

Annual Progress Report
Department of Biotechnology

1. **Name of the College:** SD College, Barnala-148101, Punjab (India)
2. **Name of Coordinator, Designation, Address, Phone No.:** Dr. Kulbhushan Rana, Associate Professor, Department of Chemistry, S.D. College Barnala, Mob. No. 7837856825.
3. **Assessment Duration:** 01/04/2023 to 31/03/2024 **Duration in Years:** One Year

4. **Details of Departments Supported:**

Sl No	Name of Department	Courses (B.Sc./M.Sc./PG Diploma, certificate etc) offered	Regular Faculty members	
1.	Botany	B.Sc. Medical	Total=02	
			With Ph.D.: 02	Without Ph.D.: Nil
2.	Zoology	B.Sc. Medical	Total=02	
			With Ph.D.: 01	Without Ph.D.: 01
3.	Chemistry	B.Sc. Medical & Non-Medical	Total=04	
			With Ph.D.: 01	Without Ph.D.: 03
4.	Mathematics	B.Sc. Non-Medical & B.A.	Total=05	
			With Ph.D.: 01	Without Ph.D.: 04
5.	Physics	B.Sc. Non-Medical	Total=04	
			With Ph.D.: 03	Without Ph.D.: 01

5. **Number & Date of Advisory committee meeting** The Coordinator Meet cum 3rd Review meeting of the Task Force, Coimbatore (7th to 9th February, 2024)

6. **Qualitative improvements due to DBT support. Please highlight 5 salient points (within 500 words).**

1. DBT grant has provided the opportunity to procure new equipments, multiple copies of already existing instruments, MATLAB Software, Consumable items enhancing the infrastructure with a variety of tools that boosted student's confidence in handling the new sophisticated equipments/software.
2. DBT funds have enabled the students to do additional practicals, minor projects as well as participate in conferences/seminars, workshops which inculcate scientific temperament among students.
3. Departments were successful in organizing guest lectures, workshops, excursions, field trips and industrial/institutional visits, which gave the students ample opportunity of exposure in experiential learning.
4. Faculty members updated their knowledge through participation in conferences/seminars/FDP's/Workshops/online courses, which helped them to design new practicals/projects for students that helped to create their interest in science streams.
5. With the star college scheme, departments are able to purchase books and subscribe journals. It has helped to create departmental libraries, which were earlier non-existing or have only textbooks. Now more learning resources in the form of new books and journals are available to the students.

Five best minor projects carried out by the Departments and their impact/outcome (Annexure-I)

1. Free Radicals and Superoxide Anion Scavenging Potential by Aqueous extracts of *Melia azedarach* L. and *Vernonia amygdalina* Del and their Phytochemical Analysis. (**Botany**)
2. Effectiveness of household agents as Larvicides on larvae of *Aedes aegypti* (**Zoology**)
3. To prepare potash alum from waste aluminum foil and to check its efficacy in purification of water (**Chemistry**).
4. Design an experiment to study diffraction through Plane Transmission Grating using different colours of LED lights and study the angle of diffraction and wavelength of lights. (**Physics**)

5. Mathematical modelling of the problem of carbon dating with the help of differential equations
(Mathematics)

7. Any novel aspect introduced or planning to introduce during the Scheme duration.

1. Students are participating in conferences to present their scientific ideas and findings. They also got the opportunity to interact with the research experts. Before implementation of Star College Scheme, participation of undergraduate students in conferences was negligible.
2. College has organizing summer training program for college students under DBT Star College Scheme annually since the inception of the scheme.
3. Interdepartmental enrichment activities to develop scientific aptitude of students in subject and related field.
4. As part of scheme, now students undertook a minor research projects in groups. Students performed experiments and documented results in the form of dissertations/reports. Some of faculty members and students published their research in journals/books.

Future plans:

- National Conference and Mega Science fair will be organized
- More Training programs/workshops will be organised.
- Students will be encouraged to participate in more Seminars/Conferences/Workshops/Competitions.
- New additional practical /research projects will be carried out.
- Interdepartmental research projects/activities will be given more emphasis.
- Training programs for laboratory staff will also be organised.
- Visits to research labs, industries, research centres etc. will also be organised.

8. Lessons learnt/ difficulties faced/ suggestions if any in implementation of the programme and utilization of DBT grant. (Max 3 points within 300 words).

- DBT's interdisciplinary and departmental activities envisioned interactive engagement amongst many scientific disciplines and departments with a holistic rather than compartmentalized approach.
- Most of the purchase and activities were completed in the last months due to difficulty faced by college because of the inability of ICICI Bank to map of DSC of authorized person in account mapping.
- The allotment of separate funds to the supporting staff, such as laboratory technicians, clerks & accountants is not given. Technical personnel play a crucial role in the activities (hands-on training, workshops, and extended practices) carried out in accordance with the plan, while the clerk or accountant aids in processing different bills and papers related to the DBT scheme.

9. Key performance indicators

S.No	Indicator	Pre-support	During/After Support														
1	No. of students admitted	Total = 331								Total =305							
		M=120				F=221				M= 93				F=212			
		SC 24	ST 0	OBC 33	G 63	SC 48	ST 0	OBC 49	G 114	SC 22	ST 0	OBC 17	G 54	SC 63	ST 0	OBC 47	G 102
2	No. of students passing out (%) Students Admitted/passing out (pass%)	94.39	Result awaited														
3	Drop-out rates	5.60 % (6 students)	Result awaited														
4	No. of students Opting for MSc	10	Result awaited														
5	Average marks	Botany= 73.55% Zoology=70.05 % Chemistry=69.87% Physics=70.76 % Mathematics: 87.08%	Result awaited														
6	No. of hands-on experiments being conducted	Botany B.Sc 1 st = 12 B.Sc 2 nd = 34 B.Sc 3 rd = 38 Zoology B.Sc 1 st - 35 B.Sc 2 nd - 32 B.Sc 3 rd -31 Chemistry B.Sc 1 st - 30 B.Sc 2 nd - 27 B.Sc 3 rd -23 Physics B.Sc 1 st =24 B.Sc 2 nd =24 B.Sc 3 rd =22 Mathematics No Practicals as per Syllabus	Botany B.Sc 1 st = 12 B.Sc 2 nd = 36 B.Sc 3 rd = 42 Zoology B.Sc 1 st - 17 B.Sc 2 nd - 28 B.Sc 3 rd -25 Chemistry B.Sc 1 st - 30 B.Sc 2 nd - 27 B.Sc 3 rd -23 Physics B.Sc 1 st =28 B.Sc 2 nd =24 B.Sc 3 rd =22 Mathematics No Practical as per Syllabus but 7 Practical were conducted														
7	No. of new Experiments introduced	Botany=02 Zoology=Nil Chemistry=03 Physics=Nil Mathematics= Nil	Botany=16 Zoology=09 Chemistry= 15 Physics=8 Mathematics=07														

8	Publications (scopus indexed)/patents, if any.	Botany= Nil Zoology=Nil Chemistry= 01 Physics=02 Mathematics= Nil	Botany= 3 (Scopus) & 5 (Chapters) Zoology= 02 (UGC care list) Chemistry= Nil Physics=01 (Scopus) &2 (Others) Mathematics= Nil
9	Training received by faculty	Botany=02 Zoology= Nil Chemistry=04 Physics=05 Mathematics=Nil	Botany=02 Zoology= Nil Chemistry=01 Physics=01 Mathematics= Nil
10	Exhibitions/seminars /training courses conducted	Botany=Nil Zoology= Nil Chemistry=01 Physics= Nil Mathematics= Nil	Botany=02 Zoology= 01 Chemistry=04 Physics=03 Mathematics=01
11	Books/journals subscribed from grants	Botany=Nil Zoology= Nil Chemistry=Nil Physics= Nil Mathematics= Nil	Botany= 33 Books with 48 copies + 01 (Journal) Zoology= 31 Books with 79 Copies + 1 (Journal) Chemistry= 80 Books with 106 Copies + 04 Journal Physics= 25 Books with 92 Copies + 01 (Journal) Mathematics= 7 (Books)
12	Outreach activities (Popular lectures)	Botany=Nil Zoology= Nil Chemistry=Nil Physics= Nil Mathematics= Nil	Botany=01 Zoology= Nil Chemistry=03 Physics= 01 Mathematics= Nil
13	Colleges mentored to apply for DBT Star College grants	Nil	Nil
14	Invited lectures	Botany=Nil Zoology= Nil Chemistry=Nil Physics= Nil Mathematics= Nil	Botany=04 Zoology= 04 Chemistry=07 Physics= 02 Mathematics= 02

• Proofs (S.No. 6-14 not more than 5 pages, 1.5 line spacing 11 times roman font size) to be provided duly attested by Principal and Coordinator.

10. Self evaluation

Department	*Objective (as stated in proposal)	% achieved	Reasons for underachievement / If achieved, state in quantitative metrics *
Botany	To provide training to students & faculty in scientific and transferable skills through modular lecture courses, projects, summer trainings, workshops and seminars/ Conferences.	100%	2/2
	To strengthen the infrastructural and instrumentation facilities in the department by procuring new equipment and upgrading existing facilities for achieving excellence in teaching and training	100 %	2/2
	To promote interdisciplinary research by students and faculty members of multiple departments, the outcome of which has to have direct application in improvising academic output, mitigating environmental/health issues etc.	80%	1.6/2 More collaboration with other depts. will be done to carry out interdisciplinary projects/activities
	To make easy accessibility of life sciences related journals/magazine in the department and college library for students	100 %	2/2
	To collect and cultivate medicinal plants in herbaria and gardens respectively and to maintain a repository of medicinal plants	80 %	1.6/2 More collection and herbarium preparations will be carried out

Department	*Objective (as stated in proposal)	% achieved	Reasons for underachievement / If achieved, state in quantitative metrics
Zoology	To strengthen the infrastructural facilities by procuring more books, Journal, chemicals etc.	100	2/2
	To encourage the faculty and students for training in scientific skills to update their knowledge through lectures, summer trainings, and seminars/Conferences.	70	1.4/2 Faculty will be encouraged to attend more and more FDPs, trainings , workshops etc.

To create awareness about the problems, professions etc. in the area by field visits and project work to develop logical Approach for problem-solving necessary for life.	70	1.4/2 Involvement of more students and more information is needed.
To organize invited lectures and workshops for students from resource persons and subject experts from time to time so as that students get chance to interact with them to get latest knowledge.	90	1.8/2 More programs will be organized for school students and non-teaching staff. and
To promote regular use of books, equipments, computer by students and hands -on exposure to experimental work.	70	1.4/2 Involvement of more students is needed.


