



**SELF ASSESSMENT REPORT (SAR) FORMAT  
UNDERGRADUATE ENGINEERING PROGRAMS (TIER-I)**

**2<sup>nd</sup> CYCLE ACCREDITATION**

*(Applicable for all those programs which have been granted full accreditation of 6 years under Tier I)*

**PART A & B**



**Department of Dyestuff Technology**

**Institute of Chemical Technology, Mumbai, Maharashtra**

University under Section 3 of UGC Act 1956 Elite Status and Centre of Excellence, Government of  
Maharashtra Nathalal Parekh Marg, Matunga (E), Mumbai 400 019, India June 2022

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## PART A: Institutional Information

**1. Name and Address of the Institution:**

Institute of Chemical Technology, Mumbai  
University under section 3 of UGC Act 1956 Estd.1933,  
Elite Status and Centre of Excellence-Govt. of Maharashtra  
ICT, Nathalal Parekh Marg, Matunga, Mumbai – 400019  
Tel: +91-22-33612312, Fax: +91-22-33611020  
Website: www.ictmumbai.edu.in

**2. Name and Address of the Affiliating University, if applicable: (Same as above)**

**3. Year of the establishment of the Institution:1933**

**4. Type of Institution:** Deemed University

**5. Ownership Status:** State Government

**Provide Details:** Category I Deemed to be University (MHRD/UGC) Elite Status and Centre Excellence, Govt. of Maharashtra, University under section 3 of UGC Act 1956

**6. Other Academic Institutions of the Trust/Society/Company etc., if any:**

Name of the Institution(s)	Year of Establishment	Programs of Study	Location
ICT-IOC Bhubaneswar	2018	Integrated M.Tech (Major in Chemical Engineering and minor in Polymer and Materials Engineering/Food Engineering and Technology/Fibre and Textile Processing Technology/Energy Engineering/Petrochemical Engineering/Chemical Technology and PhD (Tech/Science)	Bhubaneswar, Orrisa
ICT Jalna	2018	M.Tech in Food Engineering and Technology/Pharmaceutical Chemistry and Technology/Polymer Engineering and Technology and PhD	Jalna, Maharashtra

## 7. Details of all the programs being offered by the institution under consideration

**Table A7.** Details of all the programs being offered by the institution under consideration.

Sr. No.	Program Name	Name of the Department	Year of Start	Intake	Increase/Decrease in intake, if any	Year of Increase/Decrease	AICTE Approval	Accreditation Status*
1.	B. Chemical Engineering	Chemical Engineering	1933	60	15	1995	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	27/12/2016 to 30/06/2022
2.	B.Tech - Dyestuff Technology	Dyestuff Technology	1944	16	2	1995	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	27/12/2016 to 30/06/2022
3.	B.Tech- Food Engineering and Technology	Food Engineering and Technology	1943	16	N.A.	N.A.	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	27/12/2016 to 30/06/2022
4.	B.Tech- Fibres and Textile Processing Technology	Fibres and Textile Processing Technology	1933	34	N.A.	N.A.	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	27/12/2016 to 30/06/2022
5.	B.Tech- Oils, Oleochemicals and Sufactant Technology	Oils, Oleochemicals and Sufactant Technology	1943	16	N.A.	N.A.	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	27/12/2016 to 30/06/2022
6.	B.Tech- Pharmaceuticals Chemistry and Technology	Pharmaceutical Sciences and Technology	1943	18	N.A.	N.A.	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	14/01/2017 to 30/06/2020
7.	B.Tech Polymer Engineering and Technology	Polymer and Surface Engineering	1946	08	08	1995	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	27/12/2016 to 30/06/2022
8.	B.Tech Surface Engineering & Technology	Polymer and Surface Engineering	1946	08	16	1995	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	27/12/2016 to 30/06/2022
9.	B. Pharmacy	Pharmaceutical Sciences and Technology	1959	18	30	1995	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	22/09/2016 to 30/06/2021

Sr. No.	Program Name	Name of the Department	Year of Start	Intake	Increase/Decrease in intake, if any	Year of Increase/Decrease	AICTE Approval	Accreditation Status*
1.	M. Chemical Engineering	Chemical Engineering	1958	30	N.A.	N.A.	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	28/09/2016 to 30/06/2021
2.	M.Tech- Dyestuff Technology	Dyestuff Technology	1961	4	14	2019	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	01/07/2015 to 30/06/2020
3.	M.Tech.-Food Engineering & Technology	Food Engineering and Technology	1945	8	N.A.	N.A.	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	03/03/2020 to 30/06/2026
4.	M.Tech- Fibres and Textile Processing Technology	Fibres and Textile Processing Technology	1961	18	N.A.	N.A.	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	01/07/2015 to 30/06/2020
5.	M.Tech- Oils, Oleochemicals and Sufactant Technology	Oils, Oleochemicals and Sufactant Technology	1966	18	N.A.	N.A.	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	03/03/2020 to 30/06/2023
6.	M.Tech- Pharmaceuticals Sciences and Technology	Pharmaceutical Sciences and Technology	1961	18	N.A.	N.A.	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	03/03/2020 to 30/06/2026
7.	M.Tech- Polymer Engineering and Technology	Polymer and Surface Engineering	1966	18	NA	NA	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	01/07/2015 to 30/06/2020
8.	M.Tech- Surface Coating & Technology	Polymer and Surface Engineering	1966	18	NA	NA	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	01/07/2015 to 30/06/2020
9.	M.Tech- Food Biotechnology	Food Engineering and Technology	2008	2	8	2009	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	28/09/2016 to 30/06/2021
10.	M.Tech- Bioprocess Technology	DBT-ICT Center of Biosciences	1994	30	N.A	N.A.	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	03/03/2020 to 30/06/2023
11.	M.Tech- Perfumery and Flavor Technology	Dyestuff Technology	1992	5	13	2017	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	01/07/2015 to 30/06/2020

12.	M.Tech. Green Technology	Green Technology	2010	30	N.A.	N.A.	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	28/09/2016 to 30/06/2021
13.	M. Tech. Pharmaceutical Biotechnology	Pharmaceutical Sciences and Technology	2017	15	N.A.	N.A.	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	N.A.
14.	M.E. (Plastic Engineering)	General Engineering	1972	18	N.A.	N.A.	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	03/03/2020 to 30/06/2023
15.	M.Sc. (Chemistry)	Chemistry	2010	20	N.A.	N.A.	N.A.	N.A.
16.	M.Sc. (Textile Chemistry)	Fibres and Textile Processing Technology	2010	20	N.A.	N.A.	N.A.	N.A.
17.	M.Sc. (Engineering Mathematics)	Mathematics	2012	20	N.A.	N.A.	N.A.	N.A.
18.	M.Sc. (Physics)	Physics	2014	20	N.A.	N.A.	N.A.	N.A.
19.	M. Pharmacy	Pharmaceutical Sciences and Technology	1965	18	N.A.	N.A.	AICTE Approved (F.No. Western/1-9318340850/2021/EOA)	01/07/2014 to 30/06/2017

**\* Write applicable one:**

- Applying first time
- Granted provisional accreditation for two/three years for the period (specify period)
- Granted accreditation for 5/6 years for the period (specify period)
- Not accredited (specify visit dates, year)
- Withdrawn (specify visit dates, year)
- Not eligible for accreditation
- Eligible but not applied

**Note:** 1. Add rows as needed. 2. Separate tables for UG and PG Programs to be prepared.

**8. Programs to be considered for Accreditation vide this application**

**Table A8.** Programs to be considered for Accreditation vide this application.

Sr No	Level	Discipline		Program			Current Year Sanctioned Intake	Current Year Admission (in Nos.) 2021-22				
Name of Program	Program Applied level	Start Of year	Year of AICTE approval	Initial Intake	Intake Increase	Current Intake	Accreditation status	From	To	Program for consideration	Program for Duration	
1	Undergraduate	Engineering & Technology		Dyestuff Technology			20	18				
Bachelor of Technology in Dyestuff and intermediates Technology	UG	1944	1944	16	Yes	20	Granted accreditation for 5 years for the period	2016	2022	Yes	4	
<b>Sanctioned Intake for Last Five Years for the Dyestuff Technology</b>												
						2021-22						20
						2020-21						20
						2019-20						20
						2018-19						20
						2017-18						20
						2016-17						20
						2015-16						20
						2014-15						20

**9. Total number of Engineering Students**

**Table A9.** Total number of Engineering Students

<b>Chemical Engineering</b>			
Items	CAY	CAYm1	CAYm2
Total no. of boys	68	66	66
Total no. of girls	19	22	21
Total no. of students	87	88	87
<b>B.Tech (Dyestuff Technology)</b>			
Items	CAY	CAYm1	CAYm2
Total no. of boys	11	14	15
Total no. of girls	5	5	6
Total no. of students	16	19	21
<b>B.Tech (Pharma)</b>			
Items	CAY	CAYm1	CAYm2
Total no. of boys	13	16	11
Total no. of girls	10	7	10
Total no. of students	23	23	21
<b>B.Tech (Oils)</b>			

<b>Items</b>	<b>CAY</b>	<b>CAYm1</b>	<b>CAYm2</b>
<b>Total no. of boys</b>	11	15	13
<b>Total no. of girls</b>	6	3	6
<b>Total no. of students</b>	17	18	19
<b>B.Tech (Surface Coating)</b>			
<b>Items</b>	<b>CAY</b>	<b>CAYm1</b>	<b>CAYm2</b>
<b>Total no. of boys</b>	11	14	14
<b>Total no. of girls</b>	3	5	5
<b>Total no. of students</b>	14	19	19
<b>B.Tech (Food engineering)</b>			
<b>Items</b>	<b>CAY</b>	<b>CAYm1</b>	<b>CAYm2</b>
<b>Total no. of boys</b>	13	13	10
<b>Total no. of girls</b>	7	7	10
<b>Total no. of students</b>	20	20	20
<b>B.Tech (Polymer)</b>			
<b>Items</b>	<b>CAY</b>	<b>CAYm1</b>	<b>CAYm2</b>
<b>Total no. of boys</b>	16	17	14
<b>Total no. of girls</b>	3	2	5
<b>Total no. of students</b>	19	19	19
<b>B.Tech (Fibres)</b>			
<b>Items</b>	<b>CAY</b>	<b>CAYm1</b>	<b>CAYm2</b>
<b>Total no. of boys</b>	19	23	24
<b>Total no. of girls</b>	4	14	13
<b>Total no. of students</b>	23	37	37
<b>MChem Chemical Engineering</b>			
<b>Items</b>	<b>CAY</b>	<b>CAYm1</b>	<b>CAYm2</b>
<b>Total no. of boys</b>	21	24	23
<b>Total no. of girls</b>	5	5	7
<b>Total no. of students</b>	26	29	30
<b>ME Plastic Engineering</b>			
<b>Items</b>	<b>CAY</b>	<b>CAYm1</b>	<b>CAYm2</b>
<b>Total no. of boys</b>	8	5	9
<b>Total no. of girls</b>	3	6	1
<b>Total no. of students</b>	11	11	10
<b>M.Tech (Dyestuff Technology)</b>			
<b>Items</b>	<b>CAY</b>	<b>CAYm1</b>	<b>CAYm2</b>
<b>Total no. of boys</b>	4	1	7
<b>Total no. of girls</b>	4	5	8
<b>Total no. of students</b>	8	6	15
<b>M.Tech (Textile)</b>			
<b>Items</b>	<b>CAY</b>	<b>CAYm1</b>	<b>CAYm2</b>
<b>Total no. of boys</b>	12	11	9
<b>Total no. of girls</b>	3	5	6
<b>Total no. of students</b>	15	16	15
<b>M.Tech (Polymer)</b>			
<b>Items</b>	<b>CAY</b>	<b>CAYm1</b>	<b>CAYm2</b>



Total no. of boys	14	14	14
Total no. of girls	2	4	4
Total no. of students	16	18	18
<b>M.Tech (Food Engg &amp; Tech)</b>			
Items	CAY	CAYm1	CAYm2
Total no. of boys	8	10	12
Total no. of girls	9	8	5
Total no. of students	17	18	17
<b>M.Tech (Green Tech)</b>			
Items	CAY	CAYm1	CAYm2
Total no. of boys	10	8	16
Total no. of girls	13	20	10
Total no. of students	23	28	26
<b>M.Tech (Oils)</b>			
Items	CAY	CAYm1	CAYm2
Total no. of boys	12	12	8
Total no. of girls	6	5	10
Total no. of students	18	17	18
<b>M.Tech (Perfumery)</b>			
Items	CAY	CAYm1	CAYm2
Total no. of boys	8	6	9
Total no. of girls	8	12	9
Total no. of students	16	18	18
<b>M.Tech (Surface-coating)</b>			
Items	CAY	CAYm1	CAYm2
Total no. of boys	10	11	15
Total no. of girls	7	7	3
Total no. of students	17	18	18
<b>M.Tech (Parma Tech)</b>			
Items	CAY	CAYm1	CAYm2
Total no. of boys	9	11	5
Total no. of girls	8	7	13
Total no. of students	17	18	18
<b>M.Tech (Bioprocess Tech)</b>			
Items	CAY	CAYm1	CAYm2
Total no. of boys	18	12	14
Total no. of girls	10	17	16
Total no. of students	28	29	30
<b>M.Tech (Food Biotech)</b>			
Items	CAY	CAYm1	CAYm2
Total no. of boys	3	1	5
Total no. of girls	7	8	5

<b>Total no. of students</b>	10	9	10
<b>M.Tech (Pharma-biotech)</b>			
<b>Items</b>	<b>CAY</b>	<b>CAYm1</b>	<b>CAYm2</b>
<b>Total no. of boys</b>	3	5	3
<b>Total no. of girls</b>	4	5	7
<b>Total no. of students</b>	7	10	10

#### 10. Vision of the Institution:

We shall perennially strive to be a vibrant institute with continuously evolving curricula to brighten the future of the chemical, biological, materials and energy industries of the nation, and rank amongst the very best in the world through active participation and scholarship of our faculty, students, and alumni. We shall be creators of sprouting knowledge and design cutting-edge technologies that will have the greatest impact on society and benefit mankind at large.

#### 11. Mission of the Institution:

We shall generate and sustain an atmosphere conducive to germinating new knowledge at every available opportunity. The education we shall impart will enable our students to devise innovative solutions to meet the needs of all segments of society about material and energy, while protecting the environment and conserving the natural resources.

Our endeavours, while extending well beyond the confines of the classroom, will aim to enhance public welfare and our attempts to disseminate knowledge will spread to a greater multi- and cross-disciplinary platform to conduct research, discovery, technology development, service to industry and entrepreneurship, in consonance with India's aspirations to be a welfare state.

We will team scientists and engineers with professionals in other disciplines to arrive at better solutions. We will provide all our students with a solid foundation to encourage them to be our ambassadors in the professional activities that they choose to undertake in service of society at national and international levels. Through our vision, we will serve the profession and society and strive to reach the summit as a team, and ultimately serve as role models to the younger generation.

#### 12. Contact Information of the Head of the Institution and NBA coordinator, if designated:

Head of the Institution	
Name	Prof. Aniruddha B. Pandit
Designation	VICE CHANCELLOR
Mobile No.	9820408037
Email ID	vc@ictmumbai.edu.in
NBA Coordinator, If Designated	
Name	Dr. Ashwin Mohan
Designation	Assistant Professor
Mobile No.	+91 9869506632
Email ID	as.mohan@ictmumbai.edu.in

## CRITERIA SUMMARY

### Program: Bachelor of Technology in Dyestuff Technology

Criteria No.	Details	Marks	Institute assessed marks
1	Course Outcomes and Program Outcomes	100	100
2	Program Curriculum & Teaching-Learning Processes	75	75
3	Students' Performance	75	70
4	Faculty Information & Contributions	100	90
5	Resources	75	75
6	Continuous Improvement	75	70
	Total	500	480

## PART B: Program Level Criteria

CRITERION 1	Course Outcomes and Program Outcomes	100
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### 1.1. State the Vision, Mission of the Department and Institute and Program Educational Objectives (5) **Self-Assessed Marks = 5**

**Vision:** To build world class programs of excellence in education and research in specialized areas of dyestuff chemistry and technology for the benefit of society through problem solving competencies.

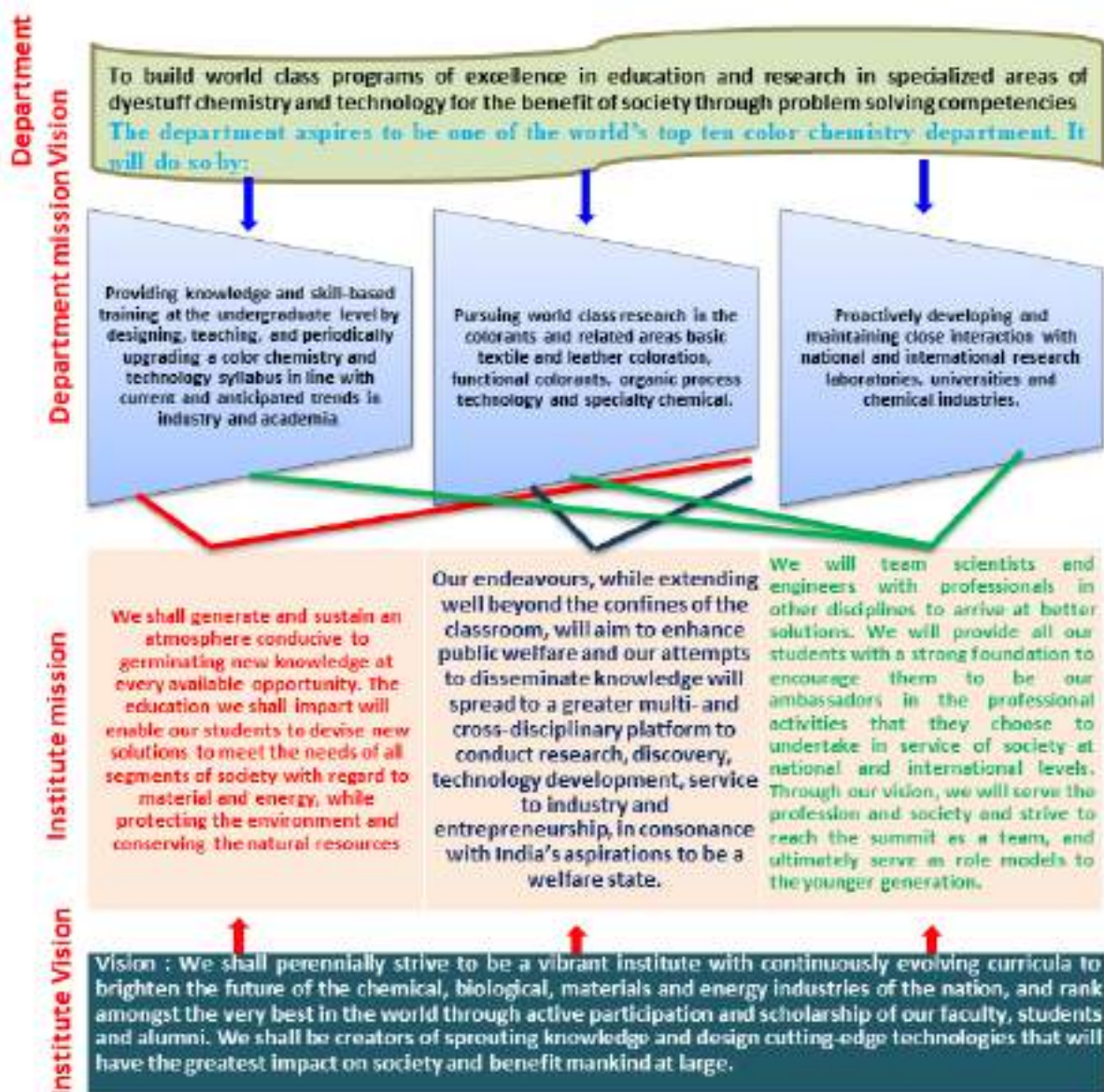
**Mission:** The department aspires to be one of the world's top ten color chemistry department. It will do so by:

- **M1:** Providing knowledge and skill-based training at the undergraduate level by designing, teaching, and periodically upgrading a color chemistry and technology syllabus in line with current and anticipated trends in industry and academia and proactively maintaining close interaction with top research labs and industry.
- **M2:** To make student graduates capable to assess and relate engineering issues to environmental and broader societal contexts and pursuing the world class research with integrity and ethics
- **M3:** To inculcate leadership qualities in graduates with strong communication skills, mould them as good team players and managers so that they have the competence to function effectively in multi-disciplinary orientation teams.

### **Justification of consistency of the Department Vision and Mission with the Institute Vision and Mission**

The departmental guiding principles for students in **B. Tech Dyestuff Technology** are as follows:

- To empower our students with ethics and integrity about strong fundamentals, knowledge, and skills
- Practices through industrial in-plant training and industrial visits so that they can serve the Dyestuff and Intermediate industry.
- The program is committed to nurture the spirit of innovation and creativity among students, faculty, and staff.

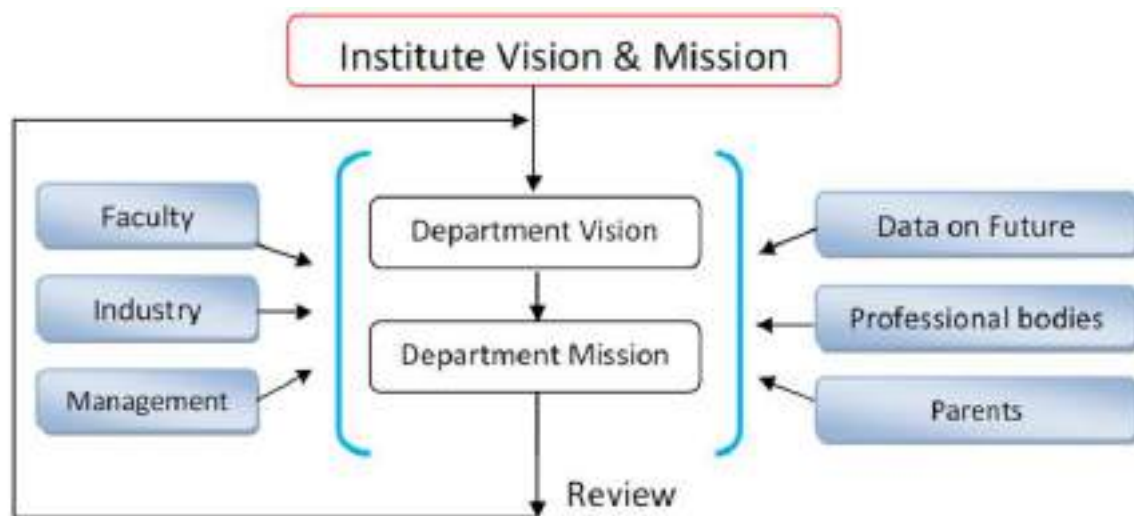


The mission of the **B. Tech Dyestuff Technology** program is consistent and perfectly aligned to the institutional mission.

