



DST



INSPIRE INTERNSHIP WINTER CAMP

October 22 to 26, 2016

Sponsored by

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

SOUVENIR



Organized by

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

(REACCREDITED BY NAAC WITH "A" GRADE II -CYCLE)

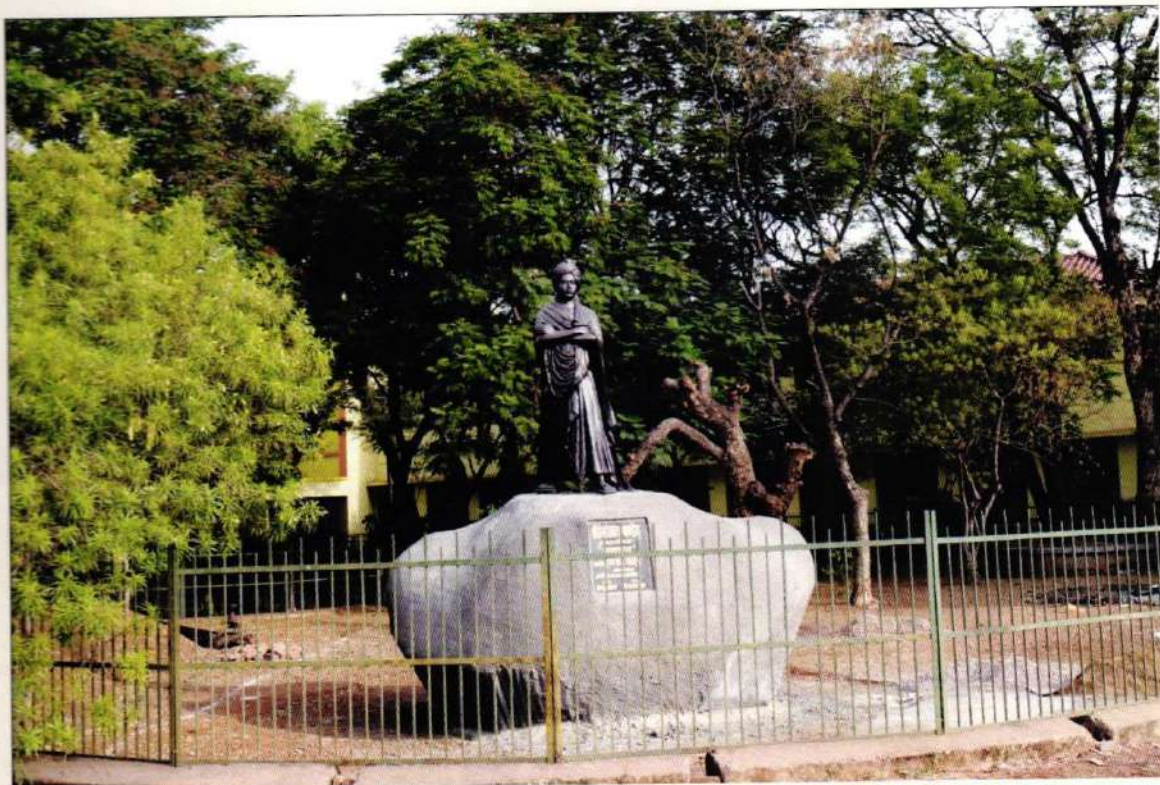
(SELECTED FOR UGC "CPE" SCHEME PHASE-III)

(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)**

2016



STATUE OF SWAMI VIVEKANAND IN COLLEGE CAMPUS



OUR COLLEGE - PATH OF EXCELLENCE



DST



INSPIRE INTERNSHIP WINTER CAMP

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

SOUVENIR

**Principal & Coordinator
Dr. S.K. Rajput**

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

Organized by

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

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Winter Camp 2016**



DURG VISHWAVIDYALAYA, DURG (C.G.)

(A State Government University established under Chhattisgarh Act No. 16 of 2015)

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Date :- 19-10-2016

//MESSAGE//

It is a matter of great pleasure that Govt. V.Y.T. PG Autonomous College, Durg is organizing 'DST-INSPIRE' autumn camp for school students of Chhattisgarh from 22nd to 26th October 2016. It is going to be the first and foremost such programme fostering scientific attitude after the establishment of Durg University.

This 'INSPIRE' autumn camp will be a milestone in the history of science education of school students of our state. The galaxy of distinguished scientist of national and international repute will truly 'inspire' the school students, thus contributing to the grooming of future scientists of our country.

This programme will not only inculcate interest in science among school students, but the UG & PG students of the host institute will also be benefited by the august presence of such scientists.

I wish a grand success to the organizers of this programme and look forward for more initiatives of this kind from various educational institutions affiliated to Durg University.

(Dr. N.P. Dixit)
Vice Chancellor

(Prof. S.K. Rajput)
Principal

Tel: 0788-2213300

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From the Principal's Desk



With a glorious history of 58 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 and has now become an excellent centre of leadership 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. The college at present is successfully catering to more than 5000 students in various faculties in its campus. The college is accredited the "A+" grade by NAAC.

The college is thus privileged to organise the prestigious **INSPIRE Science Internship Camps** for the first time from 22nd October to 26 October 2016. INSPIRE (Innovation in Science Pursuit for Inspired Research) is an innovative programme developed, managed and sponsored 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 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, CBSE etc. The basic segment of the camps 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.

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. Most of all what I wish is that everyone gains knowledge and great memories.

A handwritten signature in black ink, consisting of a stylized 'S' followed by a dot, underlined.

(Prof. S.K. Rajput)
Principal

Tel. 0788-22026

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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 infrastructure. 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 Pandit Ravishankar Shukla University, Raipur. The college has been conferred with the status of autonomy by the UGC in 1989. The college accredited with grade 'A' by NAAC in second 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, and 104 faculty members, it has 14 departments as recognized research centres, namely Hindi, English, History, Political Science, Sociology, Geography, Commerce, Physics, Chemistry, Botany, Zoology, Geology, Mathematics, and Biotechnology department. 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 housed 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 site, 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.

At the time of independence Durg was a backward district, with a diverse demographic composition, consisting mostly of OBC, SC and tribal population. The district was backward in terms of educational, industrial and economic development. In the post-independence era, new avenues of development were opened with the beginning of industrialization in the region. An integrated steel plant, biggest of its kind in Asia, was founded with the support of USSR. During the same period higher education was introduced in the region with inception of Govt. Arts and Science College, Durg in August 1958. Later on the college was renamed after late Shri Vishwanath Yadav Tamaskar, an eminent politician and freedom fighter from this region.

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 4326 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 is a distinctive feature of this institution.

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.

Keeping pace with the challenging need of the day the college has undergone major paradigm shift in terms of pedagogical methodology, from conventional ways of teaching to ICT enabled teaching. It has successively established smart classrooms, provided with Wi-Fi connectivity and computerized library to encourage effective teaching and learning.

The college is moving forward with a multi pronged strategy towards excellence with a view to come out as an institution of the future that prepares the students equipped with knowledge, skill, aptitude and social commitment.

* The Department of Higher Education, Govt. of Chhattisgarh has identified this institution as Lead College of District Durg to mentor and monitor academic and administrative functioning of other govt. and non-govt. colleges in this region.

DST
INSPIRE INTERNSHIP WINTER CAMP 2016
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. Anil Kumar	Professor, Zoology	98274-91253
Dr. Ajaya Singh	Professor, Chemistry	94062-07572
Dr. Pragya Kulkarni	Asstt. Professor, Botany	98261-42086
Dr. Rakesh Tiwari	Asstt. Professor, Mathematics	98265-23228
Dr. Prashant Shrivastava	Asstt. Professor, Geology	98271-78920

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. Rajendra Choubey	Professor & Head, Sociology	98271-95449
Dr. O.P.Gupta	Professor & Head, Commerce	99261-70704
Dr. Anil Kashyap	Professor, Chemistry	98279-58247
Dr. Purna Bose	Professor & Head, Physics	94252-46227
Dr. Kanti Choubey	Professor & Head, Zoology	94241-08171
Dr. Ranjana Sharma	Head, 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. Shriram Kunjam	Asstt. Professor, Botany	99063-78794

Application receiving/Selection of participants/Printing etc.

Name	Department	Contact Number
Dr. Nutan Rathod	Asstt. Professor, Chemistry	94061-17335
Dr. Jay Prakash Sao	Asstt. Professor, Hindi	99810-64205
Dr. Suchitra Sharma	Asstt. Professor, Sociology	94241-28806
Dr. Sapana Sharma	Asstt. Professor, Sociology	98934-67679
Dr. Pragya Kulkarni	Asstt. Professor, Botany	98261-42086
Dr. Prachi Singh	Asstt. Professor, Maths	94791-74050
Dr. Ajai Pillai	Asstt. Professor, Chemistry	94252-45612
Dr. Usha Sahu	Asstt. Professor, Zoology	75871-68720
Dr. V.S.Geete	Asstt. Professor, Chemistry	94252-44857
Dr. A.K. Pandey	Asstt. Professor, History	9425557530
Dr. Prashant Shrivastava	Asstt. Professor, Geology	98271-78920
Dr. Divya K. Minj	Asstt. Professor, Zoology	94242-74002
Dr. Anita Shukla	Asstt. Professor, Physics	97556-34741
Dr. Shaheen Gani	Asstt. Professor, Psychology	88719-45250

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. Manju Kaushal	Professor, Chemistry	98261-19294
Dr. Gayatri Pandey	Asstt. Professor Botany	9827471009
Dr. K. Padmavati	Asstt. Professor Economics	94241-31422
Dr. S.D. Deshmukh	Asstt. Professor, Geology	9329112268
Dr. Anupama kashyap	Asstt. Professor, Chemistry	98279-58247
Dr. Prachi Singh	Asstt. Professor, Maths	94791-74050
Library visit		
Dr. Jyoti Dharkar	Asstt. Professor, History	98262-34240
Dr. Neeru Agrawal	Asstt. Professor, Zoology	94061-18050
Dr. Kalpana Agrawal	Asstt. Professor, History	98263-61574
Dr. Mausumi Dey	Asstt. Professor, Zoology	95849-34627
Shri Vinod Ahirwar	Librarian	94241-14401

Accommodation (Durg and Bhilai)

Name	Department	Contact Number
Dr. G.P. Gupta	Professor & Head, Commerce	99261-70704
Dr. Abhinesh Surana	Professor, Hindi	98274-92040
Dr. A.K. Khan	Professor, Economics	98274-70364
Dr. Qamar Talat	Professor, English	94255-65387
Dr. Anil Kashyap	Professor, Chemistry	98279-58247
Dr. Sapana Sharma	Asstt. Professor, Sociology	98934-67679
Dr. Vedvati Mandavi	Asstt. Professor, Political Science	99935-65900
Dr. Vinod Sahu	Asstt. Professor, Maths	94241-09573
Dr. L.K. Bharti	Asstt. Professor, Economics	94242-79195
Dr. Sitieshwari Chandrakar	Asstt. Professor, Physics	99779-60767
Dr. Kajal Kiran Gulhare	Asstt. Professor, Computer Sc	98279-57283
Raipur Accomodation and Transportaion		
Dr. S. D. Deshmukh	Asstt. Professor, Geology	93291-12268
Dr. Shriram Kunjam	Asstt. Professor, Botany	94063-78794
Dr. Anshumala Chandangar	Asstt. Professor, Economics	90091-09019

Food & Catering

Name	Department	Contact Number
Dr. Abhinesh Surana	Professor, Hindi	98274-92040
Dr. H.P. Singh	Professor, Commerce	98263-39195
Dr. Sukumar Chatterjee	Professor, Chemistry	94241-08657
Dr. Baljeet kaur	Professor, Hindi	94790-59158
Dr. Surekha Jain	Professor, English	9300770142
Dr. Arvind Shukla	Asstt. Professor, Political Science	97522-89902
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.A.K.Pandey	Asstt. Professor, History	94255-57530
Dr. Rakesh Tiwari	Asstt. Professor, Mathematics	98265-23228

Audio visual/Photography

Name	Department	Contact Number
Dr.V.S. Geete	Asstt. Professor, Chemistry	94252-44857
Dr.Sushma Yadav	Asstt. Professor, Geography	98934-15886
Dr. Jyoti Dharkar	Asstt. Professor, History	98262-34240
Dr.S.D.Deshmukh	Asstt. Professor, Geology	93291-12268
Dr. Siteshwari Chandrakar	Asstt. Professor, Physics	9977560767

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

Name	Department	Contact Number
Dr. Alka Tiwari	Professor, Chemistry	74155-14000
Dr. S.N. Jha	Professor, Commerce	9425555280
Dr. Padmavati	Professor, Maths	9425557653
Dr. Shikha Agrawal	Professor, Economics	98279-35586

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. Jay Prakash Sao	Asstt. Professor, Hindi	9981064205
Dr. Anupama kashyap	Asstt. Professor, Chemistry	98279-58247
Dr. Prashant Shrivastava	Asstt. Professor, Geology	98271-78920

