Jai Hind College

Progress reports 2018-19 supported under DBT-STAR College Scheme

1. Name of the College: Jai Hind College, Basantsing Institute of Science, J. T. Lalwani College of Commerce

2. Name of Departments supported: Botany, Chemistry and Microbiology

Name of Coordinator, designation,	:	Dr. Brijesh Kumar N. Singh
	:	Associate Prof. and Head, Department of Chemistry
Address		JaiHind College (Autonomous)
		'A' Road, Check-Naka, Goregaon (E),
		Mumbai: 400020
Phone nos.	:	College: 022 22040256
		Cell Phone: 9820551819

3. No. of regular faculty with Ph.D. in each participatingdepartment:Botany: 04; Chemistry: 08; Microbiology: 02

4. List of courses (B.Sc./M.Sc./PG Diploma, certificate etc) run by different participating departments:

BSc	MSc	Ph.D
Botany, Chemistry, Microbiology, Physics, Mathematics, Life Sciences, Biotechnology, Information Technology.	Chemistry (Physical, Inorganic and Organic).	Botany

5. Cut off percentage for admission in different courses in participating departments, positions in university, percentage of result in 2017-18 academic session:

Program	Course	Cut-off percentage
B.Sc. (First Year)	Botany	55%
	Chemistry	55%
	Microbiology	60%
M.Sc. (Part I)	Physical, Inorganic & Organic	60%

6. List of projects undertaken by students, industrial visits by students, summer training in last one year

We have received DBT STAR Scheme by Sanction Order No : **BT/HRD/11/01/2018** dated **26/02/2018** i.e. at the end of the Financial / Academic year 2017-18. Since this was the examination period followed by Summer Vacation no activities could be conducted under STAR Scheme during March, April 2018, but DBT- STAR Scheme program awareness was spread among students and faculty.

Therefore Progress Report for Academic year 2017-18 is NIL.

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6. List of projects undertaken by students, industrial visits by students, summer training in last one year:

BOTANY DEPARTMENT

Projects:

1. A natural antioxidant alternative from *Ficussps* for synthetic dyes.

Aim and objective: The aim of the project was to prepare a natural dye and incorporate it in various industries. Synthetic dyes apart from causing water pollution also may cause allergy on human skin. A natural alternative for these synthetic dyes for its use not only in textile industry but also in cosmetic industry is required.

Activity: The extracted dye was incorporated in textile materials namely, cotton, wool, hemp, etc. the fastness of the color was checked. The dye was also included in a preparation of a lip balm because they possess antioxidant properties. The dye was also checked for its effects when added in food products like flour to use in preparation of noodles.

Instruments used:
1. Rotavap – Centre for Research
2. Water Bath – Botany Laboratory
3. UV-Spectrophotometer – Botany Laboratory under Star DBT Scheme

Outcome: The dye was successfully used for dyeing cotton, wool and hemp. The fastness of the dye was checked by following standard protocols and the obtained results were shared with Bombay Hemp Company (BOHECO), students of TYBSc (Botany) have been asked to continue this project and convert this into an entrepreneur project.
Two students from TYBSc who worked on this project were encouraged to take their project to Avishkar which fetched them silver medal. The same project won first prize at International Conference organized by Patkar College.

2. Insecticidal activity of *Centratherum anthelminticum* (L) extracts

Aim and objective: Aqueous extracts and methanolic extract of seeds of *C. antelminticum* (L)were prepared and used to study their insecticidal activity on bed bugs and mosquitoes.

Activity: The plant material was identified and authenticated from Blatter's Herbarium. The seeds were processed for checking its insecticidal activity. To confirm the presence of phytochemicals various test were performed including TLC. The plant extract was compared commercially available insecticides like '*Goodnight Cartridge*' and '*Khatnil*'. Insecticidal activity

was also studied on bed bugs and mosquitoes at Haffkine's Institute Parel.

Instruments used:
1. Clevenger's apparatus- Botany Laboratory
2. Rotary Shaker - Botany Laboratory
3. Laminar Air Flow- Botany Laboratory

Outcome: The project carried out by T.Y.B.Sc. Students brought an opportunity for a research collaboration between a government research organization like Haffkine's research institute and Jai Hind College. This project is carried out and is an ongoing work to make a product for controlling 'Bedbugs and Mosquitoes' which are considered to be a menace all over the world. Students were exposed to a research set up in a hard core research organization. This project was given to TYBSc students.

3. Incorporation of silver nanoparticles coated with antimicrobial essential oil extracted from *Ocimumsps* in a moisturizer

Aim and objective:

Activity: Essential oil was extracted from *Ocimumsps* collected from Gholwad(Gujarat) using Clevenger's apparatus by T.Y.B.Sc. students. Dilutions of this oil were made using ethyl acetate and these were tested on 7 organisms. Silver nanoparticles coated with this oil were made. UV visible spectroscopic analysis was carried out which shows a peak at 275 nm which matches values form literature. The solution containing silver nanoparticles was incorporated in commercially available *Aloe vera* gel to be used as an antibacterial moisturizer.

Instruments used:
1. Clevenger's Apparatus – Botany Laboratory
2. Laminar Air Flow – Botany Laboratory
3. Autoclave and Incubator - Botany Laboratory
4. UV Spectrophotometer - Botany Laboratory under Star DBT Scheme

Outcome: The collection of material was done from the students farmhouse at Gholwad as he observed and found significant difference in the smell of Tulsi leaves available in Mumbai and in Gholwad (Gujarat). Phytochemical tests showed the difference in the quality of oil and hence extracted oil was tested on different micro-organisms causing skin infections. This product once tested can be a very good cosmeceutical alternative for antibacterial or antifungal ointments. Two students of T.Y. B.Sc. engaged in this project were encouraged to participate in the poster competition at International Conference

organized by Patkar College and they won the consolation prize. They also won second place at Xplore 2019 held in Jai Hind College.

4. Cosmeceutical preparation from Beet peel

Aim and objective: This activity was carried out by T.Y.B.Sc. students. They collected Beet root peel from different sources and prepared a tint which acts as a substitute to expensive cosmetic tint available in the market.

Activity: *Betavulgaris* L.peel waste was collected from college canteen, juice centers and household for this project. The tint prepared was checked for its efficiency as a natural pigment and microbial load was also carried out.

Instruments used:
1. Laminar Air Flow - Botany Laboratory
2. pH meter - Botany Laboratory
3. UV Spectrometer -Botany Laboratory under Star DBT Scheme

Outcome: This project helped the students to understand that waste holds economic value and can be used to prepare a cost efficient cosmetic substitute. This project gave an effective solution for waste management other than making sugar or manure out of the waste generated by the peels. Further studies on the shelf-life of the product are going on. Three students of T.Y. B.Sc. who worked on this project won 3rd prize at International Conference organized by Patkar College.

5. Environmental Audit of a South Mumbai College

Aim and objective: This project was carried out by TYBSc students where they conducted an Electrical Audit of Jai Hind college to understand the electricity consumption of the college and to provide effective ways to reduce it.

Activity: A survey was carried out in the main building of Jai Hind by the students where they made an inventory of all the electrical appliances used and the power consumption of each appliance was noted.

Outcome: Very simple and effective solutions suggested and were implemented in the college to curb the wastage of electrical energy. Labeling the switches, assigning a non-teaching staff to ensure that all the electrical connections are switched off (for the unused classroom), making the non-teaching staff aware of importance of conserving the electrical energy were a few implementations after the audit. Four Students of T.Y.B.Sc. were the investigators.

6. Chemical composition and anti–microbial activity of Essential oil from *Callistemon* sp.

Aim and objectives :*Callistemoncitratus*oil was extracted using Hydro-distillation technique and was compared to *Eucalyptus* oil by S.Y.B.Sc. students.

Activity:*Callistemon citratus* is an ornamental tree grown as an avenue tree along the road side. The leaves are used in flower arrangements as fillers. The plant material for the said project was collected from dried floral arrangements. The leaves were processed and extracted oil was compared to *Eucalyptus* oil. GC- MS records of both the oils showed 95% similarity in the constituents of the oil. The extracted oil was tested for its anti-microbial efficacy against five common pathogens.

Instruments used:
1. Clevenger's Apparatus- Botany Laboratory
2. Rotary Shaker - Botany Laboratory
3. Autoclave - Botany Laboratory
4. Laminar Air Flow- Botany Laboratory
5. GC – MS – S. H. Kelkar& Co.

Outcome: Students of S.Y.B.Sc. were sent to a perfumery Industry where they learnt about importance of Eucalyptus oil and the need for an alternative source of *Eucalyptus* because *Eucalyptus* tree is making the soil under cultivation arid. *Callistemon* on the other hand is an ornamental tree which is under cultivation in gardens and roadside. The oil extracted can be used as an alternative in fragrance industry and also can be used to crystallize Eucalyptol. Four students who worked on this project won 2nd Prize at Xplore 2019.

7. Extraction and isolation of Ursolic acid from few Apocynaceae leaves.

Aim and objective: Leaf samples from three plants belonging to Apocynaceae were collected by SYBSc students and were subjected to Soxhlet extraction.

Activity:Ursolic acid is commonly found substance on Apple peel. Ursolic acid is known for its use in pharmaceutical industry as an anti-inflammatory and an anti-microbial product. For the project three common garden ornamental plants were selected and the leaves were used for extraction of Ursolic acid. Solvent extraction method using different solvents was carried out and purified crystals were identified by Thin layer chromatography.

Instruments used:

1. Soxhlet's Apparatus - Botany Laboratory

Outcome: Students of S.Y.B.Sc. learnt that Phytochemicals are the need of the hour and because we, the Humans, are exploiting known plants for all the benefits, new sources are constantly required. The project showed three potential plants which can be easily cultivated and are readily available for the extraction. Also during the project the students learnt the importance of recycling the chemicals. Two students of S.Y.B.Sc. completed the project.

8. Commercial aspects of medicinal botany by five F.Y.B.Sc Students demonstrated use of medicinal plants in daily life by making soaps , bath bombs and instant juices and aromatic candles, lip balms, face packs using natural ingredients from plants and there extracts.

Outcome: Students learnt from each other the various ways in which they could share and use their scientific knowledge as well as develop entrepreneurial skills.

9. Medicinal Botany Grandmas pouch project by four students of F.Y.B.Sc. Students demonstrated the active constituents and uses of four naturally and easily available vegetables like karela, Cayenne pepper, Fenugeek and Arbi and made other students aware of the importance of the same. They explained the use of all the four plants in treating various diseases and ailments like cancer, cardiovascular diseases, pain killer, skin diseases as well as for improving lactation, weight reduction and as vitamin A and C supplements.

Outcome : General awareness was spread about the medicinal use of commonly available plants and the fact that many more require to be studied in detail.

CHEMISTRY DEPARTMENT

Projects:

1. Acid content in soft drinks by pH metry:

This experiment was given as a small project participated by 04 students.

Objectives: To understand the concept of pH and its application on the daily basis. To analyze for the acid content (pepsi, cola, sprite etc) present in various beverages and to understand the limit of the acid content.

Outcomes: The student analysed the acid content by pH measurements of the samples. They understood the amount of acid present in various beverages and their limits. The project helped to familiarize the application of pH measurements and their application in food analysis.

2. Extraction of essential oils from natural sources (jasmine, rose) by Soxhlet apparatus/Steam distillation apparatus:

Participated by 03 students.

Objectives: To train the students on extraction of essential oils and other components from natural resources thereby they understand the laboratory method & industrial application of the process.

Outcomes: Students learned extraction of essential oils and natural compounds by Soxhlet extraction and steam distillation methodologies. They developed skill of using various extraction apparatus, especially Soxhlet apparatus. Selections of suitable solvents of extraction were also learned. They were also taught the extension of the methods to scale up/industrial applications.

3. Study of effect of addition of solute (urea) on the freezing point of solvent by Beckmann thermometer.

Participated by 03 students.

Objectives: To make student understand the effect of solute/impurities on physical constants of the solvents. Knowledge of Beckmann thermometers and their use.

Outcomes: Students learned the thermodynamic properties and colligative properties and their effect on physical constants. They learned to identify the extend of impurities by recording the physical parameters. To extend this concept towards assessing impurities in solutions. They learned about Beckmann thermometers and their use by reaction in Dewars flask.

4. Determination of absorption maxima and molar absorption coefficient of tetraammine copper (II) complex.

Participated by 05 students.

Objectives: To have hands on experience on UV-Visible spectrophotometer and to understand its theoretical principles. To learn the concept of λ_{max}, molar absorption coefficient and their significance on the properties of complexes.

Outcomes: Students acquired awareness about spectrophotometer, the parts of the instrument and theory. Applications of absorption spectrophotometer in measuring λ_{max} of UV-Visible active solutions. They were familiarized the advantage of the instrument in chemical analysis.

5. Verification of Nernst equation using Daniel Cell & to study the effect of concentration on potential by potentiometry:

Participated by 03 students.

Objectives: To give knowledge on theoretical principles of various electrochemical cell.

Outcomes: Students learned the setup of electrochemical cell. Determination of emf. Effect of concentration on emf. Calibration of potentiometer. Learned the theory of cell, their construction and hands on experience on potentiometer.

6. Extraction of soya oil from soya bean seeds (solvent extraction):

Participated by 03 students.

Objective: To teach students the methods of extracting oils from seeds by solvent extraction methods.

Outcomes: The students learned how to extract oil from soya bean seeds and further the methodologies related to the same. They also learned about selection of solvents, isolation and quantification which help them to understand the various industrial methodologies.

7. Determination of sugar content in various soft drinks -refractometer:

Participated by 03 students

Objective: To teach students on refractometry and analyzing samples for sugar content using the methodology.

Outcomes: The students learned the method and analysed various soft drinks available in the market to determine the sugar content. The sugar content in the drinks are a health hazard due to the overuse in present times. The analysis made the students aware of the amount they consume while drinking these beverages.

8. Extraction of essential oil from orange peel and champa flower by soxhlet extraction:

Participated by 03 students

Objective: To acquaint the students with the methodology of soxhlet extraction and to apply the method to extract essential oils from various natural sources.

Outcomes: Students learned the method and efficiently extracted essential oil from orange peel. They learned that the method can be applied to other samples.

9. Preparation of soap enriched with essential oils:

Participated by 03 students

Objective: To acquaint the students with the methodology of soap preparation and to apply essential oils in formulations.

Outcomes: Students learned the method of soap preparation – both soft and hard soaps. They learned the method of making soap and formulation by addition of colour and essential oils to give the look of soaps available in the market. They learned that the method can be applied to other samples.

10. Preparation of methyl orange indicator and measurement of wavelength in acidic and alkaline medium:

Participated by 03 students

Objective: To acquaint the students with the industry and application-based product synthesis. To teach them the reaction methods based on stoichiometry, isolation of product and purification.

Outcomes: Students successfully synthesized methyl orange indicator and purified for use in laboratory. They learned the theory of insicators and their colour changes on acidic and basic conditions. The indicators made can be used in the laboratory for analysis, thereby learned the preparation methods and use of indicators.

11. Extraction of caffeine from tea and coffee -soxhlet apparatus:

Participated by 03 students

Objective: To teach the extraction methodologies for obtaining natural constituents from foods/beverages. The student is expected to learn the methodology and should be able to apply to real sample analysis.

Outcomes: Students successfully isolated the compounds and learned the technique of isolation and acquired knowledge to apply to other samples. They learned the various theoretical principles on solvent selection, extraction methodology, isolation which can be applied to real samples.

12. Preparation of Werners complexes & using it prepare linkage isomers:

Participated by 03 students

Objective: The objective of the experiment was to teach the students with the preparation of Werner's complex and to learn Werner's theory.

Outcomes: The complexes were synthesized by the students successfully and the expected knowledge has been acquired on Werner's theory.

13. Preparation of methyl salycilate and using it for formulating pain balm:

Participated by 03 students

Objective: The experiment expected the students to learn the preparation of methyl salicylate, an active medicinal compound used in anti-inflammatory/pain relieving formulations.

Outcomes: The students are made familiar with the preparation methods and use of it as a formulation similar to few formulations available in the market.

