

## **17.3.15 a – Progress against SDG15**

–

### **Sustainable Usage of Land**

## Centre for Research on Precision Agriculture and Rural Technologies

### Objective:

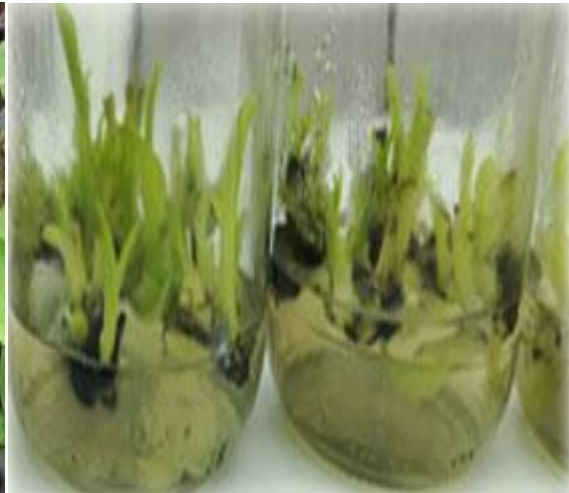
To support Agri-Tech entrepreneurs to create awareness with incubation centres to develop rural areas.

### Goals:

- To provide the platform for innovations in agriculture.
- To incorporate the technologies into the rural areas
- To encourage people for starting up the pilot projects



- Production of plants from a plant tissue on the nutrient media under controlled environment in a less duration of time. The Banana species such as G9 banana and Red Banana were initiated along with Bambusabalcooa bamboo, Ginger, Money plant, Syngonium. Our future plans are to produce the endangered medicinal plant species in more quantity through Plant tissue culture and prevent from their extinction for the extraction of medicinal plants at the early stage.



## **GREEN LANDSCAPING WITH TREES AND PLANTS**

- The campus had 909 trees before the cyclone in December 2016. A total of 341 trees were uprooted in the cyclone. Now the total number of trees in campus is approximately 3094 Nos.
- Organic Vegetable garden is formed in open land space in Men's Hostel area. The entire campus is dotted with trees, plants and lawns which are kept well maintained. Green cover is around 30 %.
- Total campus built up area: 1618024 sq.ft
- Total landscape : 656876 sq.ft

### **The other green practices include**

- Solar Power plant
- Biogas plant
- Sewage Treatment plant
- Bicycle
- E- waste Disposal
- Bio waste Disposal
- Green Building Certificate
- LED Fixtures
- Air-conditioning split units of 5-star BEE rating
- BS-IV compliant vehicles for transportation
- Incinerator Machine with wet scrubber for sanitary napkin disposal.

## DOCUMENTAL EVIDENCES FOR GREEN PRACTICES

B.S.Abdur Rahman Crescent Institute of Science and Technology has implemented many initiatives to ensure that the campus is pollution free.

### BICYCLES FOR STUDENTS



### ECO FRIENDLY VEHICLES



## Battery Operated Golf cart Electric Bike



### Eco Friendly Load Vehicle

## FUTURE PLANS TO IMPROVE UPON THE GREEN CAMPUS INITIATIVES

### 1. Plans to improve Solid Waste Management program:

The following activities are planned in the near future to further improve solid waste management in the campus.

- Color Coding System has to be introduced for dust bins in Class Room blocks, Canteens, pathways, hostels, quarters, etc.,
- All the non-ecofriendly products shall be banned
- Volunteers from staff and students are to be identified for eco volunteering.
- A monitoring team shall be formed to focus on waste reduction and segregation,
- Small size awareness flex card to be pasted in canteen and waste generating area
- Sapling new trees plantings around college campus.

2. To formulate a Green Policy / Environment Policy for the campus that will guide all activities of the Institute to align with the sustainability initiatives.
3. To get the B S Abdur Rahman Crescent Institute of Science and Technology certified under ISO 14001 for Environmental Management System
4. To get the whole campus certified as Green Campus by competent certification authority like USGBC/GBCI.
5. Create ponds to save run-off rain water and utilize for routine use to reduce water procurement and increase self-sufficiency.

#### **PLASTIC FREE CAMPUS:**

- A policy is in place to convert our campus into a Plastic-free campus. Within the context of our Green campus policy we commit to ban the use of plastics, to reduce the environmental impact of waste plastics.
- Usages of plastics are avoided in the canteen by serving the food in the steel plates.

#### **PAPERLESS OFFICE:**

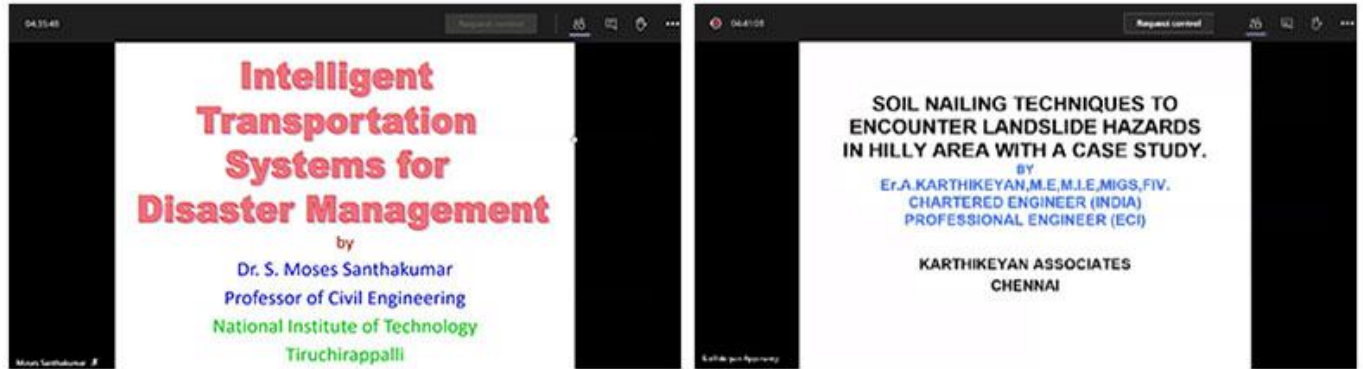
- Electronic documentation is maintained in 50 percent of the cases. All communications to faculty members and students are through e-mails and SMS.
- The student's attendance, faculty attendance, leave applications, continuous assessment tests results and semester end exam results are all maintained through TCS ION.

#### **PROGRAMME ON ECOSYSTEM**

##### **AICTE Sponsored Short Term Training Programme (STTP) – “Disaster mitigation: A shift from disaster management towards disaster preparedness” (Phase-3)**

The Department of Civil Engineering, School of Infrastructure organised AICTE Sponsored Short Term Training Programme (STTP) – “Disaster mitigation: A shift from disaster management towards disaster preparedness” (Phase -3) through online from 16.11.2020 to 21.11.2020. Around 70 participants including Faculty members, working professionals and students across different parts of India and abroad participated in this STTP. Speakers from reputed Academic Institutions like IIT Palakad, IIT Hyderabad, Anna University and also from

industries delivered lectures on various aspects of disaster management. Some of the important topics such as Impact of Urbanization on flooding, Intelligent Transportation systems for Disaster management early warning system of IMD, Soil Nailing Techniques to encounter land slide Hazards in Hilly area,, climate change and sustainability were addressed by the experts.





