

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:** 19/01/2022 to 31/03/2023 **Duration in Years:** One Year
4. **Details of Departments Supported:**

S. 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.: 02	Without Ph.D.: Nil
3.	Chemistry	B.Sc. Medical & Non-Medical	Total=06	
			With Ph.D.: 01	Without Ph.D.: 05
4.	Mathematics	B.Sc./B.A.	Total=06	
			With Ph.D.: 01	Without Ph.D.: 05
5.	Physics	B.Sc. Non-Medical	Total=05	
			With Ph.D.: 03	Without Ph.D.: 02

5. **Number & Date of Advisory committee meeting:** First Advisory Committee Meeting; 25 April, 2023.

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. Further, for lab staff, workshops were organised to repair, maintenance and operating scientific instruments.

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 few text books. 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. Evaluation of Phytotoxic and Antioxidant activities of *Cannabis sativa* and *Parthenium hysterophorus*
2. Effectiveness of household agents as Larvicides on larvae of *Aedes aegypti*
3. Microwave Assisted Synthesis of Biginelli's Compounds: A Potential Tool For Green Chemistry
4. Interpolation using MATLAB on Weather Forecast
5. To design single/double slit to study phenomenon of diffraction of light by using He-Ne LASER and to find the value of slit width with TRACKER software.

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

1. Hands-on training sessions by instrument manufacturing experts for non-teaching staff in order to ensure the safe handling and optimal use of newly acquired apparatus and equipment.
2. Students were encouraged to present and participate their scientific ideas and findings in conferences. They also got the opportunity to interact with the research experts.
3. Summer training program for college students was introduced for the first time in the College under DBT Star college Scheme from 28th July to 10th Aug, 2022. About 50 participants (5 students from University College, Barnala and 2 students from LBS College, Barnala) participated in the program. All participants from medical & non-medical streams performed Physics, Chemistry, Botany, Zoology, MLMDT, Mathematics and Pharmacy related practicals.
4. Outreach Training programs were organized by all the departments for the students of nearby school which was lacking in scientific equipments/chemicals.
5. As part of scheme, students undertook a minor research project 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:

- 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.
- More hands-on-experiments and interactive demonstrations to engage school students and inspire them to pursue science as subject for further studies. Feedback taken from school students will help us to improve while organizing more such programs.
- Nearby Colleges will be mentored to apply for DBT Star College Grants.

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 compartmentalised approach.
- Most of the purchase (equipments, chemicals, glassware) and activities were completed in the last months due to difficulty in acquisition of DSIR certificate from university, too many documents were demanded by the ICICI Bank from the college for opening of ZBSA account, refund of grant to CNA, re-assignment of grant to the college, making of Maker and Checker by the ICICI Bank took long time, ICICI Digipay stopped working many times.
- Four departments were clubbed together as two departments (Physics & mathematics considered to be one and Zoology & Botany considered to be one), leading to a shortage of funds, which restricted the department to cut short or exclude some instruments and the number of multiple copies to be purchased, which in turn affected reaching out to more beneficiaries.
- The allotment of separate funds to the supporting staff, such as laboratory technicians, clerks, accountants, etc., is not provided. Technical personnel play a crucial role in the activities (hands-on training, workshops, and extended practices) carried out in accordance with the plan, whilst the clerk or accountant aids in processing different bills and papers connected to the DBT scheme.

9. Key performance indicators

S. no	Indicator	Pre-support	During/After Support																																														
1	No. of students admitted	Total = 331	Total =294																																														
		M=120	F=211																																														
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>SC</td><td>ST</td><td>OBC</td><td>G</td> <td>SC</td><td>ST</td><td>OB</td><td>G</td> </tr> <tr> <td>24</td><td>0</td><td>33</td><td>63</td> <td>48</td><td>0</td><td>C</td><td>114</td> </tr> <tr> <td></td><td></td><td></td><td></td> <td></td><td></td><td>49</td><td></td> </tr> </table>	SC	ST	OBC	G	SC	ST	OB	G	24	0	33	63	48	0	C	114							49		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="4" style="text-align: center;">M= 95</td> <td colspan="4" style="text-align: center;">F=199</td> </tr> <tr> <td>SC</td><td>ST</td><td>OBC</td><td>G</td> <td>SC</td><td>ST</td><td>OBC</td><td>G</td> </tr> <tr> <td>18</td><td>0</td><td>22</td><td>55</td> <td>53</td><td>0</td><td>44</td><td>102</td> </tr> </table>	M= 95				F=199				SC	ST	OBC	G	SC	ST	OBC	G	18	0	22	55	53	0
SC	ST	OBC	G	SC	ST	OB	G																																										
24	0	33	63	48	0	C	114																																										
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SC	ST	OBC	G	SC	ST	OBC	G																																										
18	0	22	55	53	0	44	102																																										
2	No. of students passing out (%) Students Admitted/passing out (pass%)	94.39 %	Appearing in UG Exams																																														
3	Drop-out rates	5.60 % (6 students)	Appearing in UG Exams																																														
4	No. of students Opting for MSc	10	Appearing in UG Exams																																														
5	Average marks	Botany= 110.33 Zoology=106.27 Chemistry=104.80 Physics=106.14 Mathematics: 87.08 (Maximum Marks= 150)	Appearing in UG Exams																																														
	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 = 35 B.Sc 3 rd = 42 Zoology B.Sc 1 st - 37 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 =26 B.Sc 3 rd =23 Mathematics No Practicals as per Syllabus																																														

7	No. of new Experiments introduced	Botany=02 Zoology=Nil Chemistry=03 Physics=Nil Mathematics= Nil	Botany=17 Zoology=09 Chemistry= 21 Physics=10 Mathematics=07
8	Publications (scopus indexed)/patents, if any.	Botany= Nil Zoology=Nil Chemistry= 01 Physics=02 Mathematics= Nil	Botany= 1 (Scopus) & 6 (Others) Zoology= 02 (UGC care list) & 1 (others) Chemistry= Nil Physics=03 Mathematics= Nil
9	Training received by faculty	Botany=02 Zoology= Nil Chemistry=04 Physics=05 Mathematics=Nil	Botany=03 Zoology= 01 Chemistry=02 Physics=06 Mathematics= 01
10	Exhibitions/seminars /Training courses conducted	Botany=Nil Zoology= Nil Chemistry=01 Physics= Nil Mathematics= Nil	Botany=02 Zoology= 03 Chemistry=05 Physics=06 Mathematics=05
11	Books/journals subscribed from grants	Botany=Nil Zoology= Nil Chemistry=Nil Physics= Nil Mathematics= Nil	Botany= 29 Books with 68copies + 01 (Journal) Zoology= 39 Books with 78 Copies + 1 (Journal) Chemistry= 43 Books with 78 Copies + 02 Journal Physics= 48 Books with 87 Copies + 02 (Journal) Mathematics= 130 (Books) + 1 (Journal)
12	Outreach activities (Popular lectures)	Botany=Nil Zoology= Nil Chemistry=Nil Physics= Nil Mathematics= Nil	Botany=01 Zoology= 01 Chemistry=02 Physics= 02 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=03 Physics= 04 Mathematics= 02

***With DBT grant students were able to perform all the experiments in small groups/individually**

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.	70%	1.4/2 Due to time constraint this year more workshops will be organized in next session
	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	90%	1.9/2 More collaboration with other depts will be done to carry out interdisciplinary projects/practicals on the next session
	To organize programmes for teachers and students of schools and other colleges to inculcate scientific temper and promote science	50 %	1/2 Due to time constraint this year, more efforts will be given to organize programs and faculty will be encouraged to attend FDPs, workshops etc. in the next session
	To collect and cultivate medicinal plants in herbaria and gardens respectively and to maintain a repository of medicinal plants	80 %	1.9/2 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 develop well-equipped laboratories with	80	1.6/2

	advanced instruments for imparting practical based knowledge to students.		Paucity of resource funds
	To enrich the resources available in the department i.e., books of the departmental library, regular use of equipments, internet and computers so as to provide easy access to each and every student.	80	1.6/2 Multiple copies of books needed to provide easy access to every student
	To develop scientific temper in young students so that they use a logical approach for problem-solving.	80	1.6/2 Involvement of more students is needed.
	To collaborate with various prestigious institutes, industries and eminent scientists to provide better exposure to faculty and students.	80	1.6/2 Paucity of time
	To promote the dispersal of scientific knowledge by encouraging the participation of faculty and students in various seminars and workshop.	90	1.8/2 Motivation to develop interest of more students to participate 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 so as to provide good scientific knowledge and hands on training.	100%	2/2
	To enrich the department library with adequate book collection.	80%	1.6/2 Multiple copies yet to be purchased
	To strengthen experiment and problem-solving skills in students through various training programs, field visits and project works.	100%	22
	To encourage the faculty to attend conference seminars and training programs to update their knowledge base.	60%	1.2/2 Teachers will attend FDP's, workshops etc. on rotation basis
	Workshop on handling of chemicals, waste disposal, repair, calibration and operating new instruments.	80%	1.6/2

Department	*Objective (as stated in proposal)	% achieved	Reasons for underachievement / If achieved, state in quantitative metrics*
Physics	Enrichment of laboratory infrastructure and addition of new practicals in Curriculum.	100%	2/2
	Exposure of lab visits and industrial visits to students.	50%	1/2 Industrial visits will be organised in next session
	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 Faculty members will be encouraged to participate in FDPs, workshops, training etc.