14. Sodium content in chips – flame photometer:

Participated by 04 students

Objective: The objective of the experiment is to teach analysis of commercial products for the contents. The experiment also is framed so as to teach the students the theory, instrumentation and application of flame photometer.

Outcomes: Students acquired the requisite knowledge of the methodology and instrument. They analysed potato chips of various brands available in the market and established the sodium content. They also learned the method of sample preparation for a real sample. This group won third prize at Intercollegiate Research meet, “Jigyasa”, held at K.C. College.

15. Extraction of flowers by soxhlet method:

Participated by 04 students

Objectives: The aim of the project was to familiarize the students with solvent extraction methods to isolate essential oils by Soxhlet methodology.

Outcomes: The students successfully extracted oil from rose petals and used it as fragrance.

16. Preparation of soap with flower extracts:

Participated by 03 students

Objectives: The aim of the project was to familiarize the students on commercial formulations with natural substances.
Outcomes: The students successfully formulated soap in which extracted oil from rose petals were used as fragrance.

17. Synthesis of potential drug scaffolds based on triazoles:

Participated by 03 students

Objectives: The objective of the project was to teach research and development methodologies of synthesis, isolation and

purification of biologically active scaffolds which can be further developed to new chemical entities/drug molecules. The student is expected to be familiar with stoichiometry, reaction conditions, volumes, TLC, work-up methods and purification.

Outcomes: The objectives were accomplished as the students learned various synthetic methodologies, the way of doing reactions in commercial lab, the various parameters to be observed while planning the synthesis, the potential drug systems and their synthetic routes. The learned to synthesize, isolate, purify and run multistep synthesis.

18. Extraction of nicotine from tobacco as insecticides - soxhlet extraction:

Participated by 03 students

Objectives: To familiarize students with the method of extraction and to obtain active ingredient of natural pesticides, which is a need of the time.

Outcomes: Students learned the technique of extraction of nicotine and to isolate the active ingredient of natural pesticide formulations.

MICROBIOLOGY DEPARTMENT

Projects:

1. **Biocomposting:** This project was undertaken by 33 students of microbiology of the FYBSc. Students gained credit points for the same.

   Objectives:

   - To inculcate in students the importance of reusing and recycling.
   - Segregation of Waste was done and organic waste was used for Biocompositing.
   - Microbiological and Chemical Analysis of the compost were performed.

   Outcomes:

   - This will help the students in spreading awareness about waste segregation in their homes and societies and also using this method to carry out biocomposting of their kitchen waste at home or in their communities on a larger scale.
   - Furthermore the compost generated can be used for gardening and the excess generated could also be sold as fertilizer.

2. **Microbiological and Chemical Water analysis of the drinking water of neighbouring societies**: This project was undertaken by 22 students of Microbiology of the SYBSc.

   Objectives:

   - To determine whether the drinking water was potable or not according to said standards. It was done once during the monsoons and once during winter for 5 of the residential societies around Jai Hind College
   - The practice was undertaken to inculcate a sense of social awareness among the students

   Outcomes:

   - College Social Responsibility activity was undertaken by the students.

   This helped in inducing in students social relevance of the topics studied and applies their knowledge for a social cause.

3. Group projects were assigned to T.YBSc students for better understanding of the subject :(4 students per group) topics assigned were related to Applied component practical in ‘Food Production and Processing’.

   1. **Objectives:** To determine the efficiency of honey dip treatment as a method of preservation of fruits.

Outcomes: Students could appreciate the role of a natural preservative like honey in enhancing the shelf life of cut fruit.

2. **Objectives:** To study the Antibacterial activity of citrus peel extract against spoilage organisms.

Outcomes: Students learnt the control of food spoilage organisms using extract from the citrus fruit peels. It was found to inhibit the growth of the spoilage organisms and hence it could be used as a dip in enhancing the shelf life of foods.

3. **Objectives:** To study the microbial load present in a convenience food (paratha) before and after its expiry date.

Outcomes: Created awareness amongst students about the shelf life of Convenience foods like parathas which were wrapped and stored at low temperatures of 8 to 10 degree centigrade. An increase in the microbial load was observed towards the expiry date. Maybe better methods of Packaging would increase the shelf life.

4. **Objectives**: To study the antibacterial synergistic effect of Sodium benzoate and sodium sulphite on the organism isolated from spoilt Pomegranate juice

Outcomes: Use of preservatives in combination to reduce the individual concentration in the final product thus reducing the side effect of higher concentrations of preservatives. This was not conclusive indicating that all combinations need not be synergistic.

5. **Objectives:** To study the shelf life and microbial fauna of baked bread.

O**utcomes:** The shelf life of the experimental baked bread was much shorter in comparison to the commercially available cake. This may be due to the use of chemical preservatives in commercial products.

Visits:

1. **Go Green Nursery Panvel:**

Students of TYBSc (Botany and Life sciences) visited Go Green Nursery near Panvel to understand various aspects of gardening, composting, handicrafts and nursery management. A total of 43 students accompanied by 2 staff members conducted this visit **on 1st of August 2018** and was a very educative and informative visit. Students were asked to study each aspect in groups and make a presentation to us at College. All students presented their work in the form of power points and videos along with written reports of the same. The two teachers who accompanied evaluated the students on the basis of their presentation skills, content, knowledge and covering of the subject.

2. **Soonabai Pirojsha Godrej Marine Ecology Centre:**

No of Beneficiaries: 64 students

A Field visit to SoonabaiPirojsha Godrej Marine Ecology Centre, Vikhroli was organized under the star DBT scheme on 25th Feb 2019 to visit the Mangrove section. The aim of the visit was to sensitize the students about these green warriors of Mumbai City which are also lungs of the city. A total of about 64 students were accompanied by 3 of our staff members. Dr Hemant from the Centre explained to the students the geographical significance of location of mangroves, their role in ecology and conservation of coastline. It was an interactive session which the students enjoyed thoroughly.

3. **Visit to Sophisticated Analytical Instrumentation Facility (SAIF):**

No of Beneficiaries: 98 (All science departments)

Objectives: To familiarize students with the advanced analytical methodologies and to observe real time sample preparation and analysis.

SAIF Centre: Two visits to Sophisticated Analytical Instrumentation Facility (SAIF) at IIT-B was conducted. The visit was conducted on 5th Dec 2018 & 12th feb 2019 to familiarize students on advance analytical methods. Students were introduced to various advanced analytical methods such as NMR, Mass Spectrometry, ICP-MS etc.

Outcome: The students gained fair amount of knowledge about the latest sophisticated instruments towards analyzing samples by various methods.

4. **Breach Candy hospital, Microbiology dept:**

   No of Beneficiaries: 20 students

   For TYBSc students, a visit to the t. at, a renowned City hospital, was organized.The students learned about the various microbiological, serological and biochemistry diagnostic tests being carried out with the use of sophisticated automated machines in the hospital. Such visits motivate students, it is a practical learning of the subjects being taught in theory .(visit on 30/8/18)

5. **Water purification plant**, Bhandup:

   No of Beneficiaries: 22 students

   For SYBSc students, a visit was planned at the Water purification plant, Bhandup. The visit gave them an insight as to the actual purification steps taken to make water potable. (visit on 31/10/18)

6. **TATA Institute of Fundamental Research, Mumbai:**

   No of Beneficiaries: 24 students.

   For FYBSc students, a visit to TATA Institute of Fundamental Research was organised as a part of the process of sensitization to the INDIA INTERNATIONAL SCIENCE FAIR to be held at Lucknow that was being sponsored by DBT. (29/9/18).

7. **Elcon Drugs** a**nd formulations, Jaipur:**

   No of Beneficiaries: 28 students.

   For SYBSc and TYBSc students, an industrial visit of 4 days to Jaipur was organised. At Elcon Drugs and formulations they saw the processing and packaging of drugs and formulations. (20 / 1/19)

8. **Morarka foundation. Jaipur:**

   No of Beneficiaries: 28 students.

   A visit to **Morarka foundation** gave an insight to the methods of
   Organic farming that was practiced by farmers. Students also learnt the various methods of packaging the range of food products that were being marketed by Morarka Foundation. (22 / 1/19).

9. Saras Dairy, Jaipur:

No of Beneficiaries: 28 students.

The third day of visit at Jaipur gave an experience as to how a very large dairy produces pasteurized milk and other milk products like ghee, paneer, butter, dahi flavoured milk etc. (24 /1/19).

Summer Training:

1. Three SYBSc students were sent as Lab trainee to Export Inspection Agency, Andheri (1st Nov to 20th Nov 2018). They learnt about testing antibiotic Levels in foods like fish, honey and milk. They also learnt the working of instruments like HPLC, GC etc.

2. Summer Internship plan (April/May 2019): NCCS Pune, Breach Candy Hospital and Bhatia Hospital.

7. Training received by faculty from participating departments:

1. PFMS Workshop for office & teaching staff

a) Name: Mr. Pramod Manghi
b) Affiliation: Government representative for PFMS

Beneficiaries: Dr. B.K.N. Singh, Dr. M.Ghayal, Dr. S.Parab, Dr. S.Jain, Non-teaching office staff from accounts department of Jai Hind College headed by Mr. S.Pereira and also accounts department from neighboring colleges like K.C. & St. Xavier's college were invited. All the attendees benefitted from the workshop.

2. Dr Sangeeta Godbole:

1. Participated in 2-day workshop on Research methodology and research data analysis organized by University of Mumbai on 25th and 26th February 2019.
2. Participated in faculty workshop on ICT in Education at Jai Hind College on 15th March 2019.
3. Participated in 2-day faculty workshop on Synergy – the path to academic excellence on 25th and 26th March 2019 at Jai Hind College.

3. Dr Devangi Chachad:

1. Participated in faculty workshop on ICT in Education at Jai Hind College on 15th March 2019.
2. Participated in 2-day faculty workshop on Synergy – the path to academic excellence on 25th and 26th March 2019 at Jai Hind College.

4. Dr Payal Rane:

1. National Hands -on Training Workshop on Innovative experiments in Biological Sciences for College Teachers organized at Homi Bhabha Centre For Science Education, TIFR Mumbai--- 29th August to 04th September 2018.

5. Dr Archana Ashtekar:

1. Two day workshop held at ICT on Extraction and isolation of Phytoconstituents on 8th and 9th December 2018.
2. Participated in faculty workshop on ICT in Education at Jai Hind College on 15th March 2019.
3. Participated in 2-day faculty workshop on Synergy – the path to academic excellence on 25th and 26th March 2019 at Jai Hind College.

6. **Dr Bharati Bist:**

    1. Participated in faculty workshop on ICT in Education at Jai Hind College on 15th March 2019.
    2. Participated in 2-day faculty workshop on Synergy – the path to academic excellence on 25th and 26th March 2019 at Jai Hind College.

7. **Training on HPTLC instrument at Anchrom Enterprises:**

    Attended by: Dr. Sangeeta Parab; Dr. Shilpa Jain; Ms. Khatija Atthar; Mr. Gokul Ganesan

    Outcomes: The training program enriched delivery of theory course content to T.Y. B.Sc. students who have the technique in their theory and also helped in building a connect with the technique and the information that it can provide as TLC is already there as a part of their practical coursework.

8. **Training in Pharmaceutical management at ICT Matunga under PMMMNMTT scheme:**

    Attended by: Dr. Sreela Dasgupta

    Outcomes: The department of chemistry has an applied component at the T.Y. level of Pharmaceutical Chemistry. Owing to the training, Dr. Sreela Dasgupta could integrate a module on pharmaceutical management to her existing applied component class with T.Y. which gave them useful insights & directions into another aspect of the pharmaceutical industry.

9. **Training of Jai Hind faculty on MOOC's Google classroom & moodle:**

    Attended by: All faculty members of Jai Hind College

    Outcomes: The department of chemistry is already into Teaching learning interfaces like Edmodo wherein teachers give the enrolled students e-content, design quizzes and assignments & give their feedback. The department endeavours to add e-tutorials to enrich and augment the class room teaching to make a full module of an online course.

10. Training on HPLC instrument at LCGC:

Attended by: Dr. Sangeeta Parab; Dr. Devangi Chanchad; Dr. Shuchita Deepak; Dr. Manisha Deshpande; Ms. Niloufer Kotwal & Ms. Nissey Sunil.

Trained by: Mr. Charudatt

Outcomes: The training module helped in two ways. It helped in augmenting the theory coursework on liquid chromatography. Teachers could pass on their learning from the training modules and go beyond the books to explain. The training also helped because Jai Hind College has the HPLC instrument at its Central Instrumentation Facility. The faculty members could demonstrate the instrument to students to make their learning about chromatographic technique truly experiential.

11. Training on measurement of physicochemical parameters of water:

Attended by: All staff members of Dept. of Chemistry along with non-teaching staff of the department and students.

Trained by: Mr. Gorakhnath & Mr. Dheeraj Singh

Outcomes: Portable analyzer of various physicochemical properties of water were demonstrated and faculty members were trained hands on. The training module helped in understanding the WHO guidelines and limits of various parameters for potability of water and also the mathematical treatment of data along with the concept of errors in instrumental analysis.

12. Dr. Shuchita Deepak:

1. '**Integrating Applied Bioinformatics in undergraduate Life Science Education'** at St. Xaviers college. Workshop under Star DBT scheme. (3 days workshop).
   Outcome: The knowledge gained helped in teaching Bioinformatics to the undergraduate students. The students benefitted by doing hands on practical's on the computers.
2. '**Cellular and Molecular Biology – from gene cloning to protein expression and localization'** at UM-DAE Centre for excellence in basic sciences Kalina (4 days workshop) . Learnt the various molecular biology techniques and further trained the department colleagues and conducted practical's for the TY students.

13. Ms Petra Sequeira:

1. Workshop on **' ICT In Education'** held at Jai hind College. Learnt how to use 'Moodle' and 'Google Classroom' to enhance their teaching and evaluation skills. These skills will help teachers in generating curiosity among science students.

14. Ms Roonal Kataria:

1. Workshop on **‘ ICT In Education’** held at Jai hind College. Learnt how to use ‘Moodle’ and ‘Google Classroom’ to enhance their teaching and evaluation skills. These skills will help teachers in generating curiosity among science students.

15. Ms Candida Silveira:

1. Workshop on **‘ ICT In Education’** held at Jai hind College. Learnt how to use ‘Moodle’ and ‘Google Classroom’ to enhance their teaching and evaluation skills. These skills will help teachers in generating curiosity among science students.

8. List of exhibitions/seminars/training courses conducted by the college:

Exhibition:

1. Xplore

No of beneficiaries: 112 – Students (FY - 60, SY-40 & TY-12)
Explore: An exhibition by all science departments was conducted on National Science Day (28th Feb 2019). Large number of students participated with exhibits comprising of posters, working & non-working models, products and projects. The following are the exhibits by various classes.

FYBSc

- Fluorescence of highlighter ink
- Theory of Carnot’s engine – model
- Steroechemistry concept of diastereomers – model
- Periodic table with colored boxes – model
- Colours of d-transition elements – poster
- Colorimetry instrumentation - model
- Acid content in soft drinks by pH metry
- Quantum concepts – poster
- Green Chemistry – poster
- Chemical bonding - model
- Bohr atomic structure - model
- Electrochemistry – Cathodic protection

SYBSc

- Extraction of soya oil from soya bean seeds.
- Determination of sugar content in various soft drinks -refractometer
- Extraction of essential oil from orange peel by soxhlet extraction.
- Preparation of soap enriched with essential oils - soxhlet extraction
- Preparation of methyl orange indicator and measurement of wavelength in acidic and alkaline medium – Visible spectrometer
- Extraction of caffeine from tea and coffee -soxhlet apparatus
- Preparation of Werners complexes & using it prepare linkage isomers
- Preparation of methyl salycilate and using it for formulating pain balm
- Preparation of Hippuric acid – heating mantle & stirrers
- Sodium content in chips – flame photometer

TYBSc

- Extraction of flowers by soxhlet method.
- Preparation of soap with flower extracts - soxhlet extraction.
- Synthesis of potential drug scaffolds based on triazoles – heating mantle, magnetic stirrer & vacuum pump
- Extraction of nicotine from tobacco as insecticides - soxhlet extraction.