## Report for Webinar on Development with Environment

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16.06.2021

Conducted on 14<sup>th</sup> June 2021

Organized by School of Computer, Information and Mathematical Sciences (SCIMS),  
Department of Computer Applications

### Faculty Coordinators

Dr. A.K. Reshmy, AP/CA  
Dr. Sudha Rajesh AP/CA  
Ms. S. Sabaria, AP/CA

### Conveners

Dr. Venkatesan Selvam, Dean/SCIMS  
Dr. S. Pakkir Mohideen, HoD/CA

### PREAMBLE

Webinar on **Development with Environment** was held on **14<sup>th</sup> June 2021**, during 11 am – 12.30 pm. The Department of Computer Applications, School of Computer, Information and Mathematical Sciences organized it. The main objective of this webinar is to create awareness among the students to reduce the generation of hazardous wastes.

The Resource Person of the webinar was **Ms. Pallavi Rampati**, Technical Consultant, Paul-Edu Technology and Management Services, Chennai.

The report discusses about the following aspects of the programme:

1. [Course Content and Online Delivery Mode of the Webinar on Development with Environment.](#)
2. [Online Participants Registration Process for the Webinar on Development with Environment.](#)
3. [Certification for the Webinar on Development with Environment.](#)
4. [Analysis of Participants Feedback for the Webinar on Development with Environment.](#)
5. [Sample Screenshots taken during on Development with Environment.](#)

## **1. Course Content and Online Delivery Mode of the Webinar on Development with Environment.**

This webinar provided the participants with interesting things about environment for healthy living. Resource person started the session with the importance of environment for role in healthy living and the existence of life on planet earth. The speaker explained about the different types of pollution, and its causes and how to live with good environment. Ms. Pallavi, imparted her knowledge on the various initiatives and policies at National and international levels taken in environmental sector. At end of the session, the participants gained knowledge on how to improve the environmental efficiency at global level. The participants were provided with the course content and slides, which were shared online.

## **2. Online Participants Registration Process for the Webinar on Development with Environment.**

The Brochure highlighting the necessary information about the Webinar on Development with Environment was designed and circulated. The Brochure is displayed below:



**nirf RANKED** **A+ NAAC** **Crescent** B.S. Abdur Rahman Institute of Science & Technology Deemed to be University u/s 3 of the UGC Act, 1956 **37 YEARS OF ACADEMIC EXCELLENCE** **STARS RATED FOR EXCELLENCE 2018**

**SCHOOL OF COMPUTER, INFORMATION AND MATHEMATICAL SCIENCES**  
**DEPARTMENT OF COMPUTER APPLICATIONS**

Organizes

Webinar on  
**DEVELOPMENT WITH ENVIRONMENT**  
 On 14<sup>th</sup> June 2021, at 11 am

**Resource Person**  
**Ms. Pallavi Rampati**  
 Technical Consultant  
 Paul-Edu Technology and Management Services  
 Chennai

**Open for +2 & UG Students**  
**No Registration Fee!!**

**Conveners**  
 Dr. Venkatesan Selvam,  
 Dean, SCIMS  
 Dr. S.Pakkir Mohideen  
 HoD/CA

**Coordinators**  
 Dr. A.K.Reshmy, AP/CA  
 Dr. Sudha Rajesh, AP/CA  
 Ms. S.Sabaria, AP/CA

Registration Link : <https://forms.gle/9PcMeNzzPU6b4G4eA>  
 E-certificate will be provided for all participants  
 Admissions open 2021, [www.crescent.education](http://www.crescent.education)

There was no **Registration Fee** for the participants attending the Webinar on Development with Environment. Interested participants were requested to register their details in a google form, which was shared through the link: <https://forms.gle/9PcMeNzzPU6b4G4eA>. 70 participants have registered for this event, 53 participants attended this Webinar.

<b>Summary of Participants</b>	<b>Total No. of Institutions</b>	<b>06</b>
	<b>Participants from other state</b>	<b>09</b>
	<b>Participants within TamilNadu</b>	<b>44</b>

The details of confirmed participants are given in [Annexure A](#).

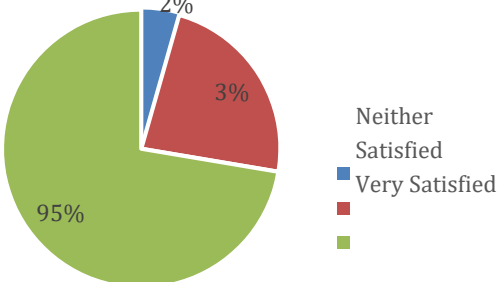
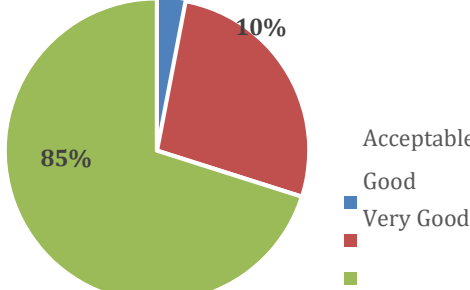
### 3. Certification for the Webinar on Development with Environment.

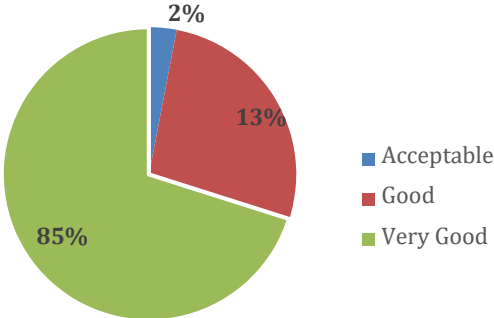
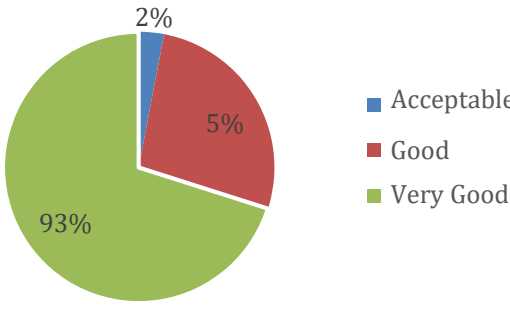
The certificate was made available to the active participants.

The sample certificate issued to the participants is given in [Annexure B](#).