Department	*Objective (as stated in proposal)	% achieved	Reasons for underachievement / If achieved, state in quantitative metrics*
Chemistry	To improve the infrastructure of chemistry labs with adequate equipments and chemicals to provide good scientific knowledge and hands on training.	100%	2/2
	To enrich the department library with adequate book collection.	100%	2/2
	To strengthen experiment and problem-solving skills in students through various training programs, field visits and project works.	100%	2/2
	To enrich student knowledge with latest techniques & innovations in chemistry by inviting experienced faculty.	90%	1.8/2 More hands on training program will be carried out in coming session
	To enhance & nurture the critical thinking among the science students.	90%	1.8/2 More student oriented activities will be carried out to improve their critical thinking

Department	*Objective (as stated in proposal)	% achieved	Reasons for underachievement /If achieved, state in quantitative metrics
Physics	Development of critical experiment and problem solving skills among students through participation in various conferences/ workshops/ training programs outside the institute	100%	2/2
	Enrichment of departmental library with all adequate printed & electronic content.	80%	1.6/2 Preparation of e-contents for students as per NEP is in progress.
	Invited lectures for students from resource persons and subject experts from time to time.	100%	2/2
	Organization of various competitions/training program / workshops for students	100%	2/2
	Participation of faculty members of Physics department in various Faculty Development Programme, workshops and orientation courses/conferences.	60%	1.2/2 Some faculty members will participate in FDPs/orientation course in coming session

Department	*Objective (as stated in proposal)	% achieved	Reasons for underachievement / If achieved, state in quantitative metrics*
Mathematics	To generate and nurture the critical thinking among the students of Mathematics by group discussions and by arranging interaction with experts from other colleges/Universities/Industries.	75%	1.5/2 More expert lectures and hands on training on applications of mathematics will be organised
	To develop interest about software's by providing study material, by arranging extension lectures from experts etc.	100%	2/2
	To develop profession competence of students by arranging visits to industries/hospitals/research centres, by providing practical training by inter-department activities etc.	50%	1/2 More visits to research centres and industries for practical training

			will be arranged
	To strengthen the physical infrastructure of our department like books of departmental library, PCs, Projector.	75%	1.5/2 More book with multiple copies will be purchased in coming session
	To strengthen ties with neighbouring institutions like Punjabi University Patiala, SLIET etc.	50%	1/2 More Collaborative activities with premium institutes will be arranged

Kulbhusan
 Co-ordinator *Rana*
 DBT, Star College Scheme
 S.D. College Barnala
 Course Coordinator


 Principal
 S.D. College, BARNALA
 Head of Institution *KK*

Annexure I

Project 1: Free Radicals and Superoxide Anion Scavenging Potential by Aqueous extracts of *Melia azedarach* L. and *Vernonia amygdalina* Del and their Phytochemical Analysis (Botany)

Reactive oxygen species produced aerobic metabolism in the body can oxidatively damage DNA, lipids, proteins, and amino acids. Plants are a good source of antioxidants, which can help protect against illnesses caused by free radicals. In the present investigation, aqueous extracts of *Melia azedarach* (AEMA) and *Vernonia amygdalina* (AEVA) were tested for antioxidant activity using DPPH, ABTS cation radical and superoxide anion radical scavenging assays. Both the extracts viz. AEMA and AEVA showed moderate scavenging activity against DPPH free radicals with an IC_{50} value of 149.83 and 198.80 $\mu\text{g/ml}$ in DPPH assay respectively. In ABTS assay, extracts viz. AEMA and AEVA showed scavenging activity with inhibition of 89.77 % and 70.89 % respectively. In case of super oxide anion radical scavenging g assay, AEMA and AEVA scavenged the superoxide anion radicals quite efficiently with an IC_{50} of 130.87 and 285.36 $\mu\text{g/ml}$ respectively. From the results of all the three assays it was conclude that *Melia azedarach* (AEMA) was more effective scavenger of radicals as compared to *Vernonia amygdalina* (AEVA). Further studies are needed to explore in vivo antioxidant efficacy of these extracts for their use in pharmaceutical/food industries.

Project 2: Assessment of physicochemical parameters of breeding habitat of dengue vector. (Zoology)

Outcome: The objective of present study was to find out the effect of physicochemical characteristics of the artificial waterbodies i.e containers on larval density. The physicochemical characteristics are key factors responsible for breeding of mosquito as its immature stages are purely aquatic and are found in freshwater. In this study focus was mainly on six parameters viz. temperature, pH, dissolved oxygen, CO_2 , TDS and conductivity of water. The students learnt about the methods, use of instruments, development stages of mosquitoes and about their surroundings with their ability to make observations. Above all, they became aware that water stored in artificial containers is cause of spread of vector of various diseases and hence should be avoided.

Project 3: To prepare potash alum from waste aluminium foil and to check its efficacy in purification of water (Chemistry)

Landfills across the globe continue to be a resting place for aluminium beverage cans, foils etc. It takes approximately 500 years to fully decompose whereas it takes 95% lesser energy to recycle it than to produce primary aluminium (as reported in the literature) So one such way to recycle it is to convert it into Potash Alum commonly known as Fitkari which has wide applications in water treatment plants, the food industry, textile industry etc. So to make the students aware of environmental hazards and pollution caused by waste aluminium foil the above said project was carried out. Waste aluminium foil collected by students was washed properly and dried up. A calculated amount of foil was dissolved in potassium hydroxide to form a complex aluminate. It was then filtered, and sulphuric acid was added to the aluminate placed in a water bath and again filtered to obtain potash alum. It was tested for potassium, aluminium, and sulphate ions qualitatively. Three water samples collected from different places were used to check the efficacy of potash alum prepared. TDS and conductivity of water samples before and after treatment with potash alum were noted with the help of soil and water analysis kit purchased from DBT funds. Tested samples exhibited decrease in TDS and conductivity after treatment with prepared Potash Alum.

Project 4: Design an experiment to study diffraction through Plane Transmission Grating using different colours of LED lights and study the angle of diffraction and wavelength of lights. (Physics)

Outcome: The project successfully demonstrated the principles of light diffraction through a transmission grating, illustrating how light bends at angles dependent on wavelength. By quantitatively analyzing diffraction angles for known LED wavelengths (red, green, and blue), the experiment validated the relationship between wavelength and diffraction angle as predicted by the grating equation. This provided an accurate method for determining the wavelength of light sources and showcased the practical applications of diffraction gratings in spectroscopy and spectral analysis across scientific disciplines. The project also enhanced practical skills in optical setup, light handling, and precise measurement techniques, while fostering analytical abilities in data interpretation and empirical understanding of physical phenomena.

Project 5: Mathematical modelling of the problem of carbon dating with the help of differential equations. (Mathematics)

Outcome: Students were provided training on how to model differential equations to solve real life problems and their solutions using MATLAB software. Differential equation form the basis of applied mathematics. They provide an important working tool in physics, chemistry and electrical engineering, biology, physiology, medicine, statistics, sociology, psychology and economics. In this project we modelled the problem of carbon dating and radioactivity with the help of differential equations. Radio -active elements like Uranium, Thorium, Potassium, Rubidium, Led 210, Carbon 14 with known half -lives) can be used to assign dates to event that took place from a few thousand to a few billion years ago. In this project we have used differential equations to estimate the time elapsed since the specimen, a wooden bowl, was used in ancient civilization (it is found that 22 percent of original radiocarbon in a wooden archeological specimen has decomposed).The age of fossilized bone was calculated with the help of MATLAB software also.

Annexure II: Key performance indicators (Point 7-14)

Department of Botany

Point 7:

List of Additional Practicals: Total: 17

S. No.	Experiment	Class	Equipment Utilized	Outcome
1.	To study couch smut disease in <i>Cynodon dactylon</i> caused by <i>Ustilago cynodontis</i> .	B.Sc. I	Stereo zoom Microscope	Studied life cycle of <i>Ustilago cynodontis</i> on host plant
2.	To study the technique of emasculation, bagging & tagging in plant breeding experiments.	B.Sc. I	-	Hand on practice for plant breeding experiments.
3.	To isolate protoplasts from mesophyll cells of fresh plant leaves	B.Sc. I	Centrifuge	Learnt the technique of protoplast isolation
4.	Study of vegetative and reproductive thalli in <i>Spirogyra</i> (Algae) and <i>Sphagnum</i> (Bryophyte)	B.Sc. I	Microscopes	Studied morphological and anatomical details

5.	To study the technique of DNA Agarose Gel Electrophoresis for the separation of DNA.	B.Sc. II	DNA Electrophoresis Assembly & pH meter	Hand on practice for technique of DNA Agarose Gel Electrophoresis
6.	To study the anatomy of gymnosperms using microtome	B.Sc. II	Microtome	Hand on practice of microtomy technique and anatomy study
7.	To study different types of secretory tissues in various plants	B.Sc. II	Microscopes	Acquainted with anatomical variations in plant tissues types
8.	To prepare a herbarium sheets of local flora	B.Sc. II	Herbarium Cabinet & Plant Press	Hand on training to prepare herbarium sheets
9.	To determine pollen viability by pollen germination using Pollen Germination Medium	B.Sc. II	Microscopes	Learnt importance of pollen viability as it is important in events in seed formation
10.	To identify unknown plants using body punched card keys and single access keys or sequential keys.	B.Sc. II	-	Hand on practical to use taxonomic keys for plant identification
11.	To separate secondary metabolites present in the bark and leaf extracts of medicinal plants using Thin Layer Chromatography (TLC).	B.Sc. III	UV Chamber	Studied the technique of Thin Layer Chromatography (TLC).
12.	To study pollen grains in different honey samples	B.Sc. III	Microscopes	checked whether the honey is unifloral or multifloral for medicinal purpose
13.	To measure the growth of plant using arc auxanometer	B.Sc. III	Arc auxanometer	Learnt method to observe and measure plant growth
14.	To sterilise and inoculate explant to raise callus in MS medium.	B.Sc. III	Laminar air flow hood, Autoclave, Electronic Weighing balance	Students learnt the technique of plant tissue culture
15.	Determination of dust holding capacity of leaves by weight method	B.Sc. III	Electronic Weighing balance	Students studied the significance of dust deposition as it induce changes in the biochemical parameters by increasing and decreasing their level in the plant leaves, thus affecting plant growth
16.	To study anatomical adaptations in some	B.Sc. III	Microscopes	Observed various

hydrophytes and xerophytes			anatomical changes wrt environment
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Minor Research Projects:

S. No.	Project Title	Supervisor	No. of Students	Outcome
1.	Free Radicals and Superoxide Anion Scavenging Potential by Aqueous extracts of <i>Melia azedarach</i> L. and <i>Vernonia amygdalina</i> Del. And their Phytochemical Analysis	Dr. Manish Kumar	5	Attained knowledge of techniques and potential of medicinal plants/phytoconstituents and their role in human health and diseases
2.	Bioinsecticidal Potency of Botanical Extracts against <i>Callosobruchus maculatus</i> (Bruchidae: Coleoptera) to Reduce Post Harvest Losses in <i>Vigna radiata</i>	Dr. Manish Kumar & Dr. Amardeep Kaur	5	With the perspective of providing quality food for population and alternatives to synthetic chemicals, plant extracts/powders could act as environmentally friendly and low cost insecticides against these pests
3.	<i>In Vitro</i> Amelioration of Oxidative stress by Methanol Extracts of <i>Madhuca indica</i> and <i>Eucalyptus globulus</i>	Dr. Manish Kumar	5	Attained knowledge of techniques and potential of medicinal plants/phytoconstituents and their role in human health and diseases
4.	Determination of Available Nitrate, Phosphate, Carbonate, Chloride and Sulfate in Different Soil Samples Collected from Barnala Region.	Dr. Amardeep Kaur	5	Students learnt method to determine available nitrate, phosphate, carbonate, chloride and sulfate in soil
6.	Effect of Chromium metal on morphological and biochemical parameters of <i>Vigna radiata</i> seedlings	Dr. Manish Kumar & Mrs. Rajni Gupta	5	Student studied the effects of heavy metals on plant growth parameters
7.	Study of Linear Attenuation Coefficient of Edible Plants by Irradiating Gamma Ray Photons using GM Counter	Dr. Manoj Kumar Gupta & Dr Manish Kumar	11	This study helps to understand the Linear Attenuation Coefficient of Edible Plants leaf's by Irradiating Gamma Ray Photons using GM Counter. This study showed that higher value of LAC of the leaf provides better defensive mechanism in human body against viral diseases.

Point 8:

Research Papers

- 1) Kaur P, **Kumar M**, Kaur S, Kumar A, Kaur S. (2024). *In Vitro* Modulation of genotoxicity and oxidative stress by polyphenol-rich fraction of Chinese Ladder Brake (*Pteris vittata* L.). *Appl Biochem Biotechnol.* 196(2):774-789.
- 2) **Kumar M.**, Kumar, P; Kaur, A, Kaur, S and Kaur, S (2023). Bioactive phytochemicals from Ephedra: An updated review," *The Thai Journal of Pharmaceutical Sciences: Vol. 47: 4*, Article 7.
- 3) **Kumar M**, Kaur SJ, Kaur S. (2023). c-Jun N-terminal Kinase (JNK), p38, and Caspases: Promising Therapeutic Targets for the Regulation of Apoptosis in Cancer Cells by Phytochemicals. *Current Cancer Therapy Reviews.* 20(2): 200 – 211.

Book Chapters

1. Jadhao AB, Das A, Topno SC, Rido L, **Kumar M**, Mahapatra BK, Yadav DU, and Kumar S. (2023). Medicinal plants used against *Escherichia coli*: Antimicrobial Agents for Future Drug formulation. Yam. ISBN: 978-81-958404-7-2.
2. Pandit K, Kaur A, **Kumar M**, Bhardwaj R, Kaur S (2023) Hepatoprotective Molecules from Himalayan Plants and their Role in Xenobiotic Mechanisms: A Tabulated Review. *Bioactive Phytochemicals from Himalayas: A Phytotherapeutic Approach (2023) 1: 14.* ISBN: 978-981-5123-29-6.
3. Chandra S, **Kumar, M, Bala A, Kaur H**, Mishra S, Kumar S.(2024).*Saccharum spontaneum*: a medicinally important grass of India. *Medicinal Poaceae of India, Volume 1; ISBN: 978-81-970898-2-4.*

Books Published

1. **Kumar M**, Kumar P, Sharma A, (2023). *Bioactive Phytochemicals from Himalayas: A Phytotherapeutic Approach*, Bentham Science Publishers. ISBN: 978-981-5123-29-6
2. Snehalatha VR, Saradar B, Sharma BP, **Kumar M**, Sahu JK (2023). *Antidiabetic Plants Volume II.* APRF, Odisha, India, Odisha, India. ISBN: 978-81-958404-0-3.

Point 9:

Faculty Participation in Conferences, Seminars, Training Programs, FDP's

1. Dr. Manish Kumar successfully completed **Two-week Refresher Course** in "**Advanced Research Methodology**" organized jointly by Teaching Learning Centre Ramanujan College, New Delhi from Dec. 17, 2023 - Dec. 31, 2023.
2. Dr. Manish Kumar participated in the **National Conference "Chemistry for the Sustainable Future (CSF- 2024)"** organized by Punjabi University Patiala on 7 March 2024.
3. Dr. Manish Kumar & Dr. Amardeep Kaur participated in **National Conference "Emerging Trends in Science & Technology for Sustainable Development"** organised by DAV College Bathinda on 2nd March 2024.
4. Dr. Manish Kumar participated in **three days training program** on "**Awareness on Medicinal Plants**" organized by Ambika Prasad Research Foundation, Odisha, India from 13 February, 2024.

Student Participation in Workshops, Trainings, Competitions etc.

1. **Six Students** participated in **National Conference "Emerging Trends in Science &**

- Technology for Sustainable Development"** organised by DAV College Bathinda on 2 March 2024 and got appreciation award in student category.
2. Two students participated in **three days training program** on "**Awareness on Medicinal Plants**" organized by Ambika Prasad Research Foundation, Odisha, India from 13 February, 2024.

Point 10:

Training Programs Organized:02

S. No.	Topic of Training	Date	Outcome	Beneficiaries
1.	Two Week Interdisciplinary Summer Training Program from	29-07-2023 to 11-08-2023	Students were trained regarding experiments on extraction of phytoconstituents and essential oils from various aromatic & medicinal plants using soxhlet and Clevenger apparatus. The spectroscopic and chromatographic analysis of these plant extracts and organic compounds were performed. Students were trained students to test various soil samples for salinity	35
2.	Extraction and Formulation of Herbal Drugs	28-03-2024	Students were trained for extraction and formulation herbal creams face wash from rose petals and gripe water preparation from fennel seeds.	65

Educational Tour/Field Visits/Awareness Programs: 04

- 1. Visit to Harvaas Nursery on 4th March, 2024:** A visit to Harvaas Nursery, Cheema Jodhpur, Barnala was organised on 4th March, 2024 by Botany Dept under DBT Star College Scheme. During the visit, students of B.Sc Medical II Sem IV have learnt various techniques of Vegetative plant Propagation such as Tongue Grafting, Wedge grafting, use of leaves, stems and roots for vegetative propagations of various ornamental and fruit plant varieties. Students have seen a variety of flowering plants, fruit plants, gymnosperms, medicinal plants etc. Students also gained knowledge of soil preparations and treatments used by nursery growers.
- 2. Visit to DST-CURIE Research & Teaching Laboratory (DCRTL), Govt. College for Girls, Ludhiana on 12th March, 2024:** Department of Botany organised a visit to DST-CURIE Research & Teaching Laboratory (DCRTL), Govt. College for Girls, Ludhiana on 12th March, 2024. 35 students visited this place. Students were taken to DST-CURIE Research & Teaching Laboratory (DCRTL), where students got opportunity to see and practically handle various equipment such as Multiple Elisa Reader, High Volume Air Sampler, Phase contrast Microscope, Fluorescent Microscope, UV Visible Spectrophotometer, Rotary Vacuum Evaporator, Soil and Water Analysis Kit, Electrophoresis Assemblies etc. After this, students were taken to the Botanical Garden and Mushroom Cultivation Unit in their College Campus, where students saw various species of medicinal, economically important & hydrophytic plants, and gained knowledge about mushroom cultivation.
- 3. Visit to Ghumaan Seed Farm, Nagra, Sangrur on 21st March, 2024:** A visit to Ghumaan Seed Farm, Nagra, Sangrur was organised on 21st March, 2024 by Botany Dept under DBT Star

College Scheme. During this seed farm visit, students learned the methods for separation of seeds of different varieties by using various equipments such as indented cylinder seed grader, seed cleaner, power duster, impurities removal machine etc. Students also visited the fields various crops viz. carrots, Pea, Wheat, Radish, Maize etc were sown for the purpose of improved seed quality and their distribution to farmer after seed testing by PAU Ludhiana. They also learnt technical; packing of seed bags to be sent for screening and quality testing PAU Ludhiana.

4. Department of Botany organized "Plantation Drive" in the college campus under DBT Star College Scheme on 20th January 2024. Different ornamental plants such as Marigold, Petunia, Salvia, etc., Gymnosperms such as *Pinus*, *Cycas*, *Cupressus* etc. and various medicinal plants such Heeng, Elaichi, Amla, Laung, Allspice, Dalchini, Betel etc were planted in the campus and Botanical Garden. Students also prepared name plates and installed them near each and every plant

Point 11:

List of Books Purchased under DBT

S.No.	Name of Book	Authors	Publishing House
1.	Statistics for the Life Sciences	Myra Samuels, Jeffrey A. Wilmer, Andrew A. Schaffner	Pearson Publishers
2.	Paleobotany and Plant Evolution	Iqbal Hussain	Oxford Book Co.
3.	Medicinal Plants & Benefits	Rajnish Mahalingam	Agrotech Press
4.	Molecular Genetics of Bacteria	Deepa Joshi	Oxford Book Co.
5.	Fundamentals of Plant Tissue Culture	Veenu Aggarwal	Oxford Book Co.
6.	Plant Viruses	Ramnivas Sharma	Agrotech Press
7.	Information Technology, Plant Pathology and Biodiversity	PN Murthy	Oxford Book Co.
8.	Applied Genetics	Veena Kumari	Agrotech Press
9.	Herbarium	Usha Jain, Praveen Mohit	Oxford Book Co.
10.	Genetics and Plant Breeding	Veenu Aggarwal	Oxford Book Co.
11.	Fundamental Genetics	Shweta Sharma	Oxford Book Co.
12.	Biomangement of Diseases	JS Bohra	Agrotech Press
13.	Morphology of Plants	Veenu Aggarwal	Oxford Book Co.
14.	Plant Ecosystem	Rajnish Mahalingam	Agrotech Press
15.	Plant Breeding	Iqbal Hussain	Oxford Book Co.
16.	Biodiversity Conservation (A Genetic Approach)	S Biswas	Oxford Book Co.
17.	Aromatic & Vital Oil Plants	Rajkumari Joshi	Oxford Book Co.
18.	Plant Cell Biology	V. Batra	Oxford Book Co.
19.	Fundamentals of Plant Breeding	Iqbal Hussain	Oxford Book Co.
20.	Applied Biotechnology and Plant Genetics	Ashok Ganguli	Oxford Book Co.
21.	Text Book of Plant Ecology	Iqbal Hussain	Oxford Book Co.
22.	Plant Ecology	V. Batra	Oxford Book Co.