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
	To develop interest about software's by providing study material, by arranging extension lectures from experts etc.	100%	2/2

To develop professional competence of students by arranging visits to industries/hospitals/research centers, by providing practical training by inter-department activities etc.	75%	1.5/2
To strengthen the physical infrastructure of our department like books of departmental library, PCs, Projector.	100%	2/2
To strengthen ties with neighboring institutions like Punjabi University Patiala, SLIET etc.	100%	2/2

* Most of the purchase (equipments, chemicals, glassware) and activities were completed in the last months due to difficulty in acquisition of DSIR certificate from university, too many documents were demanded by the ICICI Bank from the college for opening of ZBSA account, refund of grant to CNA, re-assignment of grant to the college, making of Maker and Checker by the ICICI Bank took long time, ICICI Digipay stopped working many times.

11. ZBSA Status: (Mark Check Box):

Not Opened Under Process Opened but not mapped on PFMS

Account is functional

Remarks if any: We are unable to make payment due to problem at the end of ICICI bank.

12. Sanctioned Budget details: (Rs. in Lakh)

Head	Total Released Budget from DBT	Total Expenditure	Balance as on 31.02.2023	Remarks if any
Grants for creation of capital assets (Non-recurring)	30,00,000	29,99,663	Nil	337 deposited in CFI through Bharatkosh
Grants-in-aid General (Recurring)	11,00,000	10,98,161	1839	-
Total	41,00,000	40,97,824	1839	-

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

[Signature]
Head of the Institution
Principal
S.D. College, BARNALA

Annexure I

Project 1: Evaluation of Phytotoxic and Antioxidant activities of *Cannabis sativa* and *Parthenium hysterophorus* (Botany)

Outcome:

Medicinal plants contain variety of phytochemicals, including lignans, terpenoids, alkaloids, flavonoids, phenolic acids, etc. with a variety of biological functions. In the current study, *Cannabis sativa* and *Parthenium hysterophorus* are investigated for phytotoxic and antioxidant activity along with their phytochemical analysis. Results demonstrated that both extracts viz. WCS and WPH had significant phytotoxic effect on growth of on the *Vigna radiata* L (Mung bean) and *Zea mays* L. (Maize) seedlings as evident from various parameters studied viz. shoot length, root length, fresh weight and dry weight. Results of antioxidant study revealed that both the extracts. WCS and WPH significantly scavenged the DPPH free radicals in the DPPH assay. The IC₅₀ value were found to be 348.21 µg/ml and 610.50 µg/ml respectively. Results were compared with standard antioxidant rutin (IC₅₀ 43.39 µg/ml). Activities obtained in the current studies are may be due to various phenolic phytochemicals present in these extracts. Conclusively, results of the present study highlight bioactive efficacy of both plants viz. *Cannabis sativa* and *Parthenium hysterophorus*.

Project 2: Effectiveness of household agents as Larvicides on larvae of Mosquito *Aedes aegypti* (Zoology)

Outcome: The objective of present study was to find the potential easily accessible, affordable and ecological safe larvicidal chemicals that could have significant practical consequence for controlling mosquito larvae at breeding sites. The discovery opens up a lot of potential for using regionally unique resources to control the mosquito, vector for many diseases and occurs in abundance in paddy fields in study area. According to the findings, the larvicidal properties of the household agents were comparable to those of several biological and chemical insecticides and kill the larvae by disturbing the siphonal respiration.

Project 3: Microwave Assisted Synthesis of Biginelli's Compounds: A Potential Tool for Green Chemistry (Chemistry)

Outcome: Microwave assisted synthesis of Biginelli's compounds which are reported to act as calcium antagonists and anti-hypertensive agents, was taken in unmodified domestic microwave oven. This method of synthesis offers simple, green and efficient technique as compared to conventional heating methods in multicomponent reactions (MCR) and is simplification of laboratory technique without using hot bath, reflux condenser, stirrer, water separator etc. Eight title compounds have been synthesized by the acid catalysed condensation of substituted aromatic aldehydes, ethylacetoacetate and

urea/thiourea in open borosilicate glass vessels under microwave irradiation (3-4 minutes, 210 watts, 30 percent microwave power) using ethanol as energy transfer medium. The results obtained demonstrate the versatility of the process as considerable reaction rate enhancement (from hours to minutes) has been observed with better yields. The study was aimed at MCR synthesis, stoichiometry, TLC, purification and structural elucidation using NMR, IR and Mass spectra. Further different reactants, microwave required for this green synthesis were purchased. The spectroscopy is a main theory topic of B.Sc.III but spectra were never done due to financial constraints. This became possible only due to financial support under Star College Scheme.

Project 4: Interpolation using MATLAB on Weather Forecast (Mathematics)

Outcome: This project was designed with an aim to make the students aware about application of Mathematics in day to day life. In this project, the students collected the data of temperature of different days at a particular point of time. They predicted the temperature of a particular day at a particular point of time with the help of interpolation. Interpolation is the process of using points with known values to estimate the values of other unknown points. Students estimated the value of temperature (of a particular day at a particular point of time) with the help of Newton's Forward Formula. Calculating temperature with this formula (manually) is a time-consuming process. On the other hand, students also estimated the temperature with the help of MATLAB software. There was not much variation between results of manual calculation using formula and through MATLAB software. However, MATLAB helped to make the calculations easier. It also saved time and energy and helped in developing interest among students about Mathematics as well as latest upcoming developments (like MATLAB) in the field of Mathematics.

Project 5: To design single/double slit to study phenomenon of diffraction of light by using He-Ne LASER and to find the value of slit width with TRACKER software. (Physics)

Outcome: To design and perform the above-mentioned experiment, the He-Ne LASER set up is purchased and the experiment has been conducted with designing various slits and setup. To study diffraction phenomenon due to single slit, double slit and through grating and to calculate width of single slit students have been developed various slits through sharp blades and wires. With the help of slits and He-Ne LASER diffraction pattern were observed on the screen. With the diffraction pattern students were benefitted through concepts of constructive and destructive interference. Students were also able to observe minima and maxima of diffraction pattern. With the help of image of diffraction pattern students were also calculated width of slits.

Annexure II:

Department wise details of key performance indicators (Point 7-14) are given below:

Department of Botany

Point 7:

List of Additional Practicals: Total: 17

B.Sc. I

Sem I:

1. To study couch smut disease in *Cynodondactylon* caused by *Ustilagocyanodontis*.
2. To study the effect of different light radiations on the growth of *Rhizopus* species.
3. To study various types of chloroplasts in green algae.

Sem II:

1. To study the technique of emasculation in plant breeding experiments.
2. To study morphological and cytological differences between diploid & polyploid species of *Tabernaemontana divaricata*.

B.Sc. II

Sem III:

1. To identify unknown plants using body punched card keys.
2. To identify unknown plants using single access keys or sequential keys.

Sem IV:

1. To study the abnormal secondary growth in *Dracaena*, *Acyranthes* & *Amaranthus*.
2. To study root to stem vascular transition in moong seedlings
3. To determine stomatal index of various plants.

B.Sc. III

Sem V:

1. To study phenomenon of plant morphogenesis in *Vigna radiata* seedlings.
2. To study the effect of GA₃ plant hormone on the growth of plant seedlings.
3. To separate secondary metabolites present in the bark and leaf extracts of medicinal plants using Thin Layer Chromatography (TLC).
4. To measure the growth in length using arc auxanometer.

Sem VI:

1. To study various food adulterants in pulse samples.
2. To determine whether the honey samples are Unifloral or Multifloral by pollen grain studies.
3. To identify the presence of *Argemone mexicana* seeds as adulterant in mustard seeds by morphological and anatomical studies.

Minor Research Projects:

S.No.	Project Title	Supervisor	Students	Outcome
1	Evaluation of Phytotoxic and Antioxidant activities of <i>Cannabis sativa</i> and <i>Parthenium hysterophorus</i>	Dr. Manish Kumar	4 (B.Sc. Med. III)	Students developed research aptitude and learnt techniques to evaluate bioactive potential of plants
2	Study the stomatal index of plants growing in the Campus of S.D. College, Barnala, Punjab, India.	Dr. Manish Kumar	4 (B.Sc. Med. III)	Ability to determine stomatal index of more than 20 plants growing in the campus and their

				role and significance in plant physiology and taxonomy
3	Study of the Dissolved Oxygen Content and Salinity of Different Water Samples Collected From Nearby Villages.	Dr. Amardeep Kaur	3 (B.Sc. Med. III)	Students learnt to differentiate between polluted and non-polluted water on the basis of physicochemical parameters studied
4	Study of Tree Diversity Growing in the Campus of S.D. College, Barnala, Punjab, India and their Medicinal Significance	Dr. Amardeep Kaur	4 (B.Sc. Med. III)	Study of floral diversity in the college campus and their medicinal importance.
5	Evaluation of antihelmintic activity of <i>Melia azadarechad</i> <i>Callistemon lanceolatus</i>	Dr. Manish Kumar	4 (B.Sc. Med. II)	Attained knowledge of techniques and potential of medicinal plants and their role in human health
6	Pollen viability studies of medicinal plants growing in the Campus of S.D. College, Barnala and surroundings.	Dr. Amardeep Kaur & Dr. Manish Kumar	3 (B.Sc. Med. II)	Students learnt method to determine pollen viability in various medicinal plants to assess successful fertilization and seed production
7	Ethnobotanical Studies on plants of Dhanoula region of District Barnala.	Dr. Manish Kumar	2 (B.Sc. Med. III)	Study highlighted the importance of traditional medicine, where people have a specific understanding of using medicinal plants and communication with people
8	Study the Effect of Chemical Fertilizer, Vermicompost and Compost on the Growth of <i>Brassica juncea</i> Seedlings	Dr. Amardeep Kaur	3 (B.Sc. Med. III)	Developed scientific aptitude and critical thinking to study underlying reasons for the growth changes in plants under treatment.
9.	Study of biochemical parameters of plant samples under Heavy Metal Stress	Dr. Manish Kumar & Mrs. Rajni Gupta	2 (B.Sc. Med. III)	To learn and study the biochemistry and physiology of plants
10.	Assessment of hydrogen and electron donating activities of synthetic compounds.	Dr. Manish Kumar & Dr. Kulbhushan Rana	2 (B.Sc. Med. III)	To learn synthesis and bioactivity evaluation of synthetic derivatives