### 4. Analysis of participants' feedback for the Webinar on Development with Environment.

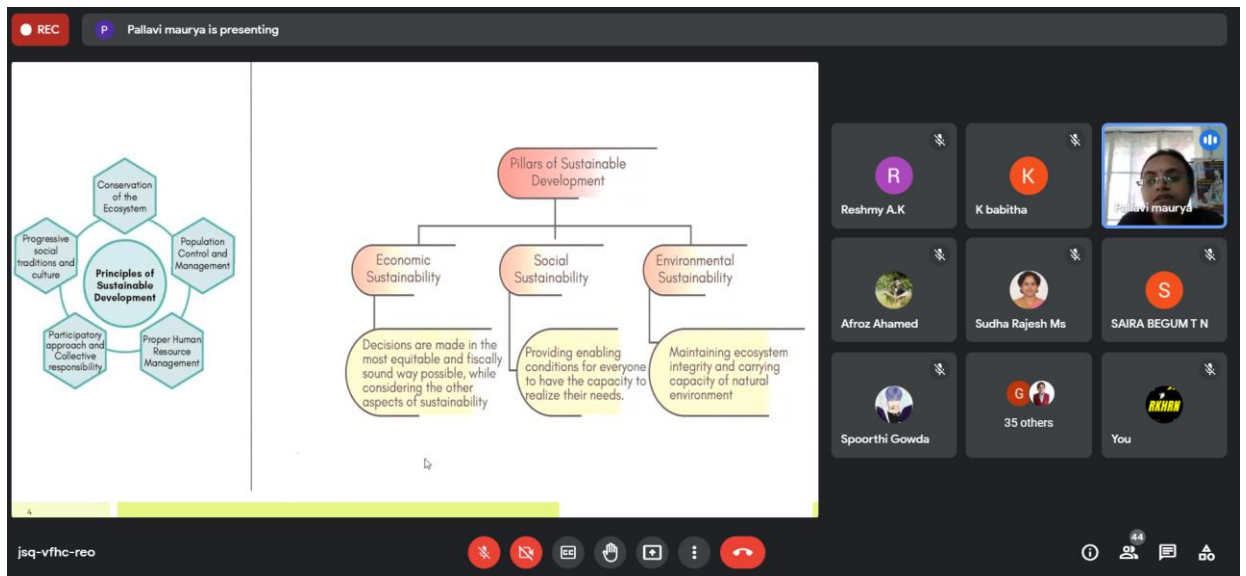
The feedback about the webinar was collected from the participants in order to improve the further conduct of these types of events.

Feedback Points	Analysis		Inference						
How satisfied were you with the event?		<p data-bbox="560 877 1031 909">How satisfied were you with the event?</p>  <table border="1" data-bbox="909 1039 1079 1186"> <tr><td>95%</td><td>Satisfied</td></tr> <tr><td>3%</td><td>Very Satisfied</td></tr> <tr><td>2%</td><td>Neither Satisfied</td></tr> </table>	95%	Satisfied	3%	Very Satisfied	2%	Neither Satisfied	<p data-bbox="1193 846 1529 1056">95% of the participants were fully satisfied and 3% felt it was very good. Almost 98% of the participants are satisfied with the event.</p>
95%	Satisfied								
3%	Very Satisfied								
2%	Neither Satisfied								
How relevant and helpful do you think it was for your knowledge gaining?		<p data-bbox="552 1266 1039 1329">How relevant and helpful do you think it was for your knowledge gaining?</p>  <table border="1" data-bbox="917 1543 1047 1705"> <tr><td>85%</td><td>Good</td></tr> <tr><td>10%</td><td>Very Good</td></tr> <tr><td>5%</td><td>Acceptable</td></tr> </table>	85%	Good	10%	Very Good	5%	Acceptable	<p data-bbox="1193 1245 1529 1612">The session was extremely relevant and helpful to 85% of the participants, and 10% of the participants felt it was very much helpful. Overall 95% participants gained knowledge through this event.</p>
85%	Good								
10%	Very Good								
5%	Acceptable								

<p>How satisfied were you with the session content?</p>	<p style="text-align: center;">How satisfied were you with the session content?</p>  <p style="text-align: right;"> <span style="color: blue;">■</span> Acceptable  <span style="color: red;">■</span> Good  <span style="color: green;">■</span> Very Good         </p>	<p>85% of the participants felt the session was excellent and 13% felt good. Almost 98% of the participants were very much satisfied with the event.</p>
<p>How did you rate the overall assessment of the event?</p>	<p style="text-align: center;">How did you rate the overall assessment of the event?</p>  <p style="text-align: right;"> <span style="color: blue;">■</span> Acceptable  <span style="color: red;">■</span> Good  <span style="color: green;">■</span> Very Good         </p>	<p>93% participants felt it was very good. % of the participants felt overall event is very satisfactory.</p>

The overall organization and deliverance was satisfying to 95% of participants. Also, the session which was deliberated and given to the participants would really make them to keep and protect their environment for future.

## 5. Sample Screenshots taken during Webinar on Algorithms and its uses



**Fig. 1: Pillars of Sustainable Development**



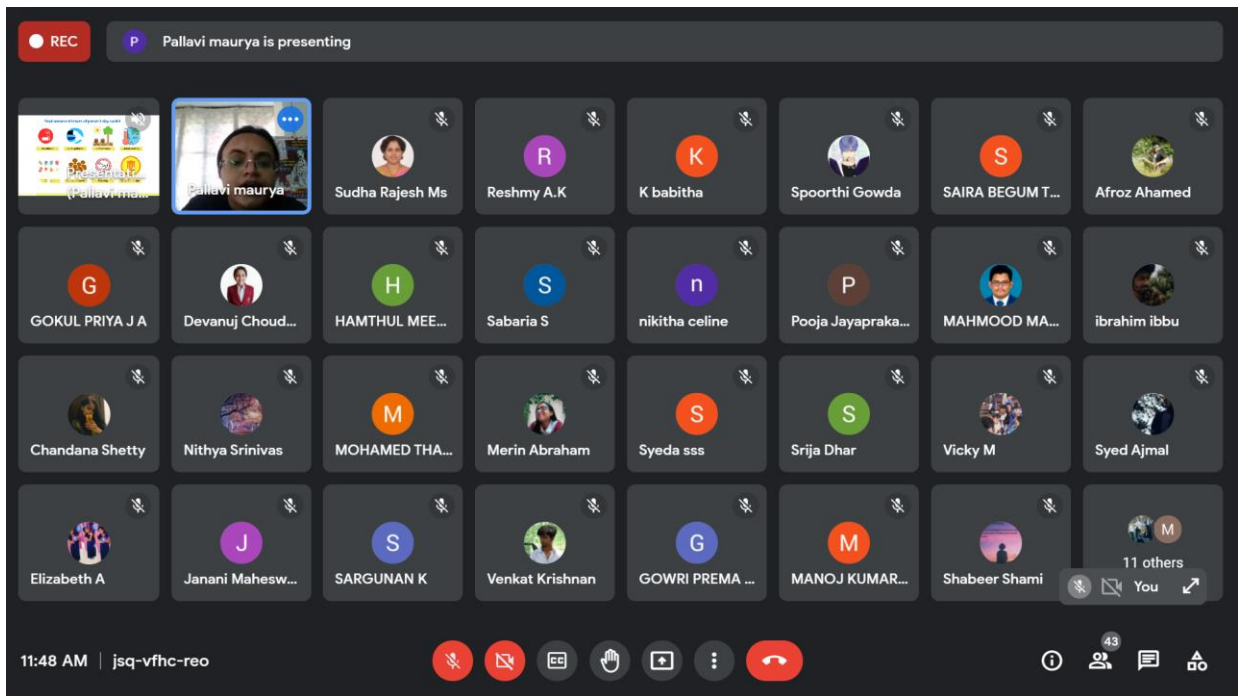
**Fig. 2: Discussion on Ozone Depletion**