2. Microbiology dept participated EXPLORE an intracollegiate science exhibition held on 'Science Day' i.e 28th February 2019. FY, S Y and TY students took part putting up 13 Exhibits in the form of posters, exhibits, models, experiments, and reviews in the form of a posters.

FYBSc

- Stem cells.
- Medicinal botany.
- Human microbiome.
- Chromosomal disorders.
- Ebola virus

SYBSc

- Microbial fuel cell.
- Dental plaque and biofilm formation.
- Application of facultative anaerobes.
- Extraction of pectin from orange peels.
- Catechewing *E. coli.*

TYBSc

- Gut microbiota and hormones.
- Quorum sensing inhibitors to inhibit biofilm formation.
- Preparation of cotton nano particles using green technology.

A SYBSc team won a first prize for their work on: Extraction of Pectin from orange peels. EXPLORE helped students in enhancing their scientific curiosity, their creativity, confidence levels , team work, competitive spirit besides others.

Seminars:

1. Conducted a 1 -day Seminar of TY B.Sc. Horticulture students based on their visit and they made presentations in groups on various aspects of Nursery and Garden Management on 22nd August 2018.
2. Student seminar of FY B.Sc. on Gymnosperms and its uses on 2nd March 2019
3. Dr Archana Ashtekar conducted a hands on training programme on "Plant Tissue culture" for FYBSc biotechnology students and TYBSc Microbiology students .

1) Title: **ChemInfo.**

Details of each module-

a) Name of alumini: Mr. Gokul Ganesan & Ms. Unnati Maru
b) Designation: Assistant Professors
c) Duration: 4 hrs
d) Topic of lecture/discussion: Challenges & Opportunities in the field of chemistry.

No of Beneficiaries: 50 (TYBSc & MSc-I & II)

The Department of Chemistry organized 'Cheminfo', an interactive event by alumni of department on Saturday, 22nd December 2018. The event was aimed at fruitful deliberation of ideas, Challenges & Opportunities in the field of chemistry. The alumni had cleared NET/SET examination multiple times and stood high in their studies. The seminar discussed various opportunities for chemistry students, preparing for competitive examinations and various methods of preparation required for various examinations.

2) Title: **Entrepreneurship in Chemistry**

a) Name: Dr. Faisal Ansari
b) Designation: Founder
c) Company: Nova Surface Care
d) Duration: 4 hrs

No of Beneficiaries: 70 (SYBSc, TYBSc & MSc-I & II)

Topic: Entrepreneurship in chemistry.

Faisal Ansari, co-founder of Nova Surface Care and an alumnus of Jai Hind College conducted an interactive talk on possibilities of entrepreneurship in chemistry.

Training:

1) Use and Handling of Autopipettes:

All students of FY, SY and TY (82) were taught the right way of handling micropipettes. There is a conscious attempt to stop the practice of ‘mouth pipetting’ and also use autopipettes for better accuracy as with bioassays and to learn best laboratory practices.

2) Western Blot Technique:

Workshop was conducted for SY and TY Bsc students . With the help of the Molecular Biology Kits the experiment was conducted and students were exposed to the Molecular Biology techniques.

9. Name, designation, host institute of guest faculty invited:

1. Name :Dr. Sunita Shailajan
Designation:Head , Department of Botany
Host institute:RamnarianRuia College
Duration of visit: 3 hours

Topic of lecture/discussion: Role of HPTLC in Herbal science.

Dr. Sunita Shailajan, Head, Department of Botany ,RamnarianRuia College with her team of students gave a lecture on their work on HPTLC. She also emphasized on importance of inter-disciplinary research for eg: Role of HPTLC in Herbal science.

2. Mrs Krupashah Koladia
Designation :entrepreneu
Duration :4 hrs
Topic Biojewellery

Ms Krupashah Koladia conducted a workshop on Biojewellery for TYBSc Botany and Lifescience students in Jan 2019 . She is an ex student of jaihind college and now an entrepreneur. She runs her own business of making biojewellery for brides and festival occassions in the state of Gujarat.

3. Name: Dr. Vijay Gupta
Designation: Director
Host institute: Advion, Sweden
Duration: 4 hrs

Topic of lecture/discussion: **GenNext Mass Spectrometers**

Lecture titled '**GenNext Mass Spectrometers**' was conducted on 23rd January 2019 to introduce bench top mass spectrometers. This helped students to understand the principles of mass spectrometry and the recent development in instrumentation and use of mass spectrometers. Approximately 155 students of all science departments benefitted from the talk.

No of Beneficiaries: 155 (FYBSc, SYBSc, TYBSc & MSc-I & II)

4. Name: Dr Vinita Sangthani
Designation: Associate Professor,
Host institute: University of North Geogia, USA'Public **Health and Epidemiology'**
Duration: 2 hrs

Interactive session wherein the students were made aware of the aspects of disease Transmission with the help of case studies

5. Name: Dr Darshana Salaskar ,
Designation: Scientific Officer ,
Host institute: BARC Mumbai.
Duration: 2hrs

Advanced Technology in Composting: Students gained an insight on the benefits of Biocomposting process at the community Level.

Awareness Programmes:

The models and posters were presented in the explore event organized by the college. Students of nearby schools and colleges were invited. The participants also invited their friends and parents for the said science exhibition on National Science Day held on 28th feb 2019.

(i) Model making:

1. **Fluorescence of highlighter ink:**

   No of participants: 03

   Objectives: To understand the concept about fluorescence and phosphorescence relating it to the jabloski diagram. Further, the students I expected to understand the application based on this.

   Outcomes: Florescence compound of highlighter ink helped the students to understand the change in the colour of the solution when put in the UV- chamber. They were familiarized with the applications. These types of inks are mainly used for warning signs and safety information such as automobile indicators, ambulances, fire engines or breakdown services. Another common application is warning signs and danger symbols. In addition, fluorescent colours, also known as luminous colours, play an important role for advertising purposes. The student also learned about biofluorescence and the use of these compounds in medicine.

2. **Theory of Carnot's engine:**

   No of participants: 03

   Objectives: To familiarize students with Carnot's theorem and so as to understand the practical applications of theorem.

   Outcomes: The poster prepared by the students met the objective. They depicted the theoretical principles and practical applications of Carnot's theorem.

3. **Stereochemistry concept of diastereomers:**

   No of participants: 03

   Objectives: To understand the three-dimensional orientation of groups in space leading to formation of different stereoisomers through models and to understand and explain the differences between enantiomers and diastereomers.

Outcomes: A 3-D model approach to stereoisomerism of organic compounds instilled a greater level of understanding among students in the principal differences between the two types- enantiomerism and diastereomerism. The exercise was also inductive in the sense that students were able to make more number of models for representative compounds and judge the stereochemical relationship between structures.

4. Periodic table with colored boxes:

No of participants: 03

Objectives: To understand the long form of periodic table and their trends across and down the group. Adding the newly discovered elements in the periodic table.

Outcomes: periodicity of the elements was understood well by placing the correct element in an appropriate block and also according to its increasing atomic number across the period**.**

5. Colorimetry instrumentation:

No of participants: 04

Objectives: To teach Beer Lambert's law and instrumentation of Colorimeter. To use to understand internal components & its theory of the instrument.

Outcomes: The students gained the expected knowledge and created a model of the internal components of colorimeter.

6. Chemical bonding:

No of participants: 03

Objectives: To understand the concept of different types of chemical bonding and studying its examples.

Outcomes: The students learned various examples of types of chemical bonding and its application.

7. Bohr atomic structure:

No of participants: 03

Objectives: To understand how the Bohr model of the atom marked an improvement over earlier model.

Outcomes: students could draw the structure of elements upto 20 elements.

Posters

1. **Colours of d-transition elements:**

No of participants: 04

Objectives: to understand the characteristic of d-block elements and their change in colour when acting as a complex ion.

Outcomes: change in the colour of metal solution on addition of ligand solution indicates there is a d-d transition**.**

2. **Quantum concepts:**

No of participants: 03

Objectives: To understand the quantum concepts related to Schrodinger wave equation.

Outcomes: The students gained the understanding of Schrodinger wave equation and its importance.

3. **Electrochemistry:**

No of participants: 03

Objectives: to understand the concept of electrochemistry and its application to various fields.

Outcomes: standard reduction potential of the elements differing in the E_{cell} and its application in various areas to prevent corrosion.

4. **Awareness in schools:**

The TYBSc students visited Girton High School in south Mumbai and the SYBSc. Students visited ‘Abhinav Vidhya Mandir’ at

Borivili a suburb in Mumbai. The Students interacted with the 9th and 10th standard students. With the help of posters actual microscopic observations and lectures they gave them an insight into the 'Wonders of Science' with reference to Microbiology. As a follow up the school students visited the Microbiology laboratory at Jai Hind College to perform basic hands on experiments in microbiology.

Outcomes:

The SY and TY students in turn learnt the art of teaching and interacting with young students.
They were the ambassadors for promoting science. With a very encouraging feedback, the department intends to extend this activity further to other schools. This also helped our students to have a better understanding of Microbiology and enhanced their communication and presentation skills.

10. Date of Advisory committee meeting: 21 August 2018

11. List of New Practicals/demonstrations introduced in different departments in last one year:

BOTANY

FYBSc

1. **Extraction of pigments:**

Extraction of pigments from various fruit and vegetable extracts followed by estimation of λ MAX for each extracted pigment(Polar and non-polar extracts of Watermelon, Black grapes , Pomogranates, Beet and tomato were prepared).
No of beneficiaries: 40

2. **Demonstration of Beer Lambert's Law:**

A lecture was conducted for FYBSc students to explain the principle of Beer Lambert's Law. This was followed by an experiment using coloured solutions of varying concentrations to demonstrate the same.

No of beneficiaries: 40

3. **Comparison of Ecological adaptations Halophytes and Xerophytes:**

Microscopic studies were done to compare the anatomical adptations.

No of beneficiaries: 90

4. **Stomatal mounting:**

Stomatal mounting was done using a different technique were the leaves were boiled in dil. HNO_3 to clear the epidermal tissues to make the stomata more visible so as to see epidermal appendages more clearly.

No of beneficiaries: 92

5. **Chi Square test:**

The practical applications of Chi Square test was demonstrated.

No of beneficiaries: 95

SYBSc

6. **Estimation and comparison of protein content from different pulses:**

Proteins were extracted from different legume seeds and protein content was determined and compared with each other.

No of beneficiaries: 40

7. **Estimation of Vitamin C from different fruits (Seasonal variation):**

Vitamin C was extracted from different fruits available in the market and compared with each other.

No of beneficiaries: 42

8. **Preparation of Permanent Slides for Maize stem (Double staining):**

Hand cut sections were passed through various grades of alcohols and xylol along with staining using safranil and fastgreen. These slides were made permanent.

No of beneficiaries: 40

Effect of 2,4-D on *in vitro* pollen germination:

Pollen were treated with 2,4-D and effect of this chemical on the germination capacity of treated pollen was compared with control samples.

No of beneficiaries: 35

TYBSc

9. **Study of Growth Curve of *E.coli:***

Study of Growth Curve of *E.coli* was studied at varying temperature conditions.

No of beneficiaries: 20

10. **Stomatal mounting from *Bigonia* and *Dracena:***

Stomatal mounting was done using a different technique were the leaves were boiled in dil. HNO_3 to clear the epidermal tissues to make the stomata more visible so as to see epidermal appendages more clearly.

No of beneficiaries: 24

11. **Activity of enzyme nitrate reductase from plant tissues:**

Nitrate reductase activity from bryophyllum leaves was demonstrated.

No of beneficiaries: 22

12. **Preparation of chemical solutions:**

Problems based on normality, molarity and molality for preparation of chemical solutions as required for tissue culture medium preparation as well as for all biochemical as well as physiology practicals.

No of beneficiaries: 24

CHEMISTRY

1. **Experiment:** Preparation of potassium trioxalato ferrate (III) complex & determination of its empirical formula.

Number of participant/beneficiaries: 200 students of FYBSc class

Objectives: To teach preparation of inorganic complexes and to analyse then for their empirical formula by non-instrumental method.

Outcomes: The students learned the importance of complexes in chemistry, stoichiometric calculation for the preparation of inorganic metal complexation, methods of synthesizing complexes and the factors affecting the quantitative formation of complexes. They had the experience of preparing water soluble complexes, their precipitation method and filtration and drying to calculate the yield of product.

2. **Experiment:** Gravimetric estimation of Nickel (II) as Ni-DMG and calculation of % error.

   Number of participant/beneficiaries: 200 students of FYBSc class

   Objectives: To familiarize the preparation of inorganic complexes from ligands, properties of ligands, identification of electron contributing sites, their stoichiometry calculations, theoretical and practical yield calculation.

   Outcomes: The students learned the stoichiometric calculation for the preparation of nickel complexes, idea about ligands and their properties, coordination sites, coordinate bonds, methods of synthesizing complexes and the factors affecting the quantitative formation of complexes which are water insoluble. Students also learned the calculation of theoretical and practical yields.

3. **Experiment:** Vacuum distillation of high boiling organic liquids & low melting solids.

   Number of participant/beneficiaries: 40 students of TYBSc class

   Objectives: To equip & train students with a method (technique) of purification of thermo labile liquids (low melting solid) & concentration of solutions containing biological samples.

   Outcomes: Concept reinforcement: relationship between boiling point and atmospheric pressure. Principle behind rotary evaporation of solvents.

4. **Experiment:** Study of enthalpy of dissolution of potassium nitrate.

   Number of participant/beneficiaries: 200 students of FYBSc

   Objectives: To study change in thermodynamic properties of a system.

   Outcomes: Students learned thermodynamic variables and their measurements. Conceptual differences between heat & enthalpy. Prediction of the effect of temperature on solubility based on molar enthalpy of dissolution.

5. **Experiment:** Simultaneous determination of Fe(II) & Cr (III) by potentiometric titration.

   Number of participant/beneficiaries: 40 students of TYBSc

   Objectives: To teach applications of potentiometer for simultaneous determination of metal ions without separation. Plotting of graph and determination of equivalence point.

   Outcomes: Students acquired knowledge on set up of electrochemical cell. Simultaneous methods of potentiometric determination. Potential variation and with respect to oxidation-reduction/reactivity of metal species. The students learned the plot of the titration method and to determine the concentrations.

6. **Experiment:** Determination of percentage composition of strong & weak acid in a mixture by conductometric titration against strong base.

   Number of participant/beneficiaries: 98 students of SYBSc

   Objectives: To impart knowledge of conductometric titrations, theoretical principles and their use in estimation of acid mixtures.

   Outcomes: Students learned about Coductometric titration methodology, cell constant determination and factors affecting conductometry. Concept of equivalence point. Estimation of acid mixtures, nature of conductometric plots.

7. **Experiment:** Estimation of barium from the given sample conductometrically by precipitation titration with sulphuric acid.

   Number of participant/beneficiaries: 40 students of TYBSc

   Objectives: To teach concepts of conductometric titrations, their applications to various types of titrations and in specific to precipitation titrations.

   Outcomes: Precipitation titrations, their importance and finding equivalence points. Conditions required for precipitation titrations. Nature of plots to determine the amount of sample.
   Applications of precipitations titrations to various ions.

8. **Experiment:** Estimation of aspirin in drug samples.

   Number of participant/beneficiaries: 40 students of TYBSc

Objectives: To train students on the analysis of pharmaceutical drug molecules and selection of methods.

Outcomes: Students learned the analytical methodology for drug analysis and selecting a method. How to prepare sample for analysis and to analyse and calculate the amount of active drug content present in drug formulations. Significance of FDA norms, USP, IP & BP protocols in drug analysis.

9. **Experiment:** Physico-chemical parameters of water samples: TSS, TDS, TS by Water Analyzer.

Number of participant/beneficiaries:

Objectives: To train students on physico-chemical parameters of water and methods of water analysis. Collection of samples from various sources, analyse and compare the results with standard vales of water parameters.

Outcomes: Knowledge on water analysis, physico-chemical parameters of water and their variations depending on sources, approved water analysis manuals and water quality standards. The physico-chemical parameters related to various sources of water and their determination by portable water analyser.