Point 8:

Research Papers & Book Chapters Published

1. Kaur T, Kumar M, Kaur SJ. (2022). Genotoxicity of sodium arsenite on *Vicia fabaroot* meristematic cells. *Nucleus* 65:215–222 [Springer].
2. Kumar M, Kaur A, Garg A, Khusboo, Kaur J, Rani A. (2022) Evaluation of phytotoxic, antioxidant and anticancer activities of *Parthenium hysterophorus* L. and *Cannabis sativa* L. . Medico-Biowealth of India, Volume- VII, ISBN: 978-81-955847-7-2.
3. Kaur A, Kumar M, Kaur H, Singh W & Deepika (2023) Survey on Trees Growing in the Campus of S.D. College, Barnala, Punjab, India. Medico-Biowealth of India, Volume- VIII, ISBN: 978-81-958404-7-2.
4. Kaur A and Kumar M. (2022). Effect of phenylalanine on the production of flavonoids in three cotton cultivars *Gossypium arboreum* (RG-8), *G. hirsutum* (GA and Pusa 8-6) grown in-vitro. Medico-Biowealth of India, Volume- VII, ISBN: 978-81-955847-7-2.
5. Sinnadorai N, Kumar M, Bidyalakshmi Devi M, Jadhav JY, Mishra M and Kumar S. (2022). Food, medicinal and ecological significance of *Dioscorea bulbifera* (Dioscoreaceae). Yam, ISBN: 978-81-955847-5-8.
6. Devi R, Manjula B.L., Kumar M, Kumar S, Marndi S. (2022). Food and medicinal values of some *Ficus* species. Medico-Biowealth of India, Volume- VI; ISBN:978-81-952750-9-0
7. Sharma BP, Kumar M, Basak G, Kaur A, Marndi S, Kumar S. (2022). Medicinal and economic values of *Cissampelos pareira* (Menispermaceae). Medico-Biowealth of India, Volume- VI; ISBN:978-81-952750-9-0

Books Published

1. Manish Kumar, Praveen Kumar, Ashita Sharma, (2023). Bioactive Phytochemicals from Himalayas: A Phytotherapeutic Approach, Bentham Science Publishers. ISBN: 978-981-5123-29-6
2. Snehalatha VR, Binod Saradar, Bhagwati Prashad Sharma, Manish Kumar, Jaydeep Kumar Sahu (2023). Antidiabetic Plants Volume II. APRF, Odisha, India, Odisha, India. ISBN: 978-81-958404-0-3
3. BL Manjula, Bhagwati Prashad Sharma, Manish Kumar, Sohan Lal, Sanjeet Kumar (2022). Medico Biowealth of India, Volume VII, APRF, Odisha, India, Odisha, India, (978-81-955847-7-2).

Point 9:

Faculty Participation in Seminars, Training Programs, FDP's

1. Dr. Manish Kumar has completed 3- days training program on "**Plant extraction, Phytochemistry & Anthelmintic activity**" organized jointly by Ambika Prasad Research Foundation, Odisha & Institute of Biological Sciences, Odisha from 28th to 30th July, 2022.
2. Dr. Manish Kumar has completed Seven days training program on "**MEDICINAL PLANTS**" from 15th May 2022 organized by Ambika Prasad Research Foundation, Odisha, India.
3. Dr. Amardeep Kaur has completed Seven days training program on "**MEDICINAL PLANTS**" from 15th May 2022 organized by Ambika Prasad Research Foundation, Odisha, India.

Student Participation in Workshops, Trainings, Competitions etc.

1. Jashanpreet Kaur participated in **national Level online Poster Making Competition** organised by Chemistry Association, Dyal Singh College, Karnal (Haryana) on World Environment Day, June 05, 2022.
2. **Thirteen students** of B.Sc. III attended one day workshop on "**Medicinal Plants**" held on 4th June 2022 at Ambika Prasad Research Foundation, Odisha.

3. **Ten students** participated in **Model making and Quiz Competition under Science Fair** organized by Dept of Mathematics and Physics, SD College Barnala on 25-26 April 2022.
4. **Five students** participated in **Extempore and Quiz Competition under Science Day Celebration** organized by Dept of Mathematics, SD College Barnala on 27-28 Feb., 2023.
5. **Four Students** Participated in National Conference on "**Environment, Food Security and Health with Reference to Climate Change**" at Sri Guru Granth Sahib World University, Fatehgarh Sahib on 7-9 Feb., 2023

Point 10:

Training Programs Organized

S. No.	Topic of Training	Date	Outcome	Beneficiaries
1.	One Week Hands on Training on Basic Techniques in Botany (Herbarium Preparation and Plant Tissue Sectioning)	13 -20 December, 2022	During sessions, students acquired knowledge regarding herbarium preparation and plant tissue sectioning	12 students of class 12 th of Sarvhitkari Vidya Mandir Sen. Sec. School, Barnala
2.	One day training on the techniques and various methods of vegetative propagation at Durga Nursery, Barnala	24 th November, 2022	Students learned various methods of vegetative propagation such as cuttings in <i>Rosa indica</i> , <i>Bougainvillea</i> , <i>Citrus</i> etc.; Wedge grafting in Mango and Plums: Propagation by leaves in Bryophyllum and other succulents.	20 students of B.Sc. II Medical

Point 11:

List of Books Purchased under DBT

S.No.	Name of Book	Authors	Publishing House	No. of Copies
1	Text Book of Algae	Ashok Kumar Awasthi	Vikas Publishing House	1
2	Phycology	Robert Edward Lee	Cambridge University Press	2
3	Bryophyta	OP Sharma	Mc Graw Hill	3
4	A Text Book of Bryophytes, Pteridophytes, Gymnosperms & Paleobotany	AVSS Sambamurty	Wiley	3
5	Gymnosperms	CJ Chamberlain	CBS Publishers	6
6	The Fungi	Geeta Sumbali	Narosa Publishing House	1
7	The Textbook of Mycology	GopinaithHait	NCBA	4

8	Practical Taxonomy of Angiosperms	RK Sinha	IK International	3
9	The Embryology of Angiosperms	SS Bhojwani, Bhatnagar & PK Dantu	Vikas Publishing House	4
10	Phytochemical Techniques	N Raaman	NIPA	1
11	Bioethics and Biosafety	MK Sateesh	Dreamteh Press	2
12	Ecology Environmental Science and Conservation	TS Singh, SP Singh, SR Gupta	S Chand	3
13	Community Ecology	Herman A Verhoef & Peter J Morin	Oxford	1
14	Ecology	Charles J Krebs	Pearsons	1
15	Fundamentals of Ecology	Eugene P Odum & Gray W Barret	Cengage	1
16	Ecology & Environment	PD Sharma	Rastogi Publications	4
17	Environment & Ecology	Anuj Kumar Rana & Manoj Kumar Rana	GAPD	1
18	A Text Book of Modern Economic Botany	Sammbanurty & Subramanyam	CBS Publishers	1
19	Economic Botany	SL Kochhar	Cambridge University Press	3
20	Drug abuse	Rajiv Sharma & Yogita Bansal	RD Publications	6
21	Genetics of Plants	BP Nautial	Medtech Science Press	1
22	Cytology, Genetics & Evolution	PK Gupta	Rastogi Publications	2
23	Cytology, Genetics, Evolution & Plant Breeding	PK Gupta	Rastogi Publications	1
24	Cytology, Genetics, Evolution & Ecology	PK Gupta	Rastogi Publications	1
25	Genetics	Veer Bala Rastogi	Medtech Science Press	5
26	Organic Evolution	Veer Bala Rastogi	Medtech Science Press	2
27	Principles & Techniques of Biochemistry & Mol. Biology	Wilson & Walker	Cambridge	1
28	Plant Biotechnology	BD Singh	Medtech Science Press	2
29	Introduction to Plant Tissue Culture	MK Razdan	CBS Publishers	2
	Journal Name	ISSN No	Publisher	
1.	Medicinal Plants - International Journal of Phytomedicines and Related Industries	0975-4261	Indian Journals: Medicinal Plants - International Journal of Phytomedicines and Related Industries	

Point 12:**Outreach Activity**

S.No.	Topic of Training	Date	Outcome	Beneficiaries
1.	One Week Hands on Training on Basic Techniques in Botany (Herbarium Preparation and Plant Tissue Sectioning)	13 -20 December, 2022	During sessions, students acquired knowledge regarding herbarium preparation and plant tissue sectioning	12 students of class 12 th of Sarvhitkari Vidya Mandir Sen. Sec. School, Barnala

Point 14:**Invited Lectures:**

S.No.	Topic of Invited Lecture	Resource Person	Date	Beneficiaries
1.	Biodiversity and Environment	Dr. Ashita Sharma, Associate Professor, Chandigarh University, Gharoun, Mohali	17 th Feb., 2023	65
2.	Covid19: its impact on Environment and Health	Dr. Ashita Sharma, Associate Professor, Chandigarh University, Gharoun, Mohali	17 th Feb., 2023	65
3.	Plant Tissue Culture: Basic & Recent Advancements	Dr. Tarunpreet Singh Thind, Assistant Professor, Govt. College for Girls, Ludhiana	11 th March, 2023	70
4.	Vermicomposting & Organic Farming	Dr. Tarunpreet Singh Thind, Assistant Professor, Govt. College for Girls, Ludhiana	11 th March, 2023	70

Awareness Programs Organised

1. Department of Botany organized “**Plantation Drive**” in the college campus on 5th December 2022. Around 200 different ornamental plants such as *Marigold*, *Petunia*, *Dimorpha*, *Salvia*, *Kale* etc. along with few medicinal plant such as lemon grass, Betel etc were planted in the campus.
2. Dept of Botany introduced **Colour coded dustbins of blue and green color for segregation of biodegradable and non-biodegradable wastes** in the college campus on 7th March, 2023.