**Fig. 3. Problems in today's environment with examples**



**Fig. 4: 3D model for Sustainable development**



**Fig. 5: Interactive Session on Development with Environment**



## Annexure A

### List of Participants:

S.No	Participant Name	Designation	Institution / Organization / School Name	Email
1	Mr. Syed Ajmal	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	syedajmal052000@gmail.com
2	Mrs. K. Krishna	Assistant Professor	Vivekananda College	krishnaarunphd@gmail.com
3	Ms. S. Nithya	Student	Mount Carmel College	nithyasrinivas1602@gmail.com
4	Ms. S. Sabaunnisa	Student	Mount Carmel College	syedsabashabana123@gmail.com
5	Mr. A. Mohamed Thareek	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	thareek0711@gmail.com
6	Mr. S. Akshay Kumar	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	akshaysubramanian064@gmail.com
7	Mr. Ibrahim	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	ibrahim7ibbu7@gmail.com
8	Mrs. P. S. Sujatha	Assistant Professor	Vivekananda College	brahassujathaps@gmail.com
9	Mr. Venkatakrishnan	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	ashokvenkat102@gmail.com
10	Ms. T. N. Saira Begum	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	sairabegum2306@gmail.com
11	Mr. Mahmood Mabrook	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	mahmoodking26@gmail.com
12	Ms. R. Surabhi	Student	Mount Carmel College, Bangalore.	surabhirajgopal13@gmail.com
13	Mr. E. Sharun Pandi	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	sharunpandi301@gmail.com
14	Ms. S. Hamthul Meera	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	meerasp2002@gmail.com
15	Ms. Gokul Priya	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	gokulpriyaja@gmail.com
16	Ms. H. Vazeerunnisha	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	Vazeerunnisha@gmail.com
17	Mr. Sargunan	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	sargudhoni30@gmail.com
18	Mr. A. Afroz	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	afrozahamed2017@gmail.com
19	Ms. K. Sneha	Student	Mount Carmel College Autonomous	snehakarunanidhi26@gmail.com

20	Ms. Merin Abraham	Student	Mount Carmel College, Bangalore	merinabraham83@gmail.com
21	Mr. Hariram Narayanan	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	rkhrn2k@gmail.com
22	Mr. T. Deepak	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	deepakthulasingham2001@gmail.com
23	Mr. R. Gokul	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	gk1846416@gmail.com
24	Ms. D. Vinodhini	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	02vinodhini06@gimal.com
25	Ms. J. Poojashree	Student	St. Josephs College of Commerce	poojayaprakash@gmail.com
26	Ms. H. Vazeerunnisha	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	h.vazeerunnisha@gmail.com
27	Mr. M. Vignesh	Student	B.S. Abdur Rahman Crescent Institute of Science and Technology	vicky.mv311@gmail.com
28	Ms. K. Sneha	Student	Mount Carmel College Autonomous, Bangalore	snehakarunanidhi26@gmail.com
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30	Mr. M. K. Aamir Malick	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	m.aamirmalick@gmail.com
31	Mr. Jhalak Dutta	Assistant Professor	Heritage Institute of Technology	jhalak.dutta@heritageit.edu
32	Ms. A. Arshiya Sultana	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	sultu9242arshiya@gmail.com
33	Mr. S. Mohan Raj	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	mohan.cubcads2018@gmail.com
34	Ms. R. Hemalatha	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	hemaram1118@gmail.com
35	Mr. Mahmood Mabrook	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	mahmoodking26@gmail.com
36	Mr. G. Faizal Rahuman	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	faizalrahuman8@gmail.com
37	Mr. S. S. Hudaifa Fabin	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	fabin.cubcads2018@gmail.com
38	Mr. S. Mohammed Shabeer	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	shabeershami728@gmail.com
39	Mr. M. K. R. Thameem Ansari	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	thameem892148@gmail.com

40	Mr. A. Kesavan	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	Kesavankesav14@gmail.com
41	Mr. M. Vignesh	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	vicky.mv311@gmail.com
42	Mr. E. Sharun Pandi	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	sharunpandi301@gmail.com
43	Mr.S. M. Abdul Basith	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	abdulbasithshaha@gmail.com
44	Ms. Thulashini	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	thulash297@gmail.com
45	Mr. Danish Ahmed	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	danishahamed498@gmail.com
46	Mr. A. Mohamed Thareek	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	thareek0711@gmail.com
47	Ms. K. Latha	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	latha.cubcads2018@gmail.com
48	Ms. M. Lavanya	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	lavanyamahendiran24@gmail.com
49	Ms. V. Kiruthika	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	kikiv070@gmail.com
50	Ms. S. Divya	Student	B. S. Abdur Rahman Crescent Institute of Science and Technology	divi.saravanan024@gmail.com
51	Ms. P. Malathi	Assistant Professor	Saveetha School of Engineering	maludhurkka@gmail.com
52	Dr. N. Noor Alleema	Assistant Professor	SRM Institute of Science and Technology	nooralln@srmist.edu.in
53	Mr. Jhalak Dutta	Assistant Professor	Heritage Institute of Technology	jhalak.dutta@heritageit.edu

## Annexure B

### Sample Participation Certificates:



Fig. 6: Certificate of Mr. S. Akshay Kumar, Student, B.S. Abdur Rahman Crescent Institute of Science and Technology



**Fig. 7: Certificate of Ms. Surabhi R, Student, Mount Carmel College, Bangalore**

**Coordinators**

Dr. A.K. Reshmy, AP/ CA  
Dr. Sudha Rajesh, AP/ CA  
Mrs. S. Sabaria, AP/CA

**Conveners**

Dr. VenkatesanSelvam, Dean/SCIMS  
Dr. S. Pakkir Mohideen, HoD/CA

The water quality reports for the well water, raw water and RO water is given below

**QUALITY REPORT OF WELL WATER**



**EKDANT ENVIRO SERVICES (P) LIMITED**

NABL Accredited & MoEF Recognised Laboratory  
 An ISO 9001 : 2008 and OHSAS 18001 : 2007 Certified Company  
 No.R-7/1, AVK Tower, North Main Road, Anna Nagar West Extn., Chennai - 600 101. India  
 Phone : 044 - 2615 3349 / 4856 2349 Mobile : 9444411178  
 E-mail : ekdantlab@gmail.com / info@ekdantlab.co.in  
 Web : www.ekdantlab.co.in

TEST REPORT						
Sample Ref No. : EES/W/140/08			Report No. : 450/08			
Issued To: M/s. B.S. Abdur Rahman Crescent University, Seethakathi Estate, G.S.T Main Road, Vandalur, Chennai-600 048.			Report Date : 28.08.19 Page: 1 of 2			
Sample Description : Water			Received On : 23.08.19			
Sample Drawn By/ Date : EES / 23.08.19			Commenced On : 23.08.19			
Customer's Reference : Letter Dated on 23.08.19			Completed On : 28.08.19			
Sample Mark : Well Water						
Sampling Procedure : EES/QM/MSP/02						
Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		PROTOCOL: APHA 23 <sup>rd</sup> Edition 2017
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
Physical Properties						
1	Appearance When Analyzed After Filtration	-	Clear	-	-	-
2	pH value at 25°C	-	6.53	6.5 - 8.5	6.5 - 8.5	4500 H° B
3	Color	Hazen	2.0	5	15	2120 B
4	Odor	-	Agreeable	Agreeable	Agreeable	IS 3025 P.5 1983 R.2012
5	Turbidity	NTU	0.2	1	5	2130 B
6	Electrical conductivity at 25°C	Micromhos/cm	2096	-	-	2510 B
Chemical Properties						
7	Total Suspended Solids	mg/l	BDL (DL:1.0)	-	-	IS:3025. P.17:1984.R.2012
8	Total Dissolved Solids	mg/l	1290	500	2000	IS 3025 P.16:1984.R.2012

---End of Page 1---



- NOTE: 1. Test results shown in this test report relate only to the items tested.  
 2. This test report shall not be reproduce anywhere except in full and in same format without the Approval of the laboratory  
 3. Unless informed by the customer the test items will not be retained for more than 10 days from The date of issue of test report (exceptional for Microbiology and wastewater for which retaining time 7 days.)