23.	Plant Biotcehnology	RC Mishra	ABD Publishers
24.	Diversity of Microbes & Cryptogams	HN Srivastava	Pradeep Publication
25.	Cell Biology & Genetics	HN Srivastava	Pradeep Publication
26.	Diversity of Seed Plants and Their Systematics	HN Srivastava	Pradeep Publication
27.	Structure, Development & Reproduction in Flowering Plants	HN Srivastava	Pradeep Publication
28.	Plant Physiology, Biochemistry & Biotechnology	HN Srivastava	Pradee Publication
29.	Ecology & Plant Utilization	HN Srivastava	Pradeep Publication
30.	Natural Products	OP Aggarwal	Krishna Prakashan
31.	Kevin's Glossary: Botany	Damiel Rhodes	ABD Publishers
32.	Genetics & Plant Breeding	V Batra	Oxford Book Co.
33.	Plant Physiology	Iqbal Hussain	Oxford Book Co.
	Journal Name	ISSN No	
1.	The Journal of Plant Science Research	0970-2539	Prints Publications Pvt. Ltd, New Delhi

Point 12:

Outreach Activities

1. Dr. Manish Kumar delivered a lecture on "Biodiversity & Its Conservation" in the college under Swachh Bharat Mission on 2nd October, 2023, birth anniversary of Mahatma Gandhi organized by NSS Dept.

Point 13:

Colleges mentored to apply for DBT Star College grants: Nil

Point 14:

Invited Lectures: 04

S.No.	Topic of Invited Lecture	Resource Person	Date	Beneficiaries
1.	Scope of Plant Sciences	Dr. Tarunpreet Singh Thind, Assistant Professor & Nodal Officer, DST-CURIE Program, Govt. College for Girls, Ludhiana (Punjab).	12 th March, 2024	35
2.	Instrumentation in Life Sciences	Dr. Tarunpreet Singh Thind, Assistant Professor & Nodal Officer, DST-CURIE Program, Govt. College for Girls, Ludhiana (Punjab).	12 th March, 2024	35
3.	Mycology & Plant Pathology	Dr. Ashutosh Sharma, Associate Professor, Faculty of Agricultural	19 th March, 2024	40

		Sciences, DAV University, Jalandhar (Punjab).		
4.	Fungal Diseases in Plants: Implications in Quality Control of Herbal Medicine	Dr. Ashutosh Sharma, Associate Professor, Faculty of Agricultural Sciences, DAV University, Jalandhar (Punjab).	19 th March, 2024	40

Department of Zoology

Point 7:

List of Additional Practicals:

1. Study of development stages of insect (mosquitoes). B.Sc III
2. Estimation of haemoglobin using colorimeter and haemoglobinometer. B.Sc III
3. Preparation of haemochromogen crystals. B.Sc III
4. Qualitative and quantitative analysis of proteins in given food stuff. B.Sc II
5. (i) To draw pedigree chart for own family using symbols.
(ii) To analyse given pedigree chart and also to draw for given situations. B.Sc II
6. To investigate how light and dark conditions affect the behavior of pill bugs. B.Sc I
7. To study antennal grooming behaviour of cockroach. B.Sc I
8. Prey- predator relation with the help of balls. B.Sc I
9. Study of fauna. B.Sc I, II, III

Minor Research Projects:

S.No.	Project Title	Supervisor	Students	Outcome
1	To study of phenotypes of some characters in families; and in students of the college (nearly 450).	Dr. Renu Bala	4	To gain knowledge of alternates of characters and their inheritance.
2	Assessment of physicochemical parameters of breeding habitat of dengue vector.	Dr. Renu Bala	6 B.Sc. III (Med.)	Learnt the use of some instruments and also observation ability.
3	Study of avian diversity in relation to tree diversity in college campus.	Dr. Renu Bala	4 B.Sc. II (Med.)	Learnt that birds have close association with trees.
4	Impact of detergent on the developmental period of <i>Aedes</i> and <i>Culex</i> sp.	Dr. Renu Bala	4 B.Sc. III (Med.)	Ability to think about the role of a substance to control mosquito by affecting development.
5	Fish-Farm - a case study	Dr. Renu Bala	All classes	Knowledge of pisciculture
6	Study of morphology of invertebrates: earthworm and cockroach.	Dr. Renu Bala	4 B.Sc. I (Med.)	Fostering interest in study animals by actual handling and observation.
7	Haemoglobin: Methods of estimation and its variation in class population	Dr. Renu Bala	3 B.Sc. III (Med.)	Students learnt to use basic statistics to draw conclusion apart from different methods of estimation of haemoglobin.

Point 8

Research Papers & Book Chapters Published

1. Bala R. 2023. Assessment of renosomatic index, histopathology and pathophysiology of the kidney of exotic freshwater fish, *Ctenopharyngodon idella* exposed to endosulfan J. Aquat. Biol. Fish.11(1): 55-59
2. Bala R., and Kaur G. Effects of some household agents (potash alum, detergent and aqueous lemon extract) on larvae of *Aedes aegypti* (Accepted in GAU Res. J. in 2023)
3. Mittu B., Kaushish M., Lily, Begum Z., Bala R., Singh M. and Kaur M. (2023). Starch-based nanomaterials, their properties and sources. *In Book: Starch based nanomaterials for food packaging: Perspectives and Future Prospectus* (Edited by Gulzar Ahmad Nayik Aamir Hussain Dar ISBN: 978-0-443-18967-18968 Academic Press publications An imprint of Elsevier <https://www.elsevier.com/books-and-journals>).

Books Published :

1. Basics of Genetics 978-81-968854-9-6 Twenty first Century Publication, Patiala (National Publishers).

Point 9:

Participation in Conferences, Seminars, Training Programs, FDP's

1. One Week Training at Krishi Vigyan Kendra: 24 Students of Zoology with their teacher .Dr. Renu Bala, Associate Professor Zoology attended a training programme on '*Fish Processing and Value Addition*' at Krishi Vigyan Kendra, Handiaya (Barnala) from 24.07.2023 to 28.07.2023. Students interacted with different scientists from different universities and learnt about fish products and fish processing industry. They also got hands-on training on processing and preparation of some products of fish.
2. Four students and both faculty members (Dr. Renu and Ms. Kajal Jain) participated in National Conference on "Emerging trends in Science and Technology for sustainable Development" at D.A.V. College, Bathinda (Punjab) on 2 March, 2024.
- 3.. Ankita and Pragati of B.Sc. I (Med.) won third prize in 'Quiz competition' in "Science Fest 2024: Science for sustainable Future" organized by Baba Farid College, Bathinda on 28.02.2024.
4. Ankita and Pragati of B.Sc. I (Med.) participated in 'Poster making competition' in "Science Fest 2024: Science for sustainable future" organized by Baba Farid College, Bathinda on 28.02.2024.

Point 10 : Exhibitions/Conference/ Workshops/trainings etc. organized

Workshops: 01

S.No	Name of event	Period	Resource person	Beneficiaries	Outcome
1	WORKSHOP: 'Preparing, Photographing Slides of Insect Genitalia, Wings, Legs'	13 March, 2024	1.Dr. Charan Kamal Sekhon, Head, Department of Zoology, Shri Guru Granth World University, Fatehgarh sahib, Punjab 2. Ms. Mandeep Kaur from same dept.	47 students	The students learnt about various ways and criteria to collect, preserve and identify the insects; preparation of slides. Students themselves prepared and photographed the slides.

Educational tours/Field Visits organized: 02

No.	Place Visited	Period	Class	No. of Beneficiaries
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1.	Bir Talab Mini Zoo, Bir Talab (Bathinda)	9 March, 2024	B.Sc Med.	38 (Students studied claws and beaks of birds in cages, observed monkeys doing different jobs in natural habitat, and bucks, deer, barasinga etc. kept and looked after in open vast area.
2	Fish Farm, Katron (Sangrur) Punjab	15 March, 2024	B.Sc Med.	34 (Students gained knowledge about various aspects of pisciculture; saw fish of different sizes in preparation pond and stock pond. Then the students learnt about water testing and working of bio-gas plant there.

Point 11: List of Books Purchased under DBT

S. No.	Name of Book	Author	Publisher
1	Basic Immunology	Abbas, Lichtman, Pillai	Elsevier
2	The life of vertebrates	J.Z.Young	Oxford University Press
3	Invertebrate Zoology	Robert D.Barnes	Cengage
4	Concepts of genetics	Klug, Cummings, Spencer, Palladino	Pearson
5	An introduction to Embryology	B.I. Balinsky	East West Press, pvt ltd New Delhi
6	Principles of Genetics (8 th ed.)	Gardner, Simmons, Snustad	Wiley India Pvt. ltd
7	A Text Book of Zoology: Development Biology and Molecular Biology	P.S.Dhami, J.K.Dhami	Pradeep Publications, Jalandhar
8	Cell biology and Genetics	K.N. Bhatia, Neelam Dhand	A Trueman Publication, Jalandhar
9	Introduction to Evolutionary Biology	F. B. Mandal	Oxford and IBH Publishing Co.Pvt. Tld.
10	Biochemistry	Hames, Hooper	Taylor and Francis group
11	Ecology Environmental Science and Conservation	Singh, Gupta	S.Chand and Company Ltd.
12	Environment and Ecology	Anand	Mc Graw Hill
13	General Endocrinology	C. Donnell Turner, Joseph T. Bagnara	East West Press, Pvt. Ltd. New Delhi
14	Principles of Molecular Biology	Veer Bala Rastogi	MedTech Science Press
15	The Cell	Cooper, Hausman	Sunderland
16	Animal Physiology	Hill, Wyse, Anderson; 3 rd ed.	Sinauer Associates Inc.
17	Animal Physiology; Adaptation and Environment; 5 th ed.	Knut Schmidt-Nielsen	Cambridge University Press
18	DNA	J. Watson	Penguin Random House
19	A Text Book of Zoology: Development Biology and Molecular Biology	P.S.Dhami, J.K.Dhami	Pradeep Publications, Jalandhar