Educational Tour/Field Visits Organized

1. Department of Botany organized a field visit for B.Sc. Medical II students to local **Shaheed Bhagat Singh Park** on 29 September, 2022 to study different types of plant organisation, their types of stems, phyllotaxy, venation and different types of inflorescences.
2. Department of Botany organized a trip for B.Sc. Medical students to **Hebarium, Museum, Photogallery and SS Bir Botanical Garden, Department of Botany, Punjabi University, Patiala** on 20th March, 2023.

Department of Zoology

Point 7:

List of new practical's/demonstrations introduced

No	Name of the Practical's	Class	Strength	Outcome
1	Study of physiochemical parameters of water-DO, Total alkalinity, Free O ₂	B.Sc. I	15	Student are capable of analyzing the various parameters in water samples.
2	Study of nests of different birds	B.Sc. I	15	Learned the value/ importance of other organisms in sustainability of ecosystem.
3	Study of Zoogeographical regions.			Learned the value/ importance of other organisms in sustainability of ecosystem.
1	Study RBC Count			All students able to count RBC's in blood sample.
2	Analysis of urine for chloride ions	B.Sc. II	28	Ability to carry out experiment
3	Pedigree analysis			Developed interest in study of hereditary traits.
4	Study of fauna of college and surrounding areas.			Learned the value/ importance of other organisms in sustainability of ecosystem.
1	Study of larvae of Mosquitoes	B.Sc. III	18	Able to understand the DNA isolation method.
2	Study of fauna of college and surrounding areas.			Learned the value/ importance of other organisms in sustainability of ecosystem.

Student Projects undertaken

S.NO	Title of the Projects	Name of the students	Class	Outcome
1	Avian Diversity in the Rural Landscape of District Barnala (Punjab)	Amandeep Kaur, Harsimran Kaur, Aashita, Anu, SarbjeetKaur ,Wattandeep Singh	B.Sc. III 2021-22	Acquired the knowledge on birds of the area
2	'Estimation of Calcium Content and Thickness in Eggshells of Birds Commonly Found in Agricultural Fields of District Barnala, Punjab (India)'	Amandeep Kaur (3715); Mandeep Kaur (3716); Sarbjeet Kaur (3710); Sahib Singh (1722); Nishanjeet Singh (1739) Gursharn Singh	UG students 2021-22	Acquired ability to estimate calcium, thickness of egg shells. Learnt about nests, clutches of birds without causing any harm.
3	Nesting Ecology and Egg Characteristics of Red-Wattled Lapwing (<i>Vanellus indicus</i>) in	SarbjeetKaur (3710);Mandeep Kaur (3716);Wattandeep Singh (3711); Anu Rani (3706)	B.Sc. III 2021-22	Acquired the knowledge on characteristics of nest and egg of the

	Rural Agro-ecosystem of District Barnala, Punjab (India)			bird, very common in study area.
4	Effectiveness of household agents as larvicides on larvae of <i>Aedes sp.</i>	Gagandeep Kaur 3708; Nainika Singla 3705; Prabhjot Kaur 2709; Hastkanwal Kaur 2707, Kaishi 2706	UG students 2022-23	Ability to understand the mechanism involved in control of mosquito
5	Study of development of an insect	Gursharn Singh B.Sc. III (Study of lemon butterfly)	B.Sc. III 2022-2023	Ability to follow and record complete development of an insect in its natural habitat without disturbing it.

Point 8

Publications

- Bala R, Kaur K, Kaur A, Kaur H. (2023). Avian diversity and its feeding guild in respect to rural landscape of District Barnala, Punjab. *Advances in Zoology and Botany*, 11(1): 32-36
- Bala R, Kaur K, Kaur M and Kaur S. (2023) Nesting ecology and egg characteristics of Red Wattled Lapwing (*Vanellus indicus*) in agroecosystem of District Barnala, Punjab. *Journal of M. Uni.*
- Bala R and Kaur K. (2023). Importance of Millets for enhancement of Calcium Content & Thickness in Egg Shells of Grainivorous Birds. In *Millets and other Potential Crops ensuring Climate Resilience & Food Security*. NPH Publishers New Delhi.

Point 9:

Faculty Participation in FDP's

- Dr. Renu Bala has completed Seven-Days Faculty Development Program on "Understanding Geodiversity & Geoheritage" from 22-2-2023 to 28-2-2023 conducted by Human Resource Development Centre, Panjab University, Chandigarh

Student participation

1. Eight students participated in Model making and Quiz Competition under Science Fair organized by Dept of Mathematics and Physics, SD College Barnala on 25-26 April 2022.
2. Five students participated in Extempore and Quiz Competition under Science Day Celebration organized by Dept of Mathematics, SD College Barnala on 27-28 Feb., 2023.
3. Two students with faculty members participated in 26th Punjab Science Congress; National Conference on "Environment, Food Security and Health with Reference to Climate Change" held at Sri Guru Granth Sahib World University, Fatehgarh Sahib on 7-9 Feb., 2023.

Point 10

- Seminars/Conference/ Workshops/training/Guest Lectures etc. organized**

No	Name of event	Period	Resource person	Beneficiaries	No
1	WORKSHOP: 'Insect taxonomy: collection, preservation and identification'	26 Nov. 2022	Dr. Abhinav Saxena, Assistant Professor, Akal University, Talwandi Sabo, Bathinda Punjab	45	The students learnt how to collect (with nets, hand picking etc.);, preserve stretch the insects, make boxes and then identify them. students themselves collected the insects mainly butterflies
2	WORKSHOP: DNA Isolation, Electrophoresis and Immunological Techniques'	06 Feb. 2023	1.Dr. Dr. Ritu Pawan, Head, Department of Biotechnology and Medical Sciences, Baba Farid College, BFGI, Bathinda Punjab Dr. Deepika Bhatia, Assistant Professor same institution as above.	45	Hands on experience on DNA Isolation, Electrophoresis and Immunological assayby all the students
3	Training at Poultry Farm	15.6.22 to 21.6.22	Sandhu Poultry Farm, Barnala	11 students B.Sc. III (2022)	Ability to perform various daily tasks in the farm: collection of eggs, feeding, light regulation, cleanliness etc.

Educational tours organized:

No.	Place Visited	Period	Class	No. of Beneficiaries
1.	Pushpa Gujral Science City, Kapurthala	16 Feb.2023	B.SC Med. Students	43
2	Kanjli Wetland	16 Feb.2023	B.SC Med. Students	43
3	Zoological Park, Chhatbir	10 March,2023	B.SC Med. Students	40

Point 11. List of Books

No	Name of Book	Author Name	Publisher Name	Quantity
1	Cell and Molecular Biology- Eighth Edition	E.D.P. De Robertis, E.M.F. De Robertis, Jr.	Wolters Kluwer	02
2.	Genetics	P.K. Gupta	Rastogi Publications	03
3.	Cell Biology	Veer Bala Rastogi	MedTech Science Press	04
4.	Textbook of Zoology Vertebrates Eighth Edition:- Vol.I	Marshall & Williams edited by Veer Bala Rastogi	MedTech Science Press	01
5	Textbook of Zoology Vertebrates Eighth Edition:- Vol.II	Marshall & Williams edited by Veer Bala Rastogi	MedTech Science Press	01
6.	Apiculture	K.V. Jayashree, C.S. Tharadevi N. Arumugam	Saras Publications	01
7.	A Textbook of Pisciculture & Aquarium Keeping	H.S. Jagtap, S.N. Mukherjee, V.K. Garad	Daya Publishing House	01
8	Parasitology (Protozoology and Helminthology)	K.D. Chatterjee	CBS Publishers & Distributors Pvt. Ltd.	01
9	Essentials of Immunology 2 nd Edition	Dr. S.K. Gupta	Arya Publications	01
10	Principles of Immunology Student's Compendium	Basant Kumar Sinha, Rinesh Kumar	CBS Publishers & Distributors Pvt. Ltd.	01
11	The elements of Immunology	Fahim Halim Khan	Pearson	01
12	Chordate Embryology Developmental Biology	P.S. Verma V.K. Agarwal	S.Chand Publishing House	02
13	Biochemical Techniques Theory and Practice	John F. Robyt Bernard J. White	CBS Publishers & Distributors Pvt. Ltd.	01
14	Ecology and Environment	P. D. Sharma	Rastogi Publications Meerut- New Delhi	01
15	Pradeep's A Text book of Zoology Vol. II	P.S. Dhami, J.K. Dhami	Pradeep Publications	02
16	Zoology Phylum-Minor Phyla, Protozoa, Porifera, Coelenterata, Annelida, Arthropoda, Mollusca, Echinodermata,- Helminthes.	R.L. Kotpal	Rastogi Publications	02 Each
17	Organic Evolution (Evolutionary Biology)	Veer Bala Rastogi	MedTech Science Press	04
18	Genetics	P.S. Verma V.K. Agarwal	S.Chand Publishing House	01
19	Theory and Practice of Animal Taxonomy and Biodiversity	V.C. Kapoor	CBS Publishers & Distributors Pvt. Ltd.	01
20	Principles of Animal Taxonomy	Ashok Verma	Narosa Publishing House	01