**TEST REPORT – ADDITIONAL SHEET**

Sample Ref No. : EESW/140/08				Report No. : 450/08		
				Report Date : 28.08.19		
				Page: 2 of 2		
Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		PROTOCOL: APHA 23 <sup>rd</sup> Edition 2017
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
9	Total Hardness as CaCO <sub>3</sub>	mg/l	776	200	600	2340 C
10	Calcium Hardness as CaCO <sub>3</sub>	mg/l	545	-	-	3500 - Ca B
11	Magnesium Hardness as CaCO <sub>3</sub>	mg/l	231	-	-	3500 - Mg D
12	Calcium as Ca	mg/l	218	75	200	3500 - Ca B
13	Magnesium as Mg	mg/l	55.0	30	100	2340 C
14	Phenolphthalein Alkalinity as CaCO <sub>3</sub>	mg/l	Nil	-	-	2320 B
15	Total Alkalinity as CaCO <sub>3</sub>	mg/l	168	200	600	2320 B
16	Chlorides as Cl	mg/l	386	250	1000	4500 Cl B
17	Sulfates as SO <sub>4</sub>	mg/l	255	200	400	4500 SO <sub>4</sub> <sup>2-</sup> E
18	Total Iron as Fe	mg/l	0.08	0.3	0.3	3500 Fe- B
19	Silica (Reactive) as SiO <sub>2</sub>	mg/l	39.0	-	-	4500 SiO <sub>2</sub> C
20	Carbonate Hardness as CaCO <sub>3</sub>	mg/l	168	-	-	2340 A
21	Non-Carbonate Hardness as CaCO <sub>3</sub>	mg/l	608	-	-	2340 A
22	Free Residual Chlorine	mg/l	BDL (DL=0.1)	0.2	**1	4500 Cl B

BDL= Below Detectable Limit, DL= Detection Limit.

\*\* To be applicable only when water is chlorinated.

—End of Report—



*[Signature]*  
 Authorized Signatory

- NOTE:
1. Test results shown in this test report relate only to the items tested.
  2. This test report shall not be reproduced anywhere except in full and in same format without the Approval of the laboratory.
  3. Unless informed by the customer the test items will not be retained for more than 10 days from The date of issue of test report (exceptional for Microbiology and wastewater for which retaining time 7 days.)



## QUALITY REPORT OF RAW WATER



### EKDANT ENVIRO SERVICES (P) LIMITED

NABL Accredited & MoEF Recognised Laboratory  
 An ISO 9001 : 2008 and OHSAS 18001 : 2007 Certified Company  
 No.R-7/1, AVK Tower, North Main Road, Anna Nagar West Extn., Chennai - 600 101. India  
 Phone : 044 - 2615 3349 / 4856 2349 Mobile : 9444411178  
 E-mail : ekdantlab@gmail.com / info@ekdantlab.co.in  
 Web : www.ekdantlab.co.in

TEST REPORT						
Sample Ref No. : EES/W/141/08			Report No. : 451/08			
Issued To: <b>M/s. B.S. Abdur Rahman Crescent University, Seethakathi Estate, G.S.T Main Road, Vandalur, Chennai-600 048.</b>			Report Date : 28.08.19 Page: 1 of 2			
Sample Description : Water			Received On : 23.08.19			
Sample Drawn By/ Date : EES / 23.08.19			Commenced On : 23.08.19			
Customer's Reference : Letter Dated on 23.08.19			Completed On : 28.08.19			
Sample Mark : Raw Water						
Sampling Procedure : EES/QM/MSP/02						
Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		PROTOCOL: APHA 23 <sup>rd</sup> Edition 2017
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
<b>Physical Properties</b>						
1	Appearance When Analyzed After Filtration	-	Clear Clear	-	-	-
2	pH value at 25°C	-	7.43	6.5 – 8.5	6.5 – 8.5	4500 H° B
3	Color	Hazen	5.0	5	15	2120 B
4	Odor	-	Agreeable	Agreeable	Agreeable	IS 3025 P.5 1983 R.2012
5	Turbidity	NTU	0.4	1	5	2130 B
6	Electrical conductivity at 25°C	Micromhos/cm	2716	-	-	2510 B
<b>Chemical Properties</b>						
7	Total Suspended Solids	mg/l	BDL (DL=1.0)	-	-	IS 3025: P.17:1984 R.2012
8	Total Dissolved Solids	mg/l	1780	500	2000	IS 3025:P.16:1984 R.2012

—End of Page 1—

  
 Authorized Signatory

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**TEST REPORT – ADDITIONAL SHEET**

Sample Ref No. : EESW/141/08		Report No. : 451/08		Report Date : 28.08.19		Page: 2 of 2	
Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		PROTOCOL: APHA 23 <sup>rd</sup> Edition 2017	
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source		
9	Total Hardness as CaCO <sub>3</sub>	mg/l	1101	200	600		2340 C
10	Calcium Hardness as CaCO <sub>3</sub>	mg/l	394	-	-		3500 - Ca B
11	Magnesium Hardness as CaCO <sub>3</sub>	mg/l	707	-	-		3500 - Mg B
12	Calcium as Ca	mg/l	158	75	200		3500 - Ca B
13	Magnesium as Mg	mg/l	170	30	100		2340 C
14	Phenolphthalein Alkalinity as CaCO <sub>3</sub>	mg/l	Nil	-	-		2320 B
15	Total Alkalinity as CaCO <sub>3</sub>	mg/l	329	200	600		2320 B
16	Chlorides as Cl	mg/l	444	250	1000		4500 Cl B
17	Sulfates as SO <sub>4</sub>	mg/l	510	200	400		4500 SO <sub>4</sub> E
18	Total Iron as Fe	mg/l	0.16	0.3	0.3		3500 Fe- B
19	Silica (Reactive) as SiO <sub>2</sub>	mg/l	41.0	-	-		4500 SiO <sub>2</sub> C
20	Carbonate Hardness as CaCO <sub>3</sub>	mg/l	329	-	-		2340 A
21	Non-Carbonate Hardness as CaCO <sub>3</sub>	mg/l	772	-	-		2340 A
22	Free Residual Chlorine	mg/l	BDL (DL=0.1)	0.2	**1		4500 Cl B

BDL= Below Detectable Limit, DL= Detection Limit.