Water, Generator, Electricity, Sound, Seminar Hall preparation

Name	Department	Contact Number
Dr. H.P. Singh	Professor, Commerce	98263-39195
Dr. Arvind Shukla	Asstt. Professor, Political Science	97522-89902
Dr. L.K. Bharti	Asstt. Professor, Economics	94242-79195
Dr. Perna Kathane	Asstt. Professor, Chemistry	98266-72649
Prof. Durgesh Kotangale	Asstt. Professor, Computer Science	9329880989
Dr. Krishna Chatterjee	Asstt. Professor, Hindi	98261-34807
Dr. Meena Maan	Asstt. Professor, English	98279-46117
Prof. Kajal Kiran Gulhare	Asstt. Professor, Computer Science	98279-57283
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. Shraddha Chandrakar	Professor Hindi	9669197987
Dr. K. Padmawati	Asstt. Professor Economics	94241-31422
Dr. Anupama Kashyap	Asstt. Professor, Chemistry	98279-58247
Dr. Jyoti Dharkar	Asstt. Professor, History	98262-34240
Dr. Meena Maan	Asstt. Professor, English	98279-46117
Dr. Krishna Chatterjee	Asstt. Professor, Hindi	98261-34807
Dr. Tarlochan Kaur	Asstt. Professor, English	98278-95972

Momento/Welcome/Certificate Writing/Certificate Distribution

Name	Department	Contact Number
Dr. Alka Tiwari	Professor, Chemistry	74155-14000
Dr. Anil Kumar	Professor, Zoology	98247-91253
Dr. V.S. Geete	Asstt. Professor, Chemistry	94252-44857
Dr. Sunitha Mathew	Asstt. Professor, Chemistry	94241-08409
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	A1- Dr. A.P.J. Kalam Group	Dr. L.K.Bharti	Dr. Sushama Yadav
	A2- Dr. Raja Ramanna Group		
Group-B	B1-Dr. Vikram Sarabhai Group	Dr. Jagjeet Kaur Saluja	Dr. Vinod Sahu
	B2-Dr. Shanti Swaroop Bhatnagar Group		
Group-C	C1-Dr. C.V.Raman Group	Dr. Ranjana Sharma Dr. Nutan Rathore (only for 23 Oct.)	Dr. Rakesh Tiwari
	C2-Dr. P.C. Roy Group		
Group-D	D1-Dr. Meghnath Saha Group	Dr.Sukumar Chatterjee	Prof. Gayatri Pande
	D2- Dr. Shrinivas Ramanujam Group		
Group-E	E1-Dr. Homi Jahangir Bhabha Group	Prof. Upma Shrivastava	Dr. G.S. Thakur Dr. Shriram Kunja (only for 23 Oct.)
	E2- Dr. Jagdish Chandra Bose Group		

Committee for conducting MCQ Test and Essay Writing and Student feedback collection

Name	Department	Contact Number
Dr. Alka Tiwari	Prof. of Chemistry	7415514000
Dr. Manju Kaushal	Prof. of Chemistry	9826119294
Dr. K.I.Toppo	Asstt. Prof. of Botany	9893978473
Prof. Upma Shrivastava	Asstt. Prof. of Chemistry	8962782515
Dr. Shubha Gupta	Asstt. Prof. of Botany	9826135227
Dr. Divya K. Minj	Asstt. Prof. of Zoology	9424274002
Dr. Neeru Agrawal	Asstt. Prof. of Zoology	9406118050
Dr. Anita Shukla	Asstt. Prof. of Physics	9755634741
Dr. Prachi Singh	Asstt. Prof. of Maths	9479174050
Dr. Durgesh Kotangale	Asstt. Prof. of Computer Science	9329880989
Dr. Kajal Kiran Gulhare	Asstt. Prof. of Computer Science	9827957283

Transportation Committee For students from 22nd to 26th Oct 2016

S.No.	Group Name	Professor Incharge
1	Group A - Dr. A.P.J. Kalam Group	Dr. Shankar Nishad
		Dr. K.I. Toppo
2	Group B - Dr. Shanti Swaroop Bhatnagar group	Dr. Arvind Shukla
		Dr. Upma Shrivastava
3	Group C - Dr. C.V.Ramian Group	Dr. S.R. Thakur
		Dr. Laxmi Dhruv
4	Group D - Dr. Meghnath Saha Group	Dr. G.S. Thakur
		Dr. Ashwani Mahajan
5	Group E - Dr. Homi Jahangeer Bhabha Group	Shri Vinod Ahirwar
		Dr. Sandhya Agrawal

Help desk/Registration counter

S.No.	Group Name	Professor Incharge
1	Group A - Dr. A.P.J. Kalam Group	Dr. Pragya Kulkarni
		Ku. Deepika Yadav (Microbiology)
		Smt. Chetna Sahu
2	Group B - Dr. Shanti Swaroop Bhatnagar group	Dr. K. Padmavati
		Ku. Nidhi Sharma (Maths)
		Dr. Alpana Tripathi
3	Group C - Dr. C.V.Raman Group	Dr. Mercy George
		Dr. Soma Sen (Chemistry)
		Shri Sitaram Dewangan
4	Group D - Dr. Meghnath Saha Group	Dr. Shaheen Ghani
		Dr. Reena Sahu (Botany)
		Smt. Shobha Rani
5	Group E - Dr. Homi Jahangeer Bhabha Group	Dr. Rakesh Tiwari
		Dr. Latika Tamrakar (Computer Science)
		Ku. Sonam Gupta

Programme Schedule

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

Time Table of Activities

INSPIRE Internship Autumn Camp Oct. 22-Oct. 26, 2016

Time	22 Oct. (Sat.)	Time	23 Oct. (Sunday)	24 Oct. (Monday)	25 Oct. (Tuesday)	26 Oct. (Wednesday)
8.30 to 10.30 AM	Registration and Breakfast	8 to 9 AM	Breakfast	Breakfast	Breakfast	Breakfast
11.30 AM to 1.00 PM	Inauguration Honorable Shri Shekhar Dutt Honorable Shri Prem Prakash Pandey Honorable Dr. N.P. Dixit	9.30 to 10.30 AM	Dr. N.B. Singh (Lecture) Chemistry	Dr. Amitabh Chattopadhyaya (Lecture) Biology	Dr. Mohammad Ali Aligarh (Lecture) Chemistry	Dr. Anil.K. Singh, (Lecture) Chemistry
		10.30 to 11 AM	Tea	Interaction	10.30 to 11.30 AM	10.30 to 11.00 AM
					Multiple choice question test (MCQ)	Interaction
1.00 to 1.30 PM	High Tea	11 to 12.00 Noon	11 to 12.00 Noon	Tea	11.30 to 12.00 Noon	11.00 to 11.30 AM
			Dr. Kishor Chikhaliya (Lecture)		Tea	Tea
1.30 to 2.30 PM	Dr. Somesh Kumar (Lecture) Maths IIT Kharagpur	12.00 to 1.00 PM	Lunch	Dr. Udayan Prajapati (Lecture) Maths	12.00 to 1.30 PM	11.30 to 12.30 PM
				Essay Writing	Dr. S.K. Apte Biology	Dr. Katiyar (Lecture) Maths
						12.30 to 2.00 PM
2.30 to 3.30 PM	Lunch	1.00 PM to 6.00 PM	Visit to Science centre Vidhansabha Road Raipur <u>Prof. incharge</u> Dr. L.K. Bharti Dr. Sushma Yadav Dr. Jagjeet Kaur Dr. Vinod Sahu Dr. Nutan Rathore Dr. Rakesh Tiwari Dr. S.K.Chatterjee Dr. Gayatri Pandey Dr. Upma Shrivastava Dr. Prashant Shrivastava	Lunch	Lunch	Visit to Various Labs of Govt. V.Y.T. PG. College, Durg in 5 group named as A,B,C,D,E
3.30 to 4.30 PM	Dr. Vijay Mendulkar (Lecture) Botany			2.30 to 4.30 PM	2.30 to 5.30 PM	
				Visit to Various Labs of Govt. V.Y.T. PG. College, Durg in 5 group named as A,B,C,D,E	Visit of Maitri Bagh, Bhilai	
4.30 to 5.00 PM	Tea			Tea	5.30 to 7.00 PM	2.00 PM to 3.00 PM Lunch
5 to 6.30 PM	Blood Test/ Eye Test			Library Visit and Film Show	Cultural Programme by college students and participants	3.00 PM to 4.00 PM
						Interaction & Students feedback
						4.00 PM to 5.00 PM
						Valedictory function
8.00 PM	Dinner	8.00 PM	Dinner	Dinner	Dinner	Dinner

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

INSPIRE INTERNSHIP WINTER CAMP.
GOVT. V.Y.T.P.G. Autonomous College, Durg C.G. 491001
October 22 to 26, 2016
Lab Visit Schedule

A1	A2	B1	B2	C1	C2	D1	D2	E1	E2
Dr. A.P.J. Kalam Group	Dr. Raja Ramanna Group	Dr. Vikram Sarabhai Group	Dr. Shanti Swaroop Bhatnagar Group	Dr. C.V.Raman Group	C2-Dr. P.C. Roy Group	D1-Dr. Meghnath Saha Group	D2- Dr. Shrinivas Ramanujam Group	E1-Dr. Homi Jahangir Bhabha Group	E2- Dr. Jagdish Chandra Bose Group
20 Students	20 Students	20 Students	20 Students	20 Students	20 Students	20 Students	20 Students	20 Students	20 Students
2.30- 3.30 Botany	2.30- 3.30 Microbiology	2.30- 3.30 Zoology	2.30- 3.30 Bio- technology	2.30- 3.30 Computer lab	2.30- 3.30 Central Instrumentation Lab/Library	2.30- 3.30 Physics	2.30- 3.30 Maths	2.30- 3.30 Chemistry	2.30- 3.30 Geology
3.30-4.30 Microbiology	3.30-4.30 Botany	3.30-4.30 Biotechnology	3.30-4.30 Zoology	3.30-4.30 Central Instrumentation Lab/Library	3.30-4.30 Computer lab	3.30- 4.30 Maths	3.30-4.30 Physics	3.30-4.30 Geology	3.30-4.30 Chemistry

List of Keynote Speakers

S.No.	Name of the Speaker & Phone number	Address	Topic	Date
1	Shri Shekhar Dutt	Ex. Governor Chhattisgarh	Inaugural Address	22.10.2016
2	Dr. Amitabh Chattopadhyay 09849803092	Centre for Cellular & Molecular Biology, Hyderabad	Cholestrol in biology & Medicine – History, Myths and excitement	23.10.2016
3	Dr. Somesh Kumar 09434051947	Department of Mathematics IIT Kharagpur	1. Glimpses into the wonderful world of numbers 2. Probability – When, why and how	21.10.2016
4	Dr. Vijay Mendulkar 09869187962	Department of Botany , Institute of Science, Mumbai	Plant Cell- A Factory of Natural bioactive constituents	22.10.2016
5	Dr. N.B. Singh 078338500311	Research and technology development centre , Sharda University greater Noida	Nano Science- Technological & Societal impacts	23.10.2016
6	Dr. Kishore H. Chikhaliya 09427155529	Department of Chemistry, School of sciences, Gujrat University Ahemdabad	Organic chemistry: Fundamentals, Advanced strategy and Biochemistry	23.10.2016
7	Prof. Ali Mohammad 09897785425	Department of Chemistry Aligarh Muslim University	Environment and Environmental Pollution	24.10.2016
8	Dr. Shree Kumar Apte 09869480205	Head, Molecular biology division Bhabha Atomic Research Centre	Microbial removal and recovery of uranium: from sea-water to nuclear waste	24.10.2016 Air India
9	Dr. Anil K. Singh 09820747167	Department of Chemistry IIT Pawai Mumbai	The excitement of doing science & the Joy of Scientific discovery : Experiences from the science of light and life.	25.10.2016 Air India
10	Dr. V.K. Katiyar 09897000998	Department of Mathematics IIT Roorkee	Importance of Mathematics in daily life.	26.10.2016 Indigo
11	Dr. Udyan Prajapati 09426383343	Department of Mathematics, St. Xaviers College, Ahmedabad	Some interesting mathematical games and puzzels	23.10.2016 Air India

Address of Shri Shekhar Dutt, SM, IAS (Retd),

Former Governor, Chhattisgarh.

**For students of INSPIRE PROGRAMME, at SCIENCE COLLEGE,
DURG, 2016.**

I am very happy to be present here for the interaction with the students of the INSPIRE PROGRAMME, at the Science College, Durg. First of all I greet and extend my good wishes to all of you. I am happy to learn that on this occasion you have a good gathering of academicians, industrialists, engineering, management and other experts. I would like to further congratulate those students who have been selected to be part of the INSPIRE PROGRAMME. I know the amount of hard work and commitment on the part of the students that has brought them to this stage of achievement. For this, I would also like to congratulate those teachers who have taught and guided the students. This is in the true Indian tradition of a Guru. I must also praise the parents who have stood by their children in their times of hard work. This is a time to remember many great Indians who have gone before us and have shown the light of knowledge to humanity – such as Bhaskaracharya, Ramanujam, Swami Vivekanand, Ravindranath Tagore, C.V. Raman, Kalpana Chawla and so many others in so many different fields of knowledge. They are examples of great achievers who are to be emulated by the youth of today. I urge that all of you young men and women to believe that it is within your capacity to become as great as them. If one wants to be a future leader of the world, one will have to nurture and develop their intellectual capital. One will have to make the environment more conducive for the intellect to grow and flourish so that their inherent talent can bloom. There will have to be more respect and appreciation of talent among the youth so that instead of going for a lucrative job, they choose to work in the area of their talent and inclinations.