10. **Experiment:** To determine the precision of a digital balance by applying statistical methods.

Number of participant/beneficiaries:

Objectives: To acquaint students with errors and approximation in analytical chemistry, statistical methods in quantifying magnitude of errors, acceptance criteria and mitigating errors.

Outcomes: Students learned the Identification of determinate and indeterminate errors and their calculations. Calculation of mean, median and standard deviations. Applying statistical methods to mitigate errors.

MICROBIOLOGY

1. **Preparation of Stains:**

Learn the use of weighing balance and understand the concept of concentrations.

2. **Effect of Antiseptics on organisms on skin:**

To understand the role of antiseptics and how they affect organisms on skin.

3. **MIC of Crystal Violet:**

Learn the basic technique of dilution and how certain dyes have antimicrobial property. As such dyes are still in use as medicines in rural areas

4. **Minimal growth requirements of Bacteria:**

   To practically see all the ingredients required by bacteria to grow.

5. **Effect of Desiccation on Bacteria:**

   To see the effect of drying on bacteria and understand the importance of moisture for bacterial growth. Also helped them to understand the preservative properties of drying in food.

6. **Effect of various growth parameters (pH, minimal media, temperature and age of culture) on generation time of bacteria:**

   Learn the use of colorimeters and also understand how various physical parameters can affect the rate of growth of bacteria.

7. **Preparation of Solutions:**

   Understand preparation of stock solutions of various molarity and normality and dilutions of the same.

8. **Isolation of sulphur reducing bacteria from soil:**

   Learn the technique of anaerobic cultivation of sulphur reducing bacteria

9. **Handling of micropipettes:**

   Understand the importance of precision in pipetting and learn modern technique

10. **TLC of lipids:**

    Learn separation technique used for oils

11. **Microbial Analysis of Homemade ghee:**

    Learn the use of special media like Gorodkowa’s agar

12. **Rapid platform tests- Specific gravity of Milk, Amount of Acidity, Alcohol Test and Clot Formation:**

    Understand the tests used for determining the quality of milk in short time.

13. **Preparation of Solutions:**

    Understand preparation of stock solutions of various molarity, normality and ppm and do the dilutions of the same.

14. **Quality Assurance of laboratory medium and reagents:**

    Validating the quality of the reagents prepared in the lab.

15. **Enrichment and isolation of anaerobic organisms using GasPak system:**

    Learn the use of GasPak and anaerobic jar and importance of cultivating anaerobic organisms
    Learn the significance of this method in food spoilage and medical (anaerobic pathogens)

16. **SRID:**

    To conceptualize the basic technique in immunology

17. **Ouchterlony double immunodiffusion:**

    Learn the use of antigen antibody reaction

18. **Bioautography of Vitamin B 12:**

    To learn a basic screening technique

19. **Synergistic activity of Antibiotics:**

    Learn swabbing technique and how two drugs can sometimes be better than one.
    Learn aspect of combination therapy especially in an era where drug resistance is on rise.

20. **Biostatistics:**

    Understand the basics of statistics and its role in biological science.

12. Details of equipment purchased in each department from DBT grant.
(item, no., cost, date of order placed, purchase/installation)

BOTANY:

Sr. No.	Purchase/ Installation	Description	Make	Model No.	Noof units	Rate per Unit	Amount	Disc %	G.S.T. 18%	Cumulative
1	30.07.18/ 06.08.18	Electronic Digital Balance	Contech	CB-600	2	15,000.00	30,000.00		5,400.00	35,400.00
2	30.07.18/ 06.08.18	Electronic Digital Balance	Contech	CA-84	1	40,125.00			7222.5	47347.5
3	18.08.18 / 27.08.18	Microtome with Accessories	BESTO	7532	1	42600.00	42600		7668	50268
4	18.09.18 / 27.08.18	Digital pH Meter with Microprocessor based	Equiptronics	EQ 621	1	17,100.00	17,100.00		3,078.00	20,178.00
5	18.09.18 / 27.08.18	Digital Conductivity Meter	Equiptronics	EQ 664A	1	9,310.00	9,310.00		1,675.80	10,985.80
6	18.09.18 / 27.08.18	Digital Colorimeter	Equiptronics	EQ652	1	9,985.00	9,985.00		1,797.30	11,782.30
7	18.09.18 / 27.08.18	Digital Specrophotometer UV-Micropro UV-	Equiptronics	EQ 827	1	78,575.00	78,575.00		14,143.50	92,718.50
8	18.09.18 / 27.08.18	Digital Specrophotometer-VIS	Equiptronics	EQ-820	1	48,285.00	48,285.00		8,691.30	56,976.30
9	18.09.18 / 27.08.18	Digital Specrophotometer-VIS	Equiptronics	EQ-822	1	44,261.00	44,261.00		7,966.98	52,227.98
10	29.10.18	STUDENT MICROSCOPEObjective:10x&40x (S/L)Eye Piece:10xWithout Mech. Stage	Micron	KG-3	25	3,050.00	76,250.00		13,725.00	89,975.00
		Objectives: 100X Oil immersion	Micron		10	950.00	9,500.00		1,710.00	11,210.00
		Objectives: 10X	Micron		8	610.00	4,880.00		878.40	5,758.40

		Objectives: 40X	Micron		25	900.00	22,500.00		4,050.00	26,550.00
		Condensers			4	350.00	1,400.00		252.00	1,652.00
		Eye Pieces: WF 10x	Micron		5	565.00	2,825.00		508.50	3,333.50
		Eye Pieces: 20x	Micron		1	250.00	250.00		45.00	295.00
		Pointers			10	400.00	4,000.00		720.00	4,720.00
		LED Adapter			5	500.00	2,500.00		450.00	2,950.00
		Microscope Camera Device			2	4,000.00	8,000.00		1,440.00	9,440.00
11	29.10.18	Dissection Microscope			15	1,040.00	15,600.00		2,808.00	18,408.00
12 a	01.10.18	Bottle Top Dispenser with recirculation mode, vol range 1 to 10 mL.	Pfact		1	14,800.00	12,580.00	15	2,264.40	14,844.40
12 b	01.10.18	Bottle Top Dispenser with recirculation mode, vol range 0.25to 2.5 mL.	Pfact		1	14,800.00	12,580.00	15	2,264.40	14,844.40
13 a	01.10.18 /08.10.18	Doctor Centrifuge with microprocessor and brushless motar, RPM 6500, With autoclavable rotar for 6 x 15 mL tubes	Neuation		1	39,000.00	33,150.00	15	5,967.00	39,117.00
	01.10.18 /08.10.18	Optional Rotor 8 x 15 ml SS	Neuation		1	6,300.00	5,355.00	15	963.90	6,318.90
13 b	01.10.18	Centrifuge tubes (15ml) with Cap PCT-15-B	Pfact		1	3,200.00	2,720.00	15	489.60	3,209.60
13 c	01.10.18	Eppendorf tubes 1.7ml graduated microcentrifuge tubes	Pfact		2	800.00	1,360.00	15	244.80	1,604.80
14	01.10.18 /08.10.18	Magnetic Stirrer, four position cat no. I Stir quottra - 1200 RPM, capacity 4 x 500 Ml	Neuation		1	24,000.00	20,400.00	15	3,672.00	24,072.00

15	01.10.18 /08.10.18	Magnetic Stirrer, Hot plate stirrer with ceramic top 2200 RPM, cat No. iStir HP 350	Neuation		1	42,000.00	35,700.00	15	6,426.00	42,126.00
16 a	01.10.18 /08.10.18	shaker, cat, No, iShak PS 10/20 Multipurpose Platform Shaker without attachments	Neution		1	65,000.00	55,250.00	15	9,945.00	65,195.00
16 b	01.10.18	Universal platform with adjustable bars (Flask capacity- 13 x 100ml / 13 x 150ml / 9 x 250ml / 6 x500 ml / 5 x 1000ml	Neution		1	5,760.00	4,896.00	15	881.28	5,777.28
17 a	01.10.18	Horizontal Gel Apparatus ready-to-use system with UV- transparent tray with gel gripping design,, apparatus with male connectors, single directional migration(1D), Gel size 7 (w) x 10 (l) cm, two 8 wells PMMA combs 1.5 mm thick.	Technocraft		1	11,900.00	10,472.00	12	1,884.96	12,356.96
17 b	01.10.18	Power supply, Range 80 V,110 V, 140 V, 200 V, single output			2	5,400.00	4,752.00	12	855.36	5,607.36
	16.03.19						4,590.00	15	826.20	5,416.20
18	01.10.18	UV-transilluminator with diffusing UV-transparent window (10 x 10 cm), **two UVA tubes**, Hi-Lo intensity control and viewing hood fitted with binocular filter eyepiece	Technocraft		1	19,500.00	17,160.00	12	3,088.80	20,248.80
19 a	01.10.18	Vertical electrophoresis single sided system, Ready to use, of gel size 7 (w) x 8.5 (l) cm, 1.5 mm four spacers, two comb 1.5 mm, PMMA, 8 wells with male connectors, electrodes, in-built gel casting, single directional migration(1D)	Technocraft		2	10,400.00	9,152.00	12	1,647.36	10,799.36
	16.03.19		Technocraft				8,840.00	15	1,591.20	10,431.20

19 b	01.10.18 /08.10.18	DC power supply range 300 V, 100 mA, constant voltage or constant current modes, autocrossover, two outputs, independent digital displays for mA & V. Input V: 220± 10% at 50 Hz,	ELECTRAS UPREME-100		1	26,500.00	23,320.00	12	4,197.60	27,517.60
20 a	01.10.18	Graduated , fully Autoclavable micropipette Range 0.5-10ul	P'fact		1	3,200.00	2,720.00	15	489.60	3,209.60
	01.10.18	Graduated , fully Autoclavable micropipette Range 2-20ul	P'fact		2	3,200.00	5,440.00	15	979.20	6,419.20
	01.10.18	Graduated , fully Autoclavable micropipette Range 10-100ul	P'fact		2	3,200.00	5,440.00	15	979.20	6,419.20
	01.10.18	Graduated , fully Autoclavable micropipette Range 20-200ul	P'fact		3	3,200.00	8,160.00	15	1,468.80	9,628.80
	01.10.18	Graduated , fully Autoclavable micropipette Range 100-1000ul	P'fact		4	3,200.00	10,880.00	15	1,958.40	12,838.40
	01.10.18	Variable vol. Autoclavable micropipette Range 1000-10000 ul	P'fact		2	4,000.00	6,800.00	15	1,224.00	8,024.00
	01.10.18	Variable vol. Autoclavable micropipette Range 500-5000 ul	P'fact		2	4,000.00	6,800.00	15	1,224.00	8,024.00
20 b	01.10.18	Micro Tips (material PP, Autoclavable), capacity 20 ul , 1000/packet,	P'fact		1	500.00	425.00	15	76.50	501.50
	01.10.18	Micro Tips (material PP, Autoclavable), capacity 2 – 200 ul , 1000/packet	P'fact		1	500.00	425.00	15	76.50	501.50
	01.10.18	P;fact CAT. NO. PF-1000B, Micro Tips (material PP, Autoclavable), capacity 1000 ul , 1000/packet	P'fact		1	550.00	467.50	15	84.15	551.65
20 c	01.10.18	Pipette Macro Volume Tips: 5 ml tip suitable to P'fact A & VA-FA series pipette 2 ml, 5 ml, 0.5 ml-5 ml & 1 ml -5 ml	P'fact		1	600.00	510.00	15	91.80	601.80

	01.10.18	Pipette Macro Volume Tips: 10 ml tip suitable to P'fact A & VA-FA series pipette 10 ml & 1 ml -10 ml pipette	P'fact		1	1,600.00	1,360.00	15	244.80	1,604.80
20 d	01.10.18	Rack (Tip Box)20ul	Technocraft		3	140.00	357.00	15	64.26	421.26
	01.10.18	Rack (Tip Box)200ul	Technocraft		3	140.00	357.00	15	64.26	421.26
	01.10.18	Rack (Tip Box)1000ul	Technocraft		5	150.00	637.50	15	114.75	752.25
21 a	01.10.18	Fixed volume micropipettes Range100ul	Technocraft		2	440.00	748.00	15	134.64	882.64
	01.10.18	Fixed volume micropipettes Range200ul	Technocraft		2	440.00	748.00	15	134.64	882.64
	01.10.18	Fixed volume micropipettes Range500ul	Technocraft		3	480.00	1,224.00	15	220.32	1,444.32
	01.10.18	Fixed volume micropipettes Range1000ul	Technocraft		3	480.00	1,224.00	15	220.32	1,444.32
21 b	01.10.18	Pipette stand for Variable vol.micropipettes with 6 places	Technocraft		1	1,900.00	1,615.00	15	290.70	1,905.70
	01.10.18	Pipette stand for fixed vol. micropipettes with 6 places	Technocraft		1	600.00	510.00	15	91.80	601.80
22	02.12.18 / 04.12.18	Refrigerator	SAMSUNG	RT39K5 518S8	1	40,600.00	40,600.00			40,600.00
23	14.12.18 / 17.12.18	Germin GPS		ETREX 30X	1	16,500.00	16,500.00		2,970.00	19,470.00
24	16.03.19	Gel casting Chamber for tray 7 cm (w) and varying length upto 15 cm	Technocraft		1	3700	3145	15	566.1	3,711.10
									TOTAL	**992,524.88**

CHEMISTRY:

No	Date of PO	Purchase / Installation	Description	Make	Model No	No of Units	Rate/unit	Discount /unit	Total	GST @ 18%	Total
1	18-12-2018	10/1/2019 / 15-01-2019	Refrigerator	samsung	RT39K5 518S8	1	33898.00	0.00	33898.00	6101.64	39999.64
2	19-01-2019	17-01-2019 / 21-01-2019	Vacuum pump with pressure control and gauge	SHREETECH		2	50556.00	50556.00	101112.00	18200.16	119312.16
3	11/9/2018	25-09-2019 /28-09-2019	Water bath with thermostat control - digital	BTI		1	9636.00	0.00	9636.00	1734.48	11370.48
4a	11/9/2018	20-10-2018 / 22-10-2018	Soxhlet Extraction Apparatus with accessories	Prerna		4	1580.00	0.00	6320.00	1137.60	7457.60
4b	1/2/2019	16-02-2019 /18-02-2019	Water circulating pump	LiteKiran		2	1550.00	0.00	3100.00	558.00	3658.00
4c	6/2/2019	07-02-2019 /12-02-2019	Water circulating pump	Prerna		2	1600.00	0.00	3200.00	576.00	3776.00
4d	11/9/2018	20-10-2018 / 22-10-2018	Heating Mantle - 500 mL flask (for Soxhlet)	Prerna		4	1105.00	0.00	4420.00	795.60	5215.60
5a	11/9/2018	06-10-2018 / 12-10-2018	Digital Beckmann Thermometer	Equiptronics	EQ550	1	11500.00	9775.00	9775.00	1759.50	11534.50
5b	22-01-2019	29-01-2019 .31-01-2019	Dewar flask for cryosystem	FrostBite		1	13000.00	13000.00	13000.00	2340.00	15340.00
5c	8/2/2019	18-02-2019	Borosil thermoflask	Borosil		2	895.00	895.00	1790.00	0.00	1790.00
6a	17-01-2019	21-01-2019 / 28-01-2019	Deionised water plant - Single stage	Numatik Engg		1	35540.00	0.00	37340.00	6721.20	44061.20
6b	19-01-2019	31-01-2019 /.06-02-2019	Deionised water plant - 3 stage	Aqua systems		1	39000.00	0.00	39000.00	7020.00	46020.00
7a	11/10/2018	22-10-2018 /05-11-2018	Single beam UV/Visible spectrophotometer	Labman	LMSP-UV1000B	1	58700.00	54591.00	54591.00	9826.38	64917.38