20	Genetics	Ahluwalia	New Age International Publishers
21	Modern's Nonchordates	Ashok Sabharwal	Modern Publishers, Jalandhar
22	Modern's Chordates	Ashok Sabharwal	Modern Publishers, Jalandhar
23	Modern's Genetics	Ashok Sabharwal	Modern Publishers, Jalandhar
24	Modern's Cell Biology	Ashok Sabharwal	Modern Publishers, Jalandhar
25	Modern's Evolutionary Biology	Ashok Sabharwal	Modern Publishers, Jalandhar
26	Modern's Ecology	Ashok Sabharwal	Modern Publishers, Jalandhar
27	Basic Genetics	Renu Bala	TFS Publication, Patiala
28	A Text Book of Zoology: Development Biology and Molecular Biology	P.S. Dhami, J.K. Dhami	Pradeep Publications, Jalandhar
29	Textbook of Zoology (Developmental and Evolutionary Biology)	Dr. R. Banerjee, Dr. P. Kr. Banerjee	Global Net Publication
30	Butterflies of India	Peter Smetacek	Prakash Books
31	Physiology and Biochemistry	T. Mishra and D. Mishra	Mahaveer Publications, New Delhi
	Journal Name	ISSN No	Publisher
1.	Indian Journal of Experimental Biology	0019-5189(p), 0975-1009(online)	CSIR-National Institute of Science communication and Policy Research (NISCAPR), New Delhi, India.

Point 12:

Outreach Activities: Nil

Point 13:

Colleges mentored to apply for DBT Star College grants: Nil

Point 14:

Invited Lectures: 04

S.No	Topic of Invited Lecture	Resource Person	Date	Beneficiaries
1.	'Self-sustainability Opportunities for Zoology Students'	Dr. Charan Kamal Sekhon, Head, Department of Zoology, Shri Guru Granth World University, Fatehgarh sahib, Punjab	13 March, 2024.	47 students
2	'Neglected Tropical Diseases'	Dr. Hina Sachdeva , Assistant Professor, M.M.Modi College, Patiala Punjab	20 March, 2024	33 students
3	'Forensic Entomology, Molecular systematic and Phylogeny'	Dr. Manish Sharma, Assistant Professor, M.M.Modi College, Patiala Punjab	20 March, 2024	33 students
4	'Human Defence and Mechanisms and Immunological Techniques'.	Dr. Hina Sachdeva , Assistant Professor, M.M.Modi College, Patiala Punjab	20 March, 2024	33 students

Department of Chemistry

Point 7

S.No	Experiment	Class	Equipment Utilized	Outcome
1.	To determine the strength of given glucose solution by Fehling's solution.	B.Sc. III	Water bath, Hot plate	Learned practical application of the theory part studied
2.	To determine the equivalent weight of an acid (oxalic acid) by conductometric titration method.	B.Sc. III	Conductometer	Acquired knowledge of conductometric methods to calculate equivalent weight.
3.	Synthesis of nanoparticles (zinc oxide, cerium oxide, nickel oxide) using solution combustion method.	B.Sc. I, II & III	Muffle Furnace, Digital weighing machine, water bath.	Attained knowledge of simple, facile & rapid SCS for nanoaggregates synthesis & their morphological & structural properties.
4.	Separation of mixture of red and blue ink by thin layer chromatography.	B.Sc. II	TLC Apparatus	Helped in understanding the principle & technique of TLC for separating & analysing components in a mixture.
5.	To carry out aldol condensation reaction using acetaldehyde.	B.Sc. II	Digital weighing machine & Digital M.Pt. Apparatus, Hot Air Oven, Filtration assembly etc.	Gained practical experience in performing Aldol Condensation reaction & understood the mechanism of this reaction.
6.	To determine enthalpy of hydration of copper sulphate calorimetrically.	B.Sc. II	Calorimeter	Learned to determine enthalpy changes through calorimetric techniques & applying thermodynamic principles to chemical processes.
7.	Paper based microfluidic analytical method for detection of Nitrogen, Sulphur and Halogens in given organic compound.	B.Sc. II	No specialized equipment	Developed skills in Fabricating & Applying of μ PAD devices in the said analysis.
8.	Estimation of oxalate ions in tomato permanganometrically.	B.Sc. II	No specialized equipment	Helped in developing interest in understanding redox reactions.

9.	Analyse the common salt for the estimation of chloride ions.	B.Sc. II	No specialized equipment	Equipped with the techniques for quantitative analysis through its application in daily life.
10.	Detection of Lead ions, Nickel ions and Nitrate ions using whatmann filter paper as microfluidic paper based analytical device.	B.Sc. I	No specialized equipment	Developed skills in Fabricating & Applying of μ PAD devices in the said analysis
11.	Special test for detection of ions in combination a. Carbonate ions in the presence of Sulphite ions. b. Nitrate ions in the presence of nitrite ions. c. Nitrate ions in the presence of Bromide and iodide ions. d. Chloride, Bromide and Iodide in presence of each other.	B.Sc. I	No specialized equipment	Learned to separate & identify anions when present together
12.	a. Extraction of pure solvent from impure solvent. b. Removing water from water extract.	B.Sc. II	Rotavapor	Learned extraction process & use of rotavapor
13.	Herbal extraction process using curry leaves and coriander powder.	B.Sc. II & III	Rotavapor and Soxhlet	Learned extraction process & use of rotavapor & Soxhlet Apparatus
14.	To verify Lambert-Beer Law	B.Sc. III	UV - Visible Spectrophotometer	Learned the principle & working of UV -Visible Spectro photometer & to apply Lambert-Beer Law in Spectrophotometry.
15.	To determine the partition Coefficient of Iodine between CCl_4 & H_2O	B.Sc. III	Mechanical Shaker	Gained Practical knowledge of Distribution Law.

Minor Research Projects

S.No.	Project Title	Supervisor	Students	Outcome
1.	Study of the efficiency of sunscreen lotions of different brands using UV visible spectrophotometer.	Rajni Gupta	B.Sc. II (6 students)	Helped in developing skills in using UV -Visible Spectro Photo Metery to measure UV absorption of Sunscreen location. Helped students to prepare carrier

				in Cosmetic Chemistry.
2.	Analysis of various quality parameters of various edible oils.	Rajni Gupta	B.Sc. II (6 students)	Learned to analyse quality parameters & nutrition value of edible oils, gained inside into food safety & quality assurance.
3.	To prepare Potash alum from Waste aluminium foil and to check its efficient efficacy in purification of water.	Savita Sood	B.Sc. III (6 students)	Learned knowledge of converting waste Aluminium foil into potash alum generally used for purifying water.
4.	To check quality parameters pH, conductivity, TDS etc of different samples of water taken from various sources.	Savita Sood	B.Sc. III (6 students)	Students got information to evaluate the suitability & safety of water used for various purpose.
5.	Organic synthesis via microwave induced eco-friendly solvent free Biginelli reaction catalyzed by calcium chloride.	Dr. Kulbhushan Rana	B.Sc. III (6 students)	Acquired the knowledge of multicomponent reactions (MCR) stoichiometry, TLC, purification & characterisation
6.	Paper based microfluidic device for detecting some heavy metals ions.	Dr. Kulbhushan Rana	B.Sc. II (6 students)	Learned fabrication, control & manipulation of fluid and application of μ PAD
7.	Solution combustion synthesis (SCS) of some nanoscale materials using dextrose as fuel.	Dr. Kulbhushan Rana	B.Sc. II (6 students)	Attained knowledge of simple, facile & rapid SCS for nanoaggregates synthesis & their morphological & structural properties.
8.	Study of Structural, Magnetic & other Physical, Chemical Parameters of YbMg Intermetallic compound using XCRYSDEN & DFT	Dr. Sanjay Kumar Singh and Rajni Gupta and Dr. Kulbhushan Rana	10	Research on YbMg compound using XCRYSDEN and DFT revealed its structure, magnetic properties, and other characteristics, showing its potential uses in various technologies, guiding further study for advanced materials applications. Work has been presented in national conference and accepted for publication in Springer nature Book proceeding.
9.	Mathematical modelling of the problem of carbon dating with the help of differential equations	Upasana Rani & Rajni	03	Students were provided training on how to model differential equations to solve real life problems and their solutions

		Gupta		using MATLAB software.
10	Effect of Chromium metal on morphological and biochemical parameters of <i>Vigna radiata</i> seedlings	Dr. Manish Kumar & Mrs. Rajni Gupta	5	Student studied the effects of heavy metals on plant growth parameters

Point 8: Nil

Point 9:

Faculty Participation in Conferences, Seminars, Training Programs, FDP's

1. Mrs. Rajni Gupta, Associate Professor in Chemistry, attended national conference at DAV College, Bathinda on 2nd March, 2024.
2. Dr. Kulbhushan Rana, Associate Professor in Chemistry, attended the national conference "**Emerging Trends in Science & Technology for Sustainable Development**" at DAV College, Bathinda on 2nd March, 2024 and he also successfully presented a paper on "Synthesis of Novel Substituted Dihydropyrimidines and their In Vitro Anticancer Activities" at the national conference organized by Chemistry Department, Punjabi University, Patiala on 6th & 7th March, 2024.
3. Mrs. Rajni Gupta, Associate Professor in Chemistry Participated in FDP on "Nanotechnology & Its Applications" organised by Shri Vaishnav Institute of Science, Indore from April 22nd to April 26th 2024.

Student Participation in Workshops, Trainings, Competitions etc.

1. Lovepreet Kaur & Rahul from BSc III presented a paper on "Hydrogen as an Alternative Fuel" under the guidance of Dr. Kulbhushan Rana, at DAV College, Bathinda on 2nd March, 2024
2. Sangeeta Sharma, Komal and Deepmala from BSc II presented a paper on "Microfluidic Paper Based Analytic Devices" under the guidance of Dr. Kulbhushan Rana, at DAV College, Bathinda on 2nd March, 2024.
3. Eeshita, Nandika, Pritpal Kaur, Manpreet Kaur, Jashan, Rajveer Kaur from BSc I presented a paper on "Hydrogen as an Alternative Fuel" under the guidance of Dr. Kulbhushan Rana, at DAV College, Bathinda on 2nd March, 2024.
4. Manjot Singh and Palak Sharma from BSc II presented a paper on "Soil Pollution and Heavy Metals Remediation" under the guidance of Mrs. Rajni Gupta, at DAV College, Bathinda on 2nd March, 2024.
5. Sandeep Kaur, Harpreet Kaur, Khushpreet Kaur from BSc II presented a paper on "Paper Based Micro-Fluidics Analytical Methods for Analysis of Organic Compounds" under the guidance of Mrs. Rajni Gupta, at DAV College, Bathinda on 2nd March, 2024.