Indepth study of some of the successful projects like the Green Revolution, the White Revolution, the construction of Delhi Metro Rail, the Guided Missile Project and the Space mission of ISRO brings out one thing loud and clear. The competence

of our leaders leading these projects is the major determinant of success or failure. The success of these projects proved India's capacity and capability. Being a country with the largest democracy in the world and aspiring to become one of the biggest economies of world, it is necessary that our youth and students have excellent leadership qualities. We need to create more opportunities for skill development and training. Our youth should be provided knowledge and skills which are required by them facing the competitive world. Colleges should boost their self-confidence, so that they can become responsible citizens of the country and the world.

We are living in a world which is highly competitive and technically advanced. The research, discoveries, inventions and innovations redefine education today. One has to excel in the field of one's choosing. Education of highest quality is of utmost importance and should be the top priority of any university or institution. The quality depends on stakeholders including policy makers, teachers, administrators and students. All these stakeholders should complement each other to instill good quality higher education in our universities. It would be a matter of great pride when our students compete with the best and carve a niche for themselves in any corner of the world.

This is an era of globalization and rapid changes, challenges and opportunities are coming at a great speed. The role of technology has also increased and widened. How can we improve our use of technology to enhance learning process? The digital revolution has brought the whole world at your door steps. With a click of the mouse you can access any international library or any new concept which was not possible only 10 years ago. Students get the information they need anytime, anywhere and without being in the physical presence of a teacher. These new opportunities need to be leveraged for the benefit of students.

Today the world is becoming a global village, with the great mobility of educated scholars and work force across the national boundaries. This has exerted pressure on our education to produce not only quantitatively but also qualitatively better achievements. To meet these challenges and keep pace with the rapidly

changing technology we have no other option but to make our educational system more responsive and flexible. The process of education must focus attention largely on human resource development. This process becomes more complicated when we take into consideration the rate at which technologies are changing. Universities and educational institutions must also promote quality research work. Our country has plenty of raw and natural resources, but we are short of scientific manpower. We have to create an environment conducive for the pursuit of science and technology. This must extend also to new and innovative research. We have to improve our understanding about the demand of industries, commerce, business, market and agriculture etc and fulfill their manpower and technological requirements. Each university or educational institution is known by its ethos and culture, therefore each university & institution must aim to develop a quality culture, set of beliefs, behaviors, which will give it a distinct identity.

The spirit of inquiry, creativity and innovativeness are the keys for transformation of life. These factors, when manifested in the form of research, open new frontiers of knowledge. This is the basis for all forms of development. Perhaps, this is the reason for which research is recognized as one of the core functions of the universities and educational institutions. India's noteworthy progress in the field of Agriculture, Information Technology, Energy, Space etc. are the outcome of the consistent endeavor of our intellectuals. This will lead to India becoming the future global knowledge hub. However, the onus lies largely on our Higher Education system and particularly on functioning of our universities and educational institutions. Resource constraints, lack of commitment and proper incentive are some of the impediments that are affecting the quality of research in our universities.

There is a wide variety of career opportunities available in various sectors. These opportunities were not available few decades ago. Some of these are software engineering, management, C.A., space technology, biotechnology, industrial production, business consultation, scientific research, armed forces etc. The INSPIRE PROGRAMME is indeed a novel strategy for identifying talented young students at the inception of their entry into secondary education (stepping stone into higher education) and nurturing them into becoming leaders in their fields.

There is no doubt there are many who are great role models for our youth. Saba Anjum is a former captain of the Indian woman hockey team, international hockey player and Arjun Award Winner. First woman chairperson of SBI Group Mrs. Arundhati Bhattacharya and recently a talented youth from Korba named Rupesh Bhardwaj was selected as a Biotechnology Specialist in NASA (National Aeronautics and Space Administration) at a young age 19 years. I feel confident that this interaction with the bright students of Chhattisgarh will definitely enhance the purpose of learning, growth of minds and career orientation. It provides the knowledge, awareness, motivation, confidence and recreation required for great achievements.

We have to strengthen our talented youth. This should be the contribution of such an educational institution as yours and indeed, the education system. The institution should help the students to form positive attitudes, to put forward confident steps towards the future. I believe that the inspiration the youth gain from here will sustain them in the future. This will help to change society thereby eventually reshaping the world itself. This INSPIRE programme will definitely provide the platform and opportunity for scientific, motivational, cultural and developmental growth to the youth.

I wish you all the very best and a bright future.

Thank You,

Jai Hind

Abstract

Cholesterol in Biology and Medicine: History, Myths, and Excitement

Amitabha Chattopadhyay

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Cholesterol, a major constituent of eukaryotic membranes, is characterized with a unique chemical structure and is responsible for a variety of functions in the cellular context. Cholesterol is implicated in a major way in the organization and dynamics of cellular membranes. A number of important membrane proteins, including G-protein coupled receptors (GPCRs), require membrane cholesterol for their function. Interestingly, although cholesterol was discovered in 1815, its biosynthetic pathway was worked out only in the 1960's by Konrad Bloch for which he was awarded the Nobel Prize. Konrad Bloch speculated that the cholesterol biosynthetic pathway parallels the evolution of cholesterol. According to the Bloch hypothesis, cholesterol precursors should have properties that gradually support cellular function of higher organisms better as they progress along the pathway toward cholesterol. The Bloch hypothesis has been validated by the Smith-Lemli-Opitz Syndrome (SLOS) that results due to defective cholesterol biosynthesis in humans. I will focus on the role of membrane cholesterol in the organization and function of G protein-coupled receptors (GPCRs) and its implications in health and disease. Interestingly, cholesterol has been associated with the entry of a number of pathogens into host cells. I will highlight this aspect of cholesterol in disease processes with an emphasis on diseases in the Indian context. In addition, I will point out certain myths associated with cholesterol.

Dr. Somesh Kumar

Department of Mathematics, IIT Kharagpur

Glimpses into the Wonderful World of Numbers

Abstract: Number theory is the oldest branch of mathematics. However, it continues to pose open and challenging problems for mathematicians even today. In fact, attempt to solve open problems in number theory has led to development of new branches of mathematics. In this lecture, we will tell some interesting facts about elementary properties of numbers. It will be shown that even at elementary level, there are challenging open problems and young minds will be exposed to fascinating details about these.

2. Probability: When, Why and How?

Abstract: The usage of tem ‘probability’ is quite old. However, the study of modern probability started in medieval Europe. We introduce the students to chronological development of probability theory. We inform about important problems that led to gradual development of the subject. Several methods of calculation of probabilities will be discussed.

Plant Cell- A Factory of Natural bioactive constituents

*Prof. Vijay D. Mendhulkar
Ph.D.*

Head, Department of Botany , Institute of Science, Mumbai-32

Now days, majority of the Research activities in the plant sciences are targeted to investigate, evaluate and clinically assess the bioactive metabolites for their usefulness to human beings .These metabolites are the natures gift to us .Nature has explored us with a wealth of flora and fauna that provides a concrete base for our survival. The plant wealth has tremendous value based utility for the existence of human beings. A cell that constructs the life of living forms is the base unit of the body. The contribution of cell in not limited only for shaping, developing and morphological structuring of the organisms but it also plays an crucial role in providing bulk quantity of important chemical constituents that has bioactive applications. The plant cells in particular provides us a excellent source to need full the our requirements due to the facts that they synthesize and store the phytoconstituents. The primary and secondary metabolites have a great role to play in day to days activities of human beings. Their utility values are well recognized in pharmaceutical industries, cosmetic industries, chemical industries, paint and paper industries, drug formulations and nutraceuticals. The alkaloids, steroids, tannins, saponin, glycosides, waxes, essential oils, flavones, resins, gum, terpenes and polyphones are some of these constituents. The importantance and utility of these bioactive metabolites is briefly highlighted in this presentation accompanied with our research findings.

Nanoscience- technological and Societal Impacts

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Integration of solid state chemistry and physics gave birth to a new discipline of science known as Materials Science. Now the development of many technologies that make our life comfortable is closely related to materials. Materials, Materials Science and Materials scientist play a very vital role in the development of a country. Properties of materials are size dependent, material scientist claim that 21st century of materials and especially nanomaterials. In fact the development of a country is directly linked with development of new type of advanced materials. The world around us is made up of materials objects with a fascinating diversity of forms and functionalities. Over the past notably for their extremely small feature size, have the potential for the wide ranging industrial, biomedical and electronic applications. Nanoscience is the study of phenomena and manipulation of materials at atomic, molecular, and macromolecular scales, where properties differ significantly from those at a larger scale. Nanotechnologies are the design, characterisation, production and application of structures, devices and systems by controlling shape and size at nanometre scale. The prefix nano is derived from the Greek word for dwarf. One nanometre (nm) is equal to one-billionth of a meter. The term 'nanotechnology' was not used until 1974, when Norio Taniguchi, a researcher at the University of Tokyo, Japan. In some senses, nanoscience and nanotechnologies are not new. Many chemicals and chemical processes have nanoscale features- for examples, chemists have been making polymers, large molecules made up of tiny nanoscale subunits, for many decades. Nanotechnologies have been used to create the tiny features on computer chips for the past 20 years. The natural world also contains many examples of nanoscale structures, from milk to sophisticated

nanosized and nanostructured proteins. Nanoscience and nanotechnology are interdisciplinary fields, involving physics, chemistry, material science, and mechanical, electrical and chemical engineering. At the nanoscale, the mechanical, electrical, optical and magnetic properties of materials change, allowing the creation of new functional materials. Nanotechnology has a broad range of applications, from biomedical science to electronics. Nanoscience and nanotechnologies are widely seen as having huge potential to bring benefits in areas as diverse as drug development, water decontamination, information and communication technologies and the production of stronger, lighter materials.

If it is difficult to predict the future direction of nanoscience and nanotechnologies and the timescale over which particular developments will occur, it is even harder to predict what will trigger social and ethical concerns. In the short to medium term concerns are expected to focus on two basic questions: who controls uses of nanotechnologies? and 'Who benefits from uses of nanotechnologies?' These questions are not unique to nanotechnologists but past experience with other technologies demonstrates that they will need to be addressed.

Organic chemistry: Fundamentals, Advanced strategy and Biochemistry

Dr. Kishor H. Chikhalia

Dept. of Chemistry,

Gujarat University,

Ahmedabad.

Abstract:

Nucleophilic substitution reaction and elimination reactions lies in the heart of numerous organic synthesis. Aromatic nucleophilic substitution as well as aliphatic nucleophilic substitution reactions has attracted attention of many researchers to carried out synthesis of vast number of organic materials. Since discovery, nucleophilic substitution as well as elimination reaction at saturated carbon atom has been studied continuously. Different protocols of substitution and elimination reaction including S_N1 , S_N2 , S_Ni , E1, E2 and E1cb consist deep understanding of basic organic chemistry. Effect on rate of reaction due to substrate, nucleophile, temperature furnishes auspicious organic chemistry leads to further advancement of research. Like substitution-elimination reaction, another and most recent synthetic protocol is transition metal catalysed coupling reaction. Nowadays, certain transition metals including palladium, copper, iron, rhodium, ruthenium etc. are widely used to construct C-C, C-N, C-S and C-O bond. Cross-coupling reactions offers alkenylation, alkylation, arylation, amination, alkynylation etc. in regioselective mean. Along with coupling-, substitution- and elimination reaction natural chemistry is also a promising chemistry and often deals with wide knowledge of organic chemistry. Synthesis as well as biological action of vitamins clubs effectively organic chemistry and biology to understand another arena that is biochemistry.

Keywords: Substitution, Elimination, Cross-coupling, Vitamins

Environment and Environmental Pollution

Prof. Ali Mohammad

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My intention of today's address is to share my views with you about certain aspects of environment, environmental pollution and current environmental issues. There is worldwide concern about the deterioration of quality of the environment due to overambitious human activities. This concern is reflected by the appearance of several articles on environmental issues in newspapers and scientific magazines. In order to address current environmental issues, it is necessary to have in-depth information about the structure of environment, environmental pollutants and pollution control processes. Environment comprising of air, water and land is beautiful, calm and peaceful until its ecological balance is disturbed by the activities of human being. The complete environment has been divided into four segments (atmosphere, hydrosphere, lithosphere and biosphere). Atmosphere consisting of different gases (N_2 , O_2 , Ar, CO_2) and water vapours, maintains heat balance of earth and supports life whereas hydrosphere including all types of water resources serves as the medium of life on earth. The outer surface of the earth is known as lithosphere and is mainly made of soil. The entire area of living organisms from 6 km above sea level to 10 km below sea level constitute biosphere. The biological, physical and chemical changes due to the entry of various pollutants in air, water and soil create atmosphere pollution. As a result numerous environmental issues including acid rain, global warming and food hazards have aroused and the delicate balance between man and environment has disturbed. It is the prime time to think over to safeguard the environment through a variety of measures (legal, Scientific, technological, educational and religious etc.). The present talk is intended to high light the importance of environment and its protection.