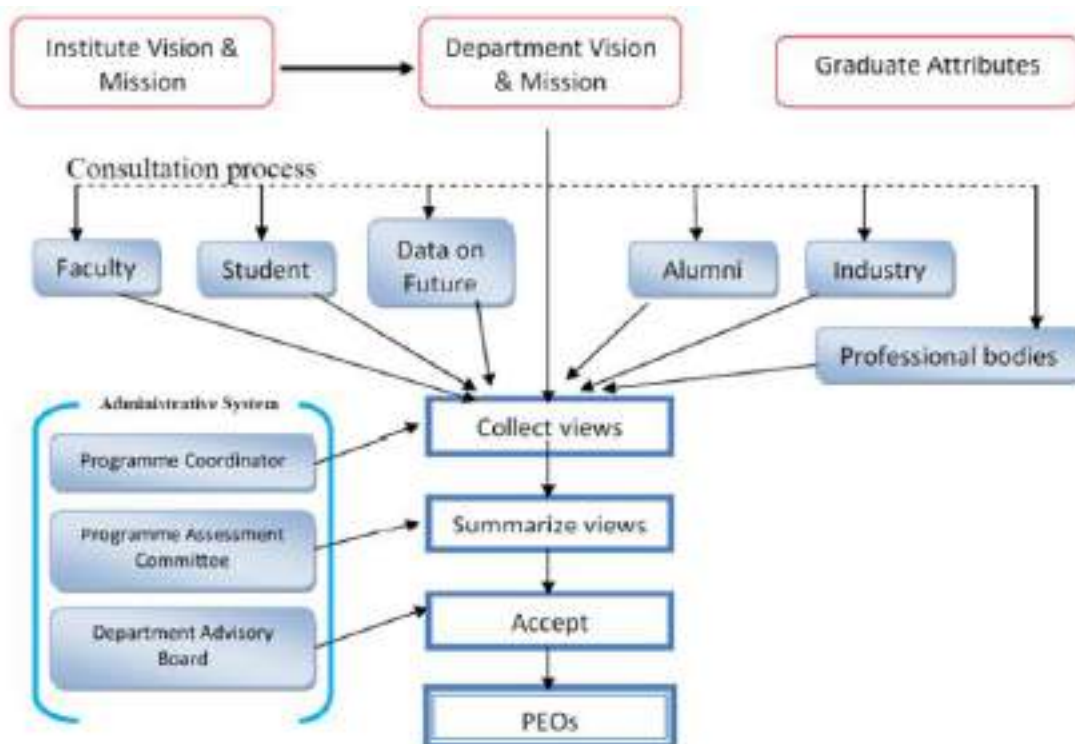
The institutional mission as well as the program mission is to strive to encourage holistic development of the students in terms of knowledge of cutting-edge technologies. Inculcate abilities and attitudes so that the students can serve the society, beneficial to the nation and the world. The department constantly strives towards the growth and development for graduates, faculty, and staff. The three missions of the department are well connected to specific components of the institute mission shown below.

PEO No.	Program Educational Objectives Statements
PEO No. 1	<b>Successful career:</b> To produce efficient organic chemical technology graduates with strong fundamentals in intermediate and dyestuff chemistry and specialty chemicals
PEO No. 2	<b>Real-time problem solver:</b> To make student graduates capable to assess and relate engineering issues to environmental and broader societal contexts and practice it with integrity and ethics

<b>PEO No. 3</b>	<b>Multidisciplinary skills:</b> To inculcate leadership qualities in graduates with strong communication skills, mould them as good team players and managers so that they have the competence to function effectively in multi-disciplinary orientation teams.
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**Process for defining Vision and Mission of the Department**



**Process for establishing PEOs**

1.2. Indicate where the Vision, Mission and PEOs are published and disseminated among stakeholders (5) **Self-Assessed Marks = 5**

SI. No	Decimation of departmental vision, mission and PEO's among the internal stakeholders
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1	Department prepares Information Brochure which includes Planning of current semester and closing of previous semester. It is circulated among all students through email at the time of commencement of semester. This Information brochure includes Vision, Mission and PEOs
2	Department Vision, Mission PEOs are available on ICT departmental website <a href="https://www.ictmumbai.edu.in/Deptindex.aspx?page=a&amp;ItemID=ce&amp;nDeptID=e">https://www.ictmumbai.edu.in/Deptindex.aspx?page=a&amp;ItemID=ce&amp;nDeptID=e</a>
3	Department Vision, Mission PEOs are available on the department and at the HoD cabin
4	The departmental faculty committee conducts meeting periodically and Vision, Mission and PEOs are discussed
5	Zero lectures are conducted for each Subject and laboratory session. It is the first lecture for any subject and lab which provides general information relevance, significance and importance as well as application
6	Admission Hand Book consists of Department Vision and Mission, Along with these objectives List of teaching faculty, their research interest, subject expertise and list of subjects taught are also mentioned in this. Admission Hand book is provided to the students during the admission process and also available in the internet. ( <a href="https://www.ictmumbai.edu.in/uploaded_files/Handbook_2021-2022.pdf">https://www.ictmumbai.edu.in/uploaded_files/Handbook_2021-2022.pdf</a> )

**Internal stakeholders** include Management, Governing Board Members, Faculty, Support staff, and students.

**External stakeholders** include Employers, Alumni, Funding agencies, Parents and Industry.

The interactive sessions between HOD along with VC and other committee members of the Advisory Committee allow for setting the aims and objectives of the department while keeping the expectations of stakeholders.

- In the Board of Studies meeting, the Departmental mission and vision are revisited by brainstorming amongst the expert members. The strength, weakness, opportunity, and threat (SWOT) analysis is performed, keeping in mind the focus of the department and the needs of the society. The statements are prepared based on the outcome. The statements are framed to emphasize the role of food technologists as a scientist, practitioners, and responsible citizens.
- The revised statements for Vision, Mission, and Program Educational Objectives (PEOs) are sent to stakeholders for their feedback by the secretary of the Board of Studies.
- Once the statements are approved by the Board of Studies, it is passed to the Dean (Academic Programs), followed by approval in the UG Program Committee of the Institute.
- Finally, it is placed to the Academic Council of the Institute for approval.
- The Vision and Mission statements are revisited every five years

### 1.3. Establish consistency of PEOs with Mission of the Department (5) **Self-Assessment** **Marks = 5**

(Generate a “Mission of the Department – PEOs matrix” with justification and rationale of the mapping)

**Table B.1.3.**

PEO Statements	M1	M2	M3
PEO1: To produce efficient organic chemical technology graduates	3	3	2

with strong fundamentals in intermediate and dyestuff chemistry and specialty chemicals			
<b>PEO2:</b> To make student graduates capable to assess and relate engineering issues to environmental and broader societal contexts and practice it with integrity and ethics	2	3	3
<b>PEO3:</b> To inculcate leadership qualities in graduates with strong communication skills, mould them as good team players and managers so that they have the competence to function effectively in multi-disciplinary orientation teams.	2	2	3

Note: M1, M2. . . Mn are distinct elements of Mission statement. Enter correlation levels 1, 2 or 3 as defined below:

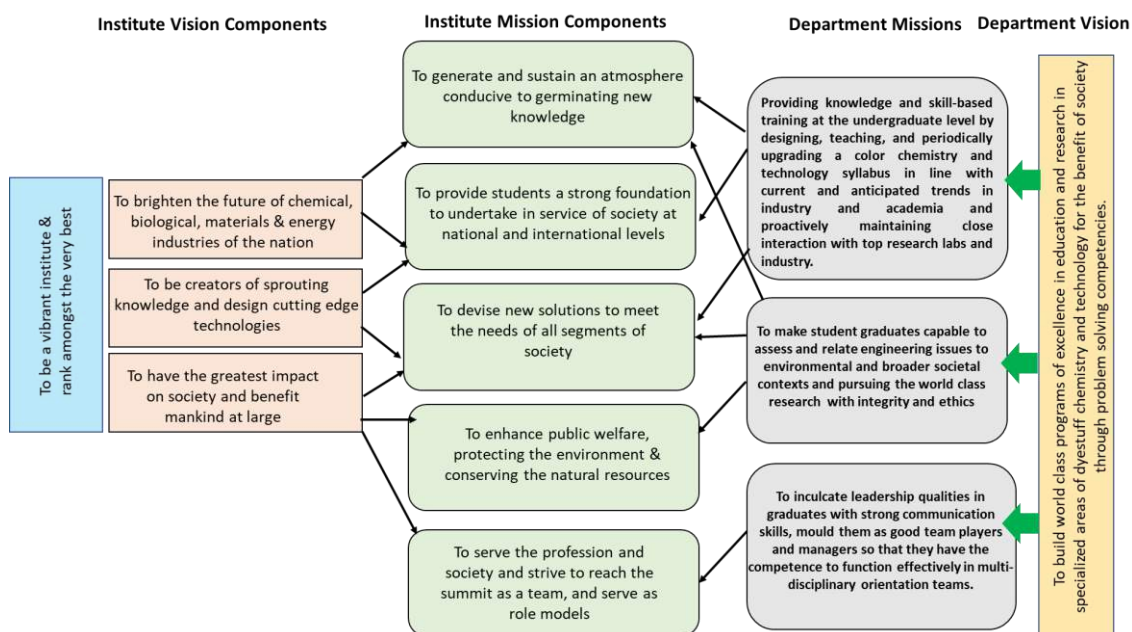
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) If there is no correlation, put “-” Note: Wherever the word “process” is used in this document its meaning is process formulation, notification to all the concerned, and implementation.

### Justification:

**PEO1** concerned with core competence of the graduate maps is highly consistent with all the mission components. These missions focuses on imparting strong fundamentals, through teaching excellence in the department. It is justified through practical and tutorial sessions, seminars, research projects, product development, placements, expert lectures, industry-institute interactions.

**PEO2** is highly consistent with all the mission components. It is justified through solving societal problems through engineering and technological solutions ethically.

**PEO3** is highly consistent with all the mission components. It is justified through Technical Paper Presentations, various case studies, their implementation in the form of mini projects, professional bodies, tech-fests, various clubs at institute level and workshops where student work in team and learn various team building activities in multiflavored environment.





1.4. Establish the correlation between the courses and the Program Outcomes (POs) & Program Specific Outcomes (10) **Self-Assessed Marks = 10**

Table B.1.4a. Course Articulation Matrix (6 courses shown, one from each semester)

Semester III		Analysis of Inorganic Raw Materials used in Dyestuff industries (DYP1001)													
CO	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
DYP1001.CO1	Estimate the amount of inorganic compounds present (K4)	2	2	2	3	3	3	2	2	3	1	2	3	3	2
DYP1001.CO2	Check the purity of compound (K3)	2	2	2	3	3	3	2	2	3	1	2	3	3	2
DYP1001.CO3	Understand the controlling and quantitative analysis of reducing agents (K2)	2	2	2	3	3	3	2	2	3	1	2	3	3	3
DYP1001.CO4	Analyse and identify the classes of metal containing reducing and oxidizing agents (K4)	3	3	3	3	3	3	2	2	2	1	2	3	3	3
DYP1001.CO5	Identify the reducing and oxidizing agents used for synthesis (K4)	3	3	3	3	3	3	2	2	3	1	2	3	3	3
DYP1001		3	3	3	3	3	3	2	2	3	1	2	3	3	3
Semester IV		Technology of Intermediates II (DYT1101)													
CO	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
DYT1101.CO1	Understand the basics of Naphthalene chemistry (K2)	2	2	2	2	1	1	1	0	0	0	3	0	2	2
DYT1101.CO2	Conceptualize basic unit processes for naphthalene and benzene (K2) used in dyes	2	2	2	2	1	1	1	0	0	0	3	0	2	2
DYT1101.CO3	Master the various technology and safety aspects for reactions. (K2)	2	2	2	2	2	2	2	0	0	0	3	0	2	2
DYT1101.CO4	Know various separation techniques used commercially and agitation systems for processes (K2)	3	3	3	3	3	2	2	1	0	0	3	0	3	3
DYT1101.CO5	Ability to design new synthetic routes of dye intermediates (K3)	3	3	3	3	3	2	2	1	0	0	3	1	3	3
DYT1101		3	3	3	3	3	2	2	1	0	0	3	1	3	3
Semester V		Technology of azo colorants (DYT1103)													
CO	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
DYT1103.CO1	Explain the and define the classes of dyes, substrates (K2)	2	2	2	2	0	0	0	0	0	0	3	0	2	3
DYT1103.CO2	Understand the variety and chemistry of dyes and their application (K2)	2	2	2	2	0	0	0	0	0	0	3	0	2	3

<b>DYT1103.CO3</b>	Overview of recent trends in the field of dyes containing azo groups (K2)	2	3	2	3	1	1	1	1	0	0	3	0	3	2
<b>DYT1103.CO4</b>	Differentiate the Techniques of diazotization and variations available (K2)	2	3	2	3	1	1	1	1	1	1	3	1	3	2
<b>DYT1103.CO5</b>	Design the synthesis of novel azo based dyes (K3)	3	3	3	3	2	2	2	1	2	2	3	2	2	3
<b>DYT1103</b>		3	3	3	3	2	2	2	1	2	2	3	3	3	3
<b>Semester VI</b>	<b>Fluorescent Colorants (DYT1203)</b>														
CO	Course Objectives	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>DYT1203.CO1</b>	Understand the basics of fluorescence (K2)	2	2	2	2	1	1	0	0	0	0	2	0	2	3
<b>DYT1203.CO2</b>	Conceptualized the basic fluorophores. (K2)	2	2	2	2	2	1	0	0	0	0	2	0	2	3
<b>DYT1203.CO3</b>	Analyze the various fluorophores for optical whitening, and functional applications (K3)	2	3	3	2	2	1	2	0	2	2	2	2	3	2
<b>DYT1203.CO4</b>	Know the various aspects of water-soluble fluorescent dyes in biology. (K2)	2	2	2	3	2	1	2	0	1	1	2	1	2	3
<b>DYT1203.CO5</b>	Identify the synthetic route for a desired fluorescent dye (K2)	2	3	3	3	2	2	2	1	2	2	3	2	3	3
<b>DYT1203</b>		2	3	3	3	2	2	2	1	2	2	3	2	3	3
<b>Semester VII</b>	<b>Technology of cationic and sulfur colorants (DYT1105)</b>														
CO	Statement	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>DYT1105.CO1</b>	Understand the constitution of Sulphur dyes. (K2)	1	2	2	2	1	0	1	0	0	0	2	0	2	3
<b>DYT1105.CO2</b>	Interpret the structural diversities in cationic dyes. (K2)	2	2	3	3	1	0	1	0	0	0	2	0	2	3
<b>DYT1105.CO3</b>	Distinguish the colour changes with different classes of cationic dyes. (K2)	1	3	3	3	1	0	1	0	0	0	2	0	2	3
<b>DYT1105.CO4</b>	Conceptualize the process in the manufacture of Sulphur dyes. (K2)	3	3	3	3	3	3	2	2	1	1	3	1	3	2
<b>DYT1105.CO5</b>	Assess the technical importance of cationic dyes and their manufacture. (K2)	3	3	3	3	3	3	2	2	1	1	3	2	3	2
<b>DYT1105</b>		3	3	3	3	3	2	2	2	1	1	3	2	3	3
<b>Semester VIII</b>	<b>Functional Application of Colorants (DYT1205)</b>														
CO	Statement	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>DYT1205.CO1</b>	Grasp broad idea about functional applications of dyes (K2)	1	2	2	2	1	1	2	0	1	1	3	0	3	2
<b>DYT1205.CO2</b>	Understand underlying properties for their application in commercial product (K2)	1	3	2	2	1	1	2	1	1	1	3	0	3	2
<b>DYT1205.CO3</b>	Know various colorants based on specific molecule engineering (K2)	2	3	2	2	1	2	2	0	1	1	3	0	2	3

<b>DYT1205.CO4</b>	Apply the knowledge in planning the synthesis of functional dyes (K3)	3	3	3	2	2	2	3	1	2	2	3	2	3	3
<b>DYT1205.CO5</b>	Design functional dyes based on the specific role (K4)	3	3	3	3	2	2	3	1	2	3	3	3	3	3
<b>DYT1205</b>		3	3	3	3	2	2	3	1	2	3	3	3	3	3

**Program Articulation Matrix.** The mapping of the core courses with the Program Objectives (PO) is shown below:

**Table 2:B.1.4b**

Course Code	Core Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>Semester III</b>															
<b>DYP1001</b>	Analysis of Inorganic Raw Materials used in Dyestuff industries (K6)	3	3	3	3	3	3	2	2	3	1	2	3	3	3
<b>OLT 1102</b>	Chemistry of Oleochemicals and Surfactants (K3)	3	3	3	3	3	3	3	3	3	3	3	3	3	3
<b>DYT1101</b>	Technology of Intermediates 1 (K3)	2	3	2	3	0	2	2	0	0	0	2	0	2	2
<b>DYT1202</b>	Chemical and Physical Constitution of Colourants (K3)	3	3	3	3	2	2	2	2	2	2	3	1	3	3
<b>Semester IV</b>															
<b>CET 1105</b>	Transport Phenomena (K4)	3	3	2	2	2	3	3	3	3	3	3	2	3	3
<b>GET1301</b>	Engineering Mechanics and Strength of Materials (K4)	3	3	2	2	2	3	3	3	3	3	3	2	3	3
<b>DYT1102</b>	Technology of Intermediates-II (K4)	3	3	3	3	3	2	2	1	0	0	3	1	3	3
<b>GEP1106</b>	Electrical Engineering and Electronics Lab (K6)	3	3	2	2	2	3	3	3	3	3	3	2	3	3
<b>GET1109</b>	Electrical Engineering and Electronics (K4)	3	3	2	2	2	3	3	3	3	3	3	2	3	3
<b>Semester V</b>															
<b>CET1212</b>	Chemical Reaction Engineering 1 (K4)	3	3	2	3	2	3	3	3	3	3	3	2	3	3
<b>CET1401</b>	Chemical Engineering Operations (K4)	3	3	2	3	2	3	3	3	3	3	3	2	3	3
<b>DYP1002</b>	Analysis of Intermediates, Dyes and Fibers (K6)	3	3	3	3	3	2	2	0	2	1	3	3	3	3
<b>DYP1003</b>	Experimental dyeing (K6)	2	3	3	3	3	2	2	1	2	1	3	2	3	3
<b>DYT1103</b>	Technology of azo colorants (K4)	3	3	3	3	2	2	2	1	2	2	3	3	3	3
<b>DYT1104</b>	Technology of Quinonoid colorants (K4)	3	3	3	3	2	2	2	1	2	1	3	1	3	3

<b>TXT1215</b>	Technology of dyeing and printing (including substrates) <b>(K6)</b>	3	3	3	3	3	3	2	2	2	2	2	2	2	2
<b>Semester VI</b>															
<b>DYP1004</b>	Chromatographic Techniques and Preparation of Dyes and Intermediates <b>(K6)</b>	3	3	3	3	3	2	1	2	2	2	3	3	3	3
<b>DYP1005</b>	Process and Plant Design <b>(K5)</b>	3	3	3	3	3	3	3	3	3	2	3	3	3	3
<b>DYT1203</b>	Fluorescent Colorants <b>(K4)</b>	2	3	3	3	2	2	2	1	2	2	3	2	3	3
<b>DYT1204</b>	Heterocyclic colorants and intermediates <b>(K4)</b>	3	3	3	3	3	3	2	3	3	2	3	2	3	3
<b>TXP1013</b>	Wet Processing of Textiles <b>(K6)</b>	3	3	3	3	3	2	2	2	3	2	2	3	3	3
<b>Semester VII</b>															
<b>CEP1714</b>	Chemical Engineering Laboratory <b>(K4)</b>	3	3	2	3	2	3	3	3	3	3	3	2	3	3
<b>CET1713</b>	Instrumentation and Process Control <b>(K4)</b>	3	3	3	3	3	3	3	3	3	3	3	3	3	3
<b>DYT1105</b>	Technology of cationic and sulfur colorants <b>(K4)</b>	3	3	3	3	3	2	2	2	1	1	3	2	3	3
<b>DYT1206</b>	Structural Elucidation of organic compounds <b>(K5)</b>	3	3	3	3	2	2	0	1	2	2	3	2	3	3
<b>DYP1007</b>	Project-I <b>(K6)</b>	3	3	3	3	3	3	3	3	3	3	3	3	3	3
<b>DYP1006</b>	Seminar <b>(K5)</b>	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	In-Plant Training <b>(K6)</b>	3	3	3	3	3	3	3	3	3	3	3	3	3	3
<b>Semester VIII</b>															
<b>DYP1009</b>	Preparation, analysis and application of dyes, optical brighteners, and functional colourants <b>(K6)</b>	3	3	3	3	3	3	3	2	3	1	3	3	3	3
<b>DYT1106</b>	Case Studies in Dyestuff Industry <b>(K5)</b>	3	3	3	3	3	3	3	2	2	3	3	3	3	3
<b>DYT1107</b>	Technology of Pigments <b>(K4)</b>	3	3	3	3	3	2	1	1	1	3	1	3	3	
<b>DYT1205</b>	Functional Applications of Organic Colourants <b>(K4)</b>	3	3	3	3	2	2	3	1	2	3	3	3	3	
<b>CET1504</b>	Project engineering Economics <b>(K4)</b>	3	3	2	3	2	3	3	3	3	3	3	2	3	
<b>DYP 1008</b>	Project II <b>(K6)</b>	3	3	3	3	3	3	3	3	3	3	3	3	3	

#The program articulation matrix considering 12POs and 2PSOs are shown in the appendix II.

Note: 1. Enter correlation levels 1, 2 or 3 as defined below: 1: Slight (Low) If The there is no correlation, Moderate (Medium) put 3: Substantial (High)

## 1.5. Attainment of Course Outcomes (25)

### 1.5.1. Describe the assessment tools and processes used to gather the data upon which the evaluation of Course Outcome is based (5) **Self-Assessed Marks = 5**

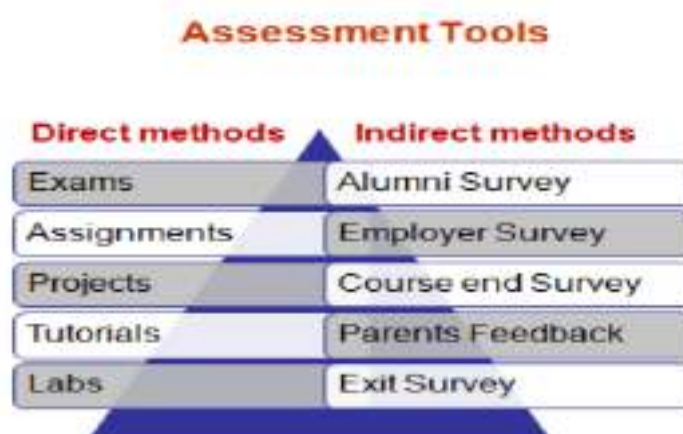
The course outcome is evaluated based on different assessment tools in the form of direct and indirect assessment. Direct assessments are obtained by evaluating the students' performance through exams, assignments, projects, tutorials, laboratory classes. The indirect assessments are done through the feedback received from the alumni, examiners etc. The different assessment tools used to obtain the evaluation of the course outcome is highlighted below.

Assessment Tools	
Direct Survey	Indirect Methods
Exams	Alumni/Examiner Feedback/Course wise feedback
Assignments	
Projects	Exist Survey
Tutorials	
Labs	

#### Assessment tools used to measure the student learning and Course Outcomes:

**End Semester exam:** End Semester Score (25 M for 50 marks course and 50M for 100 marks course)

**Continuous Evaluation:** Score for Continuous (10 M for 50 marks course and 20M for 100 marks course) and Mid sem Examination (15 M for 50 marks course and 30 M for 100 marks course). The continuous examination can be anything of the choice of the examiner like quizzes, examinations, open book test, assignments, presentations, etc.



### 1.5.2. Record the attainment of Course Outcomes of courses with respect to set attainment levels (20) **Self-Assessed Marks = 20**

The process adopted to map the assess the course outcomes

The assessment of the course outcomes (COs) has been performed by subject specialists. The corresponding steps have been discussed below.