7b	11/10/2018	22-10-2018 /05-11-2018	Single beam UV/Visible spectrophotometer	Labman	LMSP-v320	3	25500.00	23715.00	71145.00	12806.10	83951.10
8	22-01-2019	28-01-2019 /11-02-2019	Field work combined portable analyzer for water analysis	Systronics		1	70100.00	56080.00	56080.00	10094.40	66174.40
9a	11/9/2018	06-10-2018 / 12-10-2018	Digital Potentiometer with accessories	Equiptronics	EQ607	3	12800.00	10880.00	32640.00	5875.20	38515.20
9b	11/9/2018	06-10-2018 / 12-10-2018	Digital Potentiometer with accessories	Equiptronics	EQ601	5	5500.00	4675.00	23375.00	4207.50	27582.50
9c	1/2/2019	4/2/2019	Reference electrode	Equiptronics		9	648.00	550.80	4957.20	892.30	5849.50
9d	1/2/2019	4/2/2019	Platinum electrode	Equiptronics		10	1377.00	1170.45	11704.50	2106.81	13811.31
10	11/9/2018	25/9/2018 / 28/9/2018	Magnetic stirrer	BTI		2	2920.00	0.00	5840.00	1051.20	6891.20
11a	11/9/2018	06-10-2018 / 12-10-2018	Digital Conductivity meter	Equiptronics	EQ-660B	5	8500.00	7225.00	36125.00	6502.50	42627.50
11b	1/2/2019	04-02-2019 /14-02-2019	Conductivity meter - pen type	Equiptronics		1	1112.00	945.20	945.20	170.14	1115.34
12a	11/9/2018	06-10-2018 / 12-10-2018	Digital pH-meter	Equiptronics	EQ-612	1	5400.00	4590.00	4590.00	826.20	5416.20
12b	11/9/2018	06-10-2018 / 12-10-2018	Digital pH-meter	Equiptronics	EQ610	5	8400.00	7140.00	35700.00	6426.00	42126.00
12c	1/2/2019	04-02-2019 /14-02-2019	pH meter - pen type	Equiptronics		1	1112.00	945.20	945.20	170.14	1115.34
13	11/9/2018	06-10-2018 / 12-10-2018	Digital Colorimeter	Equiptronics	EQ650A	5	9000.00	7650.00	38250.00	6885.00	45135.00
14	11/10/2018	22-10-2018 /05-11-2018	Digital Flame photometer with Filters	Equiptronics	EQ850A	1	36000.00	32400.00	32400.00	5832.00	38232.00
15a	11/9/2018	06-10-2018 / 12-10-2018	TDS meter	Equiptronics	EQ-680	2	5500.00	4675.00	9350.00	1683.00	11033.00
15b	1/2/2019	04-02-2019 /14-02-2019	TDS meter - pen type	Equiptronics		1	1112.00	945.20	945.20	170.14	1115.34
16	11/9/2018	27-09-2018 /	Digital balance 200g/1mg	CONTEC		4	16000.00	0.00	64000.00	11520.00	75520.00

		22-10-2018									
17a	11/9/2018	25-09-2018 /28-9-2018	Magnetic stirrer with hot plate	BTI		1	2520.00	0.00	2520.00	453.60	2973.60
17b	11/9/2018	25-09-2018 /28-9-2018	Hot plate	BTI		1	1872.00	0.00	1872.00	336.96	2208.96
18	11/9/2018	25-09-2018 /28-9-2018	Mechanical stirrer	REMI		1	5520.00	0.00	5520.00	993.60	6513.60
19	18-12-2018	10-01-2019 / 15-01-2019	Microwave oven	Samsung		1	4661.00	0.00	4661.00	838.98	5499.98
20	1/2/2019	04-02-2019 /14-02-2019	I R Lamp	Lablink		1	5500.00	4675.00	4675.00	841.50	5516.50
21	11/9/2018	25-09-2018 /28-9-2018	Melting point apparatus metal type	BTI		5	2250.00	0.00	11250.00	2025.00	13275.00
22	5/11/2018	12-12-2018 /19-12-2018	Centrifuge machines	M-TECH		16	2250.00	0.00	36000.00	6480.00	42480.00
23	11/9/2018	25-09-2018 /28-9-2018	Incinerators	INDIAN		15	2250.00	0.00	33750.00	6075.00	39825.00
										TOTAL	**998956.11**

MICROBIOLOGY:

No	Purchase/ Installation	Description	Make	Model No	No of Units	Rate/ unit	Discount %	Total	GST @ 18%	Cumulative
1	1/10/2018	Horizontal Gel Apparatus	TechnoCraft		3	11900	12	31416.00	5654.88	37070.88
2a	1/10/2018	Vertical Electrophoresis single sided system	TechnoCraft		2	10400	12	18304.00	3294.72	21598.72
2b	1/10/2018	DC Power Supply Range 80V-200V single o/p	TechnoCraft		3	5400	12	14256.00	2566.08	16822.08
2c	1/10/2018	DC Power Supply Range 300V, 100 mA			2	26000	12	45760.00	8236.8	53996.8
3	1/10/2018 - 10.10.18	UV Transilluminator	TechnoCraft		1	19500	12	17160.00	3088.8	20248.8
4	1/10/2018	Slimblot (Western Blotting System)	TechnoCraft		1	19500	12	17160.00	3088.8	20248.8
5	24/9/2018-04.10.18	Precision Laboratory Balance	Contech	CAH 223	1	22625		22625.00	4072.5	26697.5
6	24/9/2018-19.10.18	Digital pH Meter with combined electrode	Equiptronics	EQ 610	1	8200		8200.00	1476	9676
7	14/2/2019-20.02.19	Colorimeter Hans 291	Vidyut Kanad	Hans 291	8	8700		69600.00	12528	82128
8a	1/11/2018-28.11.18	Magmaster Monocular Eco Teaching Microscope	Magnus	SM-100	10	15000		150000.00	27000	177000
8b	21/1/2019-04.02.19	Monocular Microscope with LED	Labomed	CXL	5	16000		80000.00	14400	94400
9	20/8/2018-28.11.18	Advanced Laboratory Binocular Microscope	Magnus	MLXi Plus	2	32800		65600.00	11808	77408
10a	24/9/2018-26.11.18	Revolutionary Micro Centrifuge	Remi	RM 12C	1	13950		13950.00	2511	16461
10b	24/9/2018	24 x 1.5 ml Angle Head with Micro Tubes	Remi	RM 1215	1	3600		3600.00	648	4248
11a	24/9/2018-26.11.18	Revolutionary General purpose lab centrifuge	Remi	R 8C	1	16200		16200.00	2916	19116

11b	24/9/2018	16x15 ml Angle Head with polypropylede tube	Remi	R 83	1	3780		3780.00	680.4	4460.4
11c	28/8/2018	Angled Rotor 6x 30 ml	Plasto Craft	200-0049	1	28440		28440.00	5119.2	33559.2
12	24/9/2018-26.11.18	Magnetic Stirrer with Hot plate	Remi	2MLH	1	5580		5580.00	1004.4	6584.4
13	14/2/2019	Cyclomixture	Remi	C-101	1	3822		3822.00	687.96	4509.96
14	2/12/2018-04.12.19	Refrigerator	LG	GLI402RPZY	1	33898		33898.00	6102	40000
15	14/2/2019	Soxhlet Apparatus	BTI	41	1	5355		5355.00	963.9	6318.9
16a	1/10/2018	Fully Autoclavable Micropipette 2-20 ul	P'fact		2	3200	15	5440.00	979.2	6419.2
16b	1/10/2018	Fully Autoclavable Micropipette 20-200 ul	P'fact		5	3200	15	13600.00	2448	16048
16c	1/10/2018	Fully Autoclavable Micropipette 100-1000 ul	P'fact		5	3200	15	13600.00	2448	16048
16d	1/10/2018	Micro Tips capacity 20 ul (1000 per packet)	P'fact		1	500	15	425.00	76.5	501.5
16e	1/10/2018	Micro Tips capacity 2-200 ul (1000 per packet)	P'fact		1	500	15	425.00	76.5	501.5
16f	1/10/2018	Micro Tips capacity 1000 ul (1000 per packet)	P'fact		1	550	15	467.50	84.15	551.65
16g	1/10/2018	Pipette Stand for Micropipettes			12	600	15	6120.00	1101.6	7221.6
16h	3/11/2018	Fully Autoclavable Micropipette 0.5-10 ul	P'fact		2	3500	15	5950.00	1071	7021
16i	3/11/2018	Fully Autoclavable Micropipette 5-50 ul	P'fact		2	3500	15	5950.00	1071	7021
16j	3/11/2018	Fully Autoclavable Micropipette 10-100 ul	P'fact		2	3500	15	5950.00	1071	7021
16k	3/11/2018	Fully Autoclavable Micropipette 500-5000 ul	P'fact		2	4000	15	6800.00	1224	8024
16l	3/11/2018	Fully Autoclavable Micropipette 100-10000 ul	P'fact		2	4000	15	6800.00	1224	8024
16m	3/11/2018	5 ml Micro Tips for 2ml,5ml,0.5-5ml,1-5ml			1	600	15	510.00	91.8	601.8

16n	3/11/2018	10 ml Micro tips for 10 ml, 1-10 ml			1	1600	15	1360.00	244.8	1604.8
17a	1/10/2018	Fixed Volume Micropipettes Range 50 ul	TechnoCraft		30	440	15	11220.00	2019.6	13239.6
17b	1/10/2018	Fixed Volume Micropipettes Range 100 ul	TechnoCraft		30	440	15	11220.00	2019.6	13239.6
17c	1/10/2018	Fixed Volume Micropipettes Range 1000 ul	TechnoCraft		30	480	15	12240.00	2203.2	14443.2
18	24/9/2018	Pipette Pump 25 ml	Polylab		20	350		7000.00	1260	8260
19a	24/9/2018	Bench top Incubator cum orbital shaker	Neolab		1	35190		35190.00	6334.2	41524.2
19b	24/9/2018	SS Lotus Clamp Cap 100 ml	Neolab		4	576		2304.00	414.72	2718.72
19c	24/9/2018	SS Lotus Clamp Cap 250 ml	Neolab		3	567		1701.00	306.18	2007.18
20	24/9/2018-31.09.18	Water Still Cap 4 lit	Medica	7655	1	15916		15916.00	2864.88	18780.88
21a	14/2/2019	Syringe Filter with Membrane Dia 13 mm	BTI	43	1	2375		2375.00	427.5	2802.5
21b	14/2/2019	Syringe Filter with Membrane Dia 25 mm	BTI	43	1	2625		2625.00	472.5	3097.5
22	14/2/2019	Petri Dish Turn Table			8	900		7200.00	1296	8496
23a	24/9/2018	Water Bath Thermostatic	Medica		1	9861		9861.00	1774.98	11635.98
23b	24/9/2018	Water Bath Lid	Medica		1	1341		1341.00	241.38	1582.38
24	14/2/2019	UV Cabinet 3 tube	BTI	49	1	5610		5610.00	1009.8	6619.8
									TOTAL	**1007610**

13. Details of books & journals subscribed from DBT grant.

Nil

14. Qualitative improvements due to DBT support. Please highlight (5 salient lines)

- Increase in number of equipments with high precision ensured a narrow student to instrument ratio & performance of more number of experiments beyond their curriculum in shorter duration of time.
- Funds provided by STAR-DBT has made it possible to procure latest equipments with varying degree of automation which has (a) helped increase the accuracy of results & (b) offered students more exposure, hence become more employable in research institutes and firms.
- Funding by DBT helped students in learning good laboratory practices like (a) a conscious attempt to reduce the practice of mouth pipetting and use auto-pipettes; (b) use of bottle-top dispensers to minimize wastage of solvents; (c) use of melting point apparatus, techniques like vacuum filtration etc. for energy efficiency.
- A better understanding, evident from the enthusiasm of students in experiments beyond curriculum could be achieved which has helped departments to fill the lacunae in their respective syllabi.
- Research aptitude could be developed and harnessed in students as a result of all the activities undertaken by departments including projects, experiments, awareness programs, scientific invited talks etc.

15. Problems faced, if any, in implantation of the programme and utilization of DBT grant (in two-three lines)
NIL

Name of the Department:	Microbiology	
	Number of participants/beneficiaries	Brief details (Special achievements/highlights)
A) Student Information:		**T.Y.BSc** a. Rhitam Biswas: Winner (3rd Place): 20th National level MicrobiOlympiad b. Tanvi Nirgude: Winner (1st Place): E-SHODH c. Tanvi Nirgude: Winner (2nd Place): BioCovid Poster Making (K.C College) d. Tehreem Shamsi: Winner- consolation prize: Microfiesta (K.C College) **S.YBSc** a. Shamsi Tabassum Tanveer, Shivesh Tripathy & Yougesh Sharma : Winners (1st Place): 20th National level MicrobiOlympiad **F.YBSc** a. Nair Rohit: Selected as Finalist for last round of 20th National Level MicrobiOlympiad
List of projects undertaken	SYBSc -19 (1-4) TY -21 (5-8)	**Review writing by SYBSc students-** **Common Learning Outcomes:** Students learnt to differentiate between research paper and a review article. Learnt about literature review, plagiarism. Students were exposed to learning skills like how to find good research papers, use the right keywords for searching information on the internet. Soft skills like communication, team building and time management were improved 1. Major developments in Alzheimer disease therapeutics and future implications **Learning Outcomes:** Learned about Alzheimer and therapeutics available for it.

2. Genome imprinting
   Learning Outcomes: Gained insight into epigenetics and genetic disorders.

3. Influence of gut microbiota in mood disorders
   Learning Outcomes: Gained insight into the world of microbiome. This helped them in understanding the role of normal flora and its implications.

4. Foodborne pathogens associated with semi hard cheese made from raw milk
   Learning Outcomes: Learnt about various foodborne pathogens, methods to isolate and identify them. Understood the microbiology of cheese making.

Online Survey by TYBSc students
Common Learning Outcomes: Students learnt how to make survey forms, types of questions that can be included, hypothesis setting and applying their biostatistics knowledge. They gained confidence in using statistical tools. Students' soft skills were improved

5. Dependency and Psychotropic(stimulating) effects of coffee among youth

Objectives:

- To figure out the different factors that cause addiction or rather dependence on coffee among people ranging from 15 to 30 years of age group.
- To find out their daily coffee consumption habits during Pre and Ongoing COVID period.
- To figure out whether people are aware of their daily caffeine intake doses.
- To check the effects on people when they don't consume coffee

Outcomes:

Gained insight on the coffee consumption habits of a person and also the effects on a person's physical and mental health were studied.
Dependency of people on coffee before and during the COVID period was studied
Awareness of coffee addiction in the population was noted.

6. Health impact of processed food

Objectives:

- To understand the perception of society towards processed food.
- To assess the food intake pattern in the population and determine the prevalence of processed food consumption.
- To evaluate and study the correlation between the processed food intake and the prevalent health conditions.
- To study the importance of nutrient rich diet from the collected data.

Outcomes:

Based on the responses it was concluded that due to changing lifestyle there was a rise in the processed food consumption. Also the consumption of processed food affects the health on a large scale. The most common were obesity, acidity, skin problems. In the end, we were able to conclude that the people are now adapting to healthy ways of living. They prefer healthy, nutrient rich food over convenience food.

7. Effects of spicy food on health

Objectives

- To evaluate the association between the frequency of consumption of spicy foods and the prevalence of common health ailments associated with spicy food intake.