Green Chemistry as Remedy for Chemical Pollution Control

Prof. Ali Mohammad

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The term "Green Chemistry" coined by P.T. Anastas in 1990's has become a guiding source for protection of environment from further damage. The basic principles of green chemistry encourage the scientists/chemists for using safer solvents, developing low energy consumption methodologies, prevention of waste formation and maximizing of atom economy. It is well known that organic solvents derived from petroleum products have negative impact on the health and environment. The physical, chemical and biological properties of a solvent have to be considered to decide its suitability for safer use in synthetic and analytical processes. In order to minimize the generation/use of volatile organic compounds (VOCs), the scientific community is continuously searching for new sustainable green reaction media/chemical methodologies. The use of water, ionic liquids, polyethylene glycol, per-fluorinated solvents and supercritical fluids as green solvents has occupied prominent position in chemical industries.

The present talk will highlight the importance of green solvents. In our laboratory, we have identified certain green thin layer chromatographic systems for on-plate identification of organic molecules with preliminary separation from their multi-component mixtures. Our emphasis has been to suggest alternative environmental friendly solvents to replace previously in-use VOCs for chromatographic studies. The interesting examples of green organic synthetic methodologies will also be presented as guiding routes for future development of zero waste technologies. The prime aim of green chemistry is to modify existing chemical methods along with developing new methodologies using green pathways without polluting the environment.

Microbial removal and recovery of uranium: from sea-water to nuclear waste

*Shree Kumar Apte
Emeritus Professor-HBNI,
J. C. Bose National Fellow-DST,
Raja Ramanna Fellow-DAE
Bhabha Atomic Research Centre,
Mumbai-400085*

The precious metal uranium is required in large quantities for electricity production in nuclear power plants. The uranium ores are scarce, particularly in India, and terrestrial deposits of U are getting exhausted with time, globally. This has turned attention to sea-water, which holds 60% of Earth's uranium content, but at a very low concentration of 3 ppb. Nuclear waste generated from uranium mining or fuel reprocessing activities also contain U at ppm concentrations, from which physico-chemical methods cannot recover the metal. On the other hand, uranium is a toxic element, deleterious to all life forms, and needs to be removed from contaminated waters to prevent it from getting in to the food chain. Only a few microbes and their enzymes can remove uranium from such low concentrations (ppb to ppm levels) efficiently. We have characterised marine cyanobacteria which can *biosorb* and remove >90% U present in seawater in less than an hour. Such microbes can also be used to remove uranium present in contaminated terrestrial waters, such as ponds, lakes and agricultural fields. Removing uranium from nuclear waste is a very challenging task, since very high radiation levels prevailing there are lethal to all life forms. We have genetically engineered the extremely radioresistant bacterium, *Deinococcus radiodurans*, to *bioprecipitate* uranium as insoluble phosphates from acid/neutral/alkaline aqueous radioactive waste. These results will be presented to highlight the power of recombinant DNA technology in *bioremediation* and environmental clean-up of the most difficult pollutants, such as uranium from nuclear waste.

The Excitement of doing science and the joy of scientific discovery: Experiences from the science of light and life

Anil k. Singh

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The presentation is aimed at bringing out the excitement of doing science and the joy of scientific discovery and innovations. Examples will be drawn from the multidisciplinary and multidimensional field of photobiology- the science of light and life , which is essentially a scientific study of the effects of light energy on organisms and ecosystems.

The Solar radiation sustains almost all biological activity on Earth. The scientific knowledge of the effect of solar radiation on different organism s and ecosystems is pivotal to the development of a scientific understanding of the functioning of nature. Some well known examples of light-mediated biological processes include : vision and photosynthesis , the effect of UV radiation on living systems and environment (e.g. nucleic acids and mutation, light effect on ecosystem, species composition and productivity), non-visual photoreception (e.g., microbial energy transductions, circadian clock which controls hormonal levels in birds and animals, and photoperiodism, which controls seasonal growth in plants and animals), photomorphogenesis (e.g ,germination of light sensitive seeds and the flowering of long-day plants), photomedicine (e.g., phototherapy of psoriasis and cancer , neonatal jaundice), photoimmunology (e.g., immunological rejection of tumours) and phototechnology (e.g.,optoelectronic devices),etc . The photobiological responses are primarily the result of physical and /or chemical changes induced in biological systems by the light, which is absorbed by a photoreceptor pigment present in the organisms. Scientist have successfully brought out basic molecular level understanding of several photobiological processes.

Several organisam from bacteria to humans use photoreceptor pigments, which are composed of a low molecular weight linear polyene- based organic chromophore such as

retinal covalently attached to a protein called opsin. These photobiological pigments are used for driving processes as diverse as vertebrate vision to microbial ion transport and phototaxis signalling. visual pigment Rhodopsin is the prime example of such a photoreceptor, and is the basis of vertebrate vision. Bacteriorhodopsin produced in the purple membrane of the extreme halophile, *Halobacterium salinarum* is another such photoreceptor, and allows conservation of light energy into metabolic energy required for the vital functions of halobacteria.

These photoreceptors show several unique structural and functional features. Scientific research has provided us a good understanding of several of these features. For instance, one of the features that make these pigments unique is their ability to control their colour, tune their absorption spectrum and absorb wide range of photons. Further, in spite of their diversity of occurrence in wide range of hosts, these photoreceptors use a common ultrafast photoisomerization of one of the C=C double bond of their retinylidene chromophore to store/ transfer light energy, which is ultimately employed to drive the protein functions via complex chromophore-protein interactions. Scientific investigations have revealed the molecular mechanism underlying these unique properties. Our endeavour over the years has been to gain molecular insight into some of the general structural and functional features of these pigments through bioorganic approaches. This presentation will elaborate upon how bioorganic models have contributed to the chemical understanding of the complex protein interactions, colour control mechanism and spectral tuning, and photoisomerization process. It has been found that specific electrostatic interactions of chromophore with the ionic, polar and polarisable groups of the protein environment, water molecules, and hydrogen-bond interactions play critical role in maintaining and regulating the above mentioned properties of these photoreceptors. The knowledge accumulated through multidisciplinary scientific endeavours

Has encouraged researchers to also venture into designing and developing Nature-inspired artificial photoreceptors for different applications such as devices, retinal prosthetic device and colour sensitive artificial retina, etc. Scientists have been able to design analogues and variants of these pigments having specific properties. These technological developments have opened many new vistas. Indeed, these photoreceptors

have become the object of much scientific and technological interest to the scientists and technologists across several disciplines like chemistry, physics, biology, biotechnology, electronics, neurosciences, physiology, medicine, etc.

This talk while focusing on our efforts towards building molecular level understanding of the structure and mechanism of function of these photoreceptors, and design of analogues/ variants along with their possible application scenarios, will also review the recent accomplishments in the field and highlight future inroads into other fields.

Some Interesting Mathematical Games and Puzzles

Dr. Udayan Prajapati

Head, Department of Mathematics,

St. Xavier's College, Ahmedabad-380009 (Gujarat)

We will discuss some Mathematical games are challenging, inspiring, interesting. We will also discuss some interesting problems and puzzles. The object is that the student can design the winning strategy of the game. The students can think at their own to solve this kind of problems and puzzles.

Modeling in health care management system

V.K.Katiyar

Department of Mathematics

IIT Roorkee

Email- vktmafma@rediffmail.com

Health care is of utmost important for proper functioning of biological systems.

Different aspects (Cardiovascular, Neural, Respiratory etc.) of modeling in health care will be taken into consideration. Scientific validation of respiratory system will also be discussed in detail

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. Shreeram Kunjam
Designation - Assistant Professor

Physiology Practical

I. Photosynthesis - Experiment No. 1

Aim: 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.

Experiment No. 2

Aim: To study the effect of light on rate of photosynthesis.

Materials required: Wilmott's bubbler, water, twigs of *Hydrilla*, stop watch.

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.

Average intensity of sunlight is sufficient for normal photosynthesis. The plants can photosynthesize even a low light intensity but a very low rate. The rate, however, continues to increase with increase in the light intensity till some other factor becomes limiting. Higher intensity has an inhibitory effect, thus closing the stomata and restricting the diffusion of CO_2 .

Procedure:

1. A wide mouthed bottle is completely filled with pond 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. To study the effect of light and shade the bubbler is kept in sunlight and shade alternately.

Observation table:

S. No.	Sun/Shade	Time taken for 5 bubbles
1.	Sun	
2.	Shade	
3.	Sun	
4.	Shade	

Result:

Conclusion:

In shade the rate of photosynthesis slows down as compared to when in sunlight.

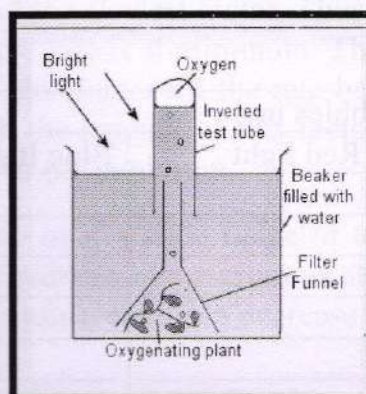
Normally light is never a limiting factor. About 1-2% of the total light falling upon the leaves is used. Thus, maximum rate of photosynthesis is attained at intensities much below those of the full sunlight.

However, low light intensity may become a limiting factor and photosynthesis is lesser in plants exposed to weak light than in plants exposed to strong light. Thus the rate of photosynthesis is lesser in shade than in sunlight.

If alternate light and dark periods (intermittent) are given, the efficiency of photosynthesis is higher. One of the reasons is the accumulation of CO_2 in the leaves and translocation or conversion of photosynthesis into soluble form. This helps to increase the rate of photosynthesis during light periods.

Precautions:

1. The apparatus should be made air tight so as not to allow air bubbles to escape.
2. There should be considerable difference in the light intensities of sun and shade.
3. Evolution of bubbles should be observed carefully.



Demonstration of Photosynthesis

Experiment No. 3

Aim: To study the effect of different wavelengths of light on rate of photosynthesis.

Materials required: Wilmott's bubbler, water, twigs of *Hydrilla*, red, green and blue cellophane paper, stop watch.

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.

Average intensity of sunlight is sufficient for normal photosynthesis. The plants can photosynthesize even a low light intensity but a very low rate. The rate, however, continues to increase with increase in the light intensity till some other factor becomes limiting. Higher intensity has an inhibitory effect, thus closing the stomata and restricting the diffusion of CO_2 . Photosynthesis only takes place in the visible part of the spectrum. Most effective wavelengths are red and blue-violet.

Procedure:

1. A wide mouthed bottle is completely filled with pond 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. To study the effect of different wavelengths of light the bubbler was covered red, green and blue cellophane papers.

Observation table:

S. No.	Time taken for 5 bubbles in			
	Sunlight	Red light	Blue light	Green light
1.				
2.				
3.				
4.				
5.				
Average				

Result:

Conclusion:

Under the sunlight, plants continue to show a definite rate of photosynthesis because the pigments active in photosynthesis absorb the respective wavelengths. These wavelengths being most effective, the rate of photosynthesis is almost maximum if other factors are also favourable.

If the red wavelengths (647-660 m μ) are available, the rate of photosynthesis rate of photosynthesis is the maximum. The wavelength (near 670 m μ) is known to be maximally effective.

Similarly, net higher peak of absorption in the blue wavelength is 422- 492 m μ . It is absorbed in larger quantities than other wavelengths. These wavelengths (near 440 m μ) are second most effective. The rate of photosynthesis in this case, would be lesser as compared to red wavelength.

The rate of photosynthesis is practically zero in the region of green wavelength. This is because the chlorophylls reflect green wavelengths.

Precautions:

1. The apparatus should be made air tight so as not to allow air bubbles to escape.
2. The bubbler should be completely by cellophane paper.
3. Evolution of bubbles should be observed carefully.

Experiment No. 4.

Aim: To study the effect of temperature on rate of photosynthesis.

Materials required: Wilmott's bubbler, water, twigs of *Hydrilla*, stop watch.

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.

The photosynthesis takes place over a wide range of temperature which differs with habitat and plant. The average suitable temperature is about 24°C to 30°C. the higher is the temperature (beyond maximum), there is a decrease in the rate.

Procedure:

1. A wide mouthed bottle is completely filled with pond 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. The temperature of the water in the bottle is raised by keeping it near a strong source of electric light.