**Step I:** Percentage weightage (W) has been given to each of the COs of a course corresponding to each question asked in end semester question paper.

**Step II:** Matrix showing Question wise marks for each student.

**Step III:** Calculation of CO wise score from Question wise marks. It is calculated as follows

$$S_{CO_j} = \sum_{i=1}^5 \sum_{j=1}^{10} \sum_{k=1}^5 S_{Q_{kj}} \times W_{iQk}$$

$$= S_{Q_{1j}} \times W_{iQ1} + S_{Q_{2j}} \times W_{iQ2} + S_{Q_{3j}} \times W_{iQ3} + S_{Q_{4j}} \times W_{iQ4} + S_{Q_{5j}} \times W_{iQ5}$$

$$s_{CO_i} = \frac{1}{j} \left( \sum_{j=1}^{10} S_{CO_j} \right)$$

Where,  $W_{iQk}$ =percent weightage given to  $i^{th}$  CO corresponding to  $k^{th}$  question ( $Q_k$ );

$S_{Q_{kj}}$  = Score obtained by  $j^{th}$  student corresponding to  $k^{th}$  question ( $Q_k$ )

$S_{CO_{ij}}$  = Score obtained by  $j^{th}$  student corresponding to  $i^{th}$  CO

$S_{CO_i}$ =Average of  $S_{CO_{ij}}$  obtained for the entire class corresponding to  $CO_i$

**Step IV:** Counting % of students (m) scoring at least class average score of corresponding to  $CO_i$ .

If % of student scoring at least class average (m)	Attainment assigned to ai
$m > 60\%$	3
$59\% \geq m \geq 40\%$	2
$m < 40\%$	1

**Step V:** Steps I to IV are followed for Continuous evaluation and Mid Semester marks.

**Step VI:** Calculation of Attainment of CO, as given below.

$$A_{CO_i} = a_{iES} \times w_{ES} + a_{iCA} \times w_{CA}$$

Where,  $a_{iES}$ =Attainment assigned to  $i$  th CO from End Semester Marks;

$w_{ES}$ =Weightage of Attainment from End Semester marks = 0.8;

$a_{iCA}$ =Attainment assigned to  $i$  th CO from Continuous + Mid Semester Marks;

$w_{CA}$ =Weightage of Attainment from Continuous + Mid Semester Marks = 0.2;

**Step VII:** Calculation of Attainment of Course (Acourse), as given below.

$$A_{course} = \frac{A_{CO1} + A_{CO2} + A_{CO3} + A_{CO4} + A_{CO5}}{5}$$

One sample calculation has been shown below:

**CAY 20-21: Semester VIII**



		pigments	
7.		a) What is "Structure" in carbon black? b) How structures form during production of carbon black c) Write desired properties of carbon black for printing ink application	1+2+2
8.		a) What is Pennington process for yellow iron oxide pigment production? b) Draw and explain the structure of iron blue pigment. c) Write the application of iron blue pigment in formation mixed pigment	2+2+1
9.		a) What is the origin of the color in color pigment? b) Write one method for color measurement of inorganic pigment c) Define undertone and tinting strength?	1+2+2
10.		Fill the blank i) ..... Doped white pigment ii) ..... Method for particle size distribution iii) ..... Red to dark violet iron ore iv) ..... Liquid and intermediates for TiO <sub>2</sub> pigment v) ..... Non-iron containing magnetic pigment	5

Figure 2. Question paper of the subject DYT1107 (examination held on April 2021).

Step II: Students obtained question-wise marks obtained in this particular course and total marks obtained in mid semester and CAT

STUDENT ROLL NUMBER	Question No 1	Question No 2	Question No 3	Question No 4	Question No 5	Question No 6	Question No 7	Question No 8	Question No 9	Question No. 10	TOTAL MARKS	CAT	MID
Total Marks	7	5	5	6	2	5	5	5	5	5	50	20	30
17DYE101	3	3	3	3	1	2	2	2	1	1	21	12	21
17DYE102	2	3	2	4	2	4	4	3	3	3	30	13	19
17DYE103	6	3	4	5	2	3	3	5	5	5	41	13	24
17DYE104	4	3	4	5	2	3	4	3	5	5	38	15	20
17DYE109	2	3	3	2	2	3	4	4	5	5	33	12	17
17DYE110	3	2	3	1	0	1	2	1	2	3	13	12	16
17DYE111	2	2	2	1	0	2	2	1	2	2	16	13	19
17DYE112	4	5	4	5	2	5	5	4	4	5	43	16	17
17DYE113	3	4	4	5	2	4	4	5	4	4	39	14	19
17DYE116	1	2	2	1	1	0	1	2	2	2	14	11	13
17DYE117	2	2	3	2	1	4	3	3	2	2	24	12	16
17DYE118	3	3	4	5	2	4	3	4	5	5	38	14	22
17DYE119	3	2	3	4	2	3	4	3	3	3	30	14	22
17DYE120	3	3	4	3	2	3	4	4	4	5	35	12	16
17DYE122	2	2	3	4	2	2	3	3	3	3	27	11	12
17DYE123	2	2	2	4	2	2	4	2	3	3	26	13	21
16DYE121	1	1	3	1	1	2	1	2	3	2	17	12	15

Step III: Conversion from question wise mark to CO wise mark (only for the End Semester)

STUDENT ROLL NUMBER	CO1	CO2	CO3	CO4	CO5
17DYE101	3.2	7.95	5.95	1.95	1.75
17DYE102	2.6	11.1	8.1	4.1	3.5



17DYE103	5	13	13	5	4
17DYE104	5	12.75	10.75	4.75	3.75
17DYE109	4	10	9	5	4
17DYE110	3.4	4.9	4.9	1.9	1.5
17DYE111	2.4	5.15	4.15	2.15	1.75
17DYE112	4.8	15.3	11.3	5.3	4.5
17DYE113	4.8	14.05	10.05	5.05	4.25
17DYE116	2.4	4.65	3.65	1.65	1.25
17DYE117	3.4	7.4	6.4	3.4	3
17DYE118	5	13	10	5	4
17DYE119	3.6	9.85	8.85	3.85	3.25
17DYE120	4.8	10.55	9.55	4.55	3.75
17DYE122	3.6	9.35	7.35	3.35	2.75
17DYE123	2.6	9.35	7.35	3.35	2.75
16DYE121	3.6	4.6	4.6	2.6	2
AVERAGE	<b>3.8</b>	<b>9.6</b>	<b>7.9</b>	<b>3.7</b>	<b>3.0</b>

The conversion formula is

$$S_{CO_2} = S_{Q_{1k}} \times W_{Q_{1k}} + S_{Q_{2k}} \times W_{Q_{2k}} + S_{Q_{3k}} \times W_{Q_{3k}} + S_{Q_{4k}} \times W_{Q_{4k}} + S_{Q_{5k}} \times W_{Q_{5k}}$$

In this sense, for Student 1 (17DYE101) the score corresponding to CO2 is 7.95. This has been calculated as shown below.

$$SCO_{21} = 3 \times 0 + 3 \times 1 + 3 \times 0 + 3 \times 1 + 1 \times 0 + 2 \times 0.25 + 2 \times 0.25 + 1 \times 0.25 + 1 \times 0.25 \\ = 0 + 3 + 0 + 3 + 0 + 0.5 + 0.5 + 0.25 + 0.25$$

$$= 7.95$$

For the same student 3 (17DYE103) the score corresponding to CO1 is 5. This has been calculated as shown below.  $SCO_{23} = 6 \times 0 + 3 \times 0 + 4 \times 1 + 5 \times 0 + 2 \times 0 + 3 \times 0 + 3 \times 0 + 5 \times 0 + 5 \times 0 + 5 \times 0.2 = 5$

#### Step IV : Calculation of the Attainment of Course Outcome (ai)

STUDENT ROLL NUMBER	CO1	CO2	CO3	CO4	CO5
17DYE101	3.2	7.95	5.95	1.95	1.75
17DYE102	2.6	11.1	8.1	4.1	3.5
17DYE103	5	13	13	5	4
17DYE104	5	12.75	10.75	4.75	3.75
17DYE109	4	10	9	5	4
17DYE110	3.4	4.9	4.9	1.9	1.5
17DYE111	2.4	5.15	4.15	2.15	1.75
17DYE112	4.8	15.3	11.3	5.3	4.5
17DYE113	4.8	14.05	10.05	5.05	4.25
17DYE116	2.4	4.65	3.65	1.65	1.25
17DYE117	3.4	7.4	6.4	3.4	3
17DYE118	5	13	10	5	4
17DYE119	3.6	9.85	8.85	3.85	3.25

17DYE120	4.8	10.55	9.55	4.55	3.75
17DYE122	3.6	9.35	7.35	3.35	2.75
17DYE123	2.6	9.35	7.35	3.35	2.75
16DYE121	3.6	4.6	4.6	2.6	2
<b>CLASS AVERAGE</b>	<b>3.8</b>	<b>9.6</b>	<b>7.9</b>	<b>3.7</b>	<b>3.0</b>
<b>Students scoring atleast class average</b>	7	9	9	9	10
<b>Total no. of students</b>	17	17	17	17	17
<b>% of students scoring set class target or above (Attainment level)</b>	41.17%	52.94%	52.94%	52.94%	58.82%

	Students	Total Marks Obtained	Assigned CO weightage				
			CO1	CO2	CO3	CO4	CO5
			0.2	0.2	0.2	0.2	0.2
1	17DYE101	33	6.6	6.6	6.6	6.6	6.6
2	17DYE102	32	6.4	6.4	6.4	6.4	6.4
3	17DYE103	37	7.4	7.4	7.4	7.4	7.4
4	17DYE104	35	7	7	7	7	7
5	17DYE109	29	5.8	5.8	5.8	5.8	5.8
6	17DYE110	28	5.6	5.6	5.6	5.6	5.6
7	17DYE111	32	6.4	6.4	6.4	6.4	6.4
8	17DYE112	33	6.6	6.6	6.6	6.6	6.6
9	17DYE113	33	6.6	6.6	6.6	6.6	6.6
10	17DYE116	24	4.8	4.8	4.8	4.8	4.8
11	17DYE117	28	5.6	5.6	5.6	5.6	5.6
12	17DYE118	36	7.2	7.2	7.2	7.2	7.2
13	17DYE119	36	7.2	7.2	7.2	7.2	7.2
14	17DYE120	28	5.6	5.6	5.6	5.6	5.6
15	17DYE122	23	4.6	4.6	4.6	4.6	4.6
19	17DYE123	34	6.8	6.8	6.8	6.8	6.8
	16DYE121	27	5.4	5.4	5.4	5.4	5.4
<b>CLASS AVERAGE</b>			6.21	6.21	6.21	6.21	6.21
<b>Students scoring above class average</b>			10	10	10	10	10
<b>Total no. of students</b>			17	17	17	17	17
<b>% of students scoring atleast average or above</b>			58.82%	58.82%	58.82%	58.82%	58.82%

If % of student scoring at least class average (m)	Attainment assigned to a <sub>i</sub>
m > 60%	3
59% ≥ m ≥ 40%	2
m < 40%	1

#### Step V - VI : Calculation of Attainment of Course ( $A_{course}$ )

	CO1	CO2	CO3	CO4	CO5
--	-----	-----	-----	-----	-----

CO attainment from End Sem	2	2	2	2	2
CO attainment from CAT+Mid Sem	2	2	2	2	2
Total attainment of CO (80% contribution of CO from end semester and 20% contribution of CO from Mid and CAT)	$(2*0.8+2*0.2) = 2$	$(2*0.8+2*0.2) = 2$	$(2*0.8+2*0.2) = 2$	$(2*0.8+2*0.2) = 2$	$(2*0.8+2*0.2) = 2$
Attainment of Course	<b>2.00 (66.67%)</b>				

### Example-II

Semester VI (17DYE Batch)

Course: DYT1203 FLUORESCENT COLORANTS

Number of assigned COs: 5

Total number of students: 18

Step I: End Semester: CO-Question Mapping along with setting target marks

Question No	Max Marks	CO weightage assigned				
		CO1	CO2	CO3	CO4	CO5
1	8	0	0	0	0.5	0.5
2	8	0	0	0.33	0.33	0.33
3	8	0	0	0.33	0.33	0.33
4	8	0.25	0.25	0.25	0	0.25
5	8	0	0	0.33	0.33	0.33
6	2	0.5	0.5	0	0	0
7	8	0.25	0.25	0.25	0.25	0

The contribution from each CO in Continuous Evaluation + Mid Semester is assumed to be equal.

	Marks	CO1	CO2	CO3	CO4	CO5
Continuous Evaluation	20	0.2	0.2	0.2	0.2	0.2
Mid Semester Evaluation	30	0.2	0.2	0.2	0.2	0.2

Step II: Students marks obtained, and the CAT and mid semester marks obtained

STUDENT ROLL NUMBER	Question No 1	Question No 2	Question No 3	Question No 4	Question No 5	Question No 6	Question No 7	TOTAL MARKS	CAT	MID
Total Marks	8	8	8	8	8	2	8	50	20	30
17DYE101	5	4	6	6	3	1	3	28	18	9
17DYE102	3	4	7	6	2	1	4	27	19	20
17DYE103	7	7	7	7	7	2	7	44	19	24

17DYE104	6	6	7	7	7	2	7	42	19	23
17DYE108	5	5	5	5	6	2	7	35	18	12
17DYE109	4	6	6	4	6	2	7	35	18	12
17DYE110	3	7	7	5	5	2	4	33	16	7
17DYE111	5	6	7	4	4	2	5	33	17	13
17DYE112	7	8	8	7	8	2	8	48	19	27
17DYE113	6	8	8	6	7	2	4	41	19	24
17DYE116	0	0	0	0	0	0	0	0	18	16
17DYE117	5	7	8	5	7	2	4	38	17	11
17DYE118	7	7	8	8	8	0	6	44	17	12
17DYE119	4	5	6	6	6	2	7	36	17	11
17DYE120	3	4	5	7	2	1	5	27	16	9
17DYE122	0	0	0	0	0	0	0	0	18	19
17DYE123	5	6	7	8	4	1	3	34	16	9
16DYE121	6	5	8	6	6	2	5	38	18	12

### Step III: Conversion from question wise mark to CO wise mark (End Semester)

STUDENT ROLL NUMBER	CO1	CO2	CO3	CO4	CO5
17DYE101	2.75	2.75	6.54	7.54	8.29
17DYE102	3	3	6.79	6.79	7.29
17DYE103	4.5	4.5	10.43	12.18	12.18
17DYE104	4.5	4.5	10.1	11.35	11.35
17DYE108	4	4	8.28	9.53	9.03
17DYE109	3.75	3.75	8.69	9.69	8.94
17DYE110	3.25	3.25	8.52	8.77	9.02
17DYE111	3.25	3.25	7.86	9.36	9.11
17DYE112	4.75	4.75	11.67	13.42	13.17
17DYE113	3.5	3.5	10.09	11.59	12.09
17DYE116	0	0	0	0	0
17DYE117	3.25	3.25	9.51	10.76	11.01
17DYE118	3.5	3.5	11.09	12.59	13.09
17DYE119	4.25	4.25	8.86	9.36	9.11
17DYE120	3.5	3.5	6.63	6.38	6.88
17DYE122	0	0	0	0	0
17DYE123	3.25	3.25	8.36	8.86	10.11
16DYE121	3.75	3.75	9.02	10.52	10.77
<b>AVERAGE</b>	<b>3.3</b>	<b>3.3</b>	<b>7.9</b>	<b>8.8</b>	<b>9.0</b>

### Step IV : Calculation of Attainment of Course Outcome (a)

STUDENT ROLL NUMBER	CO1	CO2	CO3	CO4	CO5
17DYE101	2.75	2.75	6.54	7.54	8.29
17DYE102	3	3	6.79	6.79	7.29
17DYE103	4.5	4.5	10.43	12.18	12.18

17DYE104	4.5	4.5	10.1	11.35	11.35
17DYE108	4	4	8.28	9.53	9.03
17DYE109	3.75	3.75	8.69	9.69	8.94
17DYE110	3.25	3.25	8.52	8.77	9.02
17DYE111	3.25	3.25	7.86	9.36	9.11
17DYE112	4.75	4.75	11.67	13.42	13.17
17DYE113	3.5	3.5	10.09	11.59	12.09
17DYE116	0	0	0	0	0
17DYE117	3.25	3.25	9.51	10.76	11.01
17DYE118	3.5	3.5	11.09	12.59	13.09
17DYE119	4.25	4.25	8.86	9.36	9.11
17DYE120	3.5	3.5	6.63	6.38	6.88
17DYE122	0	0	0	0	0
17DYE123	3.25	3.25	8.36	8.86	10.11
16DYE121	3.75	3.75	9.02	10.52	10.77
<b>CLASS AVERAGE</b>	<b>3.3</b>	<b>3.3</b>	<b>7.9</b>	<b>8.8</b>	<b>9.0</b>
<b>Students scoring at least class average</b>	10	10	12	12	12
<b>Total no. of students</b>	18	18	18	18	18
<b>% of students scoring at least class average (Attainment level)</b>	55.55	55.55	66.66	66.66	66.66

	Students	Total Marks Obtained in Mid + CAT	CO1	CO2	CO3	CO4	CO5
			0.2	0.2	0.2	0.2	0.2
1	17DYE101	27	5.4	5.4	5.4	5.4	5.4
2	17DYE102	39	7.8	7.8	7.8	7.8	7.8
3	17DYE103	43	8.6	8.6	8.6	8.6	8.6
4	17DYE104	42	8.4	8.4	8.4	8.4	8.4
5	17DYE108	30	6	6	6	6	6
6	17DYE109	30	6	6	6	6	6
7	17DYE110	23	4.6	4.6	4.6	4.6	4.6
8	17DYE111	30	6	6	6	6	6
9	17DYE112	46	9.2	9.2	9.2	9.2	9.2
10	17DYE113	43	8.6	8.6	8.6	8.6	8.6
11	17DYE116	34	6.8	6.8	6.8	6.8	6.8
12	17DYE117	28	5.6	5.6	5.6	5.6	5.6
13	17DYE118	29	5.8	5.8	5.8	5.8	5.8
14	17DYE119	28	5.6	5.6	5.6	5.6	5.6
15	17DYE120	25	5	5	5	5	5
16	17DYE122	37	7.4	7.4	7.4	7.4	7.4
17	17DYE123	25	5	5	5	5	5
18	16DYE121	30	6	6	6	6	6

<b>CLASS AVERAGE</b>		6.54444	6.54444	6.54444	6.54444	6.54444
<b>Students scoring above class average</b>		7	7	7	7	7
<b>Total no. of students</b>		18	18	18	18	18
<b>% of students scoring at least average or above</b>		38.89%	38.89%	38.89%	38.89%	38.89%

If % of student scoring at least class average (m)	Attainment assigned to a <sub>i</sub>
m > 60%	3
59% ≥ m ≥ 40%	2
m < 40%	1

### Step V - VI : Calculation of Attainment of Course ( $A_{\text{course}}$ )

	CO1	CO2	CO3	CO4	CO5
<b>CO attainment from End Sem</b>	2	2	3	3	3
<b>CO attainment from CAT+Mid Sem</b>	1	1	1	1	1
<b>Total attainment of CO (80% contribution of CO from end semester and 20% contribution of CO from Mid and CAT)</b>	$(2*0.8+1*0.2)$ = 2	$(2*0.8+1*0.2)$ = 2	$(3*0.8+1*0.2)$ = 2.6	$(3*0.8+1*0.2)$ = 2.6	$(3*0.8+1*0.2)$ = 2.6
<b>Attainment of Course</b>	<b>2.36 (78.67%)</b>				

**Example-III:** Course attainment calculation for the course: **DYP1004** (Chromatographic Techniques and Preparation of Dyes and Intermediates)

For all the practical courses, the CO's are uniformly distributed with equal weightage and CO attainment was calculated based on the total marks obtained by the students in that subject.

Conversion of (End Sem+CAT) marks to CO wise marks							
Sl. No.	Roll Number	Marks Obtained	CO1	CO2	CO3	CO4	CO5
			0.2	0.2	0.2	0.2	0.2
1	18DYE101	45	9	9	9	9	9
2	18DYE102	39	7.8	7.8	7.8	7.8	7.8
3	18DYE103	28	5.6	5.6	5.6	5.6	5.6
4	18DYE104	41	8.2	8.2	8.2	8.2	8.2
5	18DYE105	30	6	6	6	6	6
6	18DYE106	43	8.6	8.6	8.6	8.6	8.6
7	18DYE107	38	7.6	7.6	7.6	7.6	7.6

8	18DYE108	50	10	10	10	10	10
9	18DYE110	50	10	10	10	10	10
10	18DYE111	37	7.4	7.4	7.4	7.4	7.4
11	18DYE112	48	9.6	9.6	9.6	9.6	9.6
12	18DYE113	48	9.6	9.6	9.6	9.6	9.6
13	18DYE114	41	8.2	8.2	8.2	8.2	8.2
14	18DYE115	36	7.2	7.2	7.2	7.2	7.2
15	18DYE116	48	9.6	9.6	9.6	9.6	9.6
16	18DYE117	28	5.6	5.6	5.6	5.6	5.6
17	18DYE118	45	9	9	9	9	9
18	18DYE120	48	9.6	9.6	9.6	9.6	9.6

<b>CLASS AVERAGE</b>	8.25	8.25	8.25	8.25	8.25
<b>Students above class target</b>	9	9	9	9	9
<b>Total no. of students</b>	18	18	18	18	18
<b>% of students scoring at least class average</b>	50	50	50	50	50
<b>CO attainment from CAT+ End Sem</b>	2	2	2	2	2
<b>Total attainment of CO</b>	2	2	2	2	2
<b>Attainment of Course (a<sub>i</sub>)</b>	<b>2 (66.67%)</b>				

Course attainments of the B.Tech (Dyestuff Technology) courses in the last three years or more

Sl. No.	Course code	Course attainments (in a scale of 3) of all the subjects (Set target: 1.8, 60%)						
		Semester	2023-2024 passing out (20DYE batch)	2022-2023 passing out (19DYE batch)	2021-2022 passing out (18DYE batch)	2020-2021 passing out (17DYE batch)	2019-2020 passing out (16DYE batch)	2018-2019 passing out (15DYE batch)
1	CHP1342	Semester I	2	2	2	2	-	-
2	CHT1341		2.16	1.32	1.68	2	-	-
3	CHT1401		2.16	2	2	2	-	-
4	GEP1101		3	2	2	2	-	-
5	HUP1101		3	3	3	3	-	-
6	MAT1101		2	1.96	1.68	1.88	-	-
7	PYT1101		2.36	2	2	2	-	-
8	CET1507	Semester II	2.16	2	2	1.52	-	-
9	CHP1132		2	3	3	2	-	-
10	CHT1132		2	2.32	2.32	1.68	-	-
11	CHT1342		2	2	2	2	-	-
12	MAT1102		2.48	2	1.52	2	-	-
13	PYP1101		3	3	3	2	-	-
14	PYT1103		2.68	2	1.48	1.84	-	-
15	CHT1124	Semester III	2.2	2.8	2	2	1.8	-
16	CHT1136		2.6	2	2	1.8	2.2	-
17	DYP1001		2	3	2	2	2	-