Other Activities:

1. Around 70 students from BSc Medical and Non-Medical, accompanied by Mrs. Rajni Gupta, Associate Professor & Dr. Kulbhushan Rana, Associate Professor, visited the Department of Chemistry and the Department of Soil Sciences at PAU Ludhiana. During the visit, students toured the soil museum in groups, where Dr. Vijaykant Singh explained about various types of soils, their composition, constituents, and classification. Additionally, students were introduced to various instruments such as AES, AAS, and ion chromatography in the chemistry labs.
2. A two-week Interdisciplinary Summer Training Program was organized by the Dept. of

Chemistry in collaboration with the Department of Botany, from July 29, 2023, to August 11, 2023. They learnt how to perform organic synthesis by conventional and microwave method, extraction of phytochemicals from plants by percolation method and solution method and its qualitative analysis along with the chromatographic techniques. About 35 students attended this training program.

Point 10:

Training Programs Organized

S. No.	Topic of Training	Date	Outcome	Beneficiaries
1.	Two Week Interdisciplinary Summer Training Program	29-07-2023 to 11-08-2023	A two-week Interdisciplinary Summer Training Program was organized by the Dept. of Chemistry in collaboration with the Department of Botany, from July 29, 2023, to August 11, 2023. They learnt how to perform organic synthesis by conventional and microwave method, extraction of phytochemicals from plants by percolation method and solution method and its qualitative analysis along with the chromatographic techniques. About 35 students attended this training program.	35
2.	Hands on Training on UV Visible Spectrophotometer	29 th Feb, 2024	Acquired the knowledge of working of the instrument.	65
3.	Solution Combustion Method for Nanoaggregates	22 nd March, 2024	Attained knowledge of simple, facile & rapid SCS for nanoaggregates synthesis & their morphological & structural properties.	85
4.	Workshop on Extraction and Formulation of Herbal Drugs	28 th March, 2024	Students were trained for extraction and formulation herbal creams, face wash from rose petals and gripe water preparation from fennel seeds.	50

Point 11:

List of Books Purchased under DBT

S. NO	TITLE OF THE BOOK	NO. OF COPIES	AUTHORS
1	Spectroscopy	2	Kaur, H
2	Quantum Chemistry	3	Prasad, R.K.
3	Experimental Pharmaceutical Chemistry	1	Siddqui & Siddqui
4	Laboratory Manual Of Organic Chemistry	1	Bansal, R.K.
5	Advanced Physical Chemistry	2	Gurtu & Gurtu

6	Analytical Chemistry	1	Christian , G.D. & DasGupta, P.K.
7	Organic Chemistry	1	Carey , F.A. & Schug K.A.
8	Physical Chemistry Vol-I	1	Kapoor, K.L.
9	Physical Chemistry Vol-III	1	Kapoor, K.L.
10	Physical Chemistry Vol-IV	1	Kapoor, K.L.
11	Physical Chemistry Vol-V	1	Kapoor, K.L.
12	Physical Chemistry Vol-VI	1	Kapoor, K.L.
13	A Dictionary Of Chemistry	1	Sharma, J.L.
14	Physical Chemistry Through Problems	1	Dogra and Dogra
15	Fundamental Concepts In Environmental Studies	1	Mishra, D.D.
16	Introduction To Nanoscience And Nanotechnology	1	Poole. P.C. & Freank , J.
17	Computers For Chemist	2	Bansal, P.
18	Nanotechnology	1	Foster, L. E.
19	Nanotechnology	1	Schulte, J.
20	Advanced Practical Physical Chemistry	1	Yadav, J.
21	Practical Organic Chemistry	2	Vogel
22	Advanced Inorganic Chemistry Vol-I	1	Tuli & Basu
23	Fundamental Of Biochemistry	1	Jain and Jain
24	Organic Chemistry	1	Bahl, A.
25	Organometallic Compounds	2	Inderjeet
26	Physical Chemistry	3	Khosla, V.D. & Garg, V.C.
27	Selected topics in Inorganic Chemistry	2	Wahid , U. & Tuli, G.D.
28	Physical Chemistry	1	Bahl & Bahl
29	Practical Chemistry	1	Pandey,O.P. & Bajpay, D.N.
30	Mathematics For Chemist	1	Singh, B.
31	Biology For Chemist	2	Aggarwal, P.K.
32	Concise Inorganic Chemistry	1	Lee, J.D.
33	Stereochemistry	2	Kalsi, P.S.
34	Organic Chemistry Reactions And Reagents	1	Aggarwal, O.P.
35	Herbal Cosmetics	1	Vivleden, M.
36	Spectroscopy of Organic Compounds	2	Kalsi, P.S.
37	Physical Chemistry	2	Puri, Sharma, Kalia
38	Basic Inorganic Chemistry	1	Cotton & Wilkinson
39	Nanotechnology	1	Rathi, R.
40	Organic Spectroscopy	2	Kamp, W.
41	Reaction Mechanism In Organic Chemistry	2	Singh & Mukherji
42	Organic Chemistry Vol I	1	Singh & Mukherji
43	Organic Chemistry Vol III	1	Singh & Mukherji
44	Fundamentals Of Photochemistry	1	Rohatagi, K.

45	University Practical Chemistry	1	Kamboj, P.C.
46	Organic Chemistry	1	Bahl, A. & Bahl, B.
47	General Organic Chemistry	1	Denniston, K. J.
48	Organic Chemistry	1	Soloman, T. & Graham
49	Polymer Science	1	Gowariker, V. R.
50	Practical Organic Chemistry	1	Mann, F.G. & Saunders, B.
51	Physical Methods In Inorganic Chemistry	1	Drego, R.S.
52	Inorganic Chemistry	1	Huheey, J.E.
53	Spectroscopy	1	Pavia & Lampman
54	Organic Chemistry	3	Morrison & Boyd
55	Inorganic Chemistry	1	Puri, Sharma, Kalia
56	Basic Chemistry	2	Timber lake, K.
57	General Chemistry	1	Gammon, E.
58	Organic Reaction Mechanisms	1	Ahaluwalia
59	Organic Chemistry Vol I	2	Finar, I.L.
60	Organic Chemistry Vol II	2	Finar, I.L.
61	Spectroscopic Identification Of Organic Compounds	1	Silverstein
62	Advanced Practical Physical Chemistry	1	Yadav, J.
63	Stereochemistry Of Organic Compounds	1	Nasipuri, D.
64	Problems & their solutions in Inorganic Chemistry	2	Finar, I.L.
65	Applied Chemistry	1	Gupta, N.
66	Elementary Organic Spectroscopy	2	Sharma, Y.R.
67	Advanced Physical Chemistry Experiments	1	Gurtu & Gurtu
68	Natural Products Vol- I	1	Aggarwal, O.P.
69	Natural Products Vol- II	1	Aggarwal, O.P.
70	Heterocyclic Chemistry	2	Gilchrist, T.L.
71	Practical Organic Chemistry	2	Aggarwal, O.P.
72	Heterocyclic Chemistry	1	Bansal. R.K.
73	Principles of Instrumental Analysis	1	Skoog & Noller
74	An Introduction to Electrochemistry	1	Glasstone, S.
75	Biochemistry	1	Campbell, M.K.
76	Mechanism in Organic Chemistry	1	Sykes, P.
77	Biotechnology lab Practices	1	Borah, D.
78	Basic Chemistry concepts	1	Malhotra, V.K.
79	Advanced Inorganic Chemistry Vol-I	1	Prakash, S. & Tuli, G.D.
80	General Chemistry & Biochemistry	1	Chaudhary, J.P.

Journal Subscription

S.No.	Journal Name	ISSN No.	Publishers
1	Current Science	0011-3891	Current Science Association in collaboration with Indian Academy of Sciences, Bangalore.
2	Indian Journal of Traditional Knowledge	0972-5938	CSIR Publications
3	Pragati Vikas and Asha	0973-2616	CSIR Publications
4	Bhartiya Vagayanik and Udogic Anusandhan patrika	0971-7706	CSIR Publications

Point 12:

Outreach Activities

2. Department of Chemistry organised "Plantation Drive" in collaboration with NSS department in the village Khudi Khurd on 12th August, 2023. Around 25 different plants were planted in the village.
3. Department of Chemistry organised "Save Environment" program on 26th September, 2023 for the 6 NSS units of S.D. College, Barnala. DBT coordinator made aware the students regarding the "Depletion of ground water in Punjab".
4. DBT Coordinator Star College Scheme Dr. K. Rana delivered a lecture on "Cleanliness Campaign" in the college under Swachh Bharat Mission on 2nd October, 2023, birth anniversary of Mahatma Gandhi.