\*\* To be applicable only when water is chlorinated.

---End of Report---



*Jeeva*  
 Authorized Signatory

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## QUALITY REPORT OF RO WATER



### EKDANT ENVIRO SERVICES (P) LIMITED

NABL Accredited & MoEF Recognised Laboratory  
 An ISO 9001 : 2008 and OHSAS 18001 : 2007 Certified Company  
 No.R-7/1, AVK Tower, North Main Road, Anna Nagar West Extn., Chennai - 600 101. India  
 Phone : 044 - 2615 3349 / 4856 2349 Mobile : 9444411178  
 E-mail : ekdantlab@gmail.com / info@ekdantlab.co.in  
 Web : www.ekdantlab.co.in

TEST REPORT						
Sample Ref No. : EES/W/142/08			Report No. : 452/08			
Issued To: <b>M/s. B.S. Abdur Rahman Crescent University, Seethakathi Estate, G.S.T Main Road, Vandalur, Chennai-600 048.</b>			Report Date : 28.08.19 Page: 1 of 2			
Sample Description : Water Sample Drawn By/ Date : EES / 23.08.19 Customer's Reference : Letter Dated on 23.08.19 Sample Mark : RO Water Sampling Procedure : EES/QM/MSP/02			Received On : 23.08.19 Commenced On : 23.08.19 Completed On : 28.08.19			
Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		PROTOCOL: APHA 23 <sup>rd</sup> Edition 2017
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
<b>Physical Properties</b>						
1	Appearance When Analyzed After Filtration	-	Clear Clear	-	-	-
2	pH value at 25°C	-	6.52	6.5 - 8.5	6.5 - 8.5	4500 H° B
3	Color	Hazen	1.0	5	15	2120 B
4	Odor	-	Agreeable	Agreeable	Agreeable	IS 3025 P.5 1983 R.2012
5	Turbidity	NTU	BDL (DL=0.1)	1	5	2130 B
6	Electrical conductivity at 25°C	Micromhos/cm	65.0	-	-	2510 B
<b>Chemical Properties</b>						
7	Total Suspended Solids	mg/l	BDL (DL=1.0)	-	-	IS 3025: P.17:1984:R.2012
8	Total Dissolved Solids	mg/l	39.0	500	2000	IS 3025:P.16:1984:R.2012

---End of Page 1---



*S. Sule*  
 Authorized Signatory

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**TEST REPORT – ADDITIONAL SHEET**

Sample Ref No : EES/W/142/08			Report No. : 452/08 Report Date : 28.08.19 Page: 2 of 2			
Sl. No	PARAMETERS	UNITS	RESULTS	As Per IS 10500:2012		PROTOCOL: APHA 23 <sup>rd</sup> Edition 2017
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
9	Total Hardness as CaCO <sub>3</sub>	mg/l	4.0	200	600	2340 C
10	Calcium Hardness as CaCO <sub>3</sub>	mg/l	2.0	-	-	3500 - Ca B
11	Magnesium Hardness as CaCO <sub>3</sub>	mg/l	2.0	-	-	3500 - Mg B
12	Calcium as Ca	mg/l	0.80	75	200	3500 - Ca B
13	Magnesium as Mg	mg/l	0.48	30	100	2340 C
14	Phenolphthalein Alkalinity as CaCO <sub>3</sub>	mg/l	Nil	-	-	2320 B
15	Total Alkalinity as CaCO <sub>3</sub>	mg/l	12.0	200	600	2320 B
16	Chlorides as Cl	mg/l	17.0	250	1000	4500 Cl B
17	Sulfates as SO <sub>4</sub>	mg/l	2.0	200	400	4500 SO <sub>4</sub> <sup>2-</sup> E
18	Total Iron as Fe	mg/l	BDL (DL=0.05)	0.3	0.3	3500 Fe- B
19	Silica (Reactive) as SiO <sub>2</sub>	mg/l	3.0	-	-	4500 SiO <sub>2</sub> C
20	Carbonate Hardness as CaCO <sub>3</sub>	mg/l	4.0	-	-	2340 A
21	Non-Carbonate Hardness as CaCO <sub>3</sub>	mg/l	Nil	-	-	2340 A
22	Free Residual Chlorine	mg/l	BDL (DL=0.1)	0.2	**1	4500 Cl B

BDL= Below Detectable Limit, DL= Detection Limit.  
 \*\* To be applicable only when water is chlorinated.  
**Report Opinion: The above submitted water sample complies with acceptable limits of drinking water specification as per IS 10500:2012 with respect to the above tests.**

—End of Report—

Authorized Signatory

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B.S. Abdur Rahman

**Crescent**  
Institute of Science & Technology

Deemed to be University u/s 3 of the UGC Act, 1956



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Phone : 044 - 2615 3349 / 4856 2349 Mobile : 9444411178

E-mail : ekdantlab@gmail.com / info@ekdantlab.co.in

Web : www.ekdantlab.co.in

TEST REPORT					
Sample Ref No : EES/W/142/08			Report No : 452/08		
Issued To: M/s. B.S. Abdur Rahman Crescent University, Seethakathi Estate, G.S.T Main Road, Vandalur, Chennai-600 048.			Report Date : 28.08.19 Page: 1 of 1		
Sample Description : Water			Received On : 23.08.19		
Sample Drawn By/ Date : EES/ 23.08.19			Commenced On : 23.08.19		
Customer's Reference : Letter Dated on 23.08.19			Completed On : 28.08.19		
Sample Mark : RO Water					
Sampling Procedure : EES/SOP/MB/005					
Sl. No	PARAMETERS	UNITS	RESULTS	Requirement as per IS 10500: 2012 Second revision (Acceptable Limit)	PROTOCOL
MICROBIOLOGICAL EXAMINATION					
1	Total Coliforms	MPN / 100ml	Absent	Shall not be detectable in any 100 ml	IS:1622-1981 Amd.4 RA 2012
2	E.coli	MPN / 100ml	Absent	Shall not be detectable in any 100 ml	IS:1622-1981 Amd.4 RA 2012
MPN- Most Probable Number					
Report Opinion: The above submitted water sample meets the requirement of drinking water specification as per IS 10500:2012 with respect to the parameters tested.					