18	DYT1101		2.32	2.32	1.2	1.36	2.16	-
19	DYT1202		1.56	2.32	1.36	1.36	1.36	-
20	MAP1202		3	2	2	2	2	-
21	OLT1102		2.8	2.8	2	2	2.32	-
22	GET1301	Semester IV	-	2.2	2.6	2.32	2	-
23	DYT1102		-	1.72	0.88	1.72	2	-
24	PYP1103		-	3	3	2	3	-
25	PYT1202		-	2.48	1.4	2.16	1.8	-
26	CET1105		-	2.2	2	1.8	2.6	-
27	GEP1106		-	3	1	2	2	-
28	GET1105		-	2.68	2	2.8	2	-
29	CET1212	Semester V	-	1.52	1.84	1.52	2	-
30	CET1401		-	1.84	1.68	1.2	1.8	-
31	DYP1002		-	2	2	2	2	-
32	DYP1003		-	2	1	2	2	-
33	DYT1103		-	2.2	1.84	1.84	2	-
34	DYT1104		-	1.44	2	1.64	2.32	-
35	TXT1215		-	2.32	2	2	2.16	-
36	DYP1004	Semester VI	-	-	2	1	2	1
37	DYP1005		-	-	2	1	2	2
38	DYT1203		-	-	1.2	2.28	2.52	2.28
39	DYT1204		-	-	1.84	1.8	1.88	2.36
40	Elective I_DYT1603/ TXT1501		-	-	2.6	2.8	2.2	2.0
41	HUT1106		-	-	3	2.8	2.32	2.8
42	HUT1103		-	-	3	2.16	3	2.2
43	HUT1104		-	-	2	1.96	3	2.8
44	TXP1013	-	-	1	1	1	2	
45	CEP1714	Semester VII	-	-	2	2	2	2
46	CET1703/1713		-	-	2.16	1.8	2.16	2
47	DYT1105		-	-	1.24	1.2	1.04	0.84
48	DYT1206		-	-	2.2	2.32	2.2	2
49	elective III (PET1712)/(DYT1721)		-	-	1.4	2.2	3	2.2
50	HUT1105		-	-	3	3	2.68	3
51	MAT1106		-	-	1.72	2.12	2.2	1.8
52	Project		-	-	2	3	2	2
53	Seminar		-	-	2	3	2	3
54	In-plant Training		-	-	1	2	2	2
55	DYP1009	Semester VIII	-	-	ND	2	3	2
56	DYT1106		-	-	ND	2	2	2
57	DYT1107		-	-	ND	2	1.84	2
58	DYT1205		-	-	ND	2.04	2.8	2.52
59	HUT1107		-	-	ND	1.72	2.04	1.84
60	Project II		-	-	ND	1	1	2



61	CET1504		-	-	ND	2	1	2
62	Elective III_SCT1816 /OLT1121/DYT1812		-	-	ND	1.2	3	3

ND: Result not declared yet

## 1.6. Attainment of Program Outcomes and Program Specific Outcomes (25)

### 1.6.1. Describe assessment tools and processes used for measuring the attainment of each Program Outcome and Program Specific Outcomes (5) **Self-Assessed Marks = 5**

Assessment Tools		
Direct Survey	Indirect Methods	
Exams	Alumni/Examiner Feedback/Course wise feedback	
Assignments		
Projects	Exist Survey	
Frequency of Assessment		
<b>Continuous Assessment Test (CAT)</b>	It is a continuous process occurring throughout the semester. Assessment modes are teacher specific with atleast one assessment in the semester	Different forms of assessments are : Written exam, quiz, presentation, report submission, viva-voce etc. Full marks = 20 (for 100 marks course) Full marks = 10 (for 50 marks course)
<b>Mid Semester Examination</b>	Occurs once in the mid of every semester	Written examination Full marks = 30 (for 100 marks course) Full marks = 15 (for 50 marks course)
<b>End Semester Examination</b>	Occurs at the end of the semester	Written examination Full marks = 50 (for 100 marks course) Full marks = 25 (for 50 marks course)
<b>Course exit feedback</b>	After the end of the course	Survey feedback form collected from the outgoing batch
<b>Alumni feedback</b>	Once every year	Survey feedback form collected from the alumni
Assessment Evaluation Process		
The batchwise and subject wise course attainments were calculated considering both direct and indirect assessment methods and mapped with the PO/PSO.		



**1.6.2. Provide results of evaluation of each PO & PSO (20) Self-Assessed Marks = 20**

The attainment levels by direct (student performance) and indirect (surveys) are presented through Program level Course-PO&PSO matrices.

<b>PO1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO3</b>	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
<b>PO4</b>	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
<b>PO5</b>	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
<b>PO6</b>	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
<b>PO7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

<b>PO8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
<b>PO10</b>	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
<b>PO11</b>	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
<b>PO12</b>	<b>Life-long learning:</b> Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
<b>PSO1</b>	<b>Specialization in the synthesis, analysis and application and knowledge of dyeing techniques:</b> Our graduates will be totally in tune with the current needs of the dyestuff industry and have considerable problem-solving acumen.
<b>PSO2</b>	<b>Core organic chemistry, technology development and implementation:</b> Our graduates have strong foundation in chemistry, and thus combined with their engineering skills and independent ability to develop new dyestuff and allied chemical industry related technologies and successfully implement them at an industrial scale.

### Calculation of Program Outcome (PO)

One sample calculation for **PO1** has been shown below

**Step I:** Assessment tools for Direct measurement: The attainment values for POs have been calculated with respect to attainment of Course ( $A_{\text{course}}$ ) and their corresponding correlation with PO.

The working formula for calculating direct attainment has been presented below:

$$\text{Direct PO attainment (PO}_D) = \frac{\sum_{p=1}^n ([A_{\text{course}}]_p \times C_p)}{\sum_{p=1}^n C_p}$$

Where, n= number of Courses correlated to corresponding PO

$A_{\text{course}}$  = Obtained attainment for  $p^{\text{th}}$  course (0 to 3 scale)

$C_p$  = Correlation of  $p^{\text{th}}$  course to corresponding PO in (0 to 3 scale), where, 3, 2, 1 stands for strong, medium, and weak correlation, respectively.

### Direct Attainment of PO1 (For 17DYE batch)

Direct attainment level of a PO/PSO is determined by taking average across all courses addressing that PO/PSO.

Code	Course	Level	Correlation	Attainment
<b>Semester I</b>				
<b>CHP1342</b>	Physical and Analytical Chemistry Laboratory	K4	3	2.0
<b>CHT1341</b>	Physical Chemistry 1	K3	3	2.0
<b>CHT1401</b>	Analytical Chemistry	K3	3	2.0
<b>GEP1101</b>	Engineering Graphics	K3	3	2.0
<b>HUP1101</b>	Communication Skills	K3	3	3.0
<b>MAT1101</b>	Applied Mathematics	K3	3	1.88
<b>PYT1101</b>	Applied Physics 1	K3	3	2.0
<b>Semester II</b>				
<b>CET1507</b>	Process Calculations	K3	3	1.52
<b>CHP1132</b>	Organic Chemistry Laboratory	K4	3	2.0
<b>CHT1132</b>	Organic Chemistry	K3	3	1.68
<b>CHT1342</b>	Physical Chemistry	K3	3	2.0
<b>MAT1102</b>	Applied Mathematics	K3	3	2.0
<b>PYP1101</b>	Physics Lab	K4	3	2.0
<b>PYT1103</b>	Applied Physics 2	K3	3	1.84
<b>Semester III</b>				
<b>CHT1124</b>	Industrial Inorganic Chemistry	K3	3	2.0
<b>CHT1136</b>	Aromatic and Heterocyclic Chemistry	K3	3	1.8
<b>DYP1001</b>	Analysis of Inorganic Raw Materials used in Dyestuff industries	K4	3	2.0
<b>DYT1101</b>	Technology of Intermediates 1	K3	2	1.36
<b>DYT1202</b>	Chemical and Physical Constitution of Colourants	K3	3	1.36
<b>MAP1202</b>	Engineering Applications of Computers	K4	3	2.0
<b>OLT1102</b>	Chemistry of Oleochemicals and Surfactants	K3	3	2.0
<b>Semester IV</b>				
<b>GET1301</b>	Engineering Mechanics and Strength of Materials	K3	3	2.32
<b>DYT1102</b>	Technology of Intermediates-II	K3	3	1.72
<b>PYP1103</b>	Color Physics Lab	K4	3	2.0
<b>PYT1202</b>	Color Physics and Color Harmony	K3	3	2.16
<b>CET1105</b>	Transport Phenomenon	K3	3	1.80
<b>GEP1106</b>	Electrical Engineering and Electronics Lab	K4	3	1.0
<b>GET1109</b>	Electrical Engineering and Electronics	K3	3	2.80
<b>Semester V</b>				
<b>CET1212</b>	Chemical Reaction Engineering 1	K3	3	1.52
<b>CET1401</b>	Chemical Engineering Operations	K3	3	1.2
<b>DYP1002</b>	Analysis of Intermediates, Dyes and Fibers	K4	3	2.0
<b>DYP1003</b>	Experimental dyeing	K4	2	2.0
<b>DYT1103</b>	Technology of azo colorants	K3	3	1.84
<b>DYT1104</b>	Technology of Quinonoid colorants	K3	3	1.64
<b>TXT1215</b>	Technology of dyeing and printing (including substrates)	K4	3	2.0
<b>Semester VI</b>				
<b>DYP1004</b>	Chromatographic Techniques and Preparation of Dyes and Intermediates	K4	3	1.0
<b>DYP1005</b>	Process and Plant Design	K4	3	1.0
<b>DYT1203</b>	Fluorescent Colorants	K3	2	2.28
<b>DYT1204</b>	Heterocyclic colorants and intermediates	K3	3	1.80

<b>Elective-I</b>	Hi-Tech and Industrial Fibre	K3	3	2.80
<b>HUT1106</b>	Environmental Science and Technology	K3	3	2.80
<b>HUT1103</b>	Industrial Psychology and Human Resource Management	K3	3	2.16
<b>HUT1104</b>	Industrial Management	K3	3	1.96
<b>TXP1013</b>	Wet Processing of Textiles	K4	3	1.0
<b>Semester VII</b>				
<b>CEP1714</b>	Chemical Engineering Laboratory	K4	3	2.0
<b>CET1713</b>	Instrumentation and Process Control	K3	3	1.8
<b>DYT1105</b>	Technology of cationic and sulfur colorants	K3	3	1.20
<b>DYT1206</b>	Structural Elucidation of organic compounds	K3	3	2.32
<b>Elective-II</b>	Technology of Plastic Packaging	K3	3	2.2
<b>HUT1105</b>	Industrial Management 2	K3	3	3.0
<b>MAT1106</b>	Design and Analysis of Experiments	K3	3	2.12
<b>DYP1007</b>	Project-I	K4	3	3.0
<b>DYP1006</b>	Seminar	K3	3	3.0
<b>DYP1012</b>	In-Plant Training	K4	3	2.0
<b>Semester VIII</b>				
<b>DYP1009</b>	Preparation, Analysis and Applications of Dyes, Intermediates, Optical Brightners	K3	3	2.0
<b>DYT1106</b>	Case Studies in Dyestuff Industry	K3	3	2.0
<b>DYT1107</b>	Technology of Pigments	K3	3	1.84
<b>DYT1205</b>	Functional Application of Colorants	K3	3	2.04
<b>HUT1107</b>	Value Education	K3	2	1.72
<b>DYP1008</b>	Project-II	K6	3	1.0
<b>CET1504</b>	Project engineering Economics	K3	3	2
<b>Elective-III</b>	Corrosion Science and Corrosion Prevention	K3		1.2
<b>SCT1816</b>			3	
			Sum = 179	
Direct PO1 attainment = (3*2+3*2+3*2+3*2+3*3+3*1.88+3*2)+(3*1.52+3*2+.....+ .....+ (3*2+3*2+3*1.84+3*2.04+2*1.72+3*1+3*2.0+3*1.2)				343.2/179 = <b>1.93 (64.33%)</b>

**Indirect attainment:** Indirect attainment level of a PO/PSO is determined based on the student exit surveys, employer surveys, co-curricular activities, extracurricular activities etc.

**Step II:** Assessment tools for Indirect measurement: The attainment values for POs have been calculated with respect to two surveys viz. (i) Student exit feedback (ii) Feedback from Examiner or Industry Mentor or Alumni. For both the surveys, the working formula has been presented below:

$$a_{PO_i} = \frac{3}{5N} \sum_{j=1}^N \sum_{k=1}^9 S_{QF_{jk}} \times W_{QF_k}$$

$$= \frac{3}{5N} [S_{QF_{11}} \times W_{QF_1} + S_{QF_{12}} \times W_{QF_2} + \dots + S_{QF_{N9}} \times W_{QF_9}]$$

Where, N= number of students giving Student exit feedback

$a_{iPO1}$  = Indirect PO attainment of  $i^{th}$  PO from Feedback 1

$S_{QF}$  = Score obtained from student exit feedback in the scale of 5

Q = number of questionnaires' in feedback

$W_{iQF}$  = weightage of  $k^{th}$  feedback question for  $i^{th}$  PO

**Survey I: Student Exit Feedback**

Sl. No	List of Questions asked (Both Student exit feedback and alumni/examiners feedback)														
1	Able to apply basic Engineering knowledge														
2	Skills to analyse problems														
3	Ability to design & development of solutions														
4	Able to investigate a problem														
5	Ability to use modern technological tools														
6	Able to study the impact of process industry on global, economic and societal context														
7	Concerns for environment and sustainability														
8	Ability to practice professional skills in ethical manner														
9	Competence to undertake designated task on individual and team basis														
10	Ability to communicate properly														
11	Attitude for life-long learning														
12	Ability to participate in Project and Financial management														
13	Ability to tune with the current needs of the dyestuff industry with problem solving ability														
14	Ability to independently develop new dyestuff and allied chemical industry related technologies and successfully implement them at an industrial scale.														
Correlation of the feedback questions with the Programme Objectives															
Sl. No.	PO weightage	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
1	PO1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	PO2	0	1	0	0	0	0	0	0	0	0	0	0	0	0
3	PO3	0	0	1	0	0	0	0	0	0	0	0	0	0	0
4	PO4	0	0	0	1	0	0	0	0	0	0	0	0	0	0
5	PO5	0	0	0	0	1	0	0	0	0	0	0	0	0	0
6	PO6	0	0	0	0	0	1	0	0	0	0	0	0	0	0
7	PO7	0	0	0	0	0	0	1	0	0	0	0	0	0	0
8	PO8	0	0	0	0	0	0	0	1	0	0	0	0	0	0
9	PO9	0	0	0	0	0	0	0	0	1	0	0	0	0	0
10	PO10	0	0	0	0	0	0	0	0	0	1	0	0	0	0
11	PO11	0	0	0	0	0	0	0	0	0	0	1	0	0	0
12	PO12	0	0	0	0	0	0	0	0	0	0	0	1	0	0
13	PSO1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
14	PSO2	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Details of ability	Connected with PO	Weightage	Feedback Scores (SQF out of 5) for 17DYE batch											Avg. score	
			S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11		

Q1	PO1	1.0	3	5	4	4	4	2	4	4	4	5	5	4.0
Q2	PO2	1.0	3	5	5	4	4	2	4	4	5	5	5	4.2
Q3	PO3	1.0	4	5	5	4	2	2	4	4	4	5	5	4.0
Q4	PO4	1.0	4	5	5	4	3	2	4	4	4	5	5	4.1
Q5	PO5	1.0	3	5	3	4	4	2	5	4	1	5	5	3.7
Q6	PO6	1.0	3	5	1	4	3	2	4	4	4	4	5	3.5
Q7	PO7	1.0	4	5	1	4	4	2	5	5	2	5	5	3.6
Q8	PO8	1.0	3	5	1	4	3	2	3	4	4	5	5	3.5
Q9	PO9	1.0	3	5	1	4	4	2	4	4	2	5	5	3.5
Q10	PO10	1.0	4	5	5	4	4	2	4	4	1	5	5	3.9
Q11	PO11	1.0	4	5	5	4	5	2	5	4	5	5	5	4.5
Q12	PO12	1.0	4	5	3	4	5	2	5	4	5	5	5	4.3
Q13	PSO1	1.0	4	5	5	4	5	2	5	4	5	5	5	4.5
Q14	PSO2	1.0	4	5	3	4	5	2	5	4	5	5	5	4.3

### Calculations:

Calculation of the attainment of PO1 from indirect feedback (Survey I):

PO1 attainment (in a scale of 5) = Weightage of PO1 in Q1\*PO average in Q1

$$= 1*4$$

$$= 4$$

$$\text{PO1 attainment (in a scale of 3)} = 3*(\text{PO attainment})/5 = 2.40$$

Sl. No.	Programme Objectives	PO attainment in a scale of 5	PO attainment in a scale of 3
1	PO1	4.0	<b>2.40</b>
2	PO2	4.2	<b>2.51</b>
3	PO3	4.0	<b>2.40</b>
4	PO4	4.1	<b>2.45</b>
5	PO5	3.7	<b>2.24</b>
6	PO6	3.5	<b>2.13</b>
7	PO7	3.8	<b>2.29</b>
8	PO8	3.5	<b>2.13</b>
9	PO9	3.5	<b>2.13</b>
10	PO10	3.9	<b>2.35</b>
11	PO11	4.5	<b>2.67</b>
12	PO12	4.3	<b>2.56</b>
13	PSO1	4.5	<b>2.67</b>
14	PSO2	4.3	<b>2.56</b>

**Survey II: Examiners and/or Alumni feedback**

Details of ability	Connected with PO	Weightage	Feedback Scores (SQF out of 5)										Average score
			S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	
Q1	PO1	1.0	4	4	4	5	5	5	-	-	-	-	4.5
Q2	PO2	1.0	5	4	5	5	5	5	-	-	-	-	4.8
Q3	PO3	1.0	4	3	5	5	5	5	-	-	-	-	4.5
Q4	PO4	1.0	5	4	5	5	5	5	-	-	-	-	4.8
Q5	PO5	1.0	4	4	4	4	5	3	-	-	-	-	4.0
Q6	PO6	1.0	4	2	4	4	5	3	-	-	-	-	3.7
Q7	PO7	1.0	5	4	5	4	5	3	-	-	-	-	4.3
Q8	PO8	1.0	5	3	4	4	5	5	-	-	-	-	4.3
Q9	PO9	1.0	5	4	4	4	5	5	-	-	-	-	4.5
Q10	PO10	1.0	4	5	5	4	5	5	-	-	-	-	4.7
Q11	PO11	1.0	5	3	4	4	5	5	-	-	-	-	4.3
Q12	PO12	1.0	5	2	4	4	5	3	-	-	-	-	3.8
Q13	PSO1	1.0	5	2	4	4	5	3	-	-	-	-	4
Q14	PSO2	1.0	5	2	4	4	5	3	-	-	-	-	3.83

Calculation of the attainment of PO1 from indirect feedback (survey II):

PO1 attainment (in a scale of 5) = Weightage of PO1 in Q1 \* PO average in Q1

$$= 1.0 * 4.5$$

$$= 4.5$$

$$\text{PO1 attainment (in a scale of 3)} = 3 * (\text{PO attainment}) / 5 = 2.7$$

Sl. No.	Programme Objectives	PO attainment in a scale of 5	PO attainment in a scale of 3
1	PO1	4.5	<b>2.7</b>
2	PO2	4.8	<b>2.9</b>
3	PO3	4.5	<b>2.7</b>
4	PO4	4.8	<b>2.9</b>
5	PO5	4.0	<b>2.4</b>
Q6	PO6	3.7	<b>2.2</b>
Q7	PO7	4.3	<b>2.6</b>
Q8	PO8	4.3	<b>2.6</b>
Q9	PO9	4.5	<b>2.7</b>
Q10	PO10	4.7	<b>2.8</b>
Q11	PO11	4.3	<b>2.6</b>
Q12	PO12	3.8	<b>2.3</b>
Q13	PSO1	4.0	<b>2.4</b>
Q14	PSO2	3.8	<b>2.3</b>



**Step III:** Average of two feedback scores is assigned to indirect PO attainment (POI).

$$\text{Indirect PO attainment (PO}_i) = \frac{a_{IPO1} + a_{IPO2}}{2}$$

$a_{IPO1}$  = Indirect PO attainment of  $i^{\text{th}}$  PO from Feedback 1

The term  $a_{IPOi}$  is converted from a 5-point scale to 3-point scale.

**Table B.1.6.2b**

B.Tech (Dyestuff Technology) All courses	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>Survey I for indirect attainment</b>	2.40	2.51	2.40	2.45	2.24	2.13	2.29	2.13	2.13	2.35	2.67	2.56	2.67	2.56
<b>Survey II for indirect attainment</b>	2.7	2.9	2.7	2.9	2.4	2.2	2.6	2.6	2.7	2.8	2.6	2.3	2.4	2.3
<b>Average PO (Survey I and Survey II)</b>	2.55	2.70	2.55	2.68	2.32	2.16	2.45	2.36	2.41	2.57	2.64	2.43	2.54	2.43

**Step IV:** Calculation of Attainment of PO, as given below.

$$A_{PO} = PO_D \times w_D + PO_I \times w_I$$

Where,  $w_D$  = Weightage of Direct Attainment of PO = 0.8;  $w_I$  = Weightage of Indirect Attainment of PO = 0.2;

**Calculation of PO1 attainment for the batch 17DYE (Assessment year 2020-2021).**

For 17DYE Batch											
Course	Level	PO1		PO2		POn		POn+1		PSO2	
		Wt	$A_{\text{course}}$	Wt	$A_{\text{course}}$	Wt	$A_{\text{course}}$	Wt	$A_{\text{course}}$	Wt	$A_{\text{course}}$
Semester I											
CHP1342	K4	3	2	3	2	-	-	-	-	-	-
CHT1341	K3	3	2	3	2	-	-	-	-	-	-
CHT1401	K3	3	2	2	2	-	-	-	-	-	-
GEP1101	K4	3	2	2	2	-	-	-	-	-	-
HUP1101	K4	3	3	3	3	-	-	-	-	-	-
MAT1101	K3	3	1.88	3	1.88	-	-	-	-	-	-
PYT1101	K3	3	2.0	3	2.0	-	-	-	-	-	-
Semester II											
CET1507	K3	3	1.52	3	1.52	-	-	-	-	-	-
CHP1132	K4	3	2	3	2	-	-	-	-	-	-
CHT1132	K3	3	1.68	3	1.68	-	-	-	-	-	-
CHT1342	K3	3	2	3	2	-	-	-	-	-	-
MAT1102	K3	3	2	3	2	-	-	-	-	-	-
PYP1101	K4	3	2	3	2	-	-	-	-	-	-

PYT1103	K3	3	1.84	3	1.84	-	-	-	-	-	-
<b>Semester IV</b>											
CHT1124	K3	3	2	3	2	-	-	-	-	-	-
CHT1136	K3	3	1.8	2	1.8	-	-	-	-	-	-
DYP1001	K4	3	2	3	2	-	-	-	-	-	-
DYT1101	K3	2	1.36	3	1.36	-	-	-	-	-	-
DYT1202	K3	3	1.36	3	1.36	-	-	-	-	-	-
MAP1202	K4	3	2	3	2	-	-	-	-	-	-
OLT1102	K3	3	2	3	2	-	-	-	-	-	-
<b>Semester IV</b>											
GET1301	K3	3	2.32	3	2.32	-	-	-	-	-	-
DYT1102	K3	3	1.72	3	1.72	-	-	-	-	-	-
PYP1103	K4	3	2	3	2	-	-	-	-	-	-
PYT1202	K3	3	2.16	3	2.16	-	-	-	-	-	-
CET1105	K3	3	1.8	3	1.8	-	-	-	-	-	-
GEP1106	K4	3	1	3	1	-	-	-	-	-	-
GET1105	K3	3	2.8	3	2.8	-	-	-	-	-	-
<b>Semester V</b>											
CET1212		3	1.52	3	1.52	-	-	-	-	-	-
CET1401	K3	3	1.2	3	1.2	-	-	-	-	-	-
DYP1002	K4	3	2	3	2	-	-	-	-	-	-
DYP1003	K4	2	2	3	2	-	-	-	-	-	-
DYT1103	K3	3	1.84	3	1.84	-	-	-	-	-	-
DYT1104	K3	3	1.64	3	1.64	-	-	-	-	-	-
TXT1215	K3	3	2	3	2	-	-	-	-	-	-
<b>Semester VI</b>											
DYP1004	K4	3	1	3	1	-	-	-	-	-	-
DYP1005	K4	3	1	3	1	-	-	-	-	-	-
DYT1203	K3	2	2.28	3	2.28	-	-	-	-	-	-
DYT1204	K3	3	1.8	3	1.8	-	-	-	-	-	-
Elective-I	K3	3	2.8	3	2.8	-	-	-	-	-	-
HUT1106	K3	3	2.8	3	2.8	-	-	-	-	-	-
HUT1103	K3	3	2.16	3	2.16	-	-	-	-	-	-
HUT1104	K3	3	1.96	3	1.96	-	-	-	-	-	-
TXP1013	K4	3	1	3	1	-	-	-	-	-	-
<b>Semester VII</b>											
CEP1714	K4	3	2	3	2	-	-	-	-	-	-
CET1713	K3	3	1.8	3	1.8	-	-	-	-	-	-
DYT1105	K3	3	1.2	3	1.2	-	-	-	-	-	-
DYT1206	K3	3	2.32	3	2.32	-	-	-	-	-	-
Elective-II	K3	3	2.2	3	2.2	-	-	-	-	-	-
HUT1105	K3	3	3	3	3	-	-	-	-	-	-
MAT1106	K3	3	2.12	3	2.12	-	-	-	-	-	-
DYP1006	K4	3	3	3	3	-	-	-	-	-	-
DYP1007	K6	3	3	3	3	-	-	-	-	-	-
DYP1012	K5	3	2	3	2	-	-	-	-	-	-
<b>Semester VIII</b>											
DYP1009	K4	3	2	3	2	-	-	-	-	-	-
DYT1106	K3	3	2	3	2	-	-	-	-	-	-
DYT1107	K3	3	1.84	3	1.84	-	-	-	-	-	-

DYT1205	K3	3	2.04	3	2.04	-	-	-	-	-	-
HUT1107	K3	2	1.72	3	1.72	-	-	-	-	-	-
DYP1008	K6	3	1	3	1	-	-	-	-	-	-
CET1504	K3	3	2	3	2	-	-	-	-	-	-
Elective-III	K3	3	1.2	3	1.2	-	-	-	-	-	-
<b>Direct attainment</b>			<b>1.932</b>		<b>1.930</b>		-		-		-
Direct <b>PO1</b> Attainment										<b>1.932</b>	
Indirect Attainment	PO1	Survey I	Student Feedback		<b>2.40</b>					<b>2.55</b>	
		Survey II	Alumni Feedback		<b>2.70</b>						
Overall Attainment of PO1 (APO1)			$1.932*0.8+2.55*0.2$				<b>2.055 (68.52%)</b>				

Similarly, the attainments of other POs (PO2, PO3, etc) can be calculated.