Outcomes:

This survey provided us knowledge about the consumption of spicy food and the various health effects that could be caused by it. Also it was noted that the consumption of spicy food was not the major cause

		of the health effects in healthy people but there could be other factors which need to be studied. 8. Comparative study of human population consuming balanced diet in pre and during lockdown periods **Objectives** • To check awareness about a balanced diet. • To study dietary patterns in pre and during lockdown period. • To study the effect of lockdown and changes in diet. **Outcomes:** Dietary habits and food quality play an important role in improving the overall health and immunity that will help to tackle the virus. This study provided insights on how people are reacting to the pandemic with respect to their dietary habits. Though people incorporated healthy food in their diet, consumption of junk was the same during both the periods.
Visits to research institutes/industries		NIL
Summer training (organized in college dept/students sent to other institutes)		NIL
B) Faculty information:		
Faculty trained for skill improvement		**<u>Number of training modules:</u>** Names of each along with beneficiaries (list of names) **Ms. Roonal Kataria** 1. Coursera Courses: • Completed Course on Summary Statistics in Public Health, Johns Hopkins and Understanding Research Methods, University of London 2. FDP:

		• Trained under the TEACH(Technology in Education for Active Content Harmonization) initiative of Jai Hind college • 3 days Workshop on Online college management and online content creation tools from 30th Apr to 2nd May 2020. • 2 Days Workshop on 'Online teaching and E-Content' organized by HSNC University and IIDE on 16th and 17th May, 2020 • 3 days Workshop on New Age tools for teaching Online organized by Academisthan from 28th-30th June, 2020 3. Webinars: • Fine tuning Research Planning using Elsevier tools: Science Direct, Scopus and Mendeley organized by K.J. Somaiya College in collaboration with Elsevier on 25th April, 2020 • HPTLC- Method Development and Validation organized by IOS And Anchrom on 20th- 21st May, 2020 • Instrumental Techniques in Analysis organized by Dpt of Chemistry, JHC from 27th to 30th May, 2020 • Changing Roles of Digital Platform organized by TAF, JHC on 8th June, 2020 • Bioinformatics: Concepts, Tools and Database organized by K.J. Somaiya College on 27th and 28th July, 2020 **Dr. Shuchita Deepak** • Did course on Fundamentals in Immunology- Innate immunity and B cell function from Rice University under Coursera • Trained under the TEACH(Technology in Education for Active Content Harmonisation)initiative of Jai Hind college • Attended IIDE's Online teaching masterclass on 25th April 2020 • Attended 3 days FDP on Online college management and online content creation tools from 30th Apr to 2nd May 2020. • Attended Webinar symposium on Taming the beast of inflammation-COVID-19 on 29th April 2021

		Ms. Candida Silveira
		• Completed Course on Ecology: Ecosystem Dynamics and Conservation, American Museum of Natural History through Coursera
		• Completed Course on Summary Statistics in Public Health, Johns Hopkins through Coursera
		• Attended A 2 Days Workshop on 'Online teaching and E-Content' organised by HSNC University and IIDE
		• Trained under the TEACH(Technology in Education for Active Content Harmonisation)initiative of Jai Hind college
		• Attended the following Webinars: On
		  • New age tools for Teaching Online: Academisthan
		  • Changing Roles Of Digital Platform: Teacher's Forum, Jai Hind College
		  • Patent and Patent Processing, Varde College
		  • High Performance thin layer Chromatography: Anchrom and IY College

C) Dept. information		
Awareness programs		**Science awareness programme** Continuing the programme, the students of SYBSc were distributed in groups of 5 students. Each group was to make a presentation on the role of Microbiology in day to day life and careers in microbiology/ allied fields and interact with school students through Google meet. School students from standard 8th, 9th and 10th from the following schools were invited. Mother Haleema Public School, BHADOHI, UP St. Peter's School, Mazgaon, Mumbai Abhinav Vidya Mandir, Borivali, Mumbai **Digi-Diwali**: An initiative to bring together traditions and technology for a celebration. Diwali is a festival which celebrates the triumph of good over evil and

		keeping this in mind we Jai Hindites didn't let the pandemic crush our festive spirits and suggested joyous but safe ways to celebrate Diwali to various housing societies over Google Meet. Number of beneficiaries- More than 50 people from different housing societies attended the webinar on 10th November, 2020. **Video Making on Food Adulteration: TYBSc students made videos to detect common food adulterants at household level** **Objectives:** • To help students improve their creative skills • To help them build confidence (Facing the camera) • Apply the different adulteration tests using household items • Learn skills of video making and video editing • The idea was to create social awareness • Links of few videos on our Social Media account: https://fb.watch/5g1KxHN2-c/ https://fb.watch/5g1NNh3gyT/ https://fb.watch/5g1OYL2BhS/
Exhibition	Xplore	XPLORE helped students in enhancing their scientific curiosity, their creativity, confidence levels, team work, and competitive spirit besides others. FYBSc 1. Alzhiemer's disease - Srishti Hirani & Sarah Kazi 2. Difference between DNA & RNA - Isha Gosrani & Radha Deshpande 3. Renewable energy resources - Vaibhavi Umare & Sejal Khanvilkar 4. Phage display - Rohit Nair & Shubham Prabhudesai 5. Biofertilizers - Sanjana Dubey & Jyoti Choudhary

		6. Environmental sustainability - Ishika Mehta & Manal Qureshi 7. Plant hybrid - Santoshi Shah 8. Lichens - Ishita Pancholi & Indrayani Palande 9. Neuroscience - Sakshi Powar & Tanushree Patil SYBSc 1. CRISPR - Idris Aasmeen & Anam Khan 2. Bioplastics - Sakshi Powar & Tanushi Maini 3. Moody microbes- How microbes influence our mood - Shamsi Tabassum Tanveer 4. Microbial evaluation of raw milk from diary farm.- Jitendra Singh & Ankita Kumari 5. Innate Immunity - Tanzeela Khanam & Laraib Hashmi 6. Bioremediation - Vaishnavpragya Pandey & Preeti Gupta TYBSc Health impact of processed foods - Namira Qureshi
Seminars	Nil	Nil
Training programs		**Introduction to Data Analysis for Biologists:** The speakers for the workshop were - Dr. Sonal Dasani (PassionEdx foundation) and Dr. Rohan Gavankar (Asst. Prof. - Viva College). **Number of beneficiaries**: The workshop was conducted in two batches and over 100 participants. First batch (25th & 27th January, 2021) consisted of the students & teachers of Microbiology & Botany depts. The second batch (15th & 16th of February 2021), consisted of the teachers and students of the Life Sciences & Biotechnology depts. respectively. **Learning Outcome:** • Students and teachers were introduced to basic Biostatistics tests (t-test, ANOVA, chi square analysis. etc) • Hands on experience in use of MS Excel to collate data and use statistical tools

		• Use of Biostatistics in Science, Data Representation, Interpretation and Problem solving
Guest faculty invited by different participating departments	Number of modules: **03/ 2 hours each** Details of each module- a) Name: b) Designation: c) Host institute: d) Duration of visit: e) Topic of lecture/discussion:	**1. Topic of Lecture/discussion: Relevance of Microbiology in changing Times** a. Name: Mr Amit Rao b. Designation: Director, Sai-Biotech c. Host institute: Jai Hind College d. Duration of visit: 4th May, 2020 e. Objective: • The importance of Microbiology Post COVID Era • The Opportunities and Skills required by graduates pursuing a career in Industry f. Outcomes: • The speaker gave a brief about the relevance of Microbiology post COVID • Different fields allied to Microbiology were discussed by the speaker • Different skills required by students was discussed along with some learning and studying strategies/ techniques g. Number of beneficiaries- 54 (FY,SY and TY Microbiology) **2. Topic of Lecture/discussion: How to read scientific literature** a. Name: Dr. Anupama Harshal W b. Designation: Consultant, Science Communication and Public Engagement c. Host institute: IQAC and Bioscience Departments, Jai Hind College d. Duration of visit: 29th May, 2020 e. Objective: • To guide students how to carry out literature review • To provide our students and faculty with an opportunity to be associated with the famous "Manav – The Human Atlas Initiative" project.

		f. Outcomes: • The speaker explained the entire process of how scientific literature is read and understood in a lucid manner. g. Number of beneficiaries- 190 **3. Topic of Lecture/discussion: Building your path: Career opportunities for Bioscience graduates in industries** a. Name: 1)Dr. Vishal Dawkar and 2) Mr. Nitin Mali b. Designation: 1)Senior Research Scientist, Mitcon Biopharma 2) Manager, Mitcon Biopharma c. Host institute: IQAC and Bioscience Departments, Jai Hind College d. Duration of visit: 06th June, 2020 e. Objective: • The different opportunities for students in pharmaceutical companies • The educational and skill requirement • Scope for Bioscience graduates in industrial scenarios f. Outcomes: • The speakers gave a brief description about different aspect of a pharmaceutical industry (Mitcon) and pointed out the different avenues opened for all Bioscience students • Explained in brief the Clinical research feature of drug trials • Talked about the different fields eg. Tissue culture, Health care, Agriculture • Spoke about the skills and strength needed by students when pursuing a career in industry • Gave a detail explanation on different entrance exams and fellowships/ scholarships for higher education and academic research both in India and Abroad • Also informed about the Incubator centres for Entrepreneurs g. Number of beneficiaries- 108 **4. Topic of Lecture/discussion: Molecular Diagnostics**

		a. Name: Dr. Mrunal Warke b. Designation: Dy. QA Manager, HiMedia Laboratories c. Host institute: IQAC and Bioscience Departments, Jai Hind College d. Duration of visit: 17th June, 2020 e. Objective: • Advances in the field of Molecular Diagnostics • The importance of Molecular diagnostics in detection of Covid f. Outcomes: • The speaker gave an overview of different techniques used for Molecular diagnostics • Applications of different molecular techniques in diagnostics were discussed by the speaker • Principles of kits developed for Covid detection by Himedia were discussed by the speaker g. Number of beneficiaries- 85 **5. Topic of Lecture/discussion: Nature Driven Life Journey** a. Name: Mr Rahul Kolekar b. Designation: Owner of Conservada Aquatics and Conservada Outdoors c. Host institute: Dpt of Botany and Microbiology in association with Nature Club d. Duration of visit: 22nd September, 2020 e. Objective: • To explain the importance of conservation of resources • To inspire students to set up home garden with available resources f. Outcomes: • This was an interactive session where the speaker provided solutions for problems encountered during farming. • Students were encouraged to follow a minimalistic lifestyle where one uses whatever is needed and doesn't waste resources. • Also simple ways for setting up a kitchen garden, kitchen compost and butterfly garden was explained

		g. Number of beneficiaries- 169 **6. Topic of Lecture/discussion: Diet Planning** a. Name: Ms Tasneem Ravat Navagharwala b. Designation: Visiting Faculty, Nirmala Niketan College c. Host institute: Dept of Microbiology d. Duration of visit: 22nd October, 2020 e. Objective: • To understand the importance of balanced diet and healthy lifestyle • To learn the concept of constructing meal plans based on the need of an individual f. Outcomes: • Role of different food groups and their proportions required in diet was explained • Students were taught to calculate the calorie intake based on their lifestyle and accordingly plan a menu chart, distributing the different food groups g. Number of beneficiaries- 60 **7. Topic of Lecture/discussion: A Peep into the World of the Mighty Microbiome** a. Name: Dr Vikrant M. Bhor b. Designation: Scientist (Department of Molecular Immunology & Microbiology, ICMR-NIRRH, Parel, Mumbai) c. Host institute: IWAS, BRNS-DAE and Dept. of Microbiology d. Duration of visit: 30th Jan, 2021 e. Objective: • To spread awareness and understanding of what Microbiome means, its importance and significance. • Recent advances in the field and its impact • Provide an overview of the basic concepts, tools and techniques as well as current and potential applications of the microbiome. f. Outcomes.

		• The students had a chance to interact with Dr. Bhor who explained very systematically the role of Microbiome • Its role and impact especially in the medical field (including diagnosis and therapy of human and animal diseases as well as environmental remediation) • Recent advances in sequencing technologies that has revolutionized the field • The development of non-culture based approaches such as 'metagenomics' • Cataloging microorganisms present in different environmental niches • Next generation sequencing (NGS)' technology and data analysis g. Number of beneficiaries: 100 (Students, Teachers and Others) **8. Topic of Lecture/discussion: Vaccines: Types and Manufacturing** a. Name: 1) Dr Neelam Sirsat, 2) Dr Sunil Prabhu b. Designation:1) ACTREC 2) Vaccine facility startup and Sterile Manufacturing c. Host institute: IQAC and Dpt of Microbiology d. Duration of visit:15th March, 2021 e. Objective: • To make the students aware about the industrial manufacturing process for vaccines, • The different parameters, steps and tests involved • To learn different types of vaccines esp for COVID-19 disease. • To give students a glimpse of the recent research in the field f. Outcomes: • Students were made aware about the different types of vaccines available for Covid-19 and the various aspects involved in large scale production of vaccines. g. Number of beneficiaries- 66

		9. Topic of Lecture/discussion: Entrepreneurship and Tech Startups: Challenges and Opportunities a. Name: Dr Rahul Nabar b. Designation: Consultant & Chemical Engineer c. Host institute: IQAC and Dpt of Microbiology d. Duration of visit: 24th March, 2021 e. Objective: • To help understand the basics of starting a start-up. • The different parameters to be kept in mind from getting capital finance to executing a project and building up a company with real life examples. • To inspire students and to open another career option. f. Outcomes: • The speaker discussed the various challenges one may face while initiating a start -up and ways to go about the process. • He also enlightened the participants about the different agencies working in the sector to help small startups. • Case studies involving successful entrepreneurs with Indian perspective were discussed g. Number of beneficiaries- 28 (TYBSc)
Techniques adopted	List new techniques developed/adopted by departments	NIL
Practical incorporated	List new practicals incorporated as STAR-DBT experiments along with student beneficiaries and learning outcomes etc.	Since this year there was a constraint with doing physical practicals, we shifted to use of Virtual labs. Few practicals which were done using resources from freely available virtual labs 1. Bioinformatics (TY students - 21) 2. Use of light microscope (FY students - 37) 3. Use of micropipettes (FY students - 37)

		4. Differential staining technique - Gram's Stain (FY students - 37) 5. Problem Solving: Normality and Molarity. Revision on ppm, percentage and grams conversion. (SY students: 20)
Minor Research Projects		NIL
Any inter departmental activities		Webinars were conducted in association with Biosciences Department to benefit all the students
D) Impact of DBT support to the department:		• The motivation to conduct several online webinars was because of the DBT Star. • The research exposure in the initial years encouraged the students to work in association with TIFR. 24 students from SY and TYBSc class are working on "Comprehensive assessment of literature on malnutrition in both pre-clinical and clinical models for hypothesis generation."
E) Any other information not covered above		• Innovative teaching methodologies were tried by teachers. We made videos of our lectures and uploaded it to help students learn at their own pace. • The first newsletter of the Department was released.

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Department of Chemistry (2020-21)

Proforma for submission of progress reports by colleges supported under Star College Scheme

6. List of projects undertaken by students, industrial visits by students, summer training in last one year:

Projects			
SNo.	**Students Name**	**Year**	**Title & description**
1	Abbas Attarwala	TYBSc	Computational study of Azo compounds. **Objectives:**To study pharmacokinetics and drug likeness properties of molecules. **Outcomes:** Students got exposure to new software like ADMETsar, Dockthor and understood concepts like pharmacokinetics and molecular docking.
2	Heena Tahsildar Sakina kantawala	TYBSc	Ionic Liquid and its application. **Objectives:** To study new material used for synthesis in chemistry. **Outcomes:** Students understood the concept of Ionic Liquids and its application in the field of chemistry.
3	Anshika Jain Shalini Mishra	TYBSc	Spiro compounds and their applications in pharmaceutical chemistry. **Objectives:** As apart from their syllabus students took a due interest in elaborating the examples and put them on a poster. **Outcomes:**Students were able to understand that spiro molecule & its application in pharmaceutical chemistry.
4	Fatema Somjee Seeta Varma	TYBSc	Purification of water using waste materials from the kitchen. **Objectives:** To study various methods to purify water using eco friendly methods and also convert wasteful material into useful materials. **Outcomes:**Students learned various methods to purify waste water using waste material from the kitchen. They also learn how to be eco friendly.
5	Pranshu das Vidhi garg	TYBSc	Conductive polymers **Objectives:**As apart from their syllabus students took a due interest in elaborating the examples and put them on a poster. **Outcomes:**Students were able to understand the working and concept of conducting polymers along with new examples.
6	Anjitha Puthillam	TYBSc	Green Synthesis of Silver Nanoparticles

			Objectives: To study new and green methods to synthesize nanomaterial. **Outcomes:** Students got exposure to new concepts like nanoparticles and green synthesis.
7	Virali soni Kashish sagar	TYBSc	Materials absorbing RADAR **Objectives:** To study the specialist class of polymer-based material applied to surfaces **Outcomes:**Students got exposure to the material chemistry and application of polymers in advanced functional materials.
8	Sanjana Gohil Jyoti hazra	TYBSc	Boron Chemistry and Applications in cancer treatment **Objectives:**As apart from their syllabus students took a due interest in elaborating the examples and put them on a poster. **Outcomes:** Students were able to understand the chemistry of Boron and its potency to treat cancer.
9	Rushabh Chheda Fatema Pardawala	SYBSc	Aerogel- The Frozen Gas **Objectives:** To study new innovations in recent years chemistry **Outcomes:** Students got introduced to new concepts of aerogel its preparation, mechanism and application in the field of chemistry.
10	Meher.V.Bhagwagar Jafrin Sayad	SYBSc	Dye-Sensitized Solar Cells (DSSCs) **Objectives:** To study the emerging renewable field of energy and chemistry behind DSSC. **Outcomes:** Students were able to understand the fundamentals of photovoltaics, thin-film solar cells and the advantages of DSSC over silicon counterparts.
11	Aarti Raksha Shetty	SYBSc	Multicomponent Reaction a blessing in organic chemistry. **Objectives:** To understand the new synthetic methodologies in organic chemistry **Outcomes:** Students were able to understand the concept and importance in synthetic organic chemistry.