—End of Report—



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**Regulations 2017**  
**Curriculum and Syllabi**

**(Amendments updated upto June 2020)**

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**B.Tech.**  
**(Biotechnology)**



**REGULATIONS 2017  
CURRICULUM AND SYLLABI  
(Amendments updated upto June 2020)**

**B.TECH.  
BIOTECHNOLOGY**

**PROGRAMME ELECTIVES**

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1.	PE	BTCX01	Biophysics	3	0	0	3
2.	PE	BTCX02	Industrial Biotechnology	3	0	0	0
3.	PE	BTCX03	Bio-Organic Chemistry	3	0	0	3
4.	PE	BTCX04	Molecular Pathology	3	0	0	3
5.	PE	BTCX05	Food Biotechnology	3	0	0	3
6.	PE	BTCX06	Cancer Biology	3	0	0	3
7.	PE	BTCX07	Tissue Engineering	3	0	0	3
8.	PE	BTCX08	Developmental Biology	3	0	0	3
9.		BTCX09	Bioseparation Technology				
10.	PE	BTCX10	Proteomics & Genomics	3	0	0	3
11.	PE	BTCX11	Biomedical Instrumentation	3	0	0	3
12.	PE	BTCX12	Pharmaceutical Biotechnology	3	0	0	3
13.	PE	BTCX13	Medical Biotechnology	3	0	0	3
14.	PE	BTCX14	Drug Design and Development	3	0	0	3
15.	PE	BTCX15	Intellectual Property Rights	3	0	0	3
16.	PE	BTCX16	Recombinant DNA Technology	3	0	0	3
17.	PE	BTCX17	Material science	3	0	0	3
18.	PE	BTCX18	Molecular & Cellular Diagnostics	3	0	0	3
19.	PE	BTCX19	Biomedical Engineering	3	0	0	3
20.	PE	BTCX20	Biosafety and Bioethics	3	0	0	3
21.	PE	BTCX21	Healthcare Biotechnology	3	0	0	3

B.Tech.	Biotechnology		Regulations 2017			
6.	CHCX06	Fundamentals of Physical Chemistry	2	0	2	3
7.	CHCX07	Green Technology	2	0	2	3
8.	CHCX08	Organic Chemistry of Biomolecules	2	0	2	3
9.	CHCX09	Polymer Science and Technology	2	0	2	3

### Humanities Elective I

(to be offered in III Semester)

Sl. No.	Course Code	Course Title	L	T	P	C
1.	SSCX01	Fundamentals of Economics	2	0	0	2
2.	SSCX02	Principles of Sociology	2	0	0	2
3.	SSCX03	Sociology of Indian Society	2	0	0	2

### Humanities Elective II

(to be offered in IV Semester)

Sl. No.	Course Code	Course Title	L	T	P	C
1.	SSCX04	Economics of Sustainable Development	2	0	0	2
2.	SSCX05	Industrial Sociology	2	0	0	2
3.	SSCX06	Law for Engineers	2	0	0	2



**General Elective  
Group I Courses  
(To be offered in V semester)**

<b>Sl. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Offering Department</b>
1.	GECX 101	Disaster Management	Civil
2.	GECX 102	Total Quality Management	Mechanical
3.	GECX 103	Energy Studies	Mechanical
4.	GECX 104	Robotics	Mechanical
5.	GECX 105	Transport Management	Automobile
6.	GECX 106	Control Systems	EEE
7.	GECX 107	Introduction to VLSI Design	ECE
8.	GECX 108	Plant Engineering	EIE
9.	GECX 109	Network Security	CSE
10.	GECX 110	Knowledge management	CSE
11.	GECX 111	Cyber security	IT
12.	GECX 112	Genetic Engineering	LS
13.	GECX 113	Fundamentals of Project Management	CBS
14.	GECX 114	Operations Research	Mathematics
15.	GECX 115	Nano Technology	Physics / Chemistry
16.	GECX 116	Vehicle Maintenance	Automobile
17.	GECX 117	Fundamentals of Digital Image Processing	ECE

<b>BTCX05</b>	<b>FOOD BIOTECHNOLOGY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

The course aims to

- Provide a programme of education which can enable its graduates to enter a career in the food industry as technologists capable of ensuring the production and marketing of safe and quality foods.
- Provide a broadly based technological education whose graduates can also enter into employment in other sectors of the food chain, or related technical sectors, where they can apply their technological skills.
- Allow individuals to develop their capacity to undertake research into problems relating to the production and marketing of safe and quality foods.

**MODULE I INTRODUCTION 8**

History of Microorganisms in food, Historical Developments, Taxonomy, role and significance of microorganisms in foods. Intrinsic and Extrinsic Parameters of Foods that affect microbial growth, Microorganisms in fresh meats and poultry, processed meats, seafood's, fermented and fermented dairy products and miscellaneous food products, Starter cultures, cheeses, beer, wine and distilled spirits, SCP, medical foods, probiotics and health benefits of fermented milk and foods products.

**MODULE II PRIMARY & SECONDARY FERMENTATION 8**

Brewing malting, mashing, hops, primary & secondary fermentation: Biotechnological improvements: catabolic repression, High gravity brewing, B-glucan problem, getting rid of diacetyl. Beer, wine and distilled spirits.

**MODULE III FOOD QUALITY PARAMETERS 8**

Emerging processing and preservation technologies for milk and dairy product, Microbiological Examination of surfaces, Air Sampling, Metabolically Injured Organisms, Enumeration and Detection of Food-borne Organisms. Bioassay and related Methods

**MODULE IV FOOD PRESERVATION 7**

Food Preservation Using Irradiation, Characteristics of Radiations of Interest, in

Food Preservation. Principles Underlying the Destruction of Microorganisms by Irradiation, Processing of Foods for Irradiation, Application of Radiation, Radappertization, Radicidation, and Radurization of Foods Legal Status of Food Irradiation, Effect of Irradiation of Food constituents

**MODULE V STORAGE 7**

Stability Food Preservation with Low Temperatures, Food Preservation with High Temperatures, Preservation of Foods by Drying, Indicator and Food-borne Pathogens, Other Proven and Suspected Food-borne Pathogens.

**MODULE VI FOOD QUALITY AND CONTROL 7**

Analysis of food, major ingredients present in different product, Food additives colour, flavour, vitamins, Microbial safety of food products, Chemical safety of food products, heavy metal, fungal toxins, pesticide and herbicide contamination.

**Total Hours – 45**

**TEXT BOOKS:**

1. Modern Food Micro-Biology by James M. Jay, (2000), 6th edition, An Aspen Publication, Maryland, USA.
2. Food Microbiology: Fundamentals and frontiers by M.P. Doyle, L.R. Beuchat and Thoma J. Montville, (2001), 2nd edition, ASM press, USA.
3. Food Science and Food Biotechnology by G.F.G. Lopez & G.V.B. Canovas (2003), CRC Press, Florida, USA

**OUTCOMES:**

At the end of the course students will be able to

- Integrate the scientific disciplines relevant to food
- Apply and communicate technological knowledge to meet the needs of industry and the consumer for the production and marketing of safe and quality foods.

<b>BTCX07</b>	<b>TISSUE ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

Students shall know about

- Basic concept of types of tissues, cell migration and therapeutic importance of tissue engineering
- Different aspects of cell culture and 3 dimensional cell culture
- Importance of growth factors, hormones and signalling method
- Scaffold synthesis and its application in tissue engineering
- Case studies and regulatory issues

**MODULE I INTRODUCTION 9**

Basic definition, Structural and organization of tissues: Epithelial, connective; vascularity and angiogenesis, basic wound healing, cell migration, current scope of development and use in therapeutic and in-vitro testing.

**MODULE II CELL-CELL COMMUNICATION and IN VITRO CULTURE 9**

Different cell types, progenitor cells and cell differentiations, different kind of matrix, cell-cell interaction. Aspect of cell culture: cell expansion, cell transfer, cell storage and cell characterization, 3-D cell culture, Bioreactors.

**MODULE III MOLECULAR BIOLOGY ASPECTS 9**

Cell signaling molecules, growth factors, hormone and growth factor signaling, growth factor delivery in tissue engineering, cell attachment: differential cell adhesion, receptor-ligand binding, and Cell surface markers.