Batchwise PO attainment calculation

Table B.1.6.2a PO Attainment for the entire batch (Assessment year 2020-2021) 17DYE batch

17DYE BATCH	PO1 wtg	Attnm	PO2 wtg	Attnm	PO3 wtg	Attnm	PO4 wtg	Attnm	PO5 wtg	Attnm	PO6 wtg	Attnm	PO7 wtg	Attnm	PO8 wtg	Attnm	PO9 wtg	Attnm	PO10 wtg	Attnm	PO11 wtg	Attnm	PO12 wtg	Attnm	PSO1 wtg	Attnm	PSO2 wtg	Attnm
CHP1342	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
CHT1341	3	2	3	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
CHT1401	3	2	2	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
GEP1101	3	2	2	2	2	2	0	2	2	2	3	2	3	2	3	2	1	2	3	2	0	2	2	2	3	2	3	2
HUP1101	3	3	3	3	2	3	2	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3
MAT1101	3	1.88	3	1.88	2	1.88	2	1.88	2	1.88	3	1.88	3	1.88	2	1.88	3	1.88	3	1.88	3	1.88	2	1.88	3	1.88	3	1.88
PYT1101	3	2.0	3	2.0	2	2.0	2	2.0	2	2.0	3	2.0	3	2.0	3	2.0	3	2.0	3	2.0	3	2.0	2	2.0	3	2.0	3	2.0
CET1507	3	1.52	3	1.52	2	1.52	2	1.52	2	1.52	3	1.52	3	1.52	3	1.52	3	1.52	3	1.52	3	1.52	2	1.52	3	1.52	3	1.52
CHP1132	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
CHT1132	3	1.68	3	1.68	2	1.68	3	1.68	2	1.68	3	1.68	3	1.68	3	1.68	3	1.68	3	1.68	3	1.68	2	1.68	3	1.68	3	1.68
CHT1342	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
MAT1102	3	2	3	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
PYP1101	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
PYT1103	3	1.84	3	1.84	2	1.84	2	1.84	2	1.84	3	1.84	3	1.84	3	1.84	3	1.84	3	1.84	3	1.84	2	1.84	3	1.84	3	1.84
CHT1124	3	2	3	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
CHT1136	3	1.8	2	1.8	3	1.8	3	1.8	2	1.8	2	1.8	2	1.8	2	1.8	2	1.8	2	1.8	2	1.8	3	1.8	3	1.8	3	1.8
DYP1001	3	2	3	2	3	2	3	2	3	2	3	2	2	2	2	2	3	2	1	2	2	2	3	2	3	2	3	2
DYT1101	2	1.36	3	1.36	2	1.36	3	1.36	0	1.36	2	1.36	2	1.36	0	1.36	1	1.36	0	1.36	2	1.36	0	1.36	2	1.36	2	1.36
DYT1202	3	1.36	3	1.36	3	1.36	3	1.36	2	1.36	2	1.36	2	1.36	2	1.36	2	1.36	2	1.36	3	1.36	1	1.36	3	1.36	3	1.36

MAP1202	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
OLT1102	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2
GET1301	3	2.32	3	2.32	2	2.32	2	2.32	2	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	2	2.32	3	2.32	3	2.32
DYT1102	3	1.72	3	1.72	3	1.72	3	1.72	3	1.72	2	1.72	2	1.72	1	1.72	0	1.72	0	1.72	3	1.72	1	1.72	3	1.72	3	1.72
PYP1103	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2
PYT1202	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	1	2.16	2	2.16	1	2.16	3	2.16	3	2.16	3	2.16	3	2.16
CET1105	3	1.8	3	1.8	2	1.8	2	1.8	2	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	2	1.8	3	1.8	3	1.8
GEP1106	3	1	3	1	2	1	2	1	2	1	3	1	3	1	3	1	3	1	3	1	3	1	2	1	3	1	3	1
GET1105	3	2.8	3	2.8	2	2.8	2	2.8	2	2.8	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8	2	2.8	3	2.8	3	2.8
CET1212	3	1.52	3	1.52	2	1.52	3	1.52	2	1.52	3	1.52	3	1.52	3	1.52	3	1.52	3	1.52	3	1.52	2	1.52	3	1.52	3	1.52
CET1401	3	1.2	3	1.2	2	1.2	3	1.2	2	1.2	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2	2	1.2	3	1.2	3	1.2
DYP1002	3	2	3	2	3	2	3	2	3	2	2	2	2	2	0	2	2	2	1	2	3	2	3	2	3	2	3	2
DYP1003	2	2	3	2	3	2	3	2	3	2	2	2	2	2	1	2	2	2	1	2	3	2	2	2	3	2	3	2
DYT1103	3	1.84	3	1.84	3	1.84	3	1.84	2	1.84	2	1.84	2	1.84	1	1.84	2	1.84	2	1.84	3	1.84	3	1.84	3	1.84	3	1.84
DYT1104	3	1.64	3	1.64	3	1.64	3	1.64	2	1.64	2	1.64	2	1.64	1	1.64	2	1.64	1	1.64	3	1.64	1	1.64	3	1.64	3	1.64
TXT1215	3	2	3	2	3	2	3	2	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
DYP1004	3	1	3	1	3	1	3	1	3	1	2	1	1	1	2	1	2	1	2	1	3	1	3	1	3	1	3	1
DYP1005	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	2	1	3	1	3	1	3	1	3	1
DYT1203	2	2.28	3	2.28	3	2.28	3	2.28	2	2.28	2	2.28	2	2.28	1	2.28	2	2.28	2	2.28	3	2.28	2	2.28	3	2.28	3	2.28
DYT1204	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	2	1.8	3	1.8	3	1.8	2	1.8	3	1.8	2	1.8	3	1.8	3	1.8
Elective I	3	2.8	3	2.8	3	2.8	2	2.8	2	2.8	3	2.8	3	2.8	3	2.8	2	2.8	2	2.8	2	2.8	3	2.8	3	2.8	3	2.8
HUT1106	3	2.8	3	2.8	2	2.8	3	2.8	2	2.8	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8	2	2.8	3	2.8	3	2.8
HUT1103	3	2.16	3	2.16	2	2.16	3	2.16	2	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	2	2.16	3	2.16	3	2.16
HUT1104	3	1.96	3	1.96	2	1.96	3	1.96	2	1.96	3	1.96	3	1.96	3	1.96	3	1.96	3	1.96	3	1.96	2	1.96	3	1.96	3	1.96
TXP1013	3	1	3	1	3	1	3	1	3	1	2	1	2	1	2	1	3	1	2	1	2	1	3	1	3	1	3	1

CEP1714	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
CET1713	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8
DYT1105	3	1.2	3	1.2	3	1.2	3	1.2	3	1.2	2	1.2	2	1.2	2	1.2	1	1.2	1	1.2	3	1.2	2	1.2	3	1.2	3	1.2
DYT1206	3	2.32	3	2.32	3	2.32	3	2.32	2	2.3	2	2.32	0	2.32	1	2.32	2	2.32	2	2.32	3	2.32	2	2.32	3	2.32	3	2.32
elective III (PET1712)	3	2.2	3	2.2	3	2.2	3	2.2	2	2.2	3	2.2	2	2.2	2	2.2	2	2.2	2	2.2	2	2.2	3	2.2	3	2.2	3	2.2
HUT1105	3	3	3	3	2	3	3	3	1	3	3	3	3	3	2	3	2	3	2	3	2	3	3	3	3	3	3	3
MAT1106	3	2.12	3	2.12	3	2.12	3	2.12	3	2.1	3	2.12	3	2.12	3	2.12	3	2.12	3	2.12	3	2.12	3	2.12	3	2.12	3	2.12
DYP1007	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
DYP1006	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
DYP1012	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2
DYP1009	3	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	1	2	3	2	3	2	3	2	3	2
DYT1106	3	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2
DYT1107	3	1.84	3	1.84	3	1.84	3	1.84	3	1.8	3	1.84	2	1.84	1	1.84	1	1.84	1	1.84	3	1.84	1	1.84	3	1.84	3	1.84
DYT1205	3	2.04	3	2.04	3	2.04	3	2.04	2	2.0	2	2.04	3	2.04	1	2.04	2	2.04	3	2.04	3	2.04	3	2.04	3	2.04	3	2.04
HUT1107	2	1.72	3	1.72	2	1.72	2	1.72	1	1.7	3	1.72	2	1.72	3	1.72	3	1.72	2	1.72	2	1.72	3	1.72	3	1.72	3	1.72
DYP1008	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1
CET1504	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
Elective III_SCT1816/OLT1121/DYT 1812	3	1.2	3	1.2	3	1.2	3	1.2	2	1.2	3	1.2	2	1.2	2	1.2	2	1.2	2	1.2	2	1.2	3	1.2	3	1.2	3	1.2
Direct PO attainment		1.93		1.93		1.92		1.92		1.9		1.95		1.95		1.95		1.94		1.96		1.93		1.95		1.93		1.93
Indirect PO attainment (Survey I)		2.4		2.51		2.4		2.45		2.2		2.13		2.29		2.13		2.13		2.35		2.67		2.56		2.67		2.56
Indirect PO attainment (Survey II)		2.7		2.9		2.7		2.9		2.4		2.2		2.6		2.6		2.7		2.8		2.6		2.3		2.4		2.3
Indirect PO attainment (Survey I & Survey II)		2.55		2.70		2.55		2.67		2.3		2.16		2.44		2.36		2.41		2.57		2.63		2.43		2.53		2.43
PO attainment (%)		2.05		2.08		2.04		2.07		1.9		1.9		2.05		2.03		2.03		2.08		2.07		2.04		2.05		2.03

		68.3		69.3		68		69		66.33		66.33		68.3		67.6		67.6		69.33		69		68		68.3		67.66
		3		3						33		33		3		6		6								3		

PO Attainment for the entire batch (Assessment year 2021-2022)

18DYE BATCH	PO1	Attnm	PO2	Attnm	PO3	Attnm	PO4	Attnm	PO5	Attnm	PO6	Attnm	PO7	Attnm	PO8	Attnm	PO9	Attnm	PO10	Attnm	PO11	Attnm	PO12	Attnm	PSO1	Attnm	PSO2	Attnm
CHP1342	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	3	2	3	2	2
CHT1341	3	1.68	3	1.68	2	1.68	2	1.68	2	1.68	3	1.68	3	1.68	3	1.68	3	1.68	3	1.68	3	1.68	2	1.68	3	1.68	3	1.68
CHT1401	3	2	2	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
GEP1101	3	2	2	2	2	2	0	2	2	2	3	2	3	2	3	2	1	2	3	2	0	2	2	2	3	2	3	2
HUP1101	3	3	3	3	2	3	2	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3
MAT1101	3	1.68	3	1.68	2	1.68	2	1.68	2	1.68	3	1.68	3	1.68	2	1.68	3	1.68	3	1.68	3	1.68	2	1.68	3	1.68	3	1.68
PYT1101	3	2	3	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
CET1507	3	2	3	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
CHP1132	3	3	3	3	2	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3
CHT1132	3	2.32	3	2.32	2	2.32	3	2.32	2	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	2	2.32	3	2.32	3	2.32
CHT1342	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
MAT1102	3	1.52	3	1.52	2	1.52	2	1.52	2	1.52	3	1.52	3	1.52	3	1.52	3	1.52	3	1.52	3	1.52	2	1.52	3	1.52	3	1.52
PYP1101	3	3	3	3	2	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3
PYT1103	3	1.48	3	1.48	2	1.48	2	1.48	2	1.48	3	1.48	3	1.48	3	1.48	3	1.48	3	1.48	3	1.48	2	1.48	3	1.48	3	1.48
CHT1124	3	2	3	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
CHT1136	3	2	2	2	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	3	2	3	2
DYP1001	3	2	3	2	3	2	3	2	3	2	3	2	2	2	2	2	3	2	1	2	2	2	3	2	3	2	3	2
DYT1101	2	1.2	3	1.2	2	1.2	3	1.2	0	1.2	2	1.2	2	1.2	0	1.2	1	1.2	0	1.2	2	1.2	0	1.2	2	1.2	2	1.2
DYT1202	3	1.36	3	1.36	3	1.36	3	1.36	2	1.36	2	1.36	2	1.36	2	1.36	2	1.36	2	1.36	3	1.36	1	1.36	3	1.36	3	1.36

MAP1202	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
OLT1102	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2
GET1301	3	2.6	3	2.6	2	2.6	2	2.6	2	2.6	3	2.6	3	2.6	3	2.6	3	2.6	3	2.6	3	2.6	2	2.6	3	2.6	3	2.6
DYT1102	3	0.88	3	0.88	3	0.88	3	0.88	3	0.88	2	0.88	2	0.88	1	0.88	0	0.88	0	0.88	3	0.88	1	0.88	3	0.88	3	0.88
PYP1103	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
PYT1202	3	1.4	3	1.4	3	1.4	3	1.4	3	1.4	3	1.4	3	1.4	1	1.4	2	1.4	1	1.4	3	1.4	3	1.4	3	1.4	3	1.4
CET1105	3	2	3	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
GEP1106	3	1	3	1	2	1	2	1	2	1	3	1	3	1	3	1	3	1	3	1	3	1	2	1	3	1	3	1
GET1105	3	2	3	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
CET1212	3	1.84	3	1.84	2	1.84	3	1.84	2	1.84	3	1.84	3	1.84	3	1.84	3	1.84	3	1.84	3	1.84	2	1.84	3	1.84	3	1.84
CET1401	3	1.68	3	1.68	2	1.68	3	1.68	2	1.68	3	1.68	3	1.68	3	1.68	3	1.68	3	1.68	3	1.68	2	1.68	3	1.68	3	1.68
DYP1002	3	2	3	2	3	2	3	2	3	2	2	2	2	2	0	2	2	2	1	2	3	2	3	2	3	2	3	2
DYP1003	2	1	3	1	3	1	3	1	3	1	2	1	2	1	1	1	2	1	1	1	3	1	2	1	3	1	3	1
DYT1103	3	1.84	3	1.84	3	1.84	3	1.84	2	1.84	2	1.84	2	1.84	1	1.84	2	1.84	2	1.84	3	1.84	3	1.84	3	1.84	3	1.84
DYT1104	3	2	3	2	3	2	3	2	2	2	2	2	2	2	1	2	2	2	1	2	3	2	1	2	3	2	3	2
TXT1215	3	2	3	2	3	2	3	2	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
DYP1004	3	2	3	2	3	2	3	2	3	2	2	2	1	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2
DYP1005	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2	3	2	3	2
DYT1203	2	1.2	3	1.2	3	1.2	3	1.2	2	1.2	2	1.2	2	1.2	1	1.2	2	1.2	2	1.2	3	1.2	2	1.2	3	1.2	3	1.2
DYT1204	3	1.84	3	1.84	3	1.84	3	1.84	3	1.84	3	1.84	2	1.84	3	1.84	3	1.84	2	1.84	3	1.84	2	1.84	3	1.84	3	1.84
Elective I	3	2.6	3	2.6	3	2.6	2	2.6	2	2.6	3	2.6	3	2.6	3	2.6	2	2.6	2	2.6	2	2.6	3	2.6	3	2.6	3	2.6
HUT1106	3	3	3	3	2	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3
HUT1103	3	3	3	3	2	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3
HUT1104	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
TXP1013	3	1	3	1	3	1	3	1	3	1	2	1	2	1	2	1	3	1	2	1	2	1	3	1	3	1	3	1
CEP1714	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2



CET1713	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16		
DYT1105	3	1.24	3	1.24	3	1.24	3	1.24	3	1.24	2	1.24	2	1.24	2	1.24	1	1.24	1	1.24	3	1.24	2	1.24	3	1.24	3	1.24
DYT1206	3	2.2	3	2.2	3	2.2	3	2.2	2	2.2	2	2.2	0	2.2	1	2.2	2	2.2	2	2.2	3	2.2	2	2.2	3	2.2	3	2.2
elective III (PET1712)	3	1.4	3	1.4	3	1.4	3	1.4	2	1.4	3	1.4	2	1.4	2	1.4	2	1.4	2	1.4	2	1.4	3	1.4	3	1.4	3	1.4
HUT1105	3	3	3	3	2	3	3	3	1	3	3	3	3	2	3	2	3	2	3	2	3	2	3	3	3	3	3	3
MAT1106	3	1.72	3	1.72	3	1.72	3	1.72	3	1.72	3	1.72	3	1.72	3	1.72	3	1.72	3	1.72	3	1.72	3	1.72	3	1.72	3	1.72
DYP1007	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2
DYP1006	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2
DYP1012	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1
Direct PO attainment		1.96		1.95		1.91		1.94		1.92		1.97		1.98		2.02		1.99		2.02		1.94		1.97		1.95		1.95
Indirect PO attainment (Survey I)		2.36		2.47		2.33		2.29		2.26		2.36		2.54		2.61		2.54		2.61		2.58		2.61		2.58		2.61
Indirect PO attainment (Survey II)		2.7		2.9		2.7		2.9		2.4		2.2		2.6		2.6		2.7		2.8		2.6		2.3		2.4		2.3
Indirect PO attainment (Survey I & Survey II)		2.53		2.68		2.51		2.59		2.33		2.28		2.57		2.60		2.62		2.70		2.59		2.45		2.49		2.45
PO attainment		2.07		2.09		2.03		2.07		2.00		2.04		2.09		2.13		2.12		2.15		2.07		2.07		2.06		2.05
PO attainment (%)		69.26		69.86		67.87		69.21		66.70		68.16		69.99		71.24		70.70		71.99		69.15		69.14		68.70		68.47

PO Attainment for the entire batch (Assessment year 2019-2020)

16DYE Batch	PO1	Attnm	PO2	Attnm	PO3	Attnm	PO4	Attnm	PO5	Attnm	PO6	Attnm	PO7	Attnm	PO8	Attnm	PO9	Attnm	PO10	Attnm	PO11	Attnm	PO12	Attnm	PSO1	Attnm	PSO2	Attnm		
CHT1124	3	1.8	3	1.8	2	1.8	2	1.8	2	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	2	1.8	3	1.8	3	1.8	3	1.8
CHT1136	3	2.2	2	2.2	3	2.2	3	2.2	2	2.2	2	2.2	2	2.2	2	2.2	2	2.2	2	2.2	2	2.2	3	2.2	3	2.2	3	2.2	3	2.2
DYP1001	3	2	3	2	3	2	3	2	3	2	3	2	2	2	2	2	3	2	1	2	2	2	3	2	3	2	3	2	3	2
DYT1101	2	2.16	3	2.16	2	2.16	3	2.16	0	2.16	2	2.16	2	2.16	0	2.16	1	2.16	0	2.16	2	2.16	0	2.16	2	2.1	2	2.1	6	6
DYT1202	3	1.36	3	1.36	3	1.36	3	1.36	2	1.36	2	1.36	2	1.36	2	1.36	2	1.36	2	1.36	3	1.36	1	1.36	3	1.3	3	1.3	6	6