12	Mahenoor Khan Athira nair	SYBSc	LIQUID CRYSTALS **Objectives:** To understand the state of matter which has properties between those of conventional liquids and solid crystals. **Outcomes:** Students were able to understand the concept and its extensive application specially in pharmaceuticals.
13	Shubham Jagtap Poornima Bisoi	SYBSc	Nanomedicine **Objectives:** To understand the medical application of nanomaterials. **Outcomes:** students can understand the use of nanomaterials for diagnosis, monitoring, control, prevention and treatment of diseases.
14	Rakshita Shetty Khushi Sharma	SYBSc	Crown ethers **Objectives:** To understand the chemistry and applications of crown ethers. **Outcomes:** Students were able to understand the working and concept of crown ethers and their potential application in various fields.
15	Sakshi Bhise	SYBSc	Cosmetic Chemistry **Objectives:** To understand the principles and basic chemistry involved in cosmetics **Outcomes:** Students could understand the theory and application to cosmetics chemistry.
16	Laxmi Kaundar Shreya Mishra	SYBSc	Nuclear waste and its disposal **Objectives:** To understand the waste management system generated by Nuclear power plants **Outcomes:** Students were able to understand the importance of nuclear waste management.
17	Suwaiba Sopariwala	SYBSc	Belousov-zhabotinsky Reaction **Objectives:** To understand non-equilibrium thermodynamics in a chemical reaction. **Outcomes:** Students got to know Belousov- zhabotinsky reaction mechanism.
18	Abhay Rajak Natasha Narkar	FYBSc	Nanochemistry **Objectives:** To understand scope and

			applications of nanochemistry **Outcomes:** Students were able to explore the world of nanochemistry.
19	Shaikh Abdul azeem	FYBSc	Hydrogen as fuel **Objectives:** To introduce students with the energy crisis and how to deal with it. **Outcomes:** Students were able to understand the importance of Hydrogen gas as a fuel.
20	Samreen Mirza	FYBSc	Antipsychotics- the "anti-mental"pills **Objectives:** To introduce students with medicinal chemistry. **Outcomes:** Students could understand the drug and its physico-chemical effect.
21	Shrivastav Priya Santosh Shaikh Bushra Shahid	FYBSc	Impact of Graphene in Nanotechnology. **Objectives:** Introduction to nanotechnology **Outcomes:** Students could understand the importance & application of graphene and graphene based nanostructure.
Trainings			
1	Online Laboratory Training on HPLC using Agilent Infinity 1220 instrument of Central Instrumentation Facility of the College.	30/01/2021	An online training for sample preparation for HPLC & analysis was conducted by Mr. Gokul Ganesan followed by a talk on principles of chromatography by Dr. Ragni Desai. The session involved preparation of mobile phase, set up of the instrument including base line stabilization & correction, sample injection and analysis of chromatogram. 23 students of T.Y. & M.Sc. classes attended the session.
Visits			
	Nil		

7. Training received by faculty from participating departments:

Title	Description
Transition to online facilitation	Mr. Gokul Ganesan successfully completed a blended online workshop organized by NPTEL team of IIT, Madras from 6th May 2020 to 3rd June 2020. The workshop covered a variety of aspects of online education and the transition from traditional classroom to e classrooms.
TEACH: Technology in Education for Active Content Harmonisation	The initiative was kick started on 21st April 2020 & periodic tutorials were sent to all faculty members of the college to help them get started with online education. Mr. Gokul Ganesan was one of the facilitators of TEACH initiative and all the faculty members of the Chemistry department were a part of the training sessions.

8. List of exhibitions/seminars/training courses conducted by the college:

Seminars

Title	Beneficiaries	Description
e-Shodh - **Online Research Meet** "Impact of COVID – 19 on economy, society, international politics, Higher education, literature, media, personal or Public Health, Psychology, Management, e–commerce, Mobility, technology, research, entrepreneurship, Tourism, Research and Innovation." 11 th May to 13 th May 2020.	Total papers - 131 (all streams) Total registrations - 308	It was a national level research meet where students all across India got an opportunity to present their research work.
Instrumental Techniques In Analysis Day 1: Flash & preparative chromatography Day 2: Flow Chemistry, BT- NMR & Compact- MS Day 3: Thermal methods of analysis	Total registration- 1768	"The Department of Chemistry organized a Webinar series from 27th to 30th May 2020 on instrumental techniques. **Resource Persons:** • Mr. Karthik Bhat, Product Manager Inkarp Instruments Mumbai, Industry Experience: 14 years • Dr. Premchand Jain, GM Thermal Analysis Division, Hitachi High-Tech; Industry Experience: 35 years • Dr. Manjusha Phanse, Application Specialist, Anchrom Enterprises Pvt. Ltd.
A one day webinar on 'Review - New Norm in Scientific Research'.	158	Webinar on the recent trends and how to start a scientific research. Arriving at a scientific problem to solve and developing into a research topic..
Science popularization program - Swami Shyamanada High School, Bhatwadi. **(Chemistry Outreach Program)**	78	Graduate level students participated and showed experiments virtually followed by a quiz to around 78 participants including school science teachers.

Workshops

Sr.No	Title	Resource Person	Beneficiaries

Training Courses/Bridge Courses

Sr.No	Title	Resource Person	Beneficiaries
1.	Bridge course in Mathematics for Chemists from 02/02/2021 to 22/02/2021. Link: Detailed Schedule (Refer Annexure-I)	Dr. Sangeeta Parab Dr. Shilpa Jain Ms. Aksh Hina Shaikh	51 Beneficiaries Course Objectives (Annexure-II) Attendance (Annexure-III)

Lectures

Sr.No	Title	Resource Person	Beneficiaries
1	Career Opportunities in Perfumery on 05/12/2020	Mr. Nishit Doshi	66

1	Career Prospects In Pharmaceutical Industry on 12/12/2020	Dr. Rajiv Desai	229
2	EDUBOARD on 19/12/2020	Devyani Bhandari Mehershad Wadia Janhavi Damani Ankur Awasthi	180
3	CHROMA-GRAPHY on 30/01/2021	Dr. Ragni Desai	23
4	Research in Material Science on 06/02/2020	Dr. V.R.Patil	231
5	HPTLC	Prof. Dr. Sunita Shailajan	181
6	Career Opportunities in Biological Sciences and Chemistry	Dr.Purvi Bhatt Dr. Sudeshna Chandra	450

9. Name, designation, host institute of guest faculty invited:

Name	Designation	Host institute
Mr. Nishit Doshi	Perfumer	S.H. Kelkar & Company, Mumbai
Dr. Rajiv Desai	Head, Corporate Quality Manager	Lupin India Limited, Mumbai
Ms. Devyani Bhandari	Pursuing MS in Biomedical Forensic Sciences	Boston University, USA
Mr. Mehershad Wadia	Pursuing MS in Molecular Biology	University of Queensland, Australia
Ms. Janhavi Damani	Pursuing Ph.D. in Physiology	Pennsylvania State University, USA
Mr. Ankur Awasthi	Pursuing Ph.D. in Chemistry	University of Victoria, Canada
Dr. Ragni Desai	Officer- Technical Analyst	Amvigor Organics Pvt. Ltd, Mumbai
Dr. Vishwanath R. Patil	Associate Professor	University Department of Chemistry, University of Mumbai
Dr. Sunita Shailajan	Associate Professor & Head	Department of Botany, Ramnarain Ruia College
Dr. Purvi Bhatt	Professor at Sunandan Divatia	NMIMS, Mumbai
Dr. Sudeshna Chandra	Professor at Sunandan Divatia	NMIMS, Mumbai

10. Date of Advisory committee meeting: 24-11-2020

Members in attendance: Dr. Ashok Wadia, Dr. Garima Gupta, Dr. Meenakshi Munshi, Dr. Sunita Shailajan, Dr. Surekha Zingade, Dr. Ambika Joshi, Dr. Madhura Ghayal, Dr. Petra Sequeira & all the members of Botany, Chemistry & Microbiology Departments.

11. List of New Practicals/demonstrations introduced in different departments in last one year:

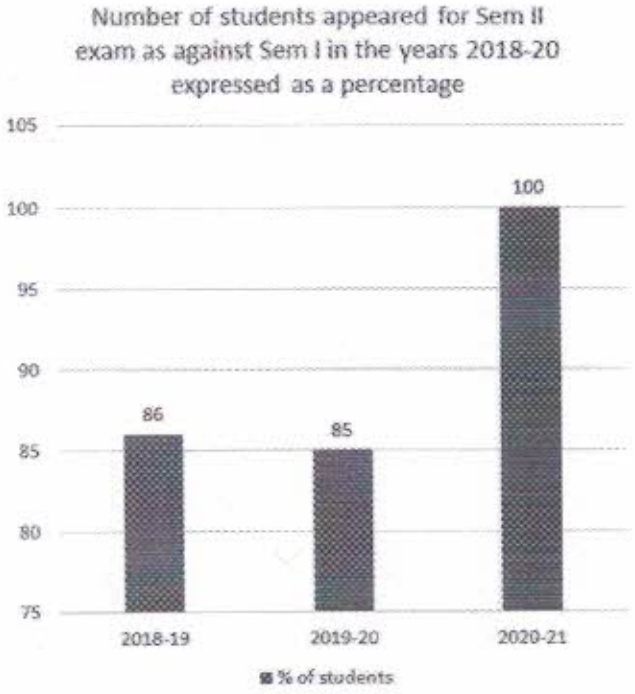
Sr No	Experiment	Number of participant/ beneficiaries	Description Impact/Outcomes
01	To determine Iron in pharmaceutical preparations by visible Spectrophotometry.	29	Understanding of spectrometry and practical training of determining the sample matrix.. To provide knowledge on preparation of analytical reagents, solutions and their molar calculations. Preparation of sample from complex pharmaceutical sample matrix. Understanding the usage of spectrophotometry

			in commercial analysis. Assay & quantification of samples.
02	To titrate a mixture of weak acid and strong acid against a strong base and estimate the amount of each acid in the mixture conductometrically.	29	To estimate amount of acid present in mixture of acid from conductance measurements. In depth learning of the determination of various physical parameters and using electrometric determination of the concentration of unknown species. Handling of instruments & development of expertise.
03	Virtual Laboratory: pH metric estimation of sodium carbonate. Determination of pH at neutralization & half neutralization points & suggesting suitable indicators for observing them.	123	The experiment was conducted using the virtual laboratory platform of Chemcollective. Use of phenolphthalein and methyl orange indicators was rationalized based on the pH. Students learnt how to plot titration curves using MS excel & identify the equivalence point using the plot. Understanding of calculations involved in the estimation of sodium carbonate in the sample using the equivalence point. Students could correlate the acidity of the base from the nature of the pH metric titration curve with 2 inflection points.
04	Virtual titration of a weak organic acid (acetic acid) against strong base (sodium hydroxide) using indicator & from the graph.	174	A virtual titration experiment was carried out using Model Chem Lab. between acetic acid & sodium hydroxide. Fundamentals of titrations & scientific methods were learnt by students right out of school, including representation of data, significant figures, pilot readings, CBR & an introduction to errors. Understanding of the differences between an equivalence point and an end point in a titration. The buffer action in the initial stages of the titration could be rationalized by the students based on the nature of the titration curve.

13. Details of books & journals subscribed from DBT grant. : Nil

14. Qualitative improvements due to DBT support
Please highlight (5 salient lines)

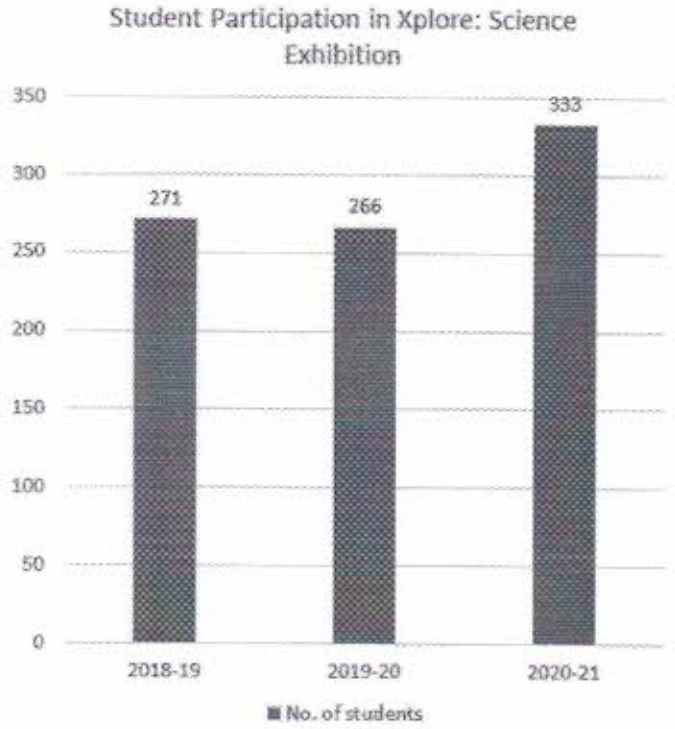
1. Student retention: The attrition rate among students in pure sciences to more lucrative professional courses has been a pressing problem. The support from DBT through the STAR scheme and the interest that could be generated among students through experiments and projects has helped us to retain students in the science programs. Interaction with alumni and industry experts in the lectures arranged by the department as well as the seminars and workshops have had a big role to play in assuring the students of the potential of the program.

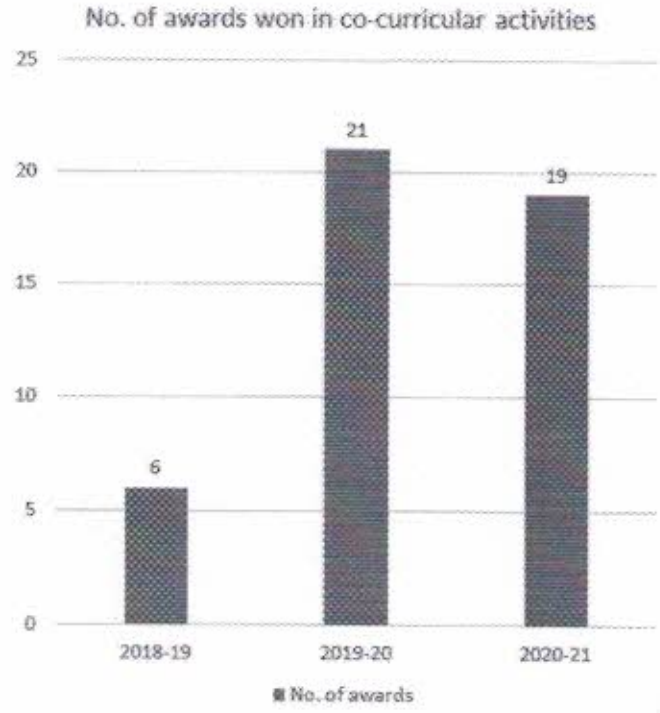


2. Increased engagement of students in practical/experimental sessions: We have found a consistent increase in student numbers for the practical sessions due to growing student interest & the hands-on experience on common laboratory instruments.