Point 13:

Colleges mentored to apply for DBT Star College grants: Nil

Point 14:

Invited Lectures:

S. No.	Topic of Invited Lecture	Resource Person	Date	Beneficiaries
1.	Basic principles of UV Visible Spectroscopy	Dr. Manmohan Chhibber, HoD Chemistry & Biochemistry, Thapar Institute of Engineering and Technology, Patiala	29 th Feb, 2024	65
2.	Principles of Mass Spectroscopy	Dr. Gulshan Kumar Bansal, Professor and Head of Dept. Pharmaceutical Sciences and Drug Research, Punjabi University, Patiala.	11 th March, 2024	70
3.	Applications of Mass	Dr. Gulshan Kumar Bansal, Professor and Head of Dept.	11 th March,	70

	Spectroscopy	Pharmaceutical Sciences and Drug Research, Punjabi University, Patiala.	2024	
4.	Fundamental Organometallic Compounds	of Dr. Meenu, Assistant Professor, Maharaja Ranjit Singh, Punjab Technical University, Bathinda	11 th March, 2024	60
5.	Applications Organometallic Compounds	of Dr. Meenu, Assistant Professor, Maharaja Ranjit Singh, Punjab Technical University, Bathinda	11 th March, 2024	60
6.	Basics & Synthesis of Nanomaterials	Dr. Rajesh Kumar, Assistant Professor, JC DAV College, Dasuya	22 nd March, 2024	85
7.	Industrial applications of Nanomaterials	Dr. Rajesh Kumar, Assistant Professor, JC DAV College, Dasuya	22 nd March, 2024	85

Department of Physics

Point 7:

List of Additional Practicals: Total: 08

S.No.	Experiment	Class	Equipment Utilized	Outcome
1	To determine the Hall Voltage developed across the sample material and calculated Hall Coefficient, Charge Carrier Density and Mobility	B.Sc-III	Hall effect set up	Students learned to measure the Hall voltage (V_H), Hall Coefficient (R_H), charge carrier density (n) and conductivity of sample material.
2	To determine the Energy Band Gap of a semiconductor (Ge) using Four Probe method	B.Sc-III	Four Probe Setup	Students learned to measure electrical resistivity and Conductivity of given sample
3	To study the dielectric constant and verification of Curie Weiss Law.	B.Sc-III	Dielectric constant apparatus	From this experiment, students learned to determine the Curie temperature of ferroelectric transition, differentiate between behavior of ferroelectric and Para electric materials, hence verified Curie-Weiss Law.
4	To find the coefficient of thermal conductivity of a bad conductor by Lee's Disc method.	B.Sc-II	Lee's Disc Apparatus	The coefficient of thermal conductivity for the bad conductor was determined. The experimental setup effectively measured the steady-state heat flow through the sample, confirming its low

5	To find out the ionization potential of Argon using Frank Hertz Experimental setup and also plot graph between Current & Ionization potential.	B.Sc-II	Frank Hertz Experimental setup	thermal conductivity. The ionization potential of argon was determined by Franck-Hertz experimental setup & current versus ionization potential graph plotted manually on graph paper and in MS excel sheet displayed discrete peaks corresponding to the energy levels at which electrons ionize argon atoms and results were also compared with theoretical one.
6	Determination of dielectric constant of solid material using resonance method	B.Sc-I	Dielectric constant apparatus	Dielectric constant(DC) of rectangular shaped Bakelite sheets of variable thicknesses is determined by measuring variable capacitance of standard specimen and test specimen at resonance condition with the aid of DC equipment..
7	Determination of Moment of Inertia of irregular shaped sample using torsional pendulum	B.Sc-I	Torsional pendulum	Students determined Moment of Inertia(M.O.I) of irregular shaped samples experimentally by measuring torsion time period of torsional pendulum
8	To study variation of magnetic field with distance along axis of a circular current carrying coil using Stewart and Gee's apparatus	B.Sc-I	Stewart and Gee's apparatus	Students studied variation of magnetic field as a function of distance from the centre of current carrying coil on x-axis in both directions and comparing the results to verify the tangent law relationship between magnetic fields.

Minor Research Projects:

S. No.	Projects Name	Mentor	No of students	Outcome
1	Measurement of spring constant by dynamic based method using smartphone and its verification using standard Hook's law method	Dr. Baltej Singh & Dr. Manoj Kumar Gupta	04	A good agreement between experimental value and value obtained using static method established the fact that smartphone technology can be used with confidence for measuring physical parameters involving dynamic motion.

2	Experimental determination of Planck's constant using four different colour Light Emitting Diodes (LED).	Dr. Baltej Singh	04	The value of Planck's constant is determined through voltage-current measurement for four LEDs i.e red , green , yellow and blue followed by measurement of wavelength of these LEDs experimentally using diffraction pattern and Bragg's law.a good agreement was achieved with theoretical value
3	To study the periodic motion of different types of oscillators (Simple Oscillator, Damped Oscillator, Forced Oscillator, Coupled Oscillator) by using MATLAB.	Dr. Manoj Kumar Gupta & Dr. Baltej Singh	08	The periodic motion of different types of oscillators observed graphically through its mathematical derivation and programming in MATLAB. It helps to understand periodic motion with different parameters.
4	Design an experiment to study diffraction through Plan Transmission Grating using different colours of LED lights and study the angle of diffraction and wavelength of lights.	Dr Sanjay Kumar Singh	09	The project showcased light diffraction through a transmission grating, validating wavelength-dependent bending with red, green, and blue LEDs. It confirmed the grating equation's predictions for precise wavelength determination, emphasizing practical applications in spectroscopy. The project also enhanced skills in optical setup, light handling, and data analysis, fostering a deeper understanding of physical phenomena.
5	First Principles Study of Structural, Magnetic, Electronic & Optical Properties of CeMg, PrMg & NdMg Intermetallic Compound using Density Functional Theory	Dr Sanjay Kumar Singh	04	Density Functional Theory simulations probed CeMg, PrMg, and NdMg intermetallic compounds, uncovering distinctive structural, magnetic, electronic, and optical properties pivotal for material advancements in magnetism and optoelectronics. Part of the findings has been published, with the remainder submitted for publication in the International Journal of Modern Physics B, including a revised manuscript.
Interdisciplinary projects				
1	Study of Structural, Magnetic & other Physical, Chemical Parameters of YbMg Intermetallic compound using XCRYSDEN & DFT	Dr. Sanjay Kumar Singh and Rajni Gupta and Dr. Kulbhushan Rana	10	Research on YbMg compound using XCRYSDEN and DFT revealed its structure, magnetic properties, and other characteristics, showing its potential uses in various technologies, guiding further study for advanced materials applications. Work has been presented in national conference and accepted for publication in Springer

				nature Book proceeding.
2	Construction of basic solid-state structures and various miller planes of simple cubic crystal using MATLAB.	Dr. Baltej Singh & Dr Dimple Chawla	05	Students perform MATLAB coding to obtained plots of different structures used in introductory solid-state Physics. Purpose of this project was to enhance student understating of basic solid-state concepts with simultaneous learning of programming language.
3	Study of Linear Attenuation Coefficient of Edible Plants by Irradiating Gamma Ray Photons using GM Counter	Dr. Manoj Kumar Gupta and Dr Manish Kumar	11	This study helps to understand the Linear Attenuation Coefficient of Edible Plants leaf's by Irradiating Gamma Ray Photons using GM Counter. This study results higher value of LAC of the leaf provides better defensive mechanism in human body against viral diseases.

Point 8:

Research Papers & Book Chapters Published

1. Baltej Singh, Manoj Kumar Gupta, A S Dhaliwal and K S Kahlon, Study of photon shielding effectiveness of recycled environment waste Cement Kiln Dust doped Bismuth Alkali Borate glasses, *J. Phys.: Conf. Ser.* 2663-012046 (2023).
2. Nikhil Kumar, Sanjay Kumar Singh, Meena Kumari & S. S. Acharya, Structural, Phase Transitional & Magnetic Properties Of Neodymium Nitride Under High Pressure: A Full Potential Study, *Ijcwki*, Vol.5 Issue 1, 23-26 (2023).
3. Toshar Garg, Shweta, Aditi Rani & Sanjay Kumar Singh, M. Kumari & S. S. Acharya, Ab-Initio Investigations Of Structural Properties Of Re-Mg (Re = Ce, Pr, Nd) Alloy, *Ijcwki*, Vol.5 Issue 1, 19-22 (2023).

Point 9:

Faculty Participation in Conferences, Seminars, Training Programs, FDP's

1. Dr. Baltej Singh, Study of photon shielding effectiveness of recycled environment waste Cement Kiln Dust doped Bismuth Alkali Borate glasses, 6th National Conference on "Advance Materials and Radiation Physics" organised by Physics Department, SLIET Longowal, 18-19 May, 2023.
2. Dr. Baltej Singh, "Research Methodologies and Scientific Research Writing using LaTeX" Short term training programs organised by Department of Electronics and Communication Engineering, NIT Kurukshetra, 4-8 January, 2024.
3. Dr. Baltej Singh, Study of photo attenuation parameters of Flyash-lime-gypsum (FaLG) sample in the energy range of 15KeV to 15MeV, DBT-Sponsored NATIONAL CONFERENCE on "Emerging Trends in Science and Technology for Sustainable Development-2024" organized by DAV COLLEGE, BATHINDA, 02 March, 2024.

4. Dr. Manoj Kumar Gupta, Study of effective atomic numbers, effective electron densities, jump factor, jump factor in effective atomic number and jump factor in effective electron densities at edge in the energy range 1keV–100keV of bismuth vanadate nanoparticles, 6th National Conference on “Advance Materials and Radiation Physics” organised by Physics Department, SLIET Longowal, 18-19 May, 2023.
5. Dr. Manoj Kumar Gupta, To Study the Effect of Magnetic Dipole on Atomic Parameters of Diamagnetic, Paramagnetic and Ferromagnetic Compounds at their K, L and M Shell Absorption Edge. National Conference on Advanced and Emerging Materials for Technological Applications (AEMTA 2024) organized by SLIET Longowal, 5-16 March, 2024.
6. Dr Sanjay Kumar Singh, Density Functional Theory Based Study of Structural, Elasto-Mechanical and Electronic Properties of Dy-Filled Skutterudite DyOs4P12 using Full Potential Approach, National Conference on Advanced and Emerging Materials for Technological Applications (AEMTA 2024) organised by SLIET Longowal, 15-19 March, 2024.

Students Participation in Conferences/Seminars, Workshops etc.

1. Shweta and Toshar Garg of B.Sc-III presented a paper , "Ab-Initio Investigations of Structural and Magnetic Properties of Praseodymium-Magnesium Alloy" in **One Day National Symposium on Advancements on Various Fields of Physics** jointly organized by Association of Indian Physicists (AIP) & Janardan Singh Foundation, on 9th September, 2023
2. Shweta , Toshar Garg Aditi Rani of BSc III NM presented paper in **10th IAPT National Students Symposium on Physics** organised by Punjab University, Chandigarh on 27-29th October, 2023
3. Toshar Garg of Bsc III presented a paper , "Ab-initio Study of Structural and Thermodynamic Properties of Rare Earth Metal Alloy NdMg: Using Density Functional Theory" in **International Conference on Recent Advancement in Sustainable Nano-Science and Technology (RASNT 2024)**, organised by IIS (deemed to be University), Jaipur, India, Jan. 30-31, (2024).
4. Mehakdeep Kaur , Aanchal Rani of B.Sc-III and Preeti of B.Sc-II participated in **DBT sponsored National Conference on Emerging Trends in Science and Technology for Sustainable Development** organised by DAV College Bathinda on 2nd March ,2024
5. Toshar Garg , Shweta and Deepmala of Bsc Non Med III presented a paper, " Ab-initio Study of Structural and Thermodynamic Properties of Rare Earth Metal Alloy YbMg: Using DFT", in **National Conference on Advanced and Emerging Materials for Technological Applications (AEMTA 2024)** organised by SLIET, Longowal, Punjab, India, March 15-16, (2024).