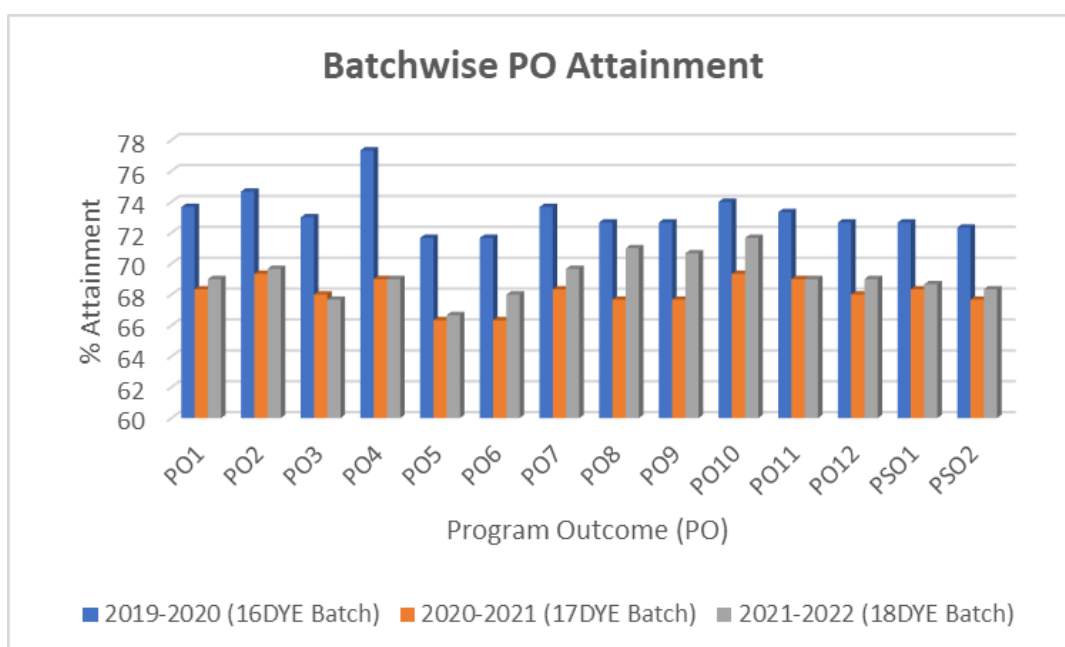
MAP1202	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
OLT1102	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32
GET1301	3	2	3	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
DYT1102	3	2	3	2	3	2	3	2	3	2	2	2	2	2	1	2	0	2	0	2	3	2	1	2	3	2	3	2
PYP1103	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8
PYT1202	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	1	1.8	2	1.8	1	1.8	3	1.8	3	1.8	3	1.8	3	1.8
CET1105	3	2.6	3	2.6	2	2.6	2	2.6	2	2.6	3	2.6	3	2.6	3	2.6	3	2.6	3	2.6	3	2.6	2	2.6	3	2.6	3	2.6
GEP1106	3	2	3	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
GET1105	3	2	3	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
CET1212	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
CET1401	3	1.8	3	1.8	2	1.8	3	1.8	2	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	3	1.8	2	1.8	3	1.8	3	1.8
DYP1002	3	2	3	2	3	2	3	2	3	2	2	2	2	2	0	2	2	2	1	2	3	2	3	2	3	2	3	2
DYP1003	2	2	3	2	3	2	3	2	3	2	2	2	2	2	1	2	2	2	1	2	3	2	2	2	3	2	3	2
DYT1103	3	2	3	2	3	2	3	2	2	2	2	2	2	2	1	2	2	2	2	2	3	2	3	2	3	2	3	2
DYT1104	3	2.32	3	2.32	3	2.32	3	2.32	2	2.32	2	2.32	2	2.32	1	2.32	2	2.32	1	2.32	3	2.32	1	2.32	3	2.32	3	2.32
TXT1215	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	2	2.16	2	2.16	2	2.16	2	2.16	2	2.16	2	2.16	2	2.16	2	2.16
DYP1004	3	2	3	2	3	2	3	2	3	2	2	2	1	2	2	2	2	2	2	2	3	2	3	2	3	2	3	2
DYP1005	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2	3	2	3	2
DYT1203	2	2.52	3	2.52	3	2.52	3	2.52	2	2.52	2	2.52	2	2.52	1	2.52	2	2.52	2	2.52	3	2.52	2	2.52	3	2.52	3	2.52
DYT1204	3	1.88	3	1.88	3	1.88	3	1.88	3	1.88	3	1.88	2	1.88	3	1.88	3	1.88	2	1.88	3	1.88	2	1.88	3	1.88	3	1.88
Elective I	3	2.2	3	2.2	3	2.2	2	2.2	2	2.2	3	2.2	3	2.2	3	2.2	2	2.2	2	2.2	2	2.2	3	2.2	3	2.2	3	2.2
HUT1106	3	2.32	3	2.32	2	2.32	3	2.32	2	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	3	2.32	2	2.32	3	2.32	3	2.32
HUT1103	3	3	3	3	2	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3
HUT1104	3	3	3	3	2	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3
TXP1013	3	1	3	1	3	1	3	1	3	1	2	1	2	1	2	1	3	1	2	1	2	1	3	1	3	1	3	1

CEP1714	3	2	3	2	2	2	3	2	2	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	3	2	3	2
CET1713	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16	3	2.16
DYT1105	3	1.04	3	1.04	3	1.04	3	1.04	3	1.04	2	1.04	2	1.04	2	1.04	1	1.04	1	1.04	3	1.04	2	1.04	3	1.04	3	1.04
DYT1206	3	2.2	3	2.2	3	2.2	3	2.2	2	2.2	2	2.2	0	2.2	1	2.2	2	2.2	2	2.2	3	2.2	2	2.2	3	2.2	3	2.2
elective II	3	3	3	3	3	3	3	3	2	3	3	3	2	3	2	3	2	3	2	3	2	3	3	3	3	3	3	3
HUT1105	3	2.68	3	2.68	2	2.68	3	2.68	1	2.68	3	2.68	3	2.68	2	2.68	2	2.68	2	2.68	2	2.68	3	2.68	3	2.68	3	2.68
MAT1106	3	2.2	3	2.2	3	2.2	3	2.2	3	2.2	3	2.2	3	2.2	3	2.2	3	2.2	3	2.2	3	2.2	3	2.2	3	2.2	3	2.2
DYP1007	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2
DYP1006	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2
DYP1012	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2
DYP1009	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	1	3	3	3	3	3	3	3	3
DYT1106	3	2	3	2	3	2	3	2	3	2	3	2	3	2	2	2	2	2	3	2	3	2	3	2	3	2	3	2
DYT1107	3	1.84	3	1.84	3	1.84	3	1.84	3	1.84	3	1.84	2	1.84	1	1.84	1	1.84	1	1.84	3	1.84	1	1.84	3	1.84	3	1.84
DYT1205	3	2.8	3	2.8	3	2.8	3	2.8	2	2.8	2	2.8	3	2.8	1	2.8	2	2.8	3	2.8	3	2.8	3	2.8	3	2.8	3	2.8
HUT1107	2	2.04	3	2.04	2	2.04	2	2.04	1	2.04	3	2.04	2	2.04	3	2.04	3	2.04	2	2.04	2	2.04	3	2.04	3	2.04	3	2.04
DYP1008	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1
CET1504	3	1	3	1	2	1	3	1	2	1	3	1	3	1	3	1	3	1	3	1	3	1	2	1	3	1	3	1
Elective III	3	3	3	3	3	3	3	3	2	3	3	3	2	3	2	3	2	3	2	3	2	3	3	3	3	3	3	3
Direct PO attainment		2.10		2.10		2.09		2.10		2.06		2.11		2.12		2.10		2.11		2.12		2.10		2.11		2.10		2.10
Indirect PO attainment (Survey I)		2.58		2.68		2.54		2.58		2.58		2.4		2.58		2.4		2.26		2.45		2.68		2.63		2.63		2.63
Indirect PO attainment (Survey II)		2.7		2.9		2.7		2.9		2.4		2.2		2.6		2.6		2.7		2.8		2.6		2.3		2.4		2.3
Indirect PO attainment (Survey I & Survey II)		2.64		2.79		2.62		2.74		2.49		2.3		2.59		2.5		2.48		2.625		2.64		2.465		2.515		2.465
PO attainment		<b>2.21</b>		<b>2.24</b>		<b>2.19</b>		<b>2.23</b>		<b>2.15</b>		<b>2.15</b>		<b>2.21</b>		<b>2.18</b>		<b>2.18</b>		<b>2.22</b>		<b>2.20</b>		<b>2.18</b>		<b>2.18</b>		<b>2.17</b>
PO attainment (%)		<b>73.6</b>		<b>74.7</b>		<b>73.2</b>		<b>74.4</b>		<b>71.7</b>		<b>71.8</b>		<b>73.8</b>		<b>72.7</b>		<b>72.9</b>		<b>74.1</b>		<b>73.6</b>		<b>72.87</b>		<b>72.87</b>		<b>72.54</b>

PO attainment of the last three academic years are shown below:

Sl. No.	Assessment year	Attainment of Programme Objectives													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2019-2020 (16DYE Batch)	2.21	2.24	2.19	2.32	2.15	2.15	2.21	2.18	2.18	2.22	2.20	2.18	2.18	2.17
2	2020-2021 (17DYE Batch)	2.05	2.08	2.04	2.07	1.99	1.99	2.05	2.03	2.03	2.08	2.07	2.04	2.05	2.03
3	2021-2022 (18DYE Batch)	2.07	2.09	2.03	2.07	2.00	2.04	2.09	2.13	2.12	2.15	2.07	2.07	2.06	2.05

Assessment year	Attainment of Programme Objectives													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
2019-2020 (16DYE Batch)	73.66	74.66	73	77.33	71.66	71.66	73.66	72.66	72.66	74	73.3	72.666	72.6666	72.33
2020-2021 (17DYE Batch)	68.33	69.33	68	69	66.33	66.33	68.33	67.66	67.66	69.33	69	68	68.33	67.66
2021-2022 (18DYE Batch)	69	69.66	67.66	69	66.66	68	69.666	71	70.66	71.66	69	69	68.66	68.33



The average of all the course attainments (CA<sub>i</sub>) is used to calculate the PO attainment level over the last three years. (Refer page number 29-30). Example: For the course **DYT1107**, the course attainments are 2, 1.82 and 2 for the 17DYE, 16DYE and 15 DYE batch respectively. Therefore, the average attainment of the course is =  $(2+1.82+2)/3 = 1.95$

PO Attainment (Based on the attainments obtained for the courses)

Course	PO1				PO2				PO3				PO4				PO5			
	w	CA <sub>avg</sub>	W*CA	PO <sub>a</sub>	w	CA	W*C A	a	w	CA	W*C A	a	w	CA	W*C A	a	w	CA	W*C A	a
<b>Semester I</b>																				
<b>CHP1342</b>	3	2	6	2	3	2	6	2	2	2	4	2	3	2	6	2	2	2	4	2
<b>CHT1341</b>	3	1.79	5.37	2	3	1.79	5.37	2	2	1.79	3.58	2	2	1.79	3.58	2	2	1.79	3.58	2
<b>CHT1401</b>	3	2.04	6.12	3	2	2.04	4.08	2	2	2.04	4.08	2	2	2.04	4.08	2	2	2.04	4.08	2
<b>GEP1101</b>	3	2.25	6.75	3	2	2.25	4.5	2	2	2.25	4.5	2	0	2.25	0	0	2	2.25	4.5	2
<b>HUP1101</b>	3	3	9	3	3	3	9	3	2	3	6	2	2	3	6	2	2	3	6	2
<b>MAT1101</b>	3	1.88	5.64	2	3	1.88	5.64	2	2	1.88	3.76	2	2	1.88	3.76	2	2	1.88	3.76	2
<b>PYT1101</b>	3	2.09	6	2	3	2.09	6	2	2	2.09	4	2	2	2.09	4	2	2	2.09	4	2
<b>Semester II</b>																				
<b>CET1507</b>	3	1.92	5.76	2	3	1.92	5.76	2	2	1.92	3.84	2	2	1.92	3.84	2	2	1.92	3.84	2
<b>CHP1132</b>	3	2.5	7.5	3	3	2.5	7.5	3	2	2.5	5	2	3	2.5	7.5	3	2	2.5	5	2
<b>CHT1132</b>	3	2.08	6.24	3	3	2.08	6.24	3	2	2.08	4.16	2	3	2.08	6.24	3	2	2.08	4.16	2
<b>CHT1342</b>	3	2	6	2	3	2	6	2	2	2	4	2	3	2	6	2	2	2	4	2
<b>MAT1102</b>	3	2	6	2	3	2	6	2	2	2	4	2	2	2	4	2	2	2	4	2
<b>PYP1101</b>	3	2.75	8.25	3	3	2.75	8.25	3	2	2.75	5.5	2	3	2.75	8.25	3	2	2.75	5.5	2
<b>PYT1103</b>	3	2	6	2	3	2	6	2	2	2	4	2	2	2	4	2	2	2	4	2
<b>Semester III</b>																				
<b>CHT1124</b>	3	2.16	6.48	3	3	2.16	6.48	3	2	2.16	4.32	2	2	2.16	4.32	2	2	2.16	4.32	2
<b>CHT1136</b>	3	2.12	6.36	3	2	2.12	4.24	2	3	2.12	6.36	3	3	2.12	6.36	3	2	2.12	4.24	2
<b>DYP1001</b>	3	2.2	6.6	3	3	2.2	6.6	3	3	2.2	6.6	3	3	2.2	6.6	3	3	2.2	6.6	3
<b>DYT1101</b>	2	1.872	3.744	2	3	1.87 2	5.61 6	2	2	1.87 2	3.74 4	2	3	1.87 2	5.61 6	2	0	1.87 2	0	0

DYT1202	3	1.592	4.776	2	3	1.59 2	4.77 6	2	3	1.59 2	4.77 6	2	3	1.59 2	4.77 6	2	2	1.59 2	3.18 4	2
MAP1202	3	2.2	6.6	3	3	2.2	6.6	3	2	2.2	4.4	2	3	2.2	6.6	3	2	2.2	4.4	2
OLT1102	3	2.384	7.152	3	3	2.38 4	7.15 2	3	3	2.38 4	7.15 2	3	3	2.38 4	7.15 2	3	3	2.38 4	7.15 2	3
<b>Semester IV</b>																				
GET1301	3	2.28	6.84	3	3	2.28	6.84	3	2	2.28	4.56	2	2	2.28	4.56	2	2	2.28	4.56	2
DYT1102	3	1.58	4.74	2	3	1.58	4.74	2	3	1.58	4.74	2	3	1.58	4.74	2	3	1.58	4.74	2
PYP1103	3	2.75	8.25	3	3	2.75	8.25	3	3	2.75	8.25	3	3	2.75	8.25	3	3	2.75	8.25	3
PYT1202	3	1.96	5.88	2	3	1.96	5.88	2	3	1.96	5.88	2	3	1.96	5.88	2	3	1.96	5.88	2
CET1105	3	2	6	2	3	2	6	2	2	2	4	2	2	2	4	2	2	2	4	2
GEP1106	3	2	6	2	3	2	6	2	2	2	4	2	2	2	4	2	2	2	4	2
GET1105	3	2.49	7.47	3	3	2.49	7.47	3	2	2.49	4.98	2	2	2.49	4.98	2	2	2.49	4.98	2
<b>Semester V</b>																				
CET1212	3	1.62	4.86	2	3	1.62	4.86	2	2	1.62	3.24	2	3	1.62	4.86	2	2	1.62	3.24	2
CET1401	3	1.57	4.71	2	3	1.57	4.71	2	2	1.57	3.14	2	3	1.57	4.71	2	2	1.57	3.14	2
DYP1002	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2
DYP1003	2	1.75	3.5	2	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2
DYT1103	3	1.97	5.91	2	3	1.97	5.91	2	3	1.97	5.91	2	3	1.97	5.91	2	2	1.97	3.94	2
DYT1104	3	1.85	5.55	2	3	1.85	5.55	2	3	1.85	5.55	2	3	1.85	5.55	2	2	1.85	3.7	2
TXT1215	3	2.12	6.36	3	3	2.12	6.36	3	3	2.12	6.36	3	3	2.12	6.36	3	3	2.12	6.36	3
<b>Semester VI</b>																				
DYP1004	3	1.5	4.5	2	3	1.5	4.5	2	3	1.5	4.5	2	3	1.5	4.5	2	3	1.5	4.5	2
DYP1005	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2
DYT1203	2	2.07	4.14	2	3	2.07	6.21	3	3	2.07	6.21	3	3	2.07	6.21	3	2	2.07	4.14	2
DYT1204	3	1.97	5.91	2	3	1.97	5.91	2	3	1.97	5.91	2	3	1.97	5.91	2	3	1.97	5.91	2
TXT1501	3	2.53	7.59	3	3	2.53	7.59	3	3	2.53	7.59	3	2	2.53	5.06	2	2	2.53	5.06	2
HUT1106	3	2.73	8.19	3	3	2.73	8.19	3	2	2.73	5.46	2	3	2.73	8.19	3	2	2.73	5.46	2
HUT1103	3	2.72	8.16	3	3	2.72	8.16	3	2	2.72	5.44	2	3	2.72	8.16	3	2	2.72	5.44	2
HUT1104	3	2.32	6.96	3	3	2.32	6.96	3	2	2.32	4.64	2	3	2.32	6.96	3	2	2.32	4.64	2
TXP1013	3	1.25	3.75	2	3	1.25	3.75	2	3	1.25	3.75	2	3	1.25	3.75	2	3	1.25	3.75	2
<b>Semester VII</b>																				

CEP1714	3	2	6	2	3	2	6	2	2	2	4	2	3	2	6	2	2	2	4	2
CET1703	3	2.03	5.4	2	3	2.03	5.4	2	3	2.03	5.4	2	3	2.03	5.4	2	3	2.03	5.4	2
DYT1105	3	1.08	3.24	2	3	1.08	3.24	2	3	1.08	3.24	2	3	1.08	3.24	2	3	1.08	3.24	2
DYT1206	3	2.18	6.54	3	3	2.18	6.54	3	3	2.18	6.54	3	3	2.18	6.54	3	2	2.18	4.36	2
PET1712	3	2.2	6.6	3	3	2.2	6.6	3	3	2.2	6.6	3	3	2.2	6.6	3	2	2.2	4.4	2
HUT1105	3	2.92	8.76	3	3	2.92	8.76	3	2	2.92	5.84	2	3	2.92	8.76	3	1	2.92	2.92	1
MAT1106	3	1.96	5.88	2	3	1.96	5.88	2	3	1.96	5.88	2	3	1.96	5.88	2	3	1.96	5.88	2
DYP1006	3	2.25	6.75	3	3	2.25	6.75	3	3	2.25	6.75	3	3	2.25	6.75	3	3	2.25	6.75	3
DYP1007	3	2.5	7.5	3	3	2.5	7.5	3	3	2.5	7.5	3	3	2.5	7.5	3	3	2.5	7.5	3
DYP1012	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2
<b>Semester VIII</b>																				
DYP1009	3	2.33	6.99	3	3	2.33	6.99	3	3	2.33	6.99	3	3	2.33	6.99	3	3	2.33	6.99	3
DYT1106	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2
DYT1107	3	1.94	5.82	2	3	1.94	5.82	2	3	1.94	5.82	2	3	1.94	5.82	2	3	1.94	5.82	2
DYT1205	3	2.45	7.35	3	3	2.45	7.35	3	3	2.45	7.35	2	3	2.45	7.35	3	2	2.45	4.9	2
HUT1107	2	1.86	3.72	2	3	1.86	5.58	2	2	1.86	3.72	2	2	1.86	3.72	2	1	1.86	1.86	1
DYP1008	3	1.33	3.99	2	3	1.33	3.99	2	3	1.33	3.99	2	3	1.33	3.99	2	3	1.33	3.99	2
CET1504	3	1.66	6	2	3	1.66	6	2	2	1.66	4	2	3	1.66	6	2	2	1.66	4	2
SCT1816	3	2.4	7.2	3	3	2.4	7.2	3	3	2.4	7.2	3	3	2.4	7.2	3	2	2.4	4.8	2

(contd...)

Course	PO6				PO7				PO8				PO9				PO10			
	w	CA <sub>avg</sub>	W*CA	PO <sub>a</sub>	w	CA	W*C A	a	w	CA	W*C A	a	w	CA	W*C A	a	w	CA	W*C A	a
<b>Semester I</b>																				
CHP1342	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2
CHT1341	3	1.79	5.37	2	3	1.79	5.37	2	3	1.79	5.37	2	3	1.79	5.37	2	3	1.79	5.37	2
CHT1401	3	2.04	6.12	3	3	2.04	6.12	3	3	2.04	6.12	3	3	2.04	6.12	3	3	2.04	6.12	3
GEP1101	3	2.25	6.75	3	3	2.25	6.75	3	3	2.25	6.75	3	1	2.25	2.25	1	3	2.25	6.75	3
HUP1101	3	3	9	3	3	3	9	3	3	3	9	3	3	3	9	3	3	3	9	3

<b>MAT1101</b>	3	1.88	5.64	2	3	1.88	5.64	2	2	1.88	3.76	2	3	1.88	5.64	2	3	1.88	5.64	2
<b>PYT1101</b>	3	2.09	6	2	3	2.09	6	2	3	2.09	6	2	3	2.09	6	2	3	2.09	6	2
<b>Semester II</b>																				
<b>CET1507</b>	3	1.92	5.76	2	3	1.92	5.76	2	3	1.92	5.76	2	3	1.92	5.76	2	3	1.92	5.76	2
<b>CHP1132</b>	3	2.5	7.5	3	3	2.5	7.5	3	3	2.5	7.5	3	3	2.5	7.5	3	3	2.5	7.5	3
<b>CHT1132</b>	3	2.08	6.24	3	3	2.08	6.24	3	3	2.08	6.24	3	3	2.08	6.24	3	3	2.08	6.24	3
<b>CHT1342</b>	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2
<b>MAT1102</b>	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2
<b>PYP1101</b>	3	2.75	8.25	3	3	2.75	8.25	3	3	2.75	8.25	3	3	2.75	8.25	3	3	2.75	8.25	3
<b>PYT1103</b>	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2
<b>Semester III</b>																				
<b>CHT1124</b>	3	2.16	6.48	3	3	2.16	6.48	3	3	2.16	6.48	3	3	2.16	6.48	3	3	2.16	6.48	3
<b>CHT1136</b>	2	2.12	4.24	2	2	2.12	4.24	2	2	2.12	4.24	2	2	2.12	4.24	2	2	2.12	4.24	2
<b>DYP1001</b>	3	2.2	6.6	3	2	2.2	4.4	2	2	2.2	4.4	2	3	2.2	6.6	3	1	2.2	2.2	1
<b>DYT1101</b>	2	1.872	3.744	2	2	1.87 2	3.74 4	2	0	1.87 2	0	0	1	1.87 2	1.87 2	1	0	1.87 2	0	0
<b>DYT1202</b>	2	1.592	3.184	2	2	1.59 2	3.18 4	2	2	1.59 2	3.18 4	2	2	1.59 2	3.18 4	2	2	1.59 2	3.18 4	2
<b>MAP1202</b>	3	2.2	6.6	3	3	2.2	6.6	3	3	2.2	6.6	3	3	2.2	6.6	3	3	2.2	6.6	3
<b>OLT1102</b>	3	2.384	7.152	3	3	2.38 4	7.15 2	3	3	2.38 4	7.15 2	3	3	2.38 4	7.15 2	3	3	2.38 4	7.15 2	3
<b>Semester IV</b>																				
<b>GET1301</b>	3	2.28	6.84	3	3	2.28	6.84	3	3	2.28	6.84	3	3	2.28	6.84	3	3	2.28	6.84	3
<b>DYT1102</b>	2	1.58	3.16	2	2	1.58	3.16	2	1	1.58	1.58	1	0	1.58	0	0	0	1.58	0	0
<b>PYP1103</b>	3	2.75	8.25	3	3	2.75	8.25	3	3	2.75	8.25	3	3	2.75	8.25	3	3	2.75	8.25	3
<b>PYT1202</b>	3	1.96	5.88	2	3	1.96	5.88	2	1	1.96	1.96	1	2	1.96	3.92	2	1	1.96	1.96	1
<b>CET1105</b>	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2
<b>GEP1106</b>	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2
<b>GET1105</b>	3	2.49	7.47	3	3	2.49	7.47	3	3	2.49	7.47	3	3	2.49	7.47	3	3	2.49	7.47	3
<b>Semester V</b>																				
<b>CET1212</b>	3	1.62	4.86	2	3	1.62	4.86	2	3	1.62	4.86	2	3	1.62	4.86	2	3	1.62	4.86	2
<b>CET1401</b>	3	1.57	4.71	2	3	1.57	4.71	2	3	1.57	4.71	2	3	1.57	4.71	2	3	1.57	4.71	2