Observation table:

S. No.	Temperature	Time taken for 5 bubbles
1.	10°C	
2.	20°C	
3.	25°C	
4.	30°C	
5.	35°C	

Result:

Conclusion:

The rate of photosynthesis increases with increase in temperature from 10°C to 35°C.

Photosynthesis occurs in a temperature range similar to that tolerated by protein compounds i.e. between 0°C to 60°C. The temperature does not affect the photochemical process but the biochemical part i.e. formation of starch is affected. This is because the enzymes are involved in this reaction. The range of temperature at which photosynthesis occurs at a relatively rapid rate is 10°C to 35°C, provided other factors are not limiting. If the temperature is raised within this limit, there shall be an increase in the rate of photosynthesis.

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

Experiment 5

Aim: Separation of chloroplast pigments by paper chromatographic technique.

Materials required: Spinach leaves, separatory funnel, Chromatography paper Whatman no.1, mortar and pestle, beakers, capillary tube, chromatographic chambers, sterilized sand, distilled water, acetone, petroleum ether, n-butanol, acetic acid etc.

Principle: Chromatography consists of separation of constituents of a mixture. Separation of these components is a function of their different affinities for a stationary phase such as a solid or liquid and their differential solubility in a moving phase such as liquid or gas. The separation of compounds is controlled by their character to distribute themselves between the solution in the liquid and absorption on the solid surface e.g. paper, silica, etc. When solid used is paper, the procedure is known as paper chromatography.

When a mixture to be separated is applied as a spot on paper, the compound travels a particular distance under specific set conditions, this develops a chromatogram. This is a characteristic feature of a compound and is used for its identification. Rf value is calculated as follows

$$R_f = \frac{\text{distance from origin travelled by compound}}{\text{distance of solvent front from origin}}$$

Rf values are constant and thus used for an identification of a particular compound. The unknown is chromatographed with series of known compounds and Rf values are then compared to determine and identify the compound.

Procedure:

The major are major steps-

- i) Preparation of paper-
 1. Cut the chromatography paper Whatman No. 1 into square sheets to a size which would fit in easily in the chromatography jar.
 2. Draw a pencil line $\frac{1}{2}$ inch above the bottom of each sheet.
- ii) Preparation of extract-
 1. Cut fine strips of spinach leaves, place in a clean mortar and pestle to reduce it to pulp.
 2. Add 50 ml of precooled 80% acetone to leaf pulp to which small quantities of acid washed sand and a small amount of CaCO_3 is added.
 3. The clear supernatant green coloured liquid to 10 ml of ethyl ether in a separatory funnel.
 4. 60ml of distilled water was gradually added while rotating the funnel slowly without shaking.

5. Two layers now separated- lower acetone-water layer and upper ether layer.
6. Allow the lower acetone layer to run off and discard it.
7. Water is added till two layers are formed and lower layer is discarded. Repeat it thrice to discard all the acetone.
8. 30 ml of methyl alcoholic KOH is added and the separating funnel is allowed to stand for 15 minutes.
9. Some amount of water (20ml) and ether (5ml) are again added and the separating funnel is shaken vigorously before keeping it at rest for some time.
10. Two layers appear, upper contains chlorophyll and lower contains carotenoids.

iii) Application

1. A spot of the extract is put with a capillary tube, $\frac{1}{2}$ inch from the left hand margin on the pencil line.
2. The pigment spot is allowed to dry. The strip is rolled around a glass rod at the top of the jar, so that its bottom just touches the solvent.

iv) Development

1. The solvent used is petroleum ether-95%, acetone in ratio 100:12 or n-butanol, acetic acid and water (5:1:4)
2. Sufficient solvent is poured into chromatography jar filling an inch from the bottom.
3. The spotted paper is placed in the jar vertically so that spot is just above the solvent level.
4. The lid of the jar is closed and allowed 1-2 hours for development.
5. The chromatogram is removed when the solvent reaches the top and allowed to dry.

Result:

The sequence of pigments from top to bottom shall be-

Carotenes: orange yellow

Xanthophylls: yellow bands

Chlorophyll a: blue green

Chlorophyll b: yellow green

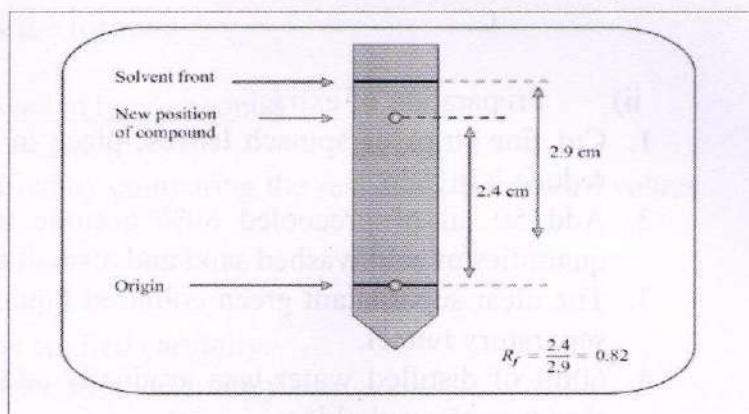
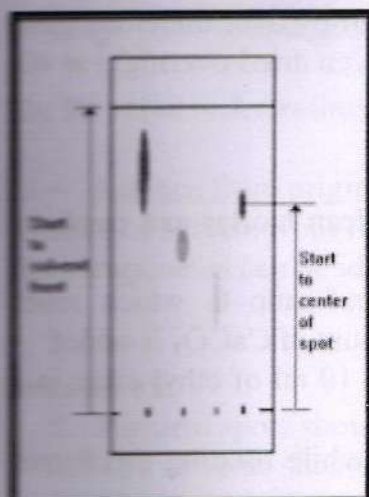
The Rf value is determined by the formula-

$R_f = \frac{\text{distance from origin travelled by compound}}{\text{distance of solvent front from origin}}$

The components can be identified by comparing the results with standard values.

Precautions:

1. Pigment spots should be applied carefully.
2. The solvents should be prepared accurately.
3. Observation should be done carefully.



Diagrammatic example that demonstrates Rf value:

Experiment No. 6

Aim: Separation of chloroplast pigments by thin layer chromatographic technique.

Materials required: Spinach leaves, separatory funnel, thin glass plates, silica gel, mortar and pestle, beakers, capillary tube, chromatographic chambers, sterilized sand, distilled water, acetone, petroleum ether, n-butanol, acetic acid etc.

Principle:

Chromatography consists of separation of constituents of a mixture. Separation of these components is a function of their different affinities for a stationary phase such as a solid or liquid and their differential solubility in a moving phase such as liquid or gas. The separation of compounds is controlled by their character to distribute themselves between the solution in the liquid and absorption on the solid surface e.g. paper, silica, etc. if bulk solids are employed as a thin layer on supporting glass plate, the procedure is known as thin layer chromatography (TLC).

When a mixture to be separated is applied as a spot on support medium, the compound travels a particular distance under specific set conditions, this develops a chromatogram. This is a characteristic feature of a compound and is used for its identification. Rf value is calculated as follows

$R_f = \frac{\text{distance from origin travelled by compound}}{\text{distance of solvent front from origin}}$

Rf values are constant and thus used for an identification of a particular compound. The unknown is chromatographed with series of known compounds and Rf values are then compared to determine and identify the compound.

The major are major steps-

- i) Preparation of plates-
 1. Slurry is prepared by suspending 2g of silica gel in 10 ml of distilled water.

2. The homogenous slurry is spread uniformly over the clean glass plate. The gel is allowed to set and is oven dried overnight at 40° C.

ii) Preparation of extract-

1. Cut fine strips of spinach leaves, place in a clean mortar and pestle to reduce it to pulp.
2. Add 50 ml of precooled 80% acetone to leaf pulp to which small quantities of acid washed sand and a small amount of CaCO_3 is added.
3. The clear supernatant green coloured liquid to 10 ml of ethyl ether in a separatory funnel.
4. 60ml of distilled water was gradually added while rotating the funnel slowly without shaking.
5. Two layers now separated- lower acetone-water layer and upper ether layer.
6. Allow the lower acetone layer to run off and discard it.
7. Water is added till two layers are formed and lower layer is discarded. Repeat it thrice to discard all the acetone.
8. 30 ml of methyl alcoholic KOH is added and the separating funnel is allowed to stand for 15 minutes.
9. Some amount of water (20ml) and ether (5ml) are again added and the separating funnel is shaken vigorously before keeping it at rest for some time.
10. Two layers appear, upper contains chlorophyll and lower contains carotenoids.

iii) Application

1. A spot of the extract is put with a capillary tube, $\frac{1}{2}$ inch from the bottom and $\frac{1}{2}$ inch from left margin of the plate.

iv) Development

1. The solvent used is petroleum ether-95%, acetone in ratio 100:12 or n-butanol, acetic acid and water (5:1:4)
2. Sufficient solvent is poured into chromatography jar filling an inch from the bottom.
3. The spotted paper is placed in the jar vertically so that spot is just above the solvent level.
4. The lid of the jar is closed and allowed 1-2 hours for development.
5. The chromatogram is removed when the solvent reaches the top and allowed to dry.

Result:

The sequence of pigments from top to bottom shall be-

Carotenes: orange yellow

Xanthophylls: yellow bands

Chlorophyll a: blue green

Chlorophyll b: yellow green

The Rf value is determined by the formula-

$$R_f = \frac{\text{distance from origin travelled by compound}}{\text{distance of solvent front from origin}}$$

The components can be identified by comparing the results with standard values.

Precautions:

1. Pigment spots should be applied carefully.
2. The solvents should be prepared accurately.
3. Observation should be done carefully.

**1. Smear of root tips showing different stages of mitosis.
{Onion, Garlic, Gram}**

Materials – Chemical - Onion root tips, acetic acid, aceto-carmin
Glassware - slides, cover slips, needle etc.

Allow the onion bulbs to grow in bottles filled with water. If the lower root portion of the bulb dips in water, it quickly sends forth large number of roots. Cut the root tips between 9 a.m. to 12 noon and 8 them in Carnoy's fluid.

Principle-

Mitosis is a type of cell division which results in the formation of two daughter cells. These cells are identical to the parent cells and have the same number of chromosomes. Mitosis occurs in vegetative cells. It can be best observed in onion root tip.

Procedure

The following procedure is used.

1. Place the fixed root tip in a drop of 45% acetic acid.
2. Place a cover glass over the tip and diffuse aceto-carmin.
3. Tap and apply uniform pressure over the cover glass.
4. The squash preparation is ready.

Observations

The slide shows almost all the stages of mitosis.

[I] Interphase

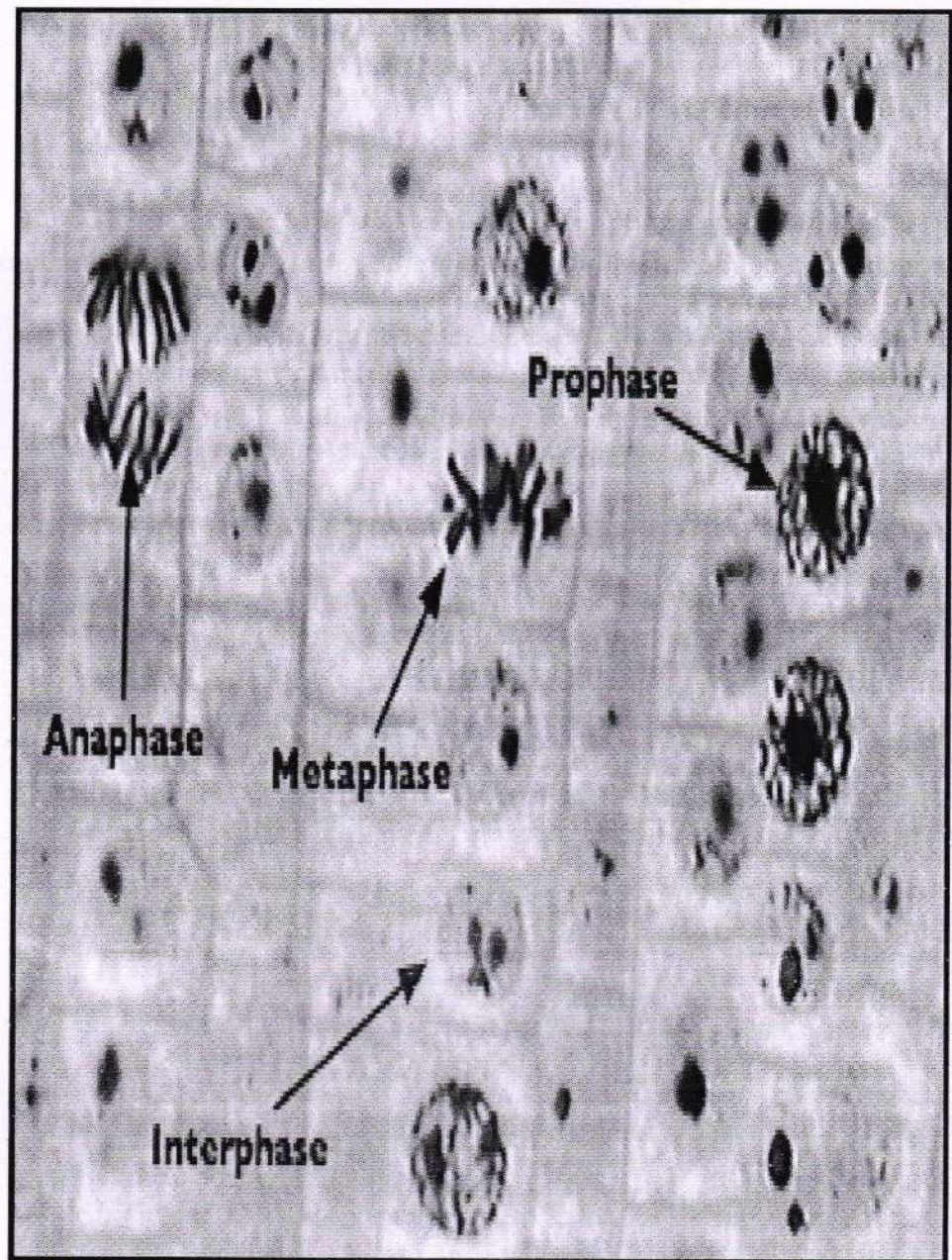
The following characteristics are seen--

1. This is a stage prior to actual mitotic cycle.
2. The cell appears to be inactive or in resting state but is metabolically the most active. DNA replication occurs during this period.
3. Nuclear membrane and nucleolus are very distinct.
4. Chromosomes are in the form of chromatin network and individual chromosomes can not be seen separately.
5. The chromosome appears double stranded i.e. made of two chromatids.

