late Dr. K.K. Verma who was an eminent scientist of international fame .

Faculty

Name - Dr Kanti Choubey
Designation - Professor and Head
Name - Dr Anil Kumar
Designation - Professor & I/C of Biotechnology
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Designation - Assistant Professor
Name – Dr. Divya K. Minj
Designation - Assistant Professor
Name - Dr. Neeru Agrawal
Designation - Assistant Professor
Name - Dr. Mousmi Dey
Designation - Assistant Professor
Name - Dr. Sanju Sinha
Designation - Assistant Professor
Name - Dr. Alka Mishra
Designation - Assistant Professor

List Of Experiments

Exp.I. Musuem specimens:

To study different animals categorized into Vertebrates and Invertebrates . The main aim behind this to make students aware about Taxonomy ,Biodiversity and evolutionary trends.

Exp.II. Osteology:

Comparative study of axial and appendicular skeletal system of Rabbit and Frog

Exp.III: Haematology

Demonstration of different haematological experiments along with their physiological signifiacance .

1. **Blood group detection**
2. **Heamoglobin percentage**
3. **Haemin crystals**

FACILITIES AVAILABLE IN OUR COLLEGE

BOTANY LAB

CENTRAL LIBRARY

LANGUAGE LAB

CHEMISTRY LAB

CENTRAL LIBRARY BUILDING

TAGORE SEMINAR HALL

ZOOLOGY LAB

SPORTS COMPLEX

INDOOR BAD MINTON HALL

GEOLOGY LAB

SMART CLASS ROOM

PG CLASS ROOM

SWAMI VIVEKANAND AUDIO-VISUAL HALL

CONFERENCE HALL

COMPUTER LAB

HONORABLE EX. GOVERNOR OF CHHATTISGARH SHRI SHEKHAR DUTT INAUGURATED DST SPONSORED INSPIRE AUTUMN CAMP 2016 IN OUR COLLEGE

HONORABLE HIGHER EDUCATION MINISTER SHRI PREM PRAKASH PANDEY WAS PRESENT IN THE OATH TAKING CEREMONY OF STUDENT UNION IN OUR COLLEGE

ANNUAL CULTURAL PROGRAMME