DYP1002	2	2	4	2	2	2	4	2	0	2	0	0	2	2	4	2	1	2	2	1
DYP1003	2	1.75	3.5	2	2	1.75	3.5	2	1	1.75	1.75	1	2	1.75	3.5	2	1	1.75	1.75	1
DYT1103	2	1.97	3.94	2	2	1.97	3.94	2	1	1.97	1.97	1	2	1.97	3.94	2	2	1.97	3.94	2
DYT1104	2	1.85	3.7	2	2	1.85	3.7	2	1	1.85	1.85	1	2	1.85	3.7	2	1	1.85	1.85	1
TXT1215	3	2.12	6.36	3	2	2.12	4.24	2	2	2.12	4.24	2	2	2.12	4.24	2	2	2.12	4.24	2
<b>Semester VI</b>																				
DYP1004	2	1.5	3	2	1	1.5	1.5	1	2	1.5	3	2	2	1.5	3	2	2	1.5	3	2
DYP1005	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2	2	1.75	3.5	2
DYT1203	2	2.07	4.14	2	2	2.07	4.14	2	1	2.07	2.07	1	2	2.07	4.14	2	2	2.07	4.14	2
DYT1204	3	1.97	5.91	2	2	1.97	3.94	2	3	1.97	5.91	2	3	1.97	5.91	2	2	1.97	3.94	2
TXT1501	3	2.5333	7.6	3	3	2.53	7.59	3	3	2.53	7.59	3	2	2.53	5.06	2	2	2.53	5.06	2
HUT1106	3	2.73	8.19	3	3	2.73	8.19	3	3	2.73	8.19	3	3	2.73	8.19	3	3	2.73	8.19	3
HUT1103	3	2.72	8.16	3	3	2.72	8.16	3	3	2.72	8.16	3	3	2.72	8.16	3	3	2.72	8.16	3
HUT1104	3	2.32	6.96	3	3	2.32	6.96	3	3	2.32	6.96	3	3	2.32	6.96	3	3	2.32	6.96	3
TXP1013	2	1.25	2.5	1	2	1.25	2.5	1	2	1.25	2.5	1	3	1.25	3.75	2	2	1.25	2.5	1
<b>Semester VII</b>																				
CEP1714	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2
CET1703	3	2.03	5.4	2	3	2.03	5.4	2	3	2.03	5.4	2	3	2.03	5.4	2	3	2.03	5.4	2
DYT1105	2	1.08	2.16	1	2	1.08	2.16	1	2	1.08	2.16	1	1	1.08	1.08	1	1	1.08	1.08	1
DYT1206	2	2.18	4.36	2	0	2.18	0	0	1	2.18	2.18	1	2	2.18	4.36	2	2	2.18	4.36	2
PET1712	3	2.2	6.6	3	2	2.2	4.4	2	2	2.2	4.4	2	2	2.2	4.4	2	2	2.2	4.4	2
HUT1105	3	2.92	8.76	3	3	2.92	8.76	3	2	2.92	5.84	2	2	2.92	5.84	2	2	2.92	5.84	2
MAT1106	3	1.96	5.88	2	3	1.96	5.88	2	3	1.96	5.88	2	3	1.96	5.88	2	3	1.96	5.88	2
DYP1006	3	2.25	6.75	3	3	2.25	6.75	3	3	2.25	6.75	3	3	2.25	6.75	3	3	2.25	6.75	3
DYP1007	3	2.5	7.5	3	3	2.5	7.5	3	3	2.5	7.5	3	3	2.5	7.5	3	3	2.5	7.5	3
DYP1012	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2
<b>Semester VIII</b>																				
DYP1009	3	2.33	6.99	3	3	2.33	6.99	3	2	2.33	4.66	2	3	2.33	6.99	3	1	2.33	2.33	1
DYT1106	3	2	6	2	3	2	6	2	2	2	4	2	2	2	4	2	3	2	6	2
DYT1107	3	1.94	5.82	2	2	1.94	3.88	2	1	1.94	1.94	1	1	1.94	1.94	1	1	1.94	1.94	1
DYT1205	2	2.45	4.9	2	3	2.45	7.35	3	1	2.45	2.45	1	2	2.45	4.9	2	3	2.45	7.35	3

HUT1107	3	1.86	5.58	2	2	1.86	3.72	2	3	1.86	5.58	2	3	1.86	5.58	2	2	1.86	3.72	2
DYP1008	3	1.33	3.99	2	3	1.33	3.99	2	3	1.33	3.99	2	3	1.33	3.99	2	3	1.33	3.99	2
CET1504	3	1.66	6	2	3	1.66	6	2	3	1.66	6	2	3	1.66	6	2	3	1.66	6	2
SCT1816	3	2.4	7.2	3	2	2.4	4.8	2	2	2.4	4.8	2	2	2.4	4.8	2	2	2.4	4.8	2

(contd....)

Course	PO11				PO12				PSO1				PSO2			
	w	CA <sub>avg</sub>	W*CA	PO <sub>a</sub>	w	CA	W*C A	a	w	CA	W*C A	a	w	CA	W*C A	a
CHP1342	3	2	6	2	2	2	4	2	3	2	6	2	3	2	6	2
CHT1341	3	1.79	5.37	2	2	1.79	3.58	2	3	1.79	5.37	2	3	1.79	5.37	2
CHT1401	3	2.04	6.12	3	2	2.04	4.08	2	3	2.04	6.12	3	3	2.04	6.12	3
GEP1101	0	2.25	0	0	2	2.25	4.5	2	3	2.25	6.75	3	3	2.25	6.75	3
HUP1101	3	3	9	3	2	3	6	2	3	3	9	3	3	3	9	3
MAT1101	3	1.88	5.64	2	2	1.88	3.76	2	3	1.88	5.64	2	3	1.88	5.64	2
PYT1101	3	2.09	6	2	2	2.09	4	2	3	2.09	6	2	3	2.09	6	2
<b>Semester II</b>																
CET1507	3	1.92	5.76	2	2	1.92	3.84		3	1.92	5.76	2	3	1.92	5.76	
CHP1132	3	2.5	7.5	3	2	2.5	5		3	2.5	7.5	3	3	2.5	7.5	
CHT1132	3	2.08	6.24	3	2	2.08	4.16		3	2.08	6.24	3	3	2.08	6.24	
CHT1342	3	2	6	2	2	2	4		3	2	6	2	3	2	6	
MAT1102	3	2	6	2	2	2	4		3	2	6	2	3	2	6	
PYP1101	3	2.75	8.25	3	2	2.75	5.5		3	2.75	8.25	3	3	2.75	8.25	
PYT1103	3	2	6	2	2	2	4		3	2	6	2	3	2	6	
<b>Semester III</b>																
CHT1124	3	2.16	6.48	3	2	2.16	4.32		3	2.16	6.48	3	3	2.16	6.48	
CHT1136	2	2.12	4.24	2	3	2.12	6.36		3	2.12	6.36	3	3	2.12	6.36	
DYP1001	2	2.2	4.4	2	3	2.2	6.6		3	2.2	6.6	3	3	2.2	6.6	
DYT1101	2	1.872	3.74	2	0	1.87	0		2	1.87	3.74	2	2	1.87	3.74	

DYT1202	3	1.592	4.77	2	1	1.59	1.59		3	1.59	4.77	2	3	1.59 2	4.77 6	
MAP1202	3	2.2	6.6	3	2	2.2	4.4		3	2.2	6.6	3	3	2.2	6.6	
OLT1102	3	2.384	7.15	3	3	2.38	7.15		3	2.38	7.15	3	3	2.38	7.15	
<b>Semester IV</b>																
GET1301	3	2.28	6.84	3	2	2.28	4.56		3	2.28	6.84	3	3	2.28	6.84	
DYT1102	3	1.58	4.74	2	1	1.58	1.58		3	1.58	4.74	2	3	1.58	4.74	
PYP1103	3	2.75	8.25	3	3	2.75	8.25		3	2.75	8.25	3	3	2.75	8.25	
PYT1202	3	1.96	5.88	2	3	1.96	5.88		3	1.96	5.88	2	3	1.96	5.88	
CET1105	3	2	6	2	2	2	4		3	2	6	2	3	2	6	
GEP1106	3	2	6	2	2	2	4		3	2	6	2	3	2	6	
GET1105	3	2.49	7.47	3	2	2.49	4.98		3	2.49	7.47	3	3	2.49	7.47	
<b>Semester V</b>																
CET1212	3	1.62	4.86	2	2	1.62	3.24		3	1.62	4.86	2	3	1.62	4.86	
CET1401	3	1.57	4.71	2	2	1.57	3.14		3	1.57	4.71	2	3	1.57	4.71	
DYP1002	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2
DYP1003	3	1.75	5.25	2	2	1.75	3.5	2	3	1.75	5.25	2	3	1.75	5.25	2
DYT1103	3	1.97	5.91	2	3	1.97	5.91	2	3	1.97	5.91	2	3	1.97	5.91	2
DYT1104	3	1.85	5.55	2	1	1.85	1.85	1	3	1.85	5.55	2	3	1.85	5.55	2
TXT1215	2	2.12	4.24	2	2	2.12	4.24	2	2	2.12	4.24	2	2	2.12	4.24	2
<b>Semester VI</b>																
DYP1004	3	1.5	4.5	2	3	1.5	4.5	2	3	1.5	4.5	2	3	1.5	4.5	2
DYP1005	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2
DYT1203	3	2.07	6.21	3	2	2.07	4.14	2	3	2.07	6.21	3	3	2.07	6.21	3
DYT1204	3	1.97	5.91	2	2	1.97	3.94	2	3	1.97	5.91	2	3	1.97	5.91	2
TXT1501	2	2.53	5.06	2	3	2.53	7.59	3	3	2.53	7.59	3	3	2.53	7.59	3
HUT1106	3	2.73	8.19	3	2	2.73	5.46	2	3	2.73	8.19	3	3	2.73	8.19	3
HUT1103	3	2.72	8.16	3	2	2.72	5.44	2	3	2.72	8.16	3	3	2.72	8.16	3
HUT1104	3	2.32	6.96	3	2	2.32	4.64	2	3	2.32	6.96	3	3	2.32	6.96	3
TXP1013	2	1.25	2.5	1	3	1.25	3.75	2	3	1.25	3.75	2	3	1.25	3.75	2
<b>Semester VII</b>																
CEP1714	3	2	6	2	2	2	4	2	3	2	6	2	3	2	6	2

CET1703	3	2.03	5.4	2	3	2.03	5.4	2	3	2.03	5.4	2	3	2.03	5.4	2
DYT1105	3	1.08	3.24	2	2	1.08	2.16	1	3	1.08	3.24	2	3	1.08	3.24	2
DYT1206	3	2.18	6.54	3	2	2.18	4.36	2	3	2.18	6.54	3	3	2.18	6.54	3
PET1712	2	2.2	4.4	2	3	2.2	6.6	3	3	2.2	6.6	3	3	2.2	6.6	3
HUT1105	2	2.92	5.84	2	3	2.92	8.76	3	3	2.92	8.76	3	3	2.92	8.76	3
MAT1106	3	1.96	5.88	2	3	1.96	5.88	2	3	1.96	5.88	2	3	1.96	5.88	2
DYP1006	3	2.25	6.75	3	3	2.25	6.75	3	3	2.25	6.75	3	3	2.25	6.75	3
DYP1007	3	2.5	7.5	3	3	2.5	7.5	3	3	2.5	7.5	3	3	2.5	7.5	3
DYP1012	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2	3	1.75	5.25	2
<b>Semester VIII</b>																
DYP1009	3	2.33	6.99	3	3	2.33	6.99	3	3	2.33	6.99	3	3	2.33	6.99	3
DYT1106	3	2	6	2	3	2	6	2	3	2	6	2	3	2	6	2
DYT1107	3	1.94	5.82	2	1	1.94	1.94	1	3	1.94	5.82	2	3	1.94	5.82	2
DYT1205	3	2.45	7.35	3	3	2.45	7.35	3	3	2.45	7.35	3	3	2.45	7.35	3
HUT1107	2	1.86	3.72	2	3	1.86	5.58	2	3	1.86	5.58	2	3	1.86	5.58	2
DYP1008	3	1.33	3.99	2	3	1.33	3.99	2	3	1.33	3.99	2	3	1.33	3.99	2
CET1504	3	1.66	6	2	2	1.66	4	2	3	1.66	6	2	3	1.66	6	2
SCT1816	2	2.4	4.8	2	3	2.4	7.2	3	3	2.4	7.2	3	3	2.4	7.2	3

**W** = Correlation of a course with corresponding PO in 1-3 scale, where 3, 2, 1 stand for strong, medium, and weak correlation, respectively.

**CA** = Average of the attainment obtained for a specific course (in 1-3 scale);

**W\*CA** = total attainment for a course in 1-9 scale;

**a** = final attainment for the course with respect to a specific PO.

The logic used here is:

**PO<sub>a</sub> = 1** if  $1 < (W*CA) \leq 3$ ; **PO<sub>a</sub> = 2** if  $3.01 \leq (W*CA) \leq 6$ ; **PO<sub>a</sub> = 3** if  $6.01 \leq (W*CA) \leq 9$ ;

Overall PO attainment (A) =  $(PO * 0.8 + PO * 0.2)$

**Table B.1.6.2a**

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CHP1342:</b> Physical and Analytical Chemistry Laboratory	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>CHT1341:</b> Physical Chemistry 1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>CHT1401:</b> Analytical Chemistry	3	2	2	2	2	3	3	3	3	3	3	2	3	3
<b>GEP1101:</b> Engineering Graphics	3	2	2	0	2	3	3	3	1	3	0	2	3	3
<b>HUP1101:</b> Communication Skills	3	3	2	2	2	3	3	3	3	3	3	2	3	3
<b>MAT1101:</b> Applied Mathematics	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>PYT1101:</b> Applied Physics 1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>Semester II</b>														
<b>CET1507:</b> Applied Physics 1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>CHP1132:</b> Organic Chemistry Laboratory	3	3	2	3	2	3	3	3	3	3	3	2	3	3
<b>CHT1132:</b> Organic Chemistry	3	3	2	3	2	3	3	3	3	3	3	2	3	3
<b>CHT1342:</b> Physical Chemistry	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>MAT1102:</b> Applied Mathematics	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>PYP1101:</b> Physics Lab	3	3	2	3	2	3	3	3	3	3	3	2	3	3
<b>PYT1103:</b> Applied Physics 2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>Semester III</b>														
<b>CHT1124:</b> Industrial Inorganic Chemistry	3	3	2	2	2	3	3	3	3	3	3	2	3	3
<b>CHT1136:</b> Aromatic and Heterocyclic Chemistry	3	2	3	3	2	2	2	2	2	2	2	3	3	3
<b>DYP1001:</b> Analysis of Inorganic Raw Materials used in Dyestuff industries	3	3	3	3	3	3	2	2	3	1	2	3	3	3
<b>DYT1101:</b> Technology of Intermediates 1	2	2	2	2	0	2	2	0	1	0	2	0	2	2
<b>DYT1202:</b> Chemical and Physical Constitution of Colourants	2	2	2	2	2	2	2	2	2	2	2	1	2	2
<b>MAP1202:</b> Engineering Applications of Computers	3	3	2	3	2	3	3	3	3	3	3	2	3	3
<b>OLT1102:</b> Chemistry of Oleochemicals and Surfactants	3	3	3	3	3	3	3	3	3	3	3	3	3	3
<b>Semester IV</b>														
<b>GET1301:</b> Engineering Mechanics and Strength of Materials	3	3	2	2	2	3	3	3	3	3	3	2	3	3

<b>DYT1102:</b> Technology of Intermediates-II	2	2	2	2	2	2	2	1	0	0	2	1	2	2
<b>PYP1103:</b> Color Physics Lab	3	3	3	3	3	3	3	3	3	3	3	3	3	3
<b>PYT1202:</b> Color Physics and Color Harmony	2	2	2	2	2	2	2	1	2	1	2	2	2	2
<b>CET1105:</b> Transport Phenomenon	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>GEP1106:</b> Electrical Engineering and Electronics Lab	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>GET1105:</b> Electrical Engineering and Electronics	3	3	2	2	2	3	3	3	3	3	3	2	3	3
<b>Semester V</b>														
<b>CET1212:</b> Chemical Reaction Engineering 1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>CET1401:</b> Chemical Engineering Operations	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>DYP1002:</b> Analysis of Intermediates, Dyes and Fibers	2	2	2	2	2	2	2	0	2	1	2	2	2	2
<b>DYP1003:</b> Experimental dyeing	2	2	2	2	2	2	2	1	2	1	2	2	2	2
<b>DYT1103:</b> Technology of azo colorants	2	2	2	2	2	2	2	1	2	2	2	2	2	2
<b>DYT1104:</b> Technology of Quinonoid colorants	2	2	2	2	2	2	2	1	2	1	2	1	2	2
<b>TXT1215:</b> Technology of dyeing and printing (including substrates)	3	3	3	3	3	3	2	2	2	2	2	2	2	2
<b>Semester VI</b>														
<b>DYP1004:</b> Chromatographic Techniques and Preparation of Dyes and Intermediates	2	2	2	2	2	2	1	2	2	2	2	2	2	2
<b>DYP1005:</b> Process and Plant Design	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>DYT1203:</b> Fluorescent Colorants	2	3	3	3	2	2	2	1	2	2	3	2	3	3
<b>DYT1204:</b> Heterocyclic colorants and intermediates	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>TXT1501 Elective I:</b> Hi-Tech and Industrial Fibres	3	3	3	2	2	3	3	3	2	2	2	3	3	3
<b>HUT1106:</b> Environmental Science and Technology	3	3	2	3	2	3	3	3	3	3	3	2	3	3
<b>HUT1103:</b> Industrial Psychology and Human Resource Management	3	3	2	3	2	3	3	3	3	3	3	2	3	3
<b>HUT1104:</b> Industrial Management	3	3	2	3	2	3	3	3	3	3	3	2	3	3
<b>TXP1013:</b> Wet Processing of Textiles	2	2	2	2	2	1	1	1	2	1	1	2	2	2
<b>Semester VII</b>														
<b>CEP1714:</b> Chemical Engineering Laboratory	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>CET1703:</b> Chemical Process Control	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>DYT1105:</b> Technology of cationic and sulfur colorants	2	2	2	2	2	1	1	1	1	1	2	1	2	2
<b>DYT1206:</b> Structural Elucidation of organic compounds	3	3	3	3	2	2	0	1	2	2	3	2	3	3

<b>Elective II PET1712: Technology of Plastic Packeging</b>	3	3	3	3	2	3	2	2	2	2	2	3	3	3
<b>HUT1105: Industrial Management 2</b>	3	3	2	3	1	3	3	2	2	2	2	3	3	3
<b>MAT1106: Design and Analysis of Experiments</b>	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>DYP1006: Seminar</b>	3	3	3	3	3	3	3	3	3	3	3	3	3	3
<b>DYP1007: Project 1</b>	3	3	3	3	3	3	3	3	3	3	3	3	3	3
<b>DYP1012: In plant training</b>	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>Semester VIII</b>														
<b>DYP1009: Preparation, Analysis and Applications of Dyes, Intermediates, Optical Brightners</b>	3	3	3	3	3	3	3	2	3	1	3	3	3	3
<b>DYT1106: Case Studies in Dyestuff Industry</b>	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>DYT1107: Technology of Pigments</b>	2	2	2	2	2	2	2	1	1	1	2	1	2	2
<b>DYT1205: Functional Application of Colorants</b>	3	3	2	3	2	2	3	1	2	3	3	3	3	3
<b>HUT1107: Value Education</b>	2	2	2	2	1	2	2	2	2	2	2	2	2	2
<b>DYT1008: Project 2</b>	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>CET1504: Chemical Project engineering Economics</b>	2	2	2	2	2	2	2	2	2	2	2	2	2	2
<b>Elective III SCT1816: Corrosion Science and Corrosion Prevention</b>	3	3	3	3	2	3	2	2	2	2	2	3	3	3

### 1.7. Evidence of solving complex engineering Problems (25) Self-Assessed Marks = 25

Complex engineering problems are solved through the activities of mini projects/major projects/ term projects/ independent study/ problem-based learning approach adopted or any other activities conducted specifically targeting the complex engineering problems. Following courses allows students to independently study the problem and offer a realistic solution to the problem offered in terms of presentation or project.