[II] Early prophase

The following characteristics are seen-

1. This is the first stage of mitosis which is observed under the microscope.
2. Nuclear membrane appears distinct.



The onion root tip is a good source of cells for studying the cell cycle. The cells are arranged in a grid-like pattern, typical of an onion root tip.

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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 concentration 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 bioassays with 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. $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$	440 mg	4.4 gm
4. $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$	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. $\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$	22.3 mg	2230 mg
3. $\text{ZnSO}_4 \cdot 4\text{H}_2\text{O}$	8.6 mg	860 mg
4. KI	0.83 mg	83 mg
5. $\text{Na}_2\text{MoO}_4 \cdot 2\text{H}_2\text{O}$	0.25 mg	25 mg
6. $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$	0.025 mg	2.5 mg
7. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$	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. Pyridoxine (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 $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ 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 to 1 ml 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

Phytochemicals 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 1 drop 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-carmin 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

The Department of Chemistry was established in 1958 and PG programme was introduced in 1965. Since its inception, the department has crossed several milestones. The Department offers undergraduate courses – B.Sc. (with Chemistry, Industrial Chemistry and Bio-chemistry) and postgraduate course - M.Sc. (Chemistry with Organic, Inorganic and Physical Chemistry as elective). The Department also has facilities for Ph.D. programme in Chemistry. All courses offered by the department are designed according to the needs and demands of current industrial sectors and to make the students competent at local and global level.

With 14 faculty, the department presently caters 1548 UG, 45 PG students and 15 research scholars. Each faculty has specialized knowledge in different branches of Chemistry. Faculty members are active in educational sphere across the state and contribute to academic and research fields in various capacities like resource persons, reviewers, authors, etc. both nationally and internationally.

Equipped with a state-of-the-art instrumentation facility, research laboratories, departmental library and ICT tools, we are counted amongst the best departments for education in Chemistry across the state of Chhattisgarh which provides a comprehensive teaching and research environment in the Chemical Sciences.

The journey from a small department teaching undergraduate students in 1958 to DST-FIST supported department actively engaged in research activity is a result of coordinated effort of dedicated faculty. The department has contributed immensely in the college being accredited A grade by NAAC and achieving CPE-Phase III status. The department strives to achieve its prime objective - to produce and train technical and scientific personnel of the highest order of excellence having scientific attitude.

Faculty

Name - Dr. (Mrs) Anupama Asthana
Designation - Professor and Head

Name - Dr. (Mrs) Alka Tiwari
Designation - Professor

Name - Dr. S. Chatterjee
Designation - Professor

Name - Dr. Anil Kashyap
Designation - Professor

Name - Dr. (Mrs) Manju Kaushal
Designation - Professor

Name - Dr. Ajaya K. Singh
Designation - Professor
Name - Dr. (Mrs) Nutan Rathod
Designation - Asst. Professor

Name - Mrs. Upma Shrivastava
Designation - Asst. Professor

Name - Dr. Ajai K. Pillai
Designation - Asst. Professor

Name - Mr. V.S. Geete
Designation - Asst. Professor

Name - Dr. (Mrs) Sunitha B. Mathew
Designation - Asst. Professor

Name - Dr. (Mrs.) Anupama Kashyap
Designation - Asst. Professor

Name - Mrs. Perna Kathane
Designation - Asst. Professor

VISIT PLAN

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

Demonstration of Advanced Experiments

Nanochemistry	<ul style="list-style-type: none"> • Synthesis of nanoparticle • Characterization by UV-Visible spectra
Polymer Chemistry	<ul style="list-style-type: none"> • Preparation of polymer beads • Removal of dye/toxicants by adsorption
Bio-analytical Chemistry	<ul style="list-style-type: none"> • Isolation of casein from milk and determination of pH • Detection of adulterants in food • Purification of liquids by distillation

Visit to Glass Apparatus Exhibit

Display of glasswares	<ul style="list-style-type: none"> • Various types of tubes- ignition, test, boiling, graduated • Various types of pipettes, burettes, flasks, beaker • Miscellaneous - desiccator, thiele tube, centrifuge tubes
Display of assemblies	<ul style="list-style-type: none"> • Various types of distillation assemblies, condensers • Kjeldahl assembly, Soxhlet extractor
Display of glass apparatuses	<ul style="list-style-type: none"> • Landsberger, Man Singh Survisometer • Ostwald Viscometer, Stalagmometer, pycnometer

Virtual Tour of Instrumentation Lab

Advanced Instruments	<ul style="list-style-type: none"> • AAS, FTIR, GC, UV-Visible spectrophotometers • Flame photometer, Polarograph, Tensiometer
Simple Instruments	<ul style="list-style-type: none"> • Visible Spectrophotometer, pH meter, • Conductometer, Turbidimeter, Polarimeter
Miscellaneous instruments	<ul style="list-style-type: none"> • BOD incubator, Electrophoresis, ELISA reader • Shaker, magnetic stirrer

Demo 1: Green synthesis of silver nanoparticle from leaf extract of neem and its characterization

Requirements: Silver nitrate, neem leaf extract

Prepare 0.01M AgNO_3 and leaf extract. Collect the leaves and wash them with double distilled water and drain 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 can be confirmed by taking UV-visible spectra. The characteristic peak is observed in the range 400-480 nm, which confirms the formation of silver nanoparticle.

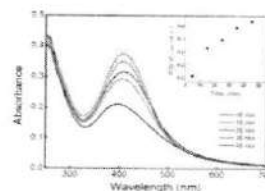
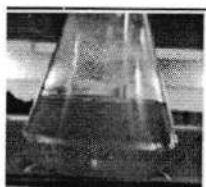


Fig. 1: Leaf extract Fig. 2: Ag nanoparticle solution Fig. 3: UV-Visible spectra of Ag nanoparticle

Demo 2: Preparation of calcium alginate beads and adsorption of dye onto the polymer bead

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

Prepare calcium alginate beads. First prepare a 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 interval of time and measure the absorbance using spectrophotometer. Thus dyes and other toxicants can be removed by adsorption method.



Fig. 4: Preparation of beads



Fig. 5: Polymer beads

Demo 3: Isolation of Casein from milk by isoelectric precipitation

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

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.

Demo 4: Determination of pH of given samples using pHmeter

Requirements: pH meter, buffer solutions, different sample solutions

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 of the solution. The pH of 7.0, below 7.0 and above 7.0 indicates that the sample is neutral, acidic and basic respectively.

Demo 5: 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 it for their economic

benefit but it effects the health of the population hence efforts must be made to check the food items to save people from its adverse effects.

Detection of adulteration in following food items will be demonstrated –
Vanaspati in ghee, Argimone oil in edible oil, Metalin yellow in dal.

Demo 6: Purification of given liquid sample by distillation

Requirements: Distillation assembly, burner, impure liquid sample, sand/water bath

Distillation is a widely used method for purifying liquids. At constant pressure, pure liquid boils at a definite temperature which is called boiling point. This principle is employed for the purification of those liquids which boil without decomposition (associated with non volatile impurities).

Take the impure liquid in round bottom flask and connect it to Liebig condenser or air condenser. Put some porcelain pieces or glass beads into round bottom flask to prevent bumping. Fit the thermometer in the neck of distillation flask and assemble the apparatus. Heat the flask on a sand bath/ water bath. The liquid vaporizes and the condensed vapor is collected in the receiver.

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

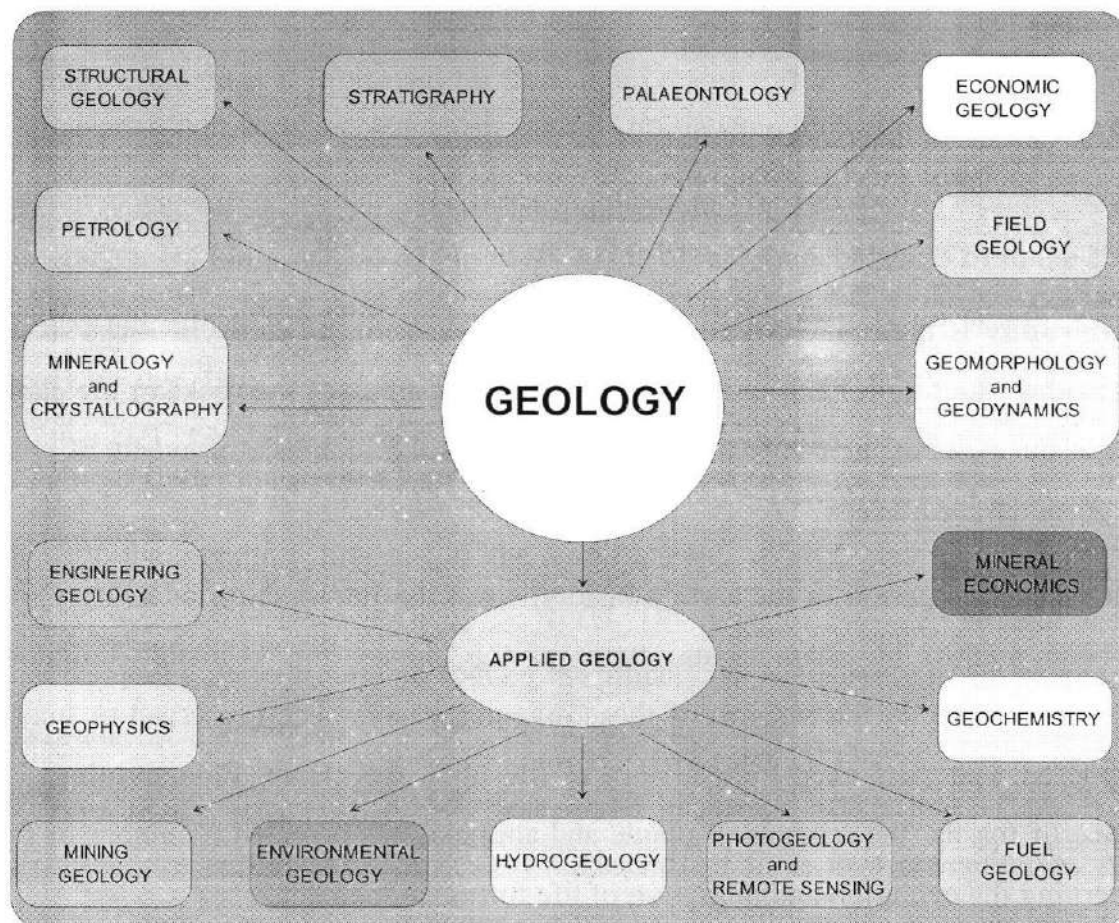
Designation - Assistant Professor & Head

Name - Dr. Prashant Kumar Shrivastava

Designation - Assistant Professor

THE STUDY OF THE EARTH

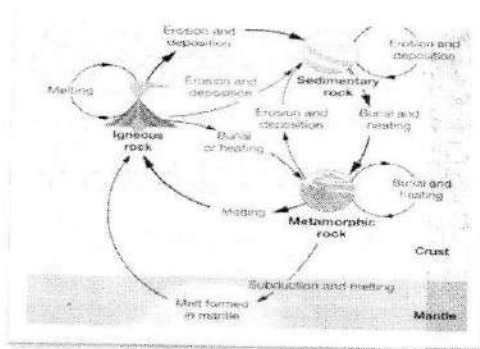
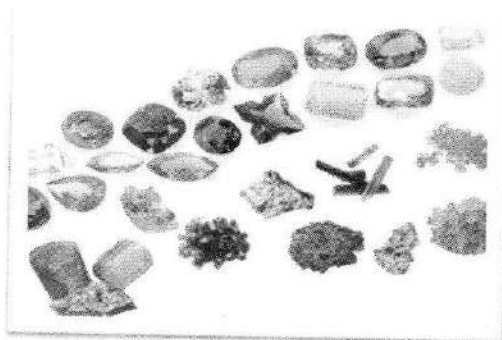
The subject of Geology is to trace the structural progress of our planet from the earliest beginnings of its separate existence, through its various stages of growth, down to its present condition. It seeks to determine the manner in which the evolution of the earth's great surface features has been 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.