21	Embryology	Mohan P. Arora	Himalaya Publishing House	01
22	The Book of Indian birds	Salim Ali	Bombay Natural History Society India	01
23	Immunology	J.P. Goyal and Amardeep Singh	Trueman's Book Co.	01
24	General and applied Ichthyology	S.K. Gupta	S. Chand Publishing House	01
25	Animal Behaviour	Mohan P. Arora	Himalaya Publishing House	01
26	Genetics	Veer Bala Rastogi	Meditech Science Press	02
27	Animal Physiology	Mohan P. Arora	Himalaya Publishing House	01
28	Bioethics and Biosafety	M.K. Sateesh	Wiley	01
29	Concepts of Genetics	William s. Klug	Pearson	01
30	Lippincott's Biochemistry	Danise R. Ferrier	Wolters Kluwer	02
31	Chordate Zoology	Jordan and Verma	S. Chand Publishing House	01
32	Invertebrate Zoology	Jordan and Verma	S. Chand Publishing House	01
33	Ganong's Physiology	Kim E. Barrett, Susan M. Barman, Scott Boitano, Heddwen L. Brooks	Mc Graw Hill	01
34	Environment and Road Safety Awareness	R. B. Singla and Mandeep Kaur	Twenty First Century Publications, Patiala	02
35	Harper's Illustrated Biochemistry: International edition	Victor W. Rodwell, David A. Bender, Kathleen M. Botham, P. Anthony Weil	McGraw Hill	01
36	Fundamentals of ecology	E.P. Odum and G.W. Barrett	CENGAGE Learning	01
37	Community Ecology	Herman A. Verhoef and Peter J. Morin	Oxford Biology	01
38	Basic Immunology	Abul K. Abbas, Andrew H. Lichtman	Elsevier	02
39	Drug Abuse	Dr. Rajeev Sharma and	RD Publishers, Jalandhar	02

JOURNAL SUBSCRIBED: Pollution Research ;ISSN: 0257-8050 ; Number of issues per year: 4

Point 12:

S.No.	Topic of Training	Date	Outcome	Beneficiaries
1.	One Week Hands on Training on Basic Techniques in Blood analysis and Animal taxonomy	13 -20 December, 2022	During sessions, students acquired training regarding how to determine Blood parameters	12 students of class 12 th of Sarvhitkari Vidya Mandir Sen. Sec. School, Barnala

Point 14:

No	Guest Lectures	Period	Resource person	Beneficiaries
1	Intellectual Property Rights-A tool for Protection of Innovations	26 May 2022	Dr. Balwinder Singh Sooch, Head Dept of Biotechnology, Depty coordinator,	More than 100

			IPR and Technology transfer cell, Punjabi University Patiala, Punjab	
2	Genetically Modified Foods	26 May 2022	Prof. R.S. Singh Associate Dean Research, Chandigarh University, Gharuan, India. Former Dean, Faculty of Life Sciences, Punjabi University, Patiala.	More than 100
3	Scope of taxonomy and importance of insects	26 Nov.2022	Dr. Abhinav Saxena, Assistant Professor, Akal University, Talwandi Sabo, Bathinda, Punjab	60
4.	Spotlight on Immunology: Theory and Experimentation	6 Feb, 2023	Dr. Ritu Pawan, Head, Department of Biotechnology and Medical Sciences, Baba Farid College, BFGI, Bathinda, Punjab	60

Tours:

No.	Place Visited	Period	Class	No. of Beneficiaries
1.	Pushpa Gujral Science City, Kapurthala	16 Feb.2023	B.SC Med. Students	43
2	Kanjli Wetland	16 Feb.2023	B.SC Med. Students	43
3	Zoological Park, Chhatbir	10 March,2023	B.SC Med. Students	40

Department of Chemistry

Point 7:

List of Additional/Extended Practicals Done Under the Scheme

S. No.	Experiment Name	Class
1.	To analyse the commercial sample of Potash Alum (Fitkari) for cations & Anions	BSc. I
2.	To prepare the crystals of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ from Kipps Apparatus waste	BSc. I
3.	To determine the contents of cold drinks	BSc. I
4.	To determine the mixed melting point of given substance	BSc. I
5.	Transesterification method for biodiesel production	BSc. I
6.	Estimation of Oxalate ions in tomatoes and potatoes volumetrically	BSc. II
7.	To calculate the acid value of a given sample of refined oil	BSc. II
8.	To determine enthalpy of hydration of CuSO_4	BSc. II
9.	Green method to analyse the organic compound for detection and confirmation of its elements (N,S,X)	BSc. II
10.	Separation of Casein Protein in given milk sample	BSc. II
11.	To determine enthalpy of solution of $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ & KNO_3 in water at room temperature	BSc. II
12.	Analysis of given milk sample for the presence of pesticide.	BSc. II
13.	To Estimate the chloride ion content in the given rock salt sample conductometrically	BSc. II
14.	Analysis of given water sample for chloride ion content using Mohr method.	BSc. II
15.	To determine Alkalinity of water sample using 0.1 N HCl Solution	BSc. II
16.	To prepare p-Nitroacetanilide from Acetanilide & to analyse the product for the detection of its functional groups	BSc. III
17.	To study the distribution of Iodine between Carbon tetrachloride and Water	BSc. III
18.	To verify Beer-Lambert law spectrophotometrically	BSc. III
19.	Synthesis of Dihydropyrimidine via conventional method and characterisation through PMR, Mass & IR Spectroscopy	BSc. III
20.	Microwave assisted green method for the Synthesis of Dihydropyrimidine & characterization through PMR, Mass & IR spectroscopy	BSc. III
21.	Determination of composition of a mixture of two acids conductometrically	BSc. III

Minor Research Projects

S. No.	Title of the project	Beneficiary	Teacher Assigned
1	Synthesis of some Biginelli compounds via conventional heating method and their characterization through PMR, Mass & IR spectroscopy	B.Sc. III 5 students	Dr. Kulbhushan Rana & Meetika
2	Green Synthesis of some Biginelli compounds using Microwave and their characterization through PMR, Mass & IR spectroscopy.	B.Sc. III 6 students	Dr. Kulbhushan Rana & Meetika
3	To prepare mosquito repellent from citrus peels extract.	B.Sc. III 5 students	Savita Sood & Navneet Kaur
4	Synthesis of biodiesel using trans- esterification method.	B.Sc. I 4 students	Dr. Kulbhushan Rana & Rajni Gupta
5	Separation & estimation of casein protein content in different milk samples.	B.Sc. II 6 students	Rajni Gupta & Malika
6	To compare hardness of water samples taken from different resources.	B.Sc. II 6 students	Rajni Gupta & Navneet Kaur
7	Study of different coordination compounds formed during salt analysis and to detect the presence of cationic and anionic species in them.	B.Sc. I 4 students	Savita Sood & Dr. Kulbhushan Rana
8	Analysis of different chemical dyes on fabric.	B.Sc. III 5 students	Savita Sood & Meetika
9	Anti-Covid Drug: 2-Deoxy-D-Glucose & its mechanism of action.	B.Sc. III 6 students	Dr. Kulbhushan Rana
10	Isolation & Extraction of caffeine in Tea leaves samples of different brands & comparison of caffeine content & water-soluble Polyphenol in the samples.	B.Sc. I 6 students	Dr. Kulbhushan Rana
11	Study of different biological activities related with Dihydropyrimidines.	B.Sc. III 4 students	Dr. Kulbhushan Rana
12	Gambia & Uzbekistan Children tragedies: Cough Syrup contaminated with toxic compounds - Diethylene Glycol & Ethylene Glycol.	B.Sc. I 3 students	Dr. Kulbhushan Rana

Point 8

Umar, Ahmad; Ibrahim, Ahmad A; Kumar, R.; Rana, Kulbhushan; Algadi, Hasan; Alhamami, Mohsen A. M.; Elsddig, Majdolin M. E.; Mohammed, Ayeda Y. Aluminum Doped ZnO Nanorods for Enhanced Phenylhydrazine Chemical Sensor Applications. Science of Advanced Materials, 13, 2021,2483-2488.

Point 9

Participation of Teachers in Various Professional Development Programmes

	Title of the program	Name of teachers who attended	Duration (from – to) (DD-MM-YYYY)
1.	Analytical Techniques in the Realm Of Molecules & Materials (STP)	Prof. Savita Sood &, Prof. Rajni Gupta	26th to 31st July 2021
2.	Together for Education Embracing changes Amid Technological Challenges (FDP)	Dr. Kulbhushan Rana	28th to 3rd Aug 2021
3.	National symposium on Scope and Prospects of Chemical Science	Dr. Kulbhushan Rana	26th to 31st July 2021

4.	Chemistry – The Catalyst for Change	Prof. Rajni Gupta Dr. Kulbhushan Rana	14th to 28th July 2021
5.	Research Methodology (FDP)	Prof. Rajni Gupta	2nd to 7th May 2022
6.	Miniaturised Total Analysis System (FDP)	Dr. Kulbhushan Rana	10-01-2023 to 20-01-2023

Students participation in Conferences

1. Ten students of B.Sc. I & III along with faculty members participated in 26 Punjab Science Congress; National Conference on "Environment, Food Security and Health with Reference to Climate Change" held at Sri Guru Granth Sahib World University, Fatehgarh Sahib on 7-9 Feb., 2023 and presented their posters.
2. Two students of B.Sc. II with faculty members participated in International Conference at Punjabi University Patiala held on 23-24th Feb, 2023 and presented their posters.