**MODULE IV SCAFFOLD AND TRANSPLANT- SYNTHESIS and APPLICATION 9**

Engineering biomaterials for tissue engineering, Degradable materials (collagen, silk and polylactic acid), porosity, mechanical strength, 3-D architecture and cell incorporation. Engineering tissues for replacing bone, cartilage, tendons, ligaments, skin and liver. Basic transplant immunology, stems cells: introduction, hematopoiesis.

**MODULE V CASE STUDY AND REGULATORY ISSUES 9**

Case study of multiple approaches: cell transplantation for liver, cardiovascular, neural, fetal tissue engineering and artificial womb, prosthetics. Ethical, FDA and regulatory issues of tissue engineering.

**Total Hours –45**

**TEXT BOOKS:**

1. Lanza, Langer and Vacanti(eds). Principles of Tissue engineering. Academic Press, 2<sup>nd</sup> Edition 1999
2. Minoth, Strehl, Schumacher. Introduction to Tissue engineering. Wiley VCH., 3<sup>rd</sup> Edition, 2005

**REFERENCES:**

related research papers

**OUTCOMES:**

Students shall be able to

- understand fundamentals of tissue engineering
- understand cell-cell communication and cell culture techniques
- understand how cell signaling molecules help in cell proliferation
- understand and apply the knowledge of scaffold synthesis and tissue engineering application
- apply to concept to different tissue engineering applications and will know the ethical and regulatory issue

**CHCX07****GREEN TECHNOLOGY****L T P C**  
**2 0 2 3****OBJECTIVES**

To make students conversant with the

- basic principles of green chemistry and green technology.
- wastes that causes hazards to human health
- chemicals that harms our environment
- need for green processes in various industries

**MODULE I GREEN CHEMISTRY PROTOCOL****7**

Need – Significance – 12 Principles with examples – R4 model – Life cycle analysis – sustainable and cleaner production - Green Technology: definition, examples: CFC free refrigerants, green building, energy, 3D printers, nanotechnology – Awards for Green chemistry – organization promoting green chemistry.

**MODULE II WASTE & WASTE MINIMISATION****8**

Source of wastes: domestic, industrial, medical, nuclear, e-waste; problems; prevention – economy of waste disposal – Waste minimization techniques: general waste treatment and recycling – alternate waste water treatment technologies: hybrid process – Green computing: goals, green cloud, green ICT - Pollution statistics from various industries (Industrial case studies).

**MODULE III GREEN SYNTHESIS****7**

Introduction - Solvent free reactions - green reagents, green solvents in synthesis - microwave and ultrasound assisted reactions – supercritical fluid extraction – green oxidation and photochemical reactions – catalyst and biocatalysts.

**MODULE IV GREEN INDUSTRIAL PROCESSES****8**

Polymer industry: biodegradable polymer - textile industry: greener approaches of dyeing, waste disposal – ecofriendly agrochemicals: biofertilizers, biopesticides – Pharmaceutical industry: atom economy, reduction of toxicity, use of biocatalyst, zero waste disposal – Leather industry: greener process in tanning, crusting, surface coating – ecofriendly batteries & fuel cells.

**L:30 periods**

**PRACTICALS**

1. Synthesis of an ionic liquids (Ex: imidazolium) and testing the solubility of organic chemicals.
2. Green bromination of stilbene (using pyridine hydrobromide).
3. Green synthesis: Photocatalytic reactions, solvent-free organic reaction – Aldol; green oxidation, green reduction.
4. Microwave assisted chemical reaction. (synthesis of aspirin, pinacol-pinacolone reaction, etc).
5. Comparison of conventional reaction with microwave assisted reactions (atom economy, solvent, etc) [Ex: aldehyde and ketones with hydrazines to give hydrazones].
6. Diels-Alder reaction in eucalyptus oil (green process).

**P:30 periods****Total: 60 periods****REFERENCES**

1. Jain P.C and Renuka Jain, Physical Chemistry for Engineers, Dhanpat Rai and Sons, New Delhi. 2001.
2. V. K. Ahluwalia, Green Chemistry: Environmentally Benign Reactions, Ane Books India, New Delhi, 2006.
3. Paul Anastas, John C. Warner, John Warner Joint; Green Chemistry: Theory & Practice New Ed Edition; Oxford University press, USA, 2000.
4. Rashmi Sanghi, M. M. Srivastava, Green chemistry, Narosa publishers, New Delhi, 2003.

**OUTCOMES**

The students will be able to

- outline the principles and implications of green chemistry.
- comprehend the potential risks of waste generated and analyse the threats to human and environment.
- integrate information into design of molecules to avoid/eliminate toxic solvents & reagents or reduce toxic products.
- identify various alternate greener technologies for various industries.

<b>GECX 108</b>	<b>PLANT ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To provide in depth knowledge on Plant Engineering
- To introduce detail engineering and P&ID
- To learn about the support to Instrumentation from other disciplines
- To study about the Installation and commissioning

**MODULE I INTRODUCTION OF PLANTS 7**

General Project Cycle – Feed – Sales - Plant Description, Component / Areas of Plant, Plant Layout, Plant Interfaces, Plant Location

**MODULE II ELEMENTS OF PLANT 8**

Main Elements of a Plant, Process Flow Scheme (PFD – Process Flow Diagram) P&ID's, Plant Legend Finalization.

**MODULE III DETAIL ENGINEERING 10**

P& ID Development with PFD's, Major Discipline Involvement & Inter discipline Interaction, Major Instrumentation & Control Systems - Development Phase – Instrument List , I/O Count, Specification Sheets, Instrument Installation ( Hook ups) , Control Philosophy – Detail Engineering.

**MODULE IV SUPPORT FROM OTHER DISCIPLINE 8**

Other Discipline Supports to Instrumentation – Plot Plan, Piping / Equipment Plan, Electrical Area Classification, Fire Hazardous Classification Telecommunication Systems - Control Network architecture.

**MODULE V INSTALLATION AND COMMISSIONING 7**

Plant Construction - Key Drawings for Construction Support Construction Activities, System Testing, Startup / Commissioning, Production.

**MODULE VI CASE STUDIES 5**

Case studies of Water Treatment Plant - Paper Industry – Power Plant etc

**L – 45; Total Hours –45**



**REFERENCES:**

1. Duncan C Richardson, Plant Equipment and Maintenance Engineering Handbook, McGraw-Hill Education: New York, Chicago, San Francisco, Athens, London, Madrid, Mexico City, Milan, New Delhi, Singapore, Sydney, Toronto, 2014 McGraw-Hill Education
2. Gabriel Salvendy, Handbook of Industrial Engineering – Technology and operations Management, John Wiley & Sons, 2001.
3. Robert C Rosaler , Standard Handbook of Plant Engineering, Mc Graw Hill third Edition, 2004
4. [R. Keith Mobley](#), Plant Engineer's Handbook, Technology and Engineering, 2001.

**OUTCOMES:**

At the end of the course, the student will be able to

- Review and correct P&IDs
- Do installation and commissioning of new plants
- Apply plant engineering in design and maintenance of water treatment plant / power plant etc