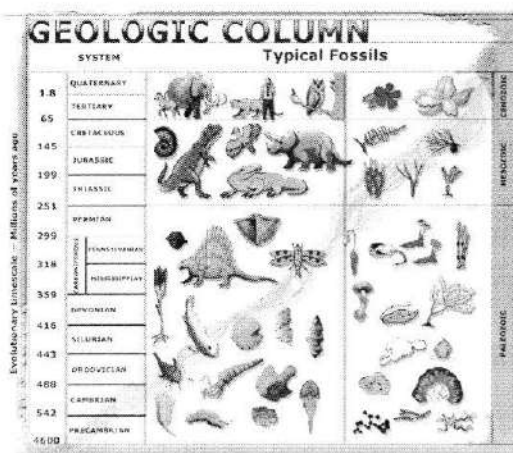
Mineralogy is the branch of Geology that deals with the study of physical, chemical and optical properties of minerals. Minerals serve as the building blocks for rocks.



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.



1 ALABASTER	2 ANTHRACITE	3 BERYL	4 BIOTITE	5 BITUMINOUS	6 BORON
7 CALCITE	8 CHINA CLAY	9 DOLOMITE	10 FELDSPAR	11 FIRE CLAY	12 FLINT
13 FULLER EARTH	14 GRAPHITE	15 GYPSUM	16 KAOLINE	17 LIME STONE	18 LIGNITE
19 MAGNESITE	20 MAGNETITE	21 MICA	22 OCHRE YELLOW	23 PYROLUSITE	24 QUARTZ
25 SILICA SAND	26 SRIMINITE	27 SLATE	28 SOAP STONE	29 STEATITE	30 SULPHUR

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.

LABORATORY VISIT AND LEARNING MODULES

I . 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.

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

III. 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)

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.

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

Useful and harmful microorganisms

Useful activities: Biofertilizer, Industrially important products, Medicines, food products etc.

Harmful activities: Causing diseases, Spoilage of material etc.

Microbial biotechnology

“Use of microorganisms for welfare of mankind”

- Tools for molecular biology studies
- Synthesis of novel bio molecules and nutraceuticals
- As biosensors
- As intermediate for drug delivery

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. Sitieshwari Chandraker

Designation - Assistant Professor

Experiment No:1

EXPERIMENT M2. To study the variation of magnetic field along the axis of a current carrying circular coil.

Apparatus. Stewart and Gee type tangent magnetometer, a battery, a commutator (or reversing key), plug key, rheostat, search needle, connecting wires etc.

Formula. The magnetic induction at a point on the axis is given by

$$B = \frac{2\pi n I r^2}{(r^2 + x^2)^{3/2}} \times 10^{-7} \text{ N/Am}$$

where,
 n = number of turns in the circular coil,
 I = current in ampere flowing through the coil,
 r = radius of the coil in metre,
 x = distance of a point in metre from the centre of the coil.

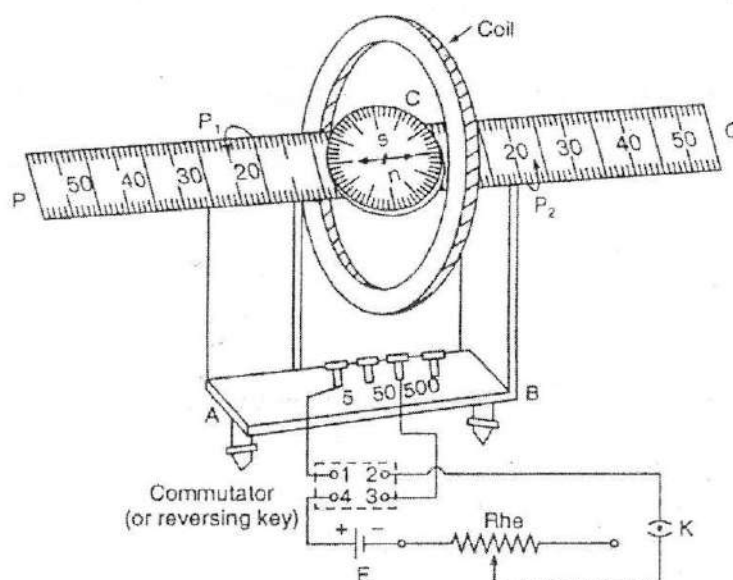
Theory. We know that the passage of electric current through a conductor generates a magnetic field around it. The direction of magnetic field is given by the right hand thumb rule. If the wire is turned in to a circular loop, the magnetic flux lines originate on one face and enter the other face of the coil. The field is uniform (parallel flux lines) over a small area near the centre of the loop or a coil of large number turns. As we move away along the axis of the coil, the strength of the field decreases on both the sides symmetrically. The magnetic induction at a point on the axis, x metre away from the centre of the coil is given by

$$B = \frac{2\pi n I r^2}{(r^2 + x^2)^{3/2}} \times 10^{-7} \text{ N/Am}$$

where r is the radius of the coil in metre and I is the current in ampere through the coil of n turns.

Description of apparatus.

Fig. 31.4 shows a Stewart and Gee type tangent galvanometer used in the experiment. It consists of a circular coil with several number of turns of well insulated copper wire.



3. Make the connections as shown in fig. 31.4. Select the proper number of turns (n) by connecting terminals 3 and 4 to proper number of turns at the base of the coil.
4. Place the magnetometer box such that the needle is at the centre of the coil and the pointer reads 0 - 0.
5. Close the key K and allow the current through the coil by rheostat such that the deflection is about 60° . Note the deflections θ_1 and θ_2 indicated by the pointers inside the dial. Normally, these should be same.
6. Reverse the direction of current through the coil using the reversing key. Note the readings θ_3 and θ_4 of the pointer.
7. Without disturbing the rheostat, move the compass box towards right hand side ray by 5 cm along the axis of the coil away from the centre and note down θ_1 , θ_2 , θ_3 and θ_4 everytime.
8. Repeat step 7 for left hand side of the coil along the axis. Record all the readings.

Observations.

1. Number of turns used, $n = \dots$
2. Radius of the coil, $r = \dots \text{cm} = \dots \text{m}$
(This can be calculated by measuring its circumference $= 2\pi r$).
3. Table for x and $\tan \theta$.

The coil is fixed vertically on a horizontal bench. A magnetic compass box C is carried on a scale calibrated on arm P and Q . The arm PQ is supported on two uprights, one on each side of the coil such that the centre of its magnetic needle remains always on the axis of the coil. The desired number of turns of the coil (5, 50, 500) can be selected by the terminals provided on the base AB . The base is provided with three screws for proper levelling.

The coil is adjusted so that its plane lies in the meridian and a current I is passed through it, then

$$F = \frac{2\pi n I r^2}{(r^2 + x^2)^{3/2}} = H \tan \theta$$

where θ is the deflection of the needle placed at a distance x from the centre of the coil. Placing the needle at the centre of the coil ($x = 0$), the rheostat is so adjusted that a large deflection, $\theta = 60^\circ$ is produced. The current is reversed by reversing key and the observation is repeated, keeping the position of rheostat constant, increase x in steps of 5 cm (0.05 m) and every time record the deflection (θ) of compass needle. A graph is plotted between x and $\tan \theta$.

Procedure.

1. Draw the Earth's magnetic meridian line using a search needle and a chalk.
2. Arrange the apparatus on wooden table such that the plane of the coil is in magnetic meridian level the apparatus.

S. No.	Distance of the compass needle from the centre of the coil x (in cm)	When compass box is on East arm						When compass box is on Right arm					
		Current in one direction		Current in opposite direction		Mean deflection θ	$\tan \theta$	Current in one direction		Current in opposite direction		Mean deflection θ	$\tan \theta$
		one end θ_1	other end θ_2	one end θ_3	other end θ_4			one end θ_1	other end θ_2	one end θ_3	other end θ_4		
1	0												
2	5												
3	10												
:	:												
:	:												
10	50												

Graphical Calculations. Using the values obtained in above observation table, plot a graph taking distance x on X-axis and $\tan \theta$ on Y-axis. Take $x = 0$ at the middle of X-axis and the values of L.H.S. are taken on $-X$ axis and R.H.S. on $+X$ axis. The graph is a smooth curve as shown in fig. 31.5. There will be two points of inflexion, where the curvature of the curve changes its sign, one on each side of O , corresponding to $d^2F/dx^2 = 0$ at $x = r/2$. In the figure, points P and Q are the points of inflexion. From this we can calculate the radius of the coil i.e. $PQ = \dots \text{cm} = \dots \text{m}$.

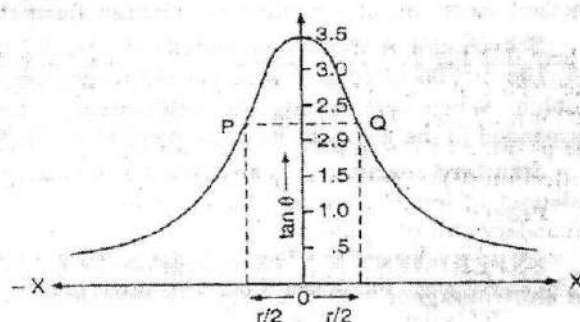


Fig. 31.5

Result.

1. The variation of magnetic field (B) with distance (x) along the axis of a current carrying coil is as shown in graph (fig. 31.5). The field is strongest at the centre of the coil and decreases gradually on either sides of the coil as one moves away from its centre.
2. The radius of the coil, $r = \dots \text{m}$ (From the graph)
and $r = \dots \text{m}$ (From the actual measurement).

Sources of error and precautions.

- (i) The plane of coil must be in magnetic meridian.
- (ii) All the magnetic substances and the accumulator must be away from the apparatus.
- (iii) The current in the coil must be such that the deflection in the magnetic needle of compass box at the centre of coil is nearly 60° .
- (iv) The current in coil once adjusted must remain unaltered throughout the experiment.
- (v) The plane of coil should not be disturbed while displacing the compass box from the centre of coil.

Experiment:2

Object. To determine the wavelength of laser with a grating.

Apparatus Required. Diode laser, holographic diffraction grating, optical bench, three vertical stands and a screen.

Theory. If laser light of wavelength λ is diffracted by a holographic diffraction grating with grating element e , the condition for n^{th} principal maxima is

$$e \sin \theta_n = n\lambda$$

when θ_n is the angle of diffraction.

For the first order, $n = 1$ and $\sin \theta_n \approx \tan \theta_n = \frac{x}{D}$

if x = mean distance of first order from the central order and D = distance of screen from the grating.

Formula used. $e \frac{x}{D} = \lambda$

where e = grating element = $\frac{1}{\text{number of lines per metre on grating}}$

x = distance of first order maxima from the central maxima and D = distance of screen from the grating.

Procedure. 1. Mount the diode laser source on the first vertical stand on the optical bench, the holographic grating on the second vertical stand and the screen on the third vertical stand such that the beam of diode laser falls on the grating normally on its ruled surface and then on the screen. The screen is also placed perpendicular to the laser beam.

2. Adjust the source, grating and screen at the same vertical height. You will see a central spot with first order spots on either side of it. Since the light of laser is monochromatic, therefore the spectrum is a single spot.

3. Measure the distance D of the screen from the grating. Then measure the separation of first order spot on either side from the central spot and take its mean value x .

4. Note the number of lines N ruled on the grating in 1 cm. Then calculate grating element e .

Observations. 1. Number of lines per cm on grating $N = \dots\dots\dots$

$$\therefore \text{grating element } e = \frac{1}{N} \text{ cm} = \frac{1}{100 N} \text{ m} = \dots \text{ m}$$

2. Distance of screen from the grating $D = \dots \text{ cm} = \dots \text{ m}$

3. Distance of first spot on left side of central spot $x_1 = \dots \text{ cm}$

Distance of first spot on right side of central spot $x_2 = \dots \text{ cm}$

$$\text{Mean } x = \frac{x_1 + x_2}{2} = \dots \text{ cm} = \dots \text{ m}$$

Calculations. Wavelength of laser light $\lambda = e \frac{x}{D} = \dots \text{ m} = \dots \text{ \AA}$

(Remember that $1 \text{ \AA} = 10^{-10} \text{ m}$)

Result. The wavelength of given laser light = $\dots \text{ \AA}$

Precautions. 1. The grating ruled surface should be placed normal to the incident laser beam.

2. The screen must be placed perpendicular to the incident laser beam.

Experiment:3

Object. To determine the refractive index and dispersive power of the material of prism with the help of spectrometer.