Point 10:

Exhibitions/seminars/training courses conducted

Pre-Support

Chemistry Department in collaboration with B.Voc Department. (MLMDT) organized poster presentation competition /Exhibition on 5th march, 2020 on the topics Save Earth Save Environment, Science and Technology connects Education, Health care and Technology and Science in EverydayLife.

Post Support

1. Workshop on Chemistry Software (Chem Sketch)

During the second hand on training session of the workshop held on 02 June 2022 students in different groups drew structures using the software under the guidance of resource person and updated themselves with the new software techniques in the field of chemistry.

2. Multidisciplinary Summer Training Programme

A Multidisciplinary Two-Week Summer Training Programme was organized by Chemistry Department in collaboration with all Science Departments from 28th July to 10th Aug, 2022. About 50 participants (5 students from University College, Barnala and 2 students from LBS College, Barnala) participated in the workshop. All participants from medical & non-medical streams performed Physics, Chemistry, Biology, MLMDT, Mathematics and Pharmacy related practicals.

3. Workshop on Lab Safety Measures

First Aid Training was provided to the students by Sh. Vijay Sharma, Training Supervisor, Red Cross Society, Barnala during the workshop on 13th Feb.2023 where he imparted training to the students regarding fire safety guidelines, artificial respiration, burning incidents and handling fractures. About 150 participants including students from nearby colleges participated in the

workshop.

4. Training for Laboratory Staff

Lab staff from Science departments of SD College, S D College of B Pharmacy and B Voc. Department (MLMDT) attended training programme held on 17th Feb.2023. Mr. Kavish Kumar, Engineer, Lab Tech Solutions, Ambala trained the laboratory staff about repair, calibration and maintenance of pH Meter, Colorimeter, Conductometer, water bath etc.

5. Hands on Training Program: Hydro – Distillation and Spectroscopic Techniques

Chemistry Department, SD College, Barnala organized a two-day Hands-on Training Program on Hydro – Distillation and Spectroscopic Techniques on 21-22 March 2023. About 104 participants of BSc Medical and Non-Medical participated in this programme. Students learnt and performed experiments on extraction of volatile oils from fennel and clove seeds and spectroscopic studies of organic compounds.

Point 11:

Books/journals subscribed from grants

1. Basic Inorganic Chemistry
2. Concise Inorganic Chemistry
3. Organic Chemistry
4. Fundamentals of Organic Chemistry
5. Organic Chemistry-Volume I,
6. University General Chemistry
7. The Elements of Physical Chemistry
8. Physical Chemistry through Problems
9. Organic Chemistry-Volume II
10. Organic Chemistry-Volume III
11. Fundamentals of Photochemistry
12. Vogel's Qualitative Inorganic Analysis
13. Vogel's Textbook of Practical Organic Chemistry
14. Advanced Exp. Chemistry, Vol. I-Physical
15. Introduction to Spectroscopy
16. Organic Spectroscopy
17. Organic Chemistry Vol I
18. A Guidebook to Mechanism in Organic Chemistry
19. Analytical Chemistry
20. Stereo Chemistry of carbon compounds
21. Advanced practical physical chemistry
22. Practical organic chemistry

23. Heterocyclic chemistry
24. Laboratory Manual of organic chemistry
25. Stereo Chemistry of organic chemistry
26. Organic Chemistry Vol II
27. Reaction Mechanism in Organic Chemistry
28. Stereo Chemistry Conformation & Mechanism
29. Advanced Practical Organic Chemistry
30. Organic Reaction Mechanisms
31. Introduction to Nano Science & Nano Technology
32. Polymer Science
33. Basic Concept of Analytical Chemistry
34. Quantum Chemistry
35. Pharmaceutical Chemistry-Inorganic
36. Advanced Physical Chemistry
37. An Introduction to Electrochemistry
38. Theoretical Inorganic Chemistry
39. Advanced Practical Organic Chemistry
40. Nano Technology
41. Outline of Bio-Chemistry
42. Principles of Inorganic Chemistry
43. Photo Chemistry

Journals subscribed from DBT grant

1. Indian Journal of Chemistry
2. Indian Journal of Traditional Knowledge

Point 12:

Outreach Activities

1. Awareness Camp against Stubble Burning: Social Initiative

As part of our initiative towards the betterment of community Chemistry Department organized an awareness drive for farmers against stubble burning in the nearby village Pharwahi on 19th Oct, 2022. The students explained them about the reasons of why stubble burning is harmful for the crops as well for the environment.

2. Training Program for School Students: Outreach Activity

As part of the outreach program, Chemistry Department, SD College Barnala, organized a Training Program for Sarvhitkari Senior Secondary School, Barnala from 26th Nov. to 05th Dec. 2022. Approximately 20 participants took part and performed practical related to Volumetric Analysis, Salt Analysis, Crystallization etc.

Point 14:

Invited Lectures

1. Two Lectures on Lab Safety Measures

Chemistry Department, SD College, Barnala, organized a lecture on 13thFeb, 2023 where Dr. Kuldeep Kaur (Assistant Professor, Dept. of Chemistry, Mata Gujri College, Fatehgarh Sahib) was the resource person. In first lecture, she elaborated about 'Identification of Chemical Hazards and Risks' and in the second session she explained about the Lab Safety Practices. About 150 participants attended the lecture.

2. Lecture on Chemistry Software (Chem Sketch)

A lecture was organized by Chemistry department on 2nd June 2022 where Dr. Bhupinder Kaur (Assistant Professor, Akal Degree College, Mastuana) explained the students about the software 'Chem Sketch'. About 150 participants (including teachers from nearby schools) attended the lecture.

Educational/Industrial/Institutional Visits

1. Educational Visit to Instrumentation Centre and Various Science Departments of CUP

Bathinda

An educational trip of 46 students from BSc. Med & Non-Med streams was organized by Chemistry Department in collaboration with all Science Departments on 29th April 2022. Dr. Kulbhushan Rana, Dr. Manoj Gupta, Dr. Manish Kumar, Dr. Kamalpreet Kaur and Prof. Manish Garg accompanied the students where they visited I instrumentation Centre, and observed the operations of Atomic Absorption Spectrometer, NMR, GCMS (Gas Chromatography and Mass Spectrometer), DNA Analyser, X-Ray Diffraction .. They also visited the central library in the campus.

2. Institutional Visit to Thapar Institute of Engineering & Technology

Students from BSc Medical and Non-Medical streams visited Thapar Institute of Engineering & Technology on 25th March, 2023. Firstly, they attended two lectures, one by Dr. Jana on 'Life is All About Simple Harmonic Motion' and another by Dr. Meenakshi Rana on 'Numbers decide the Architecture'. They also Visited SAI Lab (Sophisticated Analytical Instrumentation Lab) dealing with analysis of waste water & drinking water, components of soil and fly ash and learnt about the functioning of NMR, GCMS (Gas Chromatography - Mass Spectrometer), Mass Spectrometer, X-Ray Diffractometer and Electron Microscope.

3. Industrial Visit to Verka Milk Plant, Sangrur

Chemistry Department organized an industrial visit to Verka Milk Plant, Sangrur on 06th Aug 2022. 47 Science students visited the plant. They observed and learnt about the industrial processing of milk. They also learnt about dry powder milk making process, pasteurization technique, kheer, butter and curd making processes etc.

Department of Physics

Point 7:

Additional/New Practicals

S. No.	Name of experiment	Beneficiaries
1.	To measure voltage and unknown frequency using CRO.	B.Sc-III
2.	To draw voltage current characteristics of silicon controlled rectifier (SCR).	B.Sc-III
3.	To measure AC and DC voltage using Vacuum Tube Voltmeter.	B.Sc-I
4.	To find Moment of Inertia of Irregular Shaped Bodies Torsion Pendulum.	B.Sc-I
5.	To study diffraction of light by using He-Ne LASER and Diffraction Grating.	B.Sc-II
6.	To study the Faraday laws of electromagnetic induction using a strong magnet, coil and a galvanometer.	B.Sc-I
7.	To measure the refractive index of given liquids for a given wavelength of light (5893\AA) using spectrometer.	B.Sc-II
8.	To find the height of a S. D. College building, R. P. S. D. School building and B. Pharmacy Block Building using sextant.	B.SC-II
9.	To measure energy consumption different types of light bulbs using energy meter.	B.Sc-I
10.	To measure the magnetic susceptibility of FeCl_2 solution using Quinck's method.	B.Sc-III

Minor Projects Conducted

S. No.	Projects Name	Supervisor Name	Number of Beneficiary
3.	To study the variation in intensity of light using different light sources .	Dr. Baltej Singh & Dr. Manoj Kumar Gupta	10 students of B.Sc. NM First year
4.	To study the variation of atmospheric pressure using Fortin Barometer.	Dr. Baltej Singh & Achra Garg	10 students of B.Sc. NM First year
5.	To find the of density of different types of materials of irregular shape using Archimedes principle	Dr. Baltej Singh & Shalu Rani	10 students of B.Sc. NM First year