3. Higher student participation in review of literature, small projects, exhibitions and research scholar's meet conducted online: The number of student participants in college science exhibition Xplore has steadily increased. Learning through doing has been a big success with the students & has rekindled their excitement. It is also evident in the student participation for Chemistry festivals, aptitude tests & other co-curricular activities.

4. Eager to learn and deliberate in lectures and workshops: The nature of activities that have been possible due to STAR support has stirred the intellect of students where they participate in discussions & deliberations on scientific topics which is evidenced by the level of thorough research that they do for any project/activity that is given to them to do.





15. Problems faced, if any, in implantation of the programme and utilization of DBT grant : Nil
(in two-three lines)

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Name of the Department:	Botany	
	Number of participants/beneficiaries	Brief details (Special achievements/highlights)
A) Student Information:		
List of projects undertaken [Due to Covid restrictions students were at home and hence all have done literature review and / or a literature review with an online survey]	Class : TY BSc 18 students	1. **Threats to coral reefs of Andaman and Nicobar islands.** **Learning outcomes:** The student learnt an applied aspect of environmental pollution. Marine environment forms an important region in the ecology of earth and corals. 2.Antibacterial properties of black pepper Learning outcomes:In this ear of immunity development the student decided to do a literature survey on key ingredients used in decoctions made at home. 3.Antidiabetic activity in seeds of Syzygium cumini Learning outcomes: The student compared the different animal studies performed using extracts of jambul seeds for their various outcomes. 4. Extraction of vitamin C from unconventional leaves Learning outcomes: The student decided to see sources for extraction of vitamin C from plants other than regular citrus sources. 5. Estimation of protein from pulses Learning outcomes:The students decided to find the content of proteins in different pulses and study comparative methods of estimation of proteins. 6. Essential oil of Murraya koenigii Learning outcomes : The student studied the method used for extraction of essential oil from Murraya.

	Class : SYBSc 45 students	1. Production of biogas from flower waste Learning outcomes:The student raised a research question on the problem of wasted flowers in our country and decided to scout the literature for the same. She came across biogas production and did a review on the same. 2. Turmeric: The Golden Spice Learning outcomes: In the era of covid, majority of the students wanted solutions in home remedies and ancient ayurveda. The student worked on papers in the last few years about the use of this spice and its uses. 3. Pothos - The Fortune Clover Learning outcomes: The student decided to explore the fact that the usual plants that are kept for decorative purposes in our house could be of any potential use medicinally. 4. Immunity boosters for covid-19 : Ayurveda & Yoga Learning outcomes: The student was prompted to take up this literature survey because of the use of both the sciences in this pandemic. It was a successful attempt to establish a connection between the two. 5. Benefits of polyphenols on gut flora Learning outcomes : The student not only studied about the various types of polyphenols but also established a correlation of their consumption to our regular gut flora. 6. Vegetable Microbiome Learning outcomes: The microbiome of vegetables serves as a habitat for a variety of opportunistic and evolving pathogens. Opportunistic pathogens can cause serious infections in immunocompromised individuals. Probiotics, prebiotics, and synbiotics can provide biotechnological solutions while multiomics integration provides technical solutions. 7. Gut microbiota and immunology Learning outcomes: The gut microbiome plays a very important role in your health by helping control digestion and benefitting your immune system. In addition to the impacts of host-microbiota interaction on innate immune function, recent research also discloses mechanisms governing mutualism between the microbiome and adaptive immune system. 8. Aromatherapy in stress and anxiety management Learning outcomes:Aromatherapy works in different ways for different people, it is based

		on their preferences, the problem they are facing, the intensity of the oils and the area of application. Accounting the research and the survey conducted on the same, it is proven to work for the maximum number of the population. Hence, aromatherapy does help reduce stress and anxiety. 9. GM crops grown as a food security solution. Learning outcomes: GM crops will improve food security and in broader terms that can alter the food problems that will be faced by the world. Developing nations should adopt this methodology for correct cultivation of foods for their ever growing population and their needs. 10. Papaya leaf can cure malaria Learning outcomes:Various research on papaya leaf show that it enhances the platelet count of blood which decreases during mosquito bite infection. .Different concentrations of extract show different results. Also moderate concentration is known to exhibit good antiparasitic effects and promising inhibitory activity

Visits to research institutes/industries		NIL (Due to COVID restrictions no field visits were organised)

Summer training (organized in college dept/students sent to other institutes)		NIL
B) Faculty information:		Dr. Sangeeta Godbole Dr. Devangi Chachad Dr. Payal Acharekar Dr. Archana Ashtekar Dr. Bharati Bist

Faculty trained for skill improvement		Number of training modules: Names of each along with beneficiaries (list of names) Dr. Sangeeta Godbole • Attended a webinar on "HPTLC: Instrumentation and Techniques" on 08 May 2020 by ANCHROM, India hosted by Ismail Yusuf College. • Faculty development program on online teaching and E-content conducted by HSNC /IIDE on 16th and 17th May 2020. • "Skill development initiative - A webinar on The Future of Presentations: PREZI" organized by Jai Hind College on 28th May. • Attended a National webinar series on "Flash and Preparative Chromatography" organized by the Chemistry department, Jai Hind College from 27th-30th May. Dr. Devangi Chachad • Faculty development program on online teaching and E-content conducted by HSNC /IIDE on 16th and 17th May 2020. • Attended a webinar on "Molecular Taxonomy and DNA Barcoding Concepts, Methods and Applications conducted by RD & SH National College and SWA Science College held on 20th May 2020. • "Skill development initiative - A webinar on The Future of Presentations: PREZI" organized by Jai Hind College on 28th May. • Attended an online workshop on

		"Techniques in Field Biology"organized by the Department of Zoology, K.J. Somaiya College of Science and Commerce & Hemchandracharya North Gujarat University on 30th and 31st May 2020. • Online FDP on Statistical Analysis of Quantitative data using advanced excel for research scholars organized by Department of Mathematics, Rizvi college on 3rd and 4th June 2020. • Attended an National online seven days workshop on "Research methods and Techniques" organized by Ramanand Arya D.A.V. College in Association with University of Mumbai from 6th June to 12th June 2020. • Successfully completed a Course on "Introduction to Forensic Science" authorized by Nanyang Technological University, Singapore offered through Coursera in May 2020. • Successfully completed a Course on "Understanding Plants - Part I: What a plant knows" authorized by Tel Aviv University offered through Coursera in June 2020. • Successfully completed a Course on "Understanding Plants - Part II: "Fundamentals of Plant Biology" authorized by Tel Aviv University offered through Coursera in June 2020. • Successfully completed a Course on "Excel Skills for Business - Essentials" authorized by Macquaire University offered through Coursera in January 2021. Dr. Payal Acharekar • Faculty Development Program on online teaching and E-content conducted by HSNC /IIDE held on 16th and 17th May. • "Skill development initiative - A webinar on The Future of Presentations: PREZI" organized by Jai Hind College on 28th may. • Presented a poster named "Relationship between Noise absorption and Leaf Anatomy" during International e-conference on "Emerging Trends in Bioscience and Technology" (ETBT-2020) jointly organized by School of Science, Sandip University, Nasik & Biotechnology Society of Nepal (BSN), Nepal held on

		June 1 - 3, 2020 • Presented a poster named "Role of Tree canopies in Noise absorption" during International e-conference on "Emerging Methodologies in Pharma, Environmental and Life Sciences" organised by the Departments of Botany, Zoology and Biotechnology held on 18th and 19th June 2020 organized by Government of Maharashtra Ismail Yusuf College of Arts, Science & commerce, Mumbai • Published a paper 'Noise Pollution and Biodiversity' in International journal, Vol 4, issue 4, 29th July, 2020 • "Wealth Maximisation through Value investing" on 3rd June 2020 by Financial Planning Academy. • Principal Concave on "Digital Transformation of Indian education"by North Storm Academy on 5th June 2020. Dr. Archana Ashtekar • Presented a poster named "Amalgamation of fallen dried leaf extracts from trees with essential oil to make organic soap." during International e-conference on "Emerging Methodologies in Pharma, Environmental and Life Sciences" organised by the Departments of Botany, Zoology and Biotechnology held on 18th and 19th June 2020 organized by Government of Maharashtra Ismail Yusuf College of Arts, Science & commerce, Mumbai • Attended a 7- day online faculty development program everyday from 10 am to 4.30 pm organised by Ramanand Arya DAV College on "Research methods and techniques" from 4th - 10th may, 2020. • Faculty Development Program on Online teaching and E-content conducted by HSNC /IIDE held on 16th and 17th May 2020 • "Skill development initiative - A webinar on The Future of Presentations: PREZI" organized by Jai Hind College on 28th May 2019 • Attended 3 day webinar on "Intellectual Property Rights- Concept and Application" by Caius Research Laboratory from 30th Jan - 2nd February 2021. • Attended a webinar By P. Sainath on 4 th May 2020 on the topic "Imagining post-covid Rainfed Agriculture from the current

		crisis". • Attended a National Webinar Series on "Instrumental Techniques in Analysis" from May 27-30, 2020 organised by Dept of Chemistry , Jai Hind College. • Attended a webinar on "Application of PCR in genetic Research and Chromatographic and Spectroscopic evaluation of plant-based drugs" conducted by Central Dogma Pvt Ltd, Pune on 15 th May 2020. • Attended a National seminar on "Research writing and Enhancing Visibility" held on 21st May conducted by Ramnarain Ruia College. • Attended a National level webinar on 20th and 21st May 2020 on "HPTLC method development" and "HPTLC Method Validation" in collaboration with ANCHROM, India. • Attended a National webinar on "Ayush for COVID 19- Boosting immunity with home based Interventions" on 20th May 2020. • Attended three days International webinar on "Omics in Agriculture" from 07th -09th Oct 2020 organised by Dr Rajendra Prasad Central Agricultural University, PUSA, Samastipur Dr. Bharati Bist • Faculty Development Program on online teaching and E-content conducted by HSNC /IIDE held on 16th and 17th May. • Attended a National webinar on "Self Plagiarism-Ethical and Legal Dimensions" held on 18th May by Narsee Monjee College of Commerce and Economics. • Attended a webinar on "Molecular Taxonomy and DNA Barcoding Concepts, Methods and Applications conducted by RD & SH National College and SWA Science College held on 20th May 2020. • "Skill development initiative - A webinar on The Future of Presentations: PREZI" organized by Jai Hind College on 28th May. • Attended a National seminar on "Research writing and Enhancing Visibility" held on 21st May conducted by Ramnarain Ruia College. • Attended a National webinar series on "Flash and Preparative Chromatography" organized by the Chemistry department, Jai

		Hind College from 27th-30th May. • Attended a National Workshop on "Techniques in Field Biology" conducted by K.J. Somaiya College of Science and Commerce on 30th and 31st May. • "Empowering India: Role of Teachers and Researchers (Post COVID-19)" held on 4th May 2020 organised by Thakur College of Science, Arts and Commerce. • "Virtual reality- Very important for futuristic training" by Financial Planning Academy and SIES college held on 26th May. • Attended a National webinar on "NEW-AGE TOOLS FOR TEACHING ONLINE" held from 28th- 30th June 2020 organised by Academisthan. • Attended a Webinar on "Biodiversity and Environment Conservation: One Earth One Love " from June 9, 2020 - June 11, 2020 organised by KC College. • Attended a National level webinar on "Introduction to Modern Landscaping and Business opportunities" held on 20th June 2020 and organised by the Department of Botany, Maharashtra College. • Attended a One Day International Webinar on "Rare fungal spores as trace evidence and intelligence in Forensic investigations" held by Satish Pradhan Dnyanasadhana College and Mycological Society of India on 25th July 2020.

C) Dept. information		
Awareness programs	115 Undergraduate and Postgraduate students from different streams 95 Undergraduate and Postgraduate students from different streams 63 Participants from all faculties All the lectures were kept open for participants from Inhouse and other colleges as well.	1) "The Fascinating Forests" by Dr. Parag Mahajan on 28th July 2020. Learning Outcome: Awareness among students was created regarding the role of a layman in conservation of forests, nature and the significance of conservation was established through visuals. 2) "Mangroves- Life guards of Mumbai" by Dr Hemant Karkhanis, Head of Soonabai Pirojsha Godrej Marine Ecology Centre, Mumbai, on 5th August 2020. Learning outcome : Significance of presence of mangroves along the coastal areas and their impact on city dwellers. 3) A practical demonstration and lecture on "A journey from Kitchen WASTE to Kitchen GARDENING" by Ms Rashmi Joshi, an environmental consultant was conducted on 3rd April 2021. Learning outcome : Simplicity of the process of conversion of Wet waste into a usable manure was explained and demonstrated to participants.
Exhibition	All Students of Junior college and Degree college Science benefited from this exhibition.	XPLORE an intra-collegiate online science exhibition held on 27th February, 2021 FY, SY and TY students took part putting up 30 exhibits in the form of research posters and paper reviews in the form of a poster. XPLORE helped students in enhancing their scientific curiosity, their creativity, confidence levels, team work, and competitive spirit besides others.
Seminars	Nil	• E – SHODH, an online student research meet, organized by Research committee, IQAC, JAI HIND COLLEGE. • Science club organised the guidance talk "Review - new norm in scientific research" on 21st October 2020. It was organized to address young minds and to quench their thirst for research in the new normal the world is subjected to because of COVID 19, by Star college scheme initiative by Science Club under Jai Hind College (Autonomous).
Training programs	Non- Teaching Workshop	NIL

	Faculty Development Workshop	NIL
Guest faculty invited by different participating departments	Number of modules: 03/ 2 hours each Details of each module a) Name: b) Designation: c) Host institute: d) Duration of visit: e) Topic of lecture/discussion:	1) A lecture on "Nature Driven Life Journey" by Rahul Kolekar was held by the Department of Botany and Microbiology in association with Nature club, Jai Hind College on 22nd September 2020. Students gained perspective on Entrepreneurship development. 2) A lecture on " POLLUTION- KNOW ALL ABOUT IT" was held by Dr. Ambika Joshi, Ex Head, Botany Dept., Jai Hind College and an active researcher in Ecology and Environmental Botany on 10 February 2021. The main purpose was to create awareness about the hazards of pollution on the environment and health of mankind. 3) A lecture on " EXTRACTION AND SEPARATION OF PHYTOCHEMICALS USING HPTLC" was held by Dr Aparna Saraf, Associate Professor, Institute of Science on 13 February 2021. Students were able to learn the technique which is a part of the curriculum. 4) A lecture on "QUALITY CONTROL OF HERBAL DRUGS" was held by Dr. Sunita Shailajan, a dedicated researcher with varied experience of strong Industry-Academia linkage Nationally and Internationally and the advisory panel for STAR-DBT funding at Jai Hind College on 19 February 21. Students could understand the importance of Quality control in the food and medicine industry. 5) A lecture on "BIOINFORMATICS-PRESENT AND FUTURE" was held by Dr. Sagarika Damle, Head, LifeSciences Dept., KC College on 26 February 21. Students gained the knowledge of scope and career in Bioinformatics in day to day life.
Techniques adopted	List new techniques developed/adopted by departments	• Use of Virtual Lab for demonstration of practicals. • Video recordings of some experiments performed in Botany Lab and shown to students online. • Use of Jamboard and pdfs for the Forest plots instead of actual vegetation quadrats

		for performance of Simpson's diversity index.

Practical incorporated	List new practicals incorporated as STAR DBT experiments along with student beneficiaries and learning outcomes etc.	NIL

Minor Research Projects		NIL.
Any inter-departmental activities		• E – SHODH
D) Impact of DBT support to the department:		• Students have started remaining in an ever grasping and thinking mode • Peer learning due to connectivity between the students groups • Increase in hands on practical experience due to equipment, chemicals and glassware • Develop scientific temperament and Enriched their basic knowledge • Exposure to undergraduate students for presenting papers and posters at National/ International conferences.
E) Any other information not covered above		An overall progression in the activities taken up by the department can be seen in the 3rd year.