Apparatus Required. Spectrometer, prism, spirit level, reading lens, mercury vapour lamp and reading lamp.

Theory. When a light ray QP is incident at the point O of the surface AB of the prism ABC, it follows the path OD after refraction through the surface AB (from air to glass), bending towards the normal NOM. The refracted ray is OD. This ray again suffers refraction from glass to air at the surface AC and bends away from the normal N'DM' (i.e., bends towards the base BC) and follows the path RS. The emergent ray is RS. The angle of incidence i is $\angle QON$, the angle of refraction r is $\angle MOD$ and angle of emergence e is $\angle SDN'$. In the absence of prism, the light ray QP would have followed the straight line path QPLK. Thus the angle of deviation δ is the angle SLK due to refraction at both the surfaces of prism (Fig. 1.5).

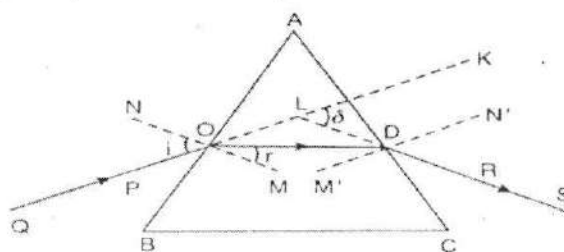


Fig. 1.5

If the angle of incidence i of the incident ray on the prism is gradually increased, the angle of deviation first decreases, then at a particular angle of incidence, the angle of deviation becomes minimum. With further increase in angle of incidence, the angle of deviation again starts increasing. The minimum value of angle of deviation is called *angle of minimum deviation* δ_m .

In the position of minimum deviation, if the refracting angle of prism $\angle BAC = A$, the refractive index of the material of prism is

$$\mu = \frac{\sin [(A + \delta_m)/2]}{\sin (A/2)}$$

Now if white light is made incident on the prism, the angle of minimum deviation corresponding to different constituent colours of white light is different. Hence a spectrum is obtained in the light emerging out of the prism. If the refractive indices of material of prism for the violet, yellow and red light be respectively μ_V , μ_Y and μ_R , the dispersive power of the material of prism is then

$$\omega = \frac{\mu_V - \mu_R}{\mu_Y - 1}$$

Formula used. The refractive index of material of prism for the monochromatic light is

$$\mu = \frac{\sin [(A + \delta_m) / 2]}{\sin (A / 2)}$$

where A is the refracting angle of prism, and δ_m is the angle of minimum deviation for the light of that colour.

Dispersive power of the material of prism $\omega = \frac{\mu_V - \mu_R}{\mu_Y - 1}$

Where μ_V , μ_R and μ_Y are respectively the refractive indices of material of prism for light of violet, red and yellow colours.

Procedure. The experiment is done in the following three steps:

(1) Adjustment of spectrometer, (2) Determination of refracting angle A of the prism, and (3) Determination of the angle of minimum deviation δ_m .

1. Adjustment. Before the experiment, the spectrometer is so adjusted that (a) the axes of collimator and telescope intersect each other on the vertical axis of the telescope, (b) the prism table is horizontal, and (c) telescope and collimator are focussed for the parallel rays.

(a) To test whether the axes of collimator and telescope intersect each other on the vertical axis of telescope or not, a vertical pin is fixed at the centre of prism table and the slit is made wide. Then taking the eyepiece out of the telescope, the pin is seen through the telescope by moving it in various angular positions. If in each position, the pin is seen in the middle of objective, the adjustment is correct; otherwise with the help of screws provided below the telescope and collimator, they are slightly raised up or lowered down so that the pin is seen in the middle of objective of telescope.

(b) To make the prism table horizontal, the prism is kept on the prism table such that its refracting edge is at the centre of prism table and the refracting face AC is perpendicular to the line joining the two levelling screws P and Q as shown in Fig. 1.6 (a). Then the prism table is rotated and it is adjusted in such a position that the parallel rays incident from collimator get reflected equally from both the refracting faces AB

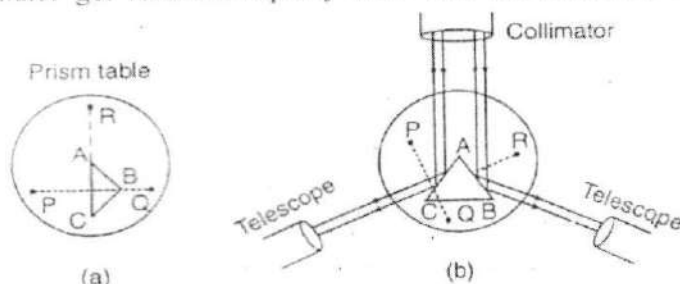


Fig. 1.6

(iv) In the position of minimum deviation, the yellow spectral line is made to coincide with the vertical cross-wire by turning the telescope and then the position of telescope is noted by taking the readings of both verniers on the circular scale.

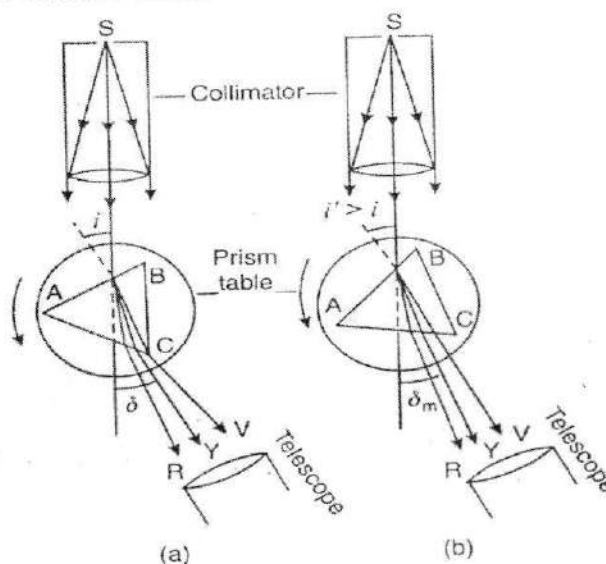


Fig. 1.8

(v) Now the prism is removed from the prism table and the telescope is brought just in front of the axis of collimator and the image of slit is made to coincide with the vertical cross-wire of telescope. This position of telescope is again noted by taking the readings of both verniers on the circular scale.

(vi) Then taking the difference in the two readings of each vernier separately, find their mean value. This will give the angle of minimum deviation δ_m for the yellow colour.

(vii) Similarly, find the angle of minimum deviation for other colours (violet and red).

Observations

Value of 1 division of circular scale of spectrometer $x = \dots\dots^\circ$

Total number of divisions on the vernier scale $n = \dots\dots\dots$

Least count of vernier

$$= \frac{\text{Value of 1 main scale division } x}{\text{Total number of divisions on vernier scale } n} = \dots\dots\dots^\circ$$

1. For the refracting angle A of the prism

S.No.	For the light reflected from the face AB of prism						For the light reflected from the face AC of prism						Difference in readings of two verniers 2A		
	Reading of vernier V ₁			Reading of vernier V ₂			Reading of vernier V ₁			Reading of vernier V ₂					
	M.S. reading	Vernier scale reading	Total reading a°	M.S. reading	Vernier scale reading	Total reading b°	M.S. reading	Vernier scale reading	Total reading a°	M.S. reading	Vernier scale reading	Total reading b°	a-a' (in °)	b-b' (in °)	Mean 2A
1.															
2.															
3.															

Mean value of 2A =

A =

2. For the angle of minimum deviation

S.No.	Colour of light	After refraction from prism						In line with the axis of collimator						Difference in the readings of two verniers δ_m		
		Reading of vernier V ₁			Reading of vernier V ₂			Reading of vernier V ₁			Reading of vernier V ₂					
		M.S. reading	V.S. reading	Total reading a°	M.S. reading	V.S. reading	Total reading b°	M.S. reading	V.S. reading	Total reading a°	M.S. reading	V.S. reading	Total reading b°	a-a' (in °)	b-b' (in °)	Mean δ_m
1.	Yellow															
2.	Violet															
3.	Red															

From the above table :

Angle of minimum deviation for yellow colour $\delta_{m1} = \dots\dots\dots^\circ$

Angle of minimum deviation for violet colour $\delta_{m2} = \dots\dots\dots^\circ$

Angle of minimum deviation for red colour $\delta_{m3} = \dots\dots\dots^\circ$

Calculations

Refractive index for yellow colour $\mu_Y = \frac{\sin[(A + \delta_{m1})/2]}{\sin(A/2)} \dots\dots\dots$

Refractive index for violet colour $\mu_V = \frac{\sin[(A + \delta_{m2})/2]}{\sin(A/2)} \dots\dots\dots$

Refractive index for red colour $\mu_R = \frac{\sin[(A + \delta_{m3})/2]}{\sin(A/2)} \dots\dots\dots$

Result. 1. The refractive index of material (.....) of prism for light of different colours is given in the following table:

Colour of light	Calculated value of refractive index μ	Standard value	Percentage error %
Yellow			
Violet			
Red			

2. The dispersive power of material (.....) of prism $\omega^\circ = \dots\dots\dots$

Standard value =

Percentage error = $\frac{\text{Standard value} - \text{Experimental value}}{\text{Standard value}} \times 100\%$
=%

Precautions. 1. Before the experiment, the spectrometer must be well adjusted.

2. The source of light must be placed near the slit of collimator.

3. The prism should be clean and the faces of prism should not be touched with hands.

4. The reading in the position of minimum deviation must be taken only when on turning the prism table in one direction, the spectral line of given colour (say, yellow) begins to return back after coinciding exactly with the vertical cross-wire of the telescope.

5. While finding either the refracting angle of prism or the angle of minimum deviation, we must take the difference in two readings of the same vernier.

DEPARTMENT OF ZOOLOGY

The department of zoology in one of the oldest departments 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 programme 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 consonance with its mission to promote an intellectual climate in this region, the department took initiative 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 far. Besides providing workspace for researches the department . Houses a well – equipped lab and library with around 700 books. Research journals are available in the central library of the college the department has undertaken minor and major research projects supported by funding agencies such as UGC & CG cost. It has also organized UGC CG cost funded 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

Name – Dr. Usha Sahu

Designation - Assistant Professor

Name – Dr. Divya K. Minj

Designation - Assistant Professor

Name - Dr. Neeru Agrawal

Designation - Assistant Professor

Name - Dr. Mausumi Dey

Designation - Assistant Professor

List of Experiments

Objective I....Study of biodiversity with the help of museum specimen(Invertebrates and Vertebrates)

Phylum –Protozoa---Volvox, Euglena, Paramecium ,Ceratum, Noctiluca

Phylum –Porifera---Sycon

Phylum –Coelenterata---Hydra, Physalia, Obelia, Metridium, Aurelia, Gorgonia

Phylum – Platyhelminthes--- Fasciola and Taenia

Phylum –Aschelminthes-----Ascaris

Phylum – Annelida----- Pheretima, Nereis, Leach,

Phylum –Arthropoda----Scorpion, Palaemeon, Crab, Peripatus, Squila, Limulus

Phylum –Mollusca-----Chiton, Pila, Octopus, Unio, Sepia, Loligo, Noctiluca shell

Phylum –Echinodermata--- Star fish, Sea Cucumber, Brittle star, sea Urchin, Feather star

Phylum – Hemichordata.... Balanoglossus

Phylum----Chordata---Myxine, Torpedo, Hippocampus ,Globe fish, Scoliodon, Ichthyophis, Salamander, Axolotl larva, Toad ,Hyla, Alytes ,Draco, Cobra ,Turtle, Viper, Krait, Hydrophis, Varanus, Pigeon, Crow, Duck , Bat, Hedgehog ,Guinea pig

Objective-II....Osteology

Articulated and disarticulated bone of Rabbit, Frog, Varanus and Fowl

Objective III----Lifecycle

Lifecycle of Silk moth, Honeybee

Objective IV----Population Density (Quadrat method and Counting-Recounting method)

Objective V-----Behavioural Study in Earthworm

Objective VI----Physiological Experiment in fishes.

Objective VII---Study of Mitosis

The department has selected those practicals based on basic zoology ,understanding trends in biosystematics, ecology and physiology

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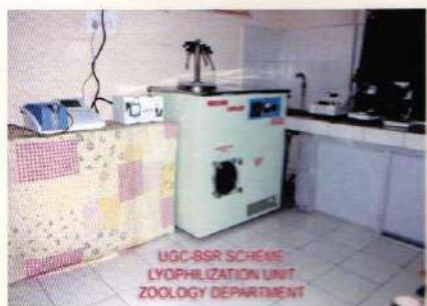
CHEMISTRY LAB



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 HIGHER EDUCATION MINISTER SHRI PREM PRAKASH PANDEY & EX. HIGHER EUDCATION MINISTER SHRI HEMCHAND YADAV IN OUR COLLEGE



HONORABLE EX. GOVERNOR OF CHHATTISGARH SHRI SHEKHAR DUTT VISITED OUR COLLEGE



ANNUAL CULTURAL PROGRAMME