6.	To design a working model an instrument for Measuring underground disturbances.	Dr. Manoj Kumar Gupta & Dr. Baltej Singh	6 B.Sc. NM Second year
7.	To design a working model for study the behavior and variation of temperature wrt displacement in different conducting materials.	Dr. Manoj Kumar Gupta & Mrs. Achra Garg	8 B.Sc. Final Year Students
8.	To study the amount of pollutant ions in the Air /soil surrounding different zones of the City Barnala .	Dr. Manoj Kumar Gupta & Dr. Baltej Singh	8 B.Sc. Final Year Students
9.	To design Kundt's Tube to observe Nodes & Antinodes in closed glass tube.	Dr. Sanjay Kumar Singh & Mrs. Achra Garag	10 B.Sc. Final Year Students
10.	To design Kundt's tube by PVC pipe to study constructive and destructive interference.	Dr. Sanjay Kumar Singh & Dr. Baltej Singh	8 B.Sc. Second Year Students
11.	To design Simple /Series pendulum and coupled oscillator to study transfer of energy.	Dr. Sanjay Kumar Singh & Dr. Manoj Kumar Gupta	6 B.Sc. Second Year Students
12.	To design Magnetic Oscillator with low cost Magnet and to study magnetic oscillation.	Dr. Sanjay Kumar Singh & Ms. Shalu Rani	12 B.Sc. Final Year Students
13.	To design Single/double slit and study diffraction of light.	Dr. Sanjay Kumar Singh & Ms. Shalu Rani	14 B.Sc. Final Year Students

Point 8:

Publications

1. Baltej Singh Sidhu , A.S. Dhaliwal , K.S. Kahlon , Sukhpal Singh, On the use of flyash-lime-gypsum (FaLG) bricks in the storage facilities for low level nuclear waste , Nuclear Engineering and Technology. 54 (2022): 674-680.
2. Sukhpal Singh, Ramanpreet Kaur, Saffi Rani, Baltej Singh Sidhu . Investigations on physical, structural and nuclear radiation shielding behaviour of niobium–bismuth–cadmium–zinc borate glass system. Progress in Nuclear Energy. 142 (2021) 104038. 10.1016/j.pnucene.2021.104038.
3. Sukhpal Singh, Ramanpreet Kaur, Saffi Rani, Baltej Singh Sidhu. (2021). Physical, structural and nuclear radiation shielding behaviour of $x\text{BaO}-(0.30-x)\text{MgO}-0.10\text{Na}_2\text{O}-0.10\text{Al}_2\text{O}_3-0.50\text{B}_2\text{O}_3$ glass matrix. Materials Chemistry and Physics. 276 (2021) 125415. 10.1016/j.matchemphys.2021.125415.
4. Baltej Singh Sidhu, A.S. Dhaliwal, K.S. Kahlon. Investigation of gamma ray and fast neutron shielding ability of some waste glasses for nuclear waste storage facilities. AIP Conference Proceedings. 2352 (2021) 050039. 10.1063/5.0052727.
5. Baltej Singh Sidhu, A.S. Dhaliwal, K.S. Kahlon, Manoj Kumar Gupta . Calculated values of jump factor and jump ratios of lanthanum compounds in K shell and L1, L2 and L3 subshells. AIP Conference Proceedings. 2352 (2021). 050029. 10.1063/5.0053046

Point 9:**Training received by Faculty:**

S.No	Name of Faculty	Title of programme	Date
1	Dr. Baltej Singh	One month Faculty Induction Programme	16-5-2021 to 15-5-2021
2	Dr. Baltej Singh	Workshop on “Recent Advances in Natural Radionuclide and Multifunctional Materials”	18-8-2021 to 20-8-2021
3	Dr. Baltej Singh	FDP on “Principles of Radiation detection and measurement and experimental technique”	3-4-2023 to 9-4-2023
4	Dr. Manoj Kumar Gupta	FDP on “Electric vehicles & energy storage system integrated with renewable energy sources”	23-8-2021 to 27-8-2021
5	Dr. Manoj Kumar Gupta	One month Faculty Induction Programme	21-8-2021 to 19-9-2021
6	Dr. Manoj Kumar Gupta	FDP on “Principles of Radiation detection and measurement and experimental technique”	3-4-2023 to 9-4-2023
7	Dr. Sanjay Kumar Singh	Workshop on “Recent Advances in Natural Radionuclide and Multifunctional Materials”	18-8-2021 to 20-8-2021
8	Dr. Sanjay Kumar Singh	AICTE Training And Learning (ATAL) Academy Online Elementary FDP on "Creating and Publishing e-Content in Technical Teaching Learning Process	July 5 to 9th July 2021
9	Dr. Sanjay Kumar Singh	7 days Training and Workshop on Advances in Characterization of Material.	12-9-2022 to 12-9-2022
10	Dr. Sanjay Kumar Singh	Short Term Course on OPTICS (Diffraction and Interference of Light)	25-2-2022 to 2-3-2022.
11	Dr. Sanjay Kumar Singh	Participated in PTPP training programme at International Center for Theoretical Science (ICTS)	09-01-2023 to 13-01-2023

Point 10:**Exhibition/Seminar/Training Courses Conducted**

1. Department of Physics organized “Science Fair” in collaboration with Department of Mathematics under DBT Star College Scheme on 25th and 26th April 2022. In this two days Science Fair, three different types of events namely Quiz, Poster making and Model/Project competition were held.
2. Department of Physics organized Two days hands on Training Programme on “Repair and Maintenance of Electrical Instruments” for B.Sc students, and lab staff of the S.D. College Institution from 15/02/2023 to 16/02/2023. In this programme Mr Kavish (M.Tech. Electronics, Lab Tech Solution) gave training to around 60 students and 12 lab staff on repair and maintenance of the electrical instruments.

3. Department of Physics, S. D. College, Barnala organized three days workshop on “Projects making based on Electronics and Electrical Circuits” from 23-2-2023 to 25-2-2023. Resource person of this workshop was Mr. Sukhvinder Singh, Coordinator, N. I. E. R. T, Patiala. In this workshop more than 60 students of B.Sc. NM (I, II and III) took part and enhanced their knowledge about the working of various electronics and electrical components like Resistor, Capacitor, LED, transformer, LDR, MOSFET, VDR, Relay, Speaker, buzzer, Preset, Diodes, transistor etc. by making electronics based working projects prepared under the guidance of resource person.
4. Department of Physics, S. D. College, Barnala organized Science Cartoon Poster Presentation Competition on 13/03/2023 for BSc students. In this competition around 50 students participated and show their talent.

Point 11:

Books /Journals

S.No.	Quantity	Book and Author's Name
1	1	Franklin-Computational methods of physics
2	2	Holics-300 creative physics problem with solution
3	1	Wher-physics of the atom
4	2	Pillai-Solid State Physics
5	1	Devries-A First Course in Computational Physics
6	2	Griffiths-Introduction to Electrodynamics
7	1	Pradeep-Nanoscience and Nanotechnology
8	1	Jackson-Classical Electrodynamics
9	1	Patel-Nuclear Physics
10	2	Verma-Quantum Physics
11	2	Agarwal- Statistical Mechanics
12	2	Kaplan -Nuclear Physics
13	2	Choudhary-Laser Systems and Application
14	2	Dutta- Semiconductor devices and circuits
15	2	Griffiths-Introduction to Quantum mechanics
16	1	Ghatak-Quantum mechanics
17	2	Subrahmanyam-Atomic and Nuclear Physics
18	2	Arora-B.Sc. Practical Physics
19	2	Gupta- Basic Electrical and Electronic Engineering
20	2	Bhargava-Basic Electronics and Linear Circuits
21	2	Goldstein-Classical Mechanics
22	2	Tewari- Electricity and Magnetism
23	2	Patil-Elements of Modern Physics
24	2	Singh-Elements of Quantum Physics
25	1	Banwell-Fundamentals of Molecular Spectroscopy
26	2	Griffiths-Introduction to Electrodynamics

27	2	Shrivastva-Introduction to Optics
28	2	Griffiths-Introduction to Quantum Mechanics
29	2	Krane-Introductory Nuclear Physics
30	2	Silfvast-Laser Fundamentals
31	2	Ghatak-Laser Fundamentals and Application
32	2	Marthur-Mechanics
33	2	Subrahmanyam-Optics
34	2	Ghatak-Optics
35	2	Aruldas-Quantum Mechanics
36	1	Merzbacher-Quantum Mechanics
37	2	Mathews-Quantum Mechanics
38	2	Chaddha-Quantum Mechanics
39	2	Thankappan-Quantum Mechanics
40	2	Kittle-Introduction to Solid State Physics
41	2	Puri-Solid State Physics and Electronics
42	2	Wahab-Solid state Physics
43	2	Lokanathau-Statistical and Thermal Physics
44	2	Huang-Statistical Mechanics
45	2	Tayal-Nuclear Physics
46	2	Tayal-Electricity and Magnetism
47	2	Upadhayaya -Cladssical Mechanics
48	2	Pardeep's-Physics

Journals Name	Publisher
Resonance (Journal of Science Education)	Indian Academy of Sciences & Springer
Current Science (A Fortnightly Journal of Research)	Indian Academy of Sciences

Point 12:

1. Dr. Sanjay Kumar Singh, as resource person attended 5 days Mini Physics Training & Talent search program organized by H.P.T Arts & R.Y.K Science College Nasik , Maharashtra.

2. Department of Physics organized one week Hands-on Training Programme for 12th standard students of Sarvhitkari Vidyamandir Sen. Sec. School Barnala from 5 December 2022 to 12 December 2022.

Point 14

1. “**Mobile Phone Radiations and its IMPACTS on human body**” delivered by Dr. Tajinder Singh, Associate Professor and Head, PG Physics Department, Mata Gujri College, Fatehgarh Sahib, Punjab.
2. “**Applications of Nanotechnology**” delivered by Dr. Karamjit Singh, Assistant Professor, Punjabi University Patiala.
3. “**Nuclear Radiation: Awareness & Applications**” delivered by Dr. Tejbir Singh, Deam faculty of Basic and Applied Sciences, Professor & Head, Dept. of Physics, SGGSW University, Fatehgarh Sahib, Punjab on 13th March, 2023.