Point 10:

Exhibitions/seminars /training courses conducted:02

S. No.	Topic of event	Date	Outcome	Beneficiaries
1	Three Days Electronics Based Hands on Training Programme Cum Workshop	12-14 March 2024	Students enhanced their knowledge about the working of various electronics and electrical components like Resistor, Capacitor, LED, transformer, LDR, MOSFET, VDR, Relay,	75 students of B.Sc. NM (I, II and III)

			Speaker, buzzer, Preset, Diodes, transistor etc. by making electronics based working projects prepared under the guidance of resource person Mr. Sukhvinder Singh, Coordinator, N. I. E. R. T, Patiala.	
2	One day Hands-on-training program "Exploring Oscilloscopes: CRO vs DSO"	18 March 2024	Students learned about DSO and CRO's functioning principles, their applications, under the direction of a resource person Dr. Asha Rani. Students enthusiastically performed various experiments using these devices. In addition, students were taught how to test a variety of electrical components, including diodes, NPN and PNP transistors, capacitors, and others, using these two devices.	40 students of B.SC.NM-II and III students

Educational Tour/Field Visits Organized

1. The Department of Physics, S.D College, Barnala organised a One-Day Educational Tour under DBT Star College Scheme on 20.03.2024. Total 30 students of B.Sc. III Non-Medical under the supervision of by Dr. Sanjay Kumar Singh visited Department of Physics and Idea Lab of MRSPTU, Bathinda. Dr. Satnam Singh, Assistant Professor, Department of Physics, MSRPTU, introduced to the students with all instruments available in Radiation Physics Lab, Electronics Lab and Idea Lab.
2. 40 students of B. Sc-I, II & III under the supervision of Dr Sanjay Kumar Singh visited Shakunt Enterprises Pvt. Ltd. Ludhiana on 27th March 2024 with aim to experience hands-on exposure about manufacturing of Mig and flux welding wires utilized in various applications for machines and automobiles.

Any other activity:

1. Department of Physics organised poster making competition for B. Sc. students on 1st march 2024. About 29 students of B.Sc-I, II& III took part in it. Competition was organized with aim to provide students with the opportunity to develop and refine their verbal and scientific communication skills.

Point 11:

List of Books Purchased under DBT

S.No.	Publisher	Author Name	Book title	No. of Copies
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1	New Age International	Chattopadhyay, D.	Electronics: Fundamentals and Applications	4
2	Wiley	Walker	Principles of Physics	3
3	New Age International	Chattopadhyay, D.	Foundations of Electronics	8
4	S. Chand	C L Arora	B.Sc. Practical Physics	6
5	New Age International	Pillai, S.O.	Modern Physics and Solid State Physics: Problems and Solutions	3
6	New Age International	Gupta, M.C.	Statistical Thermodynamics	2
7	PHI	Srivastava, Saha & Jain	Thermodynamics: A Core Course, 3rd ed.	2
8	Mc Graw Hill	Ajay Ghatak	Optics 6e	4
9	Cambridge	Griffith	Introduction to Quantum Mechanics	2
10	Trinity	Thayagarajan & Ajay Ghatak	Laser Fundamentals and Applications	2
11	Narosa Publications	S Puri	Modern Physics	5
12	Narosa Publications	Kumar	Atomic and Molecular spectra	1
13	CBSPD	S L kakani & C Hemrajani	WAVES AND OSCILLATIONS & ACOUSTICS	3
14	Mc Graw Hill	Arthur Beiser	Concepts of modern Physics	5
15	Surya	Verma	Quantum Physics	1
16	S. Chand	Arora	Physics - I	2
17	S. Chand	Arora	Physics - II	2
18	S. Chand	Arora	Physics - III	2
19	D. C. Tayal And Sons	Dr. D.C. Tayal	Mechanics And Properties Of Matter	5
20	D. C. Tayal And Sons	Dr. D.C. Tayal	Semiconductor Devices	5
21	D. C. Tayal And Sons	Dr. D.C. Tayal	Mechanics & Relativity	5
22	D. C. Tayal And Sons	Dr. D.C. Tayal	Waves And Oscillations	5
23	D. C. Tayal And Sons	Dr. D.C. Tayal	Electronic Circuit & Network Analysis	5

24	D. C. Tayal And Sons	Dr. D.C. Tayal	Nuclear Physics	5
25	D. C. Tayal And Sons	Dr. D.C. Tayal	Electricity and Magnetism	5

Journal Subscribed

	Journal Name	ISSN No	Publisher
1.	Resonance (Journal of Science Education)	0971-8044 (print)	Indian Academy of Sciences & Spiringer

Point 12:

Outreach Activities - Dr Manoj Kumar Gupta delivered lecture on “Adverse effect of Radiation on communication” at Government Ranbir College Sangrur on 1st March 2024.

Point 13:

Colleges mentored to apply for DBT Star College grants: Nil

Point 14:

Invited Lectures: 02

S. No.	Topic of Invited Lecture	Resource Person	Date	Beneficiaries
1.	Nanomaterials and their applications	Dr. Pukhrambham Deepak, Chandigarh University,	1 st March 2024	Approx. 90 Students of B.Sc-I,II and III
2.	High Energy Physics and its applications in various sectors	Dr. Captain Rituraj Singh, Post-Doctoral Fellow, IIT Indore	2nd march 2024	Approx. 90 Students of B.Sc-I,II and III

Department of Mathematics

Point 7:

List of Additional Practicals: 07

S. No.	Experiment	Class	Equipment Utilized	Outcome
1	Calculating Limits using MATLAB	Common for students of all	SOFTWARE	Students have learned basics of Software MATLAB, including popular toolboxes. They have used MATLAB as a tool for technical
2	Differentiation using MATLAB			
3	How to Evaluate Polynomials			

4	Finding the roots of polynomial equations.	classes	"MATLAB"	computing. They have learned to find limits, derivatives and integrations of functions. They have also learned to evaluate polynomials and curve fitting and gained the skill of using MATLAB Software to solve differential equations
5	Polynomial Curve Fitting			
6	Integration using MATLAB			
7	Solving differential equations.			

Minor Research Projects:

S.No	Project Title	Supervisor	Students	Outcome
1	Mathematical modelling of the problem of carbon dating with the help of differential equations	Upasana Rani & Rajni Gupta	03	Students were provided training on how to model differential equations to solve real life problems and their solutions using MATLAB software.
2	To estimate the flow of water in a river in a year with help of numerical integration	Upasana Rani	03	Students became well versed in various methods of numerical integration and this project helped the students to understand the practical utility of higher mathematics and also they gained knowledge of MATLAB software
3	Solving IVP using Euler's and Runge-Kutta Method, using C, C++ and MATLAB	Dr.Dimple Rani & Riya	02	In this project, two standard numerical methods Euler's method and Runge Kutta method are discussed to solve initial value problems of ordinary differential equations. Students have developed the C, C++ and MATLAB Algorithms for both the methods and have compared the solution. It is observed that if we manually apply the method then it is very much time consuming and chances of error are bigger.
4	Application of Linear Algebra to Image Processing	Gurkeert Singh	02	Students have learnt the method of image processing using linear algebra and understand the applications of linear algebra in engineering
5	The Evolution of Cryptography Through Number Theory	Gurkeert Singh	02	Students have learnt different ciphers, methods of encryption and decryption and brief history of each concept and applications of cryptography.

6	Construction of basic solid structures and various Miller indexes of simple cubic crystal using MATLAB	Dr. Baltej Singh & Dr. Dimple Rani	05	Students have performed MATLAB coding to obtain plots of different structures used in introductory solid state Physics. Purpose of this project was to enhance student understanding of basic solid-state concepts with simultaneous learning of programming language.
8.	Numerical integration using programming in C & C++	Riya	02	Students have studied numerical integration in their syllabus, in this project they have developed C & C++ programs of Trapezoidal and Simpson's rule of numerical integration which make the process easy and less time consuming.

Point 8:

Research Papers & Book Chapters Published: NIL

Books Published: NIL

Point 9:

Faculty Participation in Conferences, Seminars, Training Programs, FDP's : NIL

Student Participation in Workshops, Trainings, Competitions etc.: NIL

Point 10:

Training Programs Organized: 01

S. No.	Topic of Training	Date	Outcome	Beneficiaries
1	Workshop on Software "MATLAB"	12 th & 13 th March 2024	During this workshop, students have learned the basics of MATLAB Software	36 Students

Educational Tour/Field Visits Organized:

Department of Mathematics arranged an Educational Visit to Sant Longowal Institute of Engineering and Technology (SLIET), Longowal on 21st March 2024 where the students were given hand on training on Software "MATLAB".

Point 11:

List of Books Purchased under DBT

S.No.	Name of Book	Authors	Publishing House
1	Partial differential equations	R.K.Gupta,	Krishna Prakashan Media Pvt. Ltd.
2	Mathematical Modelling	J.N.Kapur	New Age International Pvt. Ltd.

3	Foundation of Complex Analysis	S. Ponnusamy	Narosa Publishing House.
4	Scope in A course of Mathematical Analysis	Shanti Narayan and P.K Mittal	S. Chand and company
5	Differential Equations and Their Applications	Zafar Ahsan	Prentice - Hall of India, Pvt. Ltd, New Delhi - Second Editon
6	Statistical Methods	S. P Gupta	Sultan Chand and Sons
7	Matrix and Linear Algebra	K. B. Datta	Prentice Hall of India Pvt. Ltd, New Delhi

Point 12:

Outreach Activities: Nil

Point 13:

Colleges mentored to apply for DBT Star College grants: Nil

Point 14:

Invited Lectures: 02

S.No.	Topic of Invited Lecture	Resource Person	Date	Beneficiaries
1.	Introduction to Curves	Dr. Rakesh Kumar, Associate Professor, Department of Mathematics, Punjabi University, Patiala.	19 th March 2024	80 Students
2	Geometric Visualization of Surfaces	Dr. Rakesh Kumar, Associate Professor, Department of Mathematics, Punjabi University, Patiala.	19 th March 2024	80 Students

Kulbhushan Rana
Course Coordinator
 Co-ordinator
 DBT, Star College Scheme
 S.D. College Barnala

R. Singh
Principal
S.D. College, BARNALA
 Head of Institution