4. “Career Opportunities in Physics in India” delivered by Dr. Tejbir Singh, Deamn faculty of Basic and Applied Sciences, Professor & Head, Dept. of Physics, SGGSW University, Fatehgarh Sahib, Punjab on 13th March, 2023.

Department of Mathematics

Point 7:

Hands-on experiments being conducted

1. Creating a matrix and different operations on matrices.
2. Matrix manipulations.
3. Creating different functions.
4. Solving basic Algebraic Equations
5. Solving system of equations.
6. Creating simple plots.
7. Creating symbolic variables and manipulating expression using symbolic math functions.

Point 9:

1. Dr.Dimple Rani, Assistant Professor in Mathematics participated in 5-day workshop on “Statistical Analysis using Python” held at VNRVJIET, Hyderabad, Telangana, India during 6-11 March,2023 organized by Department of Humanities & Sciences, CSE(CYS,DS) and AI&DS(online mode).

Point 10:

Exhibition/Seminar/Training Courses

S.No.	Activity	Date	Outcome	Beneficiaries
1.	Workshop on MATLAB by Resource person Ms. Savita Bansal, S.D. College Barnala	05-02-2022 to 12-02-2022	To enhance knowledge of Faculty about MATLAB software	20 Teachers of our college
2.	Workshop on MATLAB by Resource persons Dr. V.K.Kukreja, Professor and Head, Department of Mathematics, SLIET, Longowal and Dr. Bharti Gupta, Assistant Prof. Department of Mathematics , Doaba College , Jalandhar	2-02-2023 to 04-02-2023	To enhance knowledge of students about MATLAB software	30 students of our college
3.	Quiz Competition	25-04-2022	To create interest of science among students.	20 students of our college
4.	Mathematical models presentation	28-02-2023	To create interest of Mathematics among students.	20 students of our college

Point 11:**Books & Journals**

Sr. No.	Title of Book	Writer Name	Copies
1	Getting Started with MATLAB	Rudra Pratap	6
2	Practical MATLAB with modeling, simulation and processing projects	Irfan Turk	2
3	MATLAB and Simulink for Engineers	Agam kumartyagi	1
4	Essentials MATLAB	Brian H. Hahn and Daniel T. Valentine	1
5	Programming in MATLAB a problem solving approach	Ram N. patel and Ankush Mittal	1
6	Advanced guide to MATLAB, Practical, Examples in Science and Engineering	Syed NasimulAlam, Sanjid Islam and Saroj Kumar Patel	1
7	MATLAB an Introduction With Applications	Amos Gilat	1
8	Applied numerical analysis using MATLAB	Laurene V. Fausett	3
9	An introduction to partial differential equations with MATLAB	Mathew P. coleman	1
10	Introduction to MATLAB	Delros M. Etter	1
11	operations research	PK Gupta , DS Hira	4
12	Bioinformatics Principles and Applications	Zhumur Ghosh and Bibekanandmallick	2
13	Computer oriented numerical methods	V. Rajaraman	3
14	Introductory Methods of numerical Analysis	S.S Sastry	2
15	Numerical Methods for Scientific and Engineering Computation	M K jain , SRK Iyenagar and RK Jain	2
16	Numerical Methods for Engineering	Steven C. Chapra andRaymind P. Canale	2
17	Numerical Methods using MATLAB	john H. Mathews and Kurtis D. Fink	1
18	Theory of Functions of Complex Variable	Shanti Narayan and Dr. P.K Mittal	4

19	Analytic Solid Geometry	Shanti Narayan and Dr. P.K Mittal	6
20	Real and complex analysis	Walter Rudin	4
21	First Course in Linear Algebra	PB Bhattacharya, SK jain and SR Nagpaul	3
22	Linear algebra	Vivek Sahai and Vikas Bist	4
23	linear algebra and its application	David C. lay	4
24	linear algebra and its application	Gilbert Strang	4
25	Topology of Metric Spaces	S. kumaresan	3
26	Ordinary and Partial Differential Equations	M.D. raisinghanian	3
27	A Course of Mathematical Analysis	Shanti Narayan and P.K. Mittal	2
28	A Course in Abstract Algebra	Vijay K Khanna and SK Bhambri	1
29	Text Book of Analytic geometry	PK Jain and Khalil Ahmad	6
30	Higher Algebra	Henry Sinclair Hall and Samuel Ratcliff Knight	4
31	Matrices	A.R. vasishtha and A.K. vasishtha	1
32	Basic Number Theory	S.B. Malik	2
33	Complex Analysis	Lars V. ahlfors	3
34	Calculus and Analytic geometry	George B. Thomas and Jr. Ross L. finney	2
35	Engineering Mechanics, Statics and Dynamics	Irving H. Shames and G. Krishna Mohana Rao	1
36	Cryptography and Network Security Principles and Practice	williamstallings	1
37	Marvels of Math	Kendall Haven	1
38	International Mathematical Olympiad Vol.-I	Istvan Reiman	1
39	International Mathematical Olympiad Vol.-II	Istvan Reiman	1
40	Vedic Mathematics Made Easy	Dhaval Bathia	3
41	Introduction to Biostatistics	Dr. Pranab Kumar Banerjee	4
42	MATLAB and Its Applications in Engineering	Raj Kumar Bansal and Ashok Kumar Goel	1
43	Operations Research an Introduction	Hamdy A. Taha	1

44	Optimization Techniques	Chander Mohan and Kusum Deep	1
45	Operations research Quantitative Techniques for Management	V.K. Kapoor and Sumant Kapoor	2
46	Operations research Theory, Methods and applications	S.D. Sharma and Himanshu Sharma	2
47	Differential equations and their Applications	Zafar Ahsan	2
48	Mathematical Analysis	SC Malik and Savita Arora	2
49	Introductory Operations Research Theory and Applications	H.S. Kasana and K.D. Kumar	2
50	Numerical Methods in Engineering and Science With Programming in C, C++,MATLAB	B.S. Grewal and J.S. Grewal	2
51	Advanced Engineering Mathematics	R.K. jain and S.R.K. Iyengar	3
52	Operations Research	Kanti Swaeup , PK Gupta and Man Mohan	3
53	Mathematical Analysis	Tom M. Apostol	4
54	Intergral Transforms	A.R. Vasishtha and R.k. gupta	3

Journal purchased from DBT Grants

Journal of the RAMANUNJAN Mathematical Society

Point 14:

Invited/Guest Lectures:

Sr No	Name and Designation of Resource person	Topic /Activity	Date	Purpose
1.	Dr. Gurmeet Singh, Vice Principal and Head of Department of Mathematics at G.S.S.D.G.S Khalsa College, Patiala	Guest Lectures on Topics:- Golden ratio' and 'Fermat's Last Theorem	18 th Nov. 2022	To encourage the students to study mathematics by correlating it with real life
2.	Prof. Parveen Lata, Head, Department of Mathematics, Punjabi University, Patiala.	Science Day Celebration, Lecture on topic 'Everything Around you in Mathematics'	27-02-2023 to 28-02-2023	To create interest of science among students.

Educational Tour/Visits

1. One Day educational tour to Pushpa Gujral Science City, Kapurthala on 16/2/2023 to generate

- scientific aptitude among students. 51 students participated in this visit.
2. Visit to Panjab University Chandigarh on 27/03/2023 to give exposure to the students about research, MATLAB and Mathematica Softwares. 55 students participated in this visit.

**COLLABORATIVE ACTIVITIES BY ALL SCIENCE DEPARTMENTS CARRIED OUT
UNDER DBT STAR COLLEGE SCHEME**

1. Two Week Multidisciplinary Summer Training Program (Under DBT Star College Scheme)(28-7-2022 to 10-8-2022). About 50 participants (5 students from University College, Barnala and 2 students from LBS College, Barnala) participated in the workshop. All participants from medical & non-medical streams performed Physics, Chemistry, Biology, MLMDT, Mathematics and Pharmacy related practicals.
2. Department of Physics and Department of Mathematics in collaboration with all science departments jointly organized 'Science Fair' on 25th and 26th April, 2022. In this science fair, three different types of events namely Quiz Competition, Poster Making Competition and Model/Project Competition were held.
3. National Science Day was celebrated on 27th and 28th February, 2023 by Department of Mathematics along with all the science Departments under DBT Start College Scheme. In these celebrations, five different type of events namely Extempore Competition, Quiz Competition, Poster Presentation Competition, Mathematical Model Competition and Sudoku Puzzle competition were held.
4. Faculty members and 95 Students of all science departments visited THAPAR University Patiala on 25th March, 2023. Two lectures were delivered by Dr. Jana on topic "Life is all about simple harmonic motion" and by Dr. Meenakshi Rana: on topic "Numbers decide the Architecture". Students visited SAI Lab (Sophisticated Analytical Instrumentation Lab) dealing with wastewater & drinking water analysis, components of soil and fly ash and learnt about the functioning of instruments viz. NMR, GCMS (Gas Chromatography - Mass Spectrometer), Mass Spectrometer, X-Ray Diffractometer, Electron Microscope etc.
5. All the science departments organized one day visit to Verka Milk Plant, Sangrur on 06th Aug 2022. Students observed and learnt about the industrial processing of milk. They also learnt about Dry powder milk making process, pasteurization technique, kheer, butter and curd making processes etc.
6. All the Science departments organized one day tour to Central University, Bathinda on 29th April, 2022. Students visited central instrumentation facility and science depts and gained working knowledge of various equipments such as Flow cytometer, DNA sequencer, HPLC, Atomic Absorption Spectrophotometer, NMR, Rotary Vacuum Evaporator, DNA Electrophoresis Apparatus, PCR etc.

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

Principal
Principal
S.D. College, BARNALA