Sl. No	Courses	Evidence of solving complex engineering problem	Involvement of knowledge level
1	Project-I and Project-II, <b>DYP1007</b> and <b>DYP1008</b>	<p>Students are allowed to independently study the problem and come up with a solution-based approach through demonstration of the proposed solution experimentally in the laboratory as a part of their research project.</p> <p>At the end, students submit give a pre-project presentation explaining their objectives, route plan, and deliverables and submit their report on the basis of the laboratory experiments performed.</p> <p><b>Example 1:</b> Project title: Synthesis of 4-Amino-3-chlorobenzenesulfonic acid from ortho nitro chloro benzene. (Assigned to Aniket Sole (16DYE101))</p> <p>Objective:</p> <p>Route scouting through literature search considering the feasibility, environmental aspects, economics of the process and establishing the best possible route to synthesize the molecule.</p> <p>Synthesizing the molecule in the lab in 10 batches</p> <p>Cost calculation</p> <p>Evaluating the production cost for 100kg batch</p> <p>Designing the plant for the production of the product</p> <p>Setting up of the plant considering the plant location, raw materials transportation cost, employee cost to the company and calculating the annual turnover.</p> <p><b>Example 2:</b> The index of the project report of Pranjali Tambe (18DYE108) is shown below for the reference. The project shows ample example of solving complex engineering problem.</p>	K5
2	Seminar, <b>DYP 1006</b>	<p>Students are asked to independently study a given problem topic assigned to them and submit a report and present.</p> <p><b>Example:</b></p>	K5



		<p>Student; Pranjali Tambe (18DYE108)</p> <p><b>Seminar Topic assigned:</b> “Photo inactivation of microorganisms using phenothiazine dyes”</p> <p>The topic is a multidisciplinary topic encompassing biology, chemistry and dyes. The student has to understand the concepts by self-learning, taking help from the literatures available at the library as well as online resources (journals/patents etc). Since the topics has not been discussed in the curriculum so the student’s conceptual knowledge on the basics of biology/biochemistry/dyes will help them to understand this complex topic. The students are expected to write report on the topic and present which also tests their communication and presentation skills. The students are also required to use ChemDraw software to draw the structures in their report. Self-learning of the software for drawing chemical structures is also another evidence of solving complex problems.</p>	
3	Process and Plant Design, <b>DYP 1011</b>	Complex scenarios of process and plant designs are discussed and students are asked to offer a viable solution of some complex engineering problems arising in a chemical plant.	K5
4	Case Studies in Dyestuff Industry, <b>DYT 1106</b>	Real life case studies are discussed and problem-based learning approach adopted to solve complex engineering problems.	K5
5	In-plant Training <b>DYP1012</b>	<p>Training on industrial plant with the real-life chemical problems and at the end students are asked to submit the report and present.</p> <p>Some of the projects done by the students during their in-plant training are listed below. The list shows the evidence of solving complex engineering problems.</p> <ul style="list-style-type: none"> <li>• Design of Chemical Reactors</li> <li>• Exploring innovative technologies in wastewater treatment to expand product portfolio</li> <li>• Development of Zeolites for Thermal Cracking Technologies</li> <li>• Synthesis and Separation of <i>Para</i> Tert-Butyl Toluene</li> </ul>	K5



Project Period Table		Project 2021-22	12/20/20
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	Type	Page number	
1	Introduction	5	
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1.2	Product identification and information	8	
1.3	Material handling and safety instructions	7	
2	Objective and scope of investigation	11	
2.1	Project goal	11	
2.2	Project execution and planning	12	
3	Description of various routes	13	
3.1	Urban trifluoro acetate catalyzed Friedel-Crafts acylation using oxomata carboxylic acids as acylating agents under micro-microwave irradiation	13	
3.2	Friedel-Crafts acylation of anoles with carboxylic acids using silan gel supported AlCl <sub>3</sub>	14	
3.3	USNIC catalyzed synthesis of diacyl ketones	15	
3.4	Reaction of benzoic acid and 4-carboxy benzoic acid with EEDQ(1) and polydimethyl ether	15	
3.5	Green synthesis of 4-methoxybenzoic acid from anisole and benzoic acid catalyzed by tungstophosphoric acid supported on MCM-41	16	
4	Selection of route	17	
4.1	Drawbacks of previously discussed routes	17	
4.2	Selected route	14	

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Project Period Table		Project 2021-22	12/20/20
4.3	Detail analysis of selected route	17	
4.3.1	Chemical Table	18	
4.4	Input output diagram	18	
4.5	Mechanism of reaction	19	
5	Raw material analysis	19	
5.1	Benzoic Acid	19	
5.2	SOCl <sub>2</sub>	19	
5.3	Anisole	19	
5.4	AlCl <sub>3</sub>	14	
5.5	Hexane	19	
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7	Block flow diagram	44	
8	P&ID	42	
8	Scaling up	44	
10	Detail analysis of batch cycle time	48	
12	Material of construction	52	
13	Effluent treatment	54	
14	Cost estimation of the project	58	
15	Plant location	64	
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**Figure 3.** Evidence of solving complex engineering problems (process development, effluent treatment, cost estimation, deciding upon plant location, material of construction of the reactors etc in the course **DYP1007** and **DYP1008**

**Some more evidences of question papers showing the complex engineering problems.**



# INSTITUTE OF CHEMICAL TECHNOLOGY

(University under Section - 5 of UGC Act 1956)(formerly UDCT/UCT, Mumbai)  
 Elite Status and Centre of Excellence- Govt. of Maharashtra  
 NBA Accredited; 'A' Grade by MHRD; UNIVERSITY PAR EXCELLENCE  
 Malunga, Mumbai - 400019, India

## THIRD YEAR B.TECH (SEM - V) E-EXAMINATION DECEMBER 2020 CET1212 - CHEMICAL REACTION ENGINEERING (ALL BRANCH)

DATE : DECEMBER 15, 2020  
 DAY : TUESDAY

TIME : 11.00 A.M TO 1.15 P.M  
 MARKS : 25

Please Note:  
 Make suitable assumptions as required and clearly state the same  
 Q 1 is compulsory; Attempt any two of the remaining three questions

Que No.	CO Nos.	Question	Marks														
1	1,2	<p>A] Distinguish between physical adsorption and chemical adsorption (any two points). Explain in which cases these types of adsorption will be preferred in catalytic reactions?</p> <p>B] Explain the concepts of overall effectiveness and internal effectiveness factors. Also explain how you will determine whether internal and external diffusion resistances will be prevalent in the catalytic reactions.</p> <p>C] Explain briefly the operational developments for achieving effective recycle of hydrogen gas in the hydrogenation reaction. What are the important operating parameters governing the rate of hydrogenation reaction.</p>	11														
2	1,3	<p>A catalytic reaction is performed in a stirred tank reactor and it is observed that there is a significant catalyst deactivation. Explain in brief the method used to derive the order of catalyst deactivation. Derive the necessary expressions and clearly show the different graphs that might be required (only nature to be shown without any data). Show the working for any two orders of deactivation.</p> <p>With an objective of nullifying the effect of catalyst deactivation, what reactor design you will use for such system of significant deactivation. Briefly explain the constructional features</p>	7														
3	1,3,5	<p>Reactive absorption of a gas A into a liquid B is represented by the following chemical reaction:</p> $A + zB \longrightarrow \text{Products}$ <p>Experiments have shown that solute gas reacts entirely in the liquid film. Also the conditions are such that there is always excess of liquid reactant available. Derive expressions for the specific rate of absorption and the enhancement factor due to chemical reaction. Also draw a neat concentration profile expected for this system. Finally if a laminar jet apparatus was used to decipher the regime for this system, explain the observed trends for the effect of operating parameters</p>	7														
4	1,2,5	<p>Explain in brief the non-ideality observed in CSTR based on the concept of two parameter model. A tracer experiment is performed in a CSTR having a capacity of 1 m<sup>3</sup> and the flow rate to the reactor is 0.1 m<sup>3</sup>/min. The initial tracer concentration used in the study is 2000 mg/dm<sup>3</sup>. The results of the experiments for monitoring the tracer concentration are as follows:</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;"><math>C_T</math> (mg/dm<sup>3</sup>)</th> <th style="text-align: center;">1000</th> <th style="text-align: center;">1333</th> <th style="text-align: center;">1500</th> <th style="text-align: center;">1666</th> <th style="text-align: center;">1750</th> <th style="text-align: center;">1800</th> </tr> </thead> <tbody> <tr> <th style="text-align: center;"><math>t</math> (min)</th> <td style="text-align: center;">4</td> <td style="text-align: center;">8</td> <td style="text-align: center;">10</td> <td style="text-align: center;">14</td> <td style="text-align: center;">16</td> <td style="text-align: center;">18</td> </tr> </tbody> </table> <p>Using the above data, calculate the model parameters for the two parameter model. Clearly show the calculations of intercept and slope on graph paper.</p>	$C_T$ (mg/dm <sup>3</sup> )	1000	1333	1500	1666	1750	1800	$t$ (min)	4	8	10	14	16	18	7
$C_T$ (mg/dm <sup>3</sup> )	1000	1333	1500	1666	1750	1800											
$t$ (min)	4	8	10	14	16	18											



## INSTITUTE OF CHEMICAL TECHNOLOGY

(University under Section – 3 of UGC Act 1956)(formerly UDCT/UICT, Mumbai)  
Elite Status and Centre of Excellence- Govt. of Maharashtra  
NBA Accredited; 'A' Grade by MHRD; UNIVERSITY PAR EXCELLENCE  
Matunga, Mumbai – 400019, India

**FINAL YEAR BACHELOR OF TECHNOLOGY (SEMESTER – VIII)**  
**E – EXAMINATION APRIL 2021**  
**DYT1106 – CASE STUDIES IN DYESTUFF INDUSTRIES**  
**(DYES)**

DATE : APRIL 27, 2021  
DAY : TUESDAY

TIME : 11:00 A.M TO 1:15 P.M  
MARKS : 25

NOTE-ANSWER ANY 8 OF THE FOLLOWING QUESTIONS.ALL QUESTIONS CARRY EQUAL MARKS.

Q1) 5000 Kgs of Mixed Acid of composition 60% Sulfuric acid 35% Nitric acid and 5% water was to be prepared by mixing 98% Sulfuric Acid, 98% Nitric Acid and water. Required amount of Sulfuric Acid and water were already added. However after adding 1500 kgs of 98% Nitric acid the operator realized that stock of 98% nitric Acid is over. He reported to you and also said that 70% Nitric acid is available. what would be your advise to him. ( hint-spent acid)

Q2) During cooling of 10000 Kgs mixture of ONCB and PNCB obtained after nitration to the eutectic temp of 16 degrees, the cooling system( jacket cooling, condenser cooling, vacuum pump) failed when the temp had reached 25 degrees. As a plant manager what would be your advise? Why? Maintenance Engineer reported that repairs would take a long time.

Q3) During a continuous fractionation operation under reduced pressure an operator reported that the top temp of the column is fluctuating significantly. What would you ask him to check? In what order?

Q4) In a Research lab The manager told you to prepare 100 gms of p Nitro Acetanilide Quickly ( In 1 day). You agreed only to find out that Acetanilide was not available in stock ( procuring would take a week ) what would you next do?

Q5) 1 mole of methanol and 1 Mole of Acetic Acid give you 60% conversion to Methyl Acetate. You want 80% conversion. What are your options? Describe as many as possible. And give mathematical calculations.

Q6) A Quality Control Chemist found out during finished product analysis that a sample of Bromamine Acid two extra spots on TLC. And came to you as The R&D Head. What would you ask him to check for? Further what would you advise The Plant manager to do/not do?

CRITERION 2	Program Curriculum and Teaching –Learning Processes	75
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## 2.1. Program Curriculum (15)

### 2.1.1. State the Structure and Component of the Curriculum (5) **Self-Assessment Marks = 5**

Table B.2.1.1a

Sl. No	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Total hours	Total Credit
1	CHP1342	<b>BASIC SCIENCE 1:</b> Physical and Analytical Chemistry Laboratory	0	0	4	4	2
2	CHT1341	<b>BASIC SCIENCE 2:</b> Physical Chemistry 1	2	1	0	3	3
3	CHT1401	<b>BASIC SCIENCE 3:</b> Analytical Chemistry	2	1	0	3	3
4	GEP1101	<b>ENGINEERING SCIENCE 1:</b> Engineering Graphics 1	2	0	6	8	4
5	HUP1101	<b>HUMANITIES 1:</b> Communications Skills	0	0	4	4	2
6	MAT1101	<b>BASIC SCIENCE 4:</b> Applied Mathematics 1	3	1	0	4	4
7	PYT1101	<b>BASIC SCIENCE 5:</b> Applied Physics 1	3	1	0	4	4
			<b>12</b>	<b>4</b>	<b>14</b>	<b>30</b>	<b>22</b>
<b>Semester II</b>							
ID	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Total hours	Total Credit
8	CET1507	<b>ENGINEERING SCIENCE 2:</b> Process Calculations	3	1	0	4	4
9	CHP1132	<b>BASIC SCIENCE 6</b> Organic Chemistry Laboratory	0	0	4	4	2
10	CHT1132	<b>BASIC SCIENCE 7:</b> Organic Chemistry	3	1	0	4	4
11	CHT1342	<b>BASIC SCIENCE 8:</b> Physical Chemistry	2	1	0	3	3
12	MAT1102	<b>BASIC SCIENCE 9:</b> Applied Mathematics 2	2	2	0	4	4
13	PYP1101	<b>BASIC SCIENCE 10:</b> Physics Laboratory	0	0	4	4	2
14	PYT1103	<b>BASIC SCIENCE 11:</b> Applied Physics 2	2	1	0	3	3
			<b>13</b>	<b>5</b>	<b>8</b>	<b>26</b>	<b>22</b>
<b>Semester III</b>							

ID	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Total hours	Total Credit
15	CHT1124	<b>BASIC SCIENCE 12: Industrial Inorganic Chemistry</b>	3	1	0	4	4
16	CHT1136	<b>BASIC SCIENCE 13: Aromatic and Heterocyclic Chemistry</b>	3	1	0	4	4
17	DYP1001	<b>PROGRAMME CORE 1: Analysis of Inorganic Raw Materials used in Dyestuff industries</b>	0	0	4	4	2
18	DYT1101	<b>PROGRAMME CORE 2: Technology of Intermediates 1</b>	3	1	0	4	4
19	DYT1202	<b>PROGRAMME CORE 3: Chemical and Physical Constitution of Colourants</b>	2	1	0	3	3
20	MAP1202	<b>ENGINEERING SCIENCE 3: Engineering Applications of Computers</b>	0	0	4	4	2
21	OLT1102	<b>PROGRAMME CORE 4: Chemistry of Oleochemicals and Surfactants</b>	3	1	0	4	4
			<b>14</b>	<b>5</b>	<b>8</b>	<b>-</b>	<b>23</b>
<b>Semester IV</b>							
ID	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Total hours	Total Credit
22	CET1105	<b>ENGINEERING SCIENCE 4: Transport Phenomena</b>	3	1	0	4	4
23	DYT1102	<b>PROGRAMME CORE 5: Technology of Intermediates 2</b>	3	1	0	4	4
24	GEP1106	<b>ENGINEERING SCIENCE 5: Electrical Engineering and Electronics Lab</b>	0	0	4	4	2
25	GET1109	<b>ENGINEERING SCIENCE 6: Electrical Engineering And Electronics</b>	2	1	0	3	3
26	GET1301	<b>ENGINEERING SCIENCE 7: Engineering Mechanics and Strength of Materials</b>	3	1	0	4	4
27	PYP1103	<b>BASIC SCIENCE 14: Colour Physics Laboratory</b>	0	0	4	4	2
28	PYT1202	<b>BASIC SCIENCE 15: Colour Physics and Colour Harmony</b>	2	1	0	3	3
			<b>13</b>	<b>5</b>	<b>8</b>	<b>-</b>	<b>22</b>
<b>Semester V</b>							
ID	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Total hours	Total Credit
29	CET1212	<b>ENGINEERING SCIENCE 8: Chemical Reaction Engineering 1</b>	2	1	0	3	3

30	CET1401	<b>ENGINEERING SCIENCE 9:</b> Chemical Engineering Operations	2	1	0	3	3
31	DYP1002	<b>PROGRAMME CORE 6:</b> Analysis of Intermediates, Dyes and Fibers	0	0	8	8	4
32	DYP1003	<b>PROGRAMME CORE 7:</b> Experimental dyeing	0	0	4	4	2
33	DYT1103	<b>PROGRAMME CORE 8:</b> Technology of azo colorants	3	1	0	4	4
34	DYT1104	<b>PROGRAMME CORE 9:</b> Technology of Quinonoid colorants	3	1	0	4	4
35	TXT1215	<b>PROGRAMME CORE 10:</b> Technology of dyeing and printing (including substrates)	3	1	0	4	4
			<b>13</b>	<b>5</b>	<b>12</b>	<b>-</b>	<b>24</b>
<b>Semester VI</b>							
ID	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Total hours	Total Credit
36	DYP1004	<b>PROGRAMME CORE 11:</b> Chromatographic Techniques and Preparation of Intermediates of Dyes	0	0	8	8	4
37	DYP1005	<b>PROGRAMME CORE 12:</b> Process and Plant Design	0	0	4	4	2
38	DYT1203	<b>PROGRAMME CORE 13:</b> Fluorescent Colourants	3	1	0	4	4
39	DYT1204	<b>PROGRAMME CORE 14:</b> Heterocyclic Intermediates and colorants	2	1	0	3	3
40	Elec_DYE_TYBT	<b>OPEN ELECTIVE 1:</b> Technology of Organic Processes	2	1	0	3	3
41	HUT1103	<b>HUMANITIES 2:</b> Industrial Psychology and Human Resource Management (VF)	2	1	0	3	3
42	HUT1104	<b>HUMANITIES 3:</b> Industrial Management 1 (VF)	2	1	0	3	3
43	HUT1106	<b>HUMANITIES 4:</b> Environmental Science and Technology (VF)	2	1	0	3	3
44	TXP1013	<b>PROGRAMME CORE 15:</b> Wet Processing of Textiles	0	0	4	4	2
			<b>13</b>	<b>6</b>	<b>16</b>	<b>-</b>	<b>27</b>
<b>Semester VII</b>							
ID	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Total hours	Total Credit
45	CEP1714	<b>ENGINEERING 10:</b> Chemical Engineering Laboratory	0	0	4	4	2
46	CET1713	<b>ENGINEERING 11:</b> Instrumentation and Process Control	2	1	0	3	3



47	DYT1105	<b>PROGRAMME CORE 16:</b> Technology of cationic and sulfur colorants	2	1	0	0	3
48	DYT1206	<b>PROGRAMME CORE 17:</b> Structural Elucidation of organic compounds	2	1	0	3	3
49	DYT1721	<b>OPEN ELECTIVE 2:</b> Reaction Mechanism and reagent chemistry	2	1	0	3	3
50	HUT1105	<b>HUMANITIES 5:</b> Industrial Management 2	2	1	0	3	3
51	MAT1106	<b>BASIC SCIENCE 16:</b> Design and Analysis of Experiments	2	1	0	3	3
52	DYP1006	<b>SEMINAR 1:</b> Seminar	0	0	4	4	2
53	DYP1007	<b>PROJECT 1:</b> Project 1	0	0	8	8	4
54	DYP1012	In plant training	-	-	-	-	3
			<b>12</b>	<b>6</b>	<b>16</b>		<b>29</b>
<b>Semester VIII</b>							
ID	Course Code	Course Title	Lecture (L)	Tutorial (T)	Practical (P)	Total hours	Total Credit
55	CET1504	<b>ENGINEERING 12:</b> Chemical Project Engineering Economics	2	1	0	3	3
56	DYP1009	<b>PROGRAMME CORE 18:</b> Preparation, analysis and application of dyes, optical brighteners, and functional colourants	0	0	8	8	4
57	DYT1106	<b>PROGRAMME CORE 19:</b> Case Studies in Dyestuff Industry	3	1	0	4	3
58	DYT1107	<b>PROGRAMME CORE 20:</b> Technology of Pigments	3	1	0	4	4
59	DYT1205	<b>PROGRAMME CORE 21:</b> Functional Applications of Organic Colourants	2	1	0	3	3
60	DYT1812	<b>OPEN ELECTIVE 3:</b> Elective 3 Introduction to Green Chemistry	2	1	0	3	3
61	HUT1107	<b>HUMANITIES 6:</b> Value Education	2	1	0	3	3
62	DYP1008	<b>PROJECT 2:</b> Project 2	0	0	8	8	4
			<b>14</b>	<b>6</b>	<b>16</b>	-	<b>27</b>
	Number of Basic Sciences courses: 16, 50 credits						
	Number of Engineering Sciences courses: 12, 37 credits						
	Number of Humanities and Social Sciences courses: 6, 17 credits						
	Number of Programme Core subjects: 21, 70 credits						
	Number of Open elective subjects: 3, 9 credits						
	Number of Projects/Seminars/implant trainings: 3, 13 credits						

**Table B.2.1.1b.** Program curriculum grouping based on course components

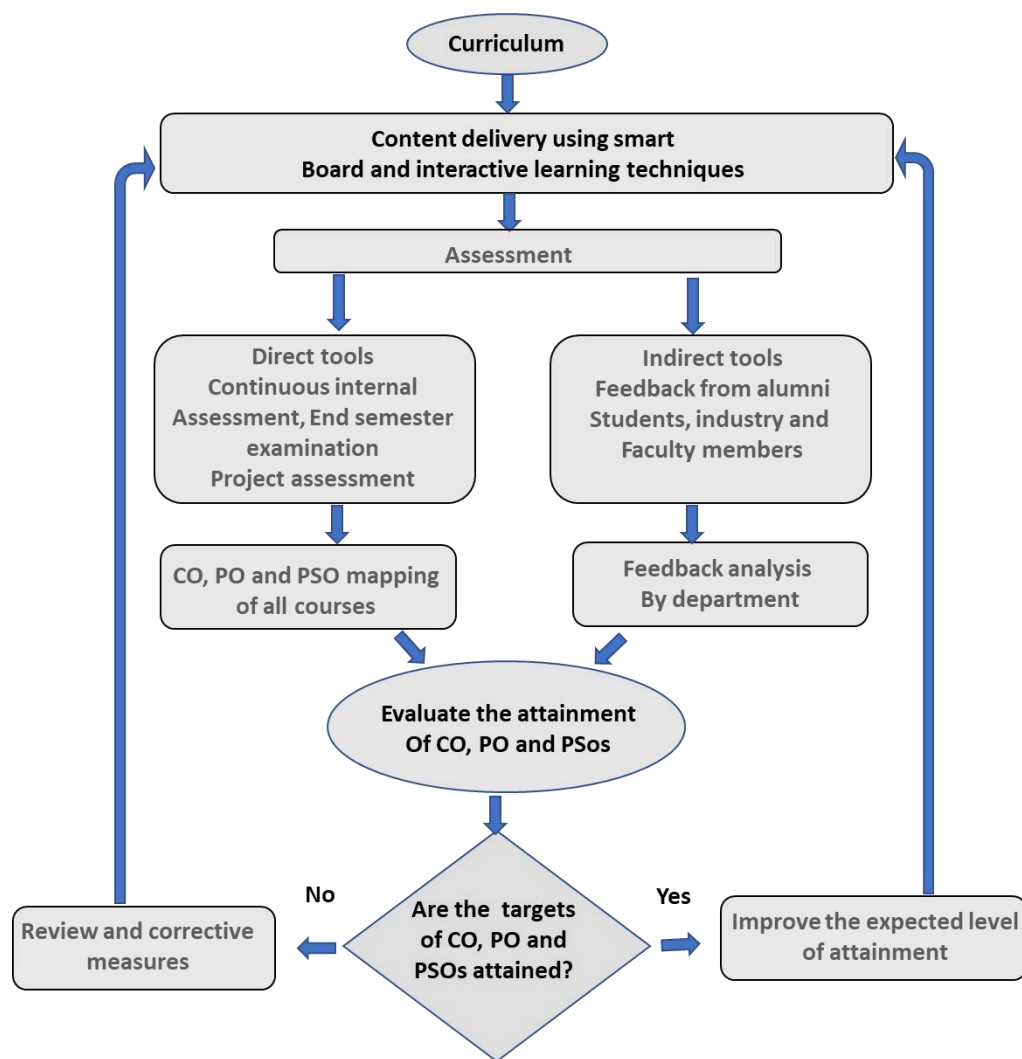
Course Components	Curriculum content (% of total number of credits of the programme)	Total number of contact hours	Total number of credits
Basic Sciences	25.5%	855	50

Engineering Sciences	18.87%	645	37
Humanities and Social Sciences	8.67%	285	17
Program Core	35.71%	1350	70
Program Electives	-	135	9
Open Electives	4.59%	-	-
Project(s)	4.08%	240	8
Internships/Seminars	2.55%	540	5
Employment Enhancement Courses/Skill Based Courses	-	-	-
Any other (Please specify)	-	-	-
<b>Total number of Credits (100%)</b>			<b>196</b>

**2.1.2. State the process used to identify extent of compliance of the curriculum for attaining the Program Outcomes and Program Specific Outcomes as mentioned in Annexure I (10) Self-Assessment Marks = 10**

**Process used to identify extent of compliance of the curriculum:** The curriculum for B. Tech. in Dyestuff Technology programme maintains a balance among various categories of courses from Science, Mathematics, Engineering, Humanities and Management, Projects and Internship components. The syllabus for each course has been designed to meet compliance of the curriculum for attaining the POs and PSOs defined for the program. All the courses in the program are very closely related to the Program Outcomes and Program Specific Outcomes. At the end of each semester, the attainment of course outcomes is estimated and is related to program outcome attainment. Similar analysis of compliance of curriculum for attaining the PO and PSO is carried out by taking exit student feedback. Institute also has a process to collect student feedback at the end of each semester. The feedback helps in evaluating the POs and PSOs. The curriculum design and component wise distribution is in accordance with leading universities.

1. Courses are offered in a sequence of order in a logical manner to make the students aware of how to arrive at the solution for a particular problem
2. Laboratory experiments are designed to synthesize, characterise the dyes and dye intermediates and lab scale analysis of the relevant dye related chemicals for real field applications
3. The performance of students is appraised through direct and indirect assessment.
4. Assignments are provided to the students to verify the basic theory and to solve the practical problems
5. Internships, technical field visits and seminars are made part of the curriculum to make the students aware of industry practices and presentation of the work completed
6. Projects are assigned to the students related to field problems
7. Projects are reviewed by the faculty of the department for the betterment of the project results.



**Guiding principles and aims for B. Tech in Dyestuff Technology are**

- To enable our students with strong fundamentals, knowledge & skills in the fields of Dyestuff Technology.
- Practices through vigorous training and courses content so that they can serve the industry in general and society at large.
- To acquire a strong background of processes synthesis and their development.
- The program is committed to foster spirit of innovation and creativity among, students, faculty, and staff

**The curriculum for B. Tech. in Dyestuff Technology is developed by taking into consideration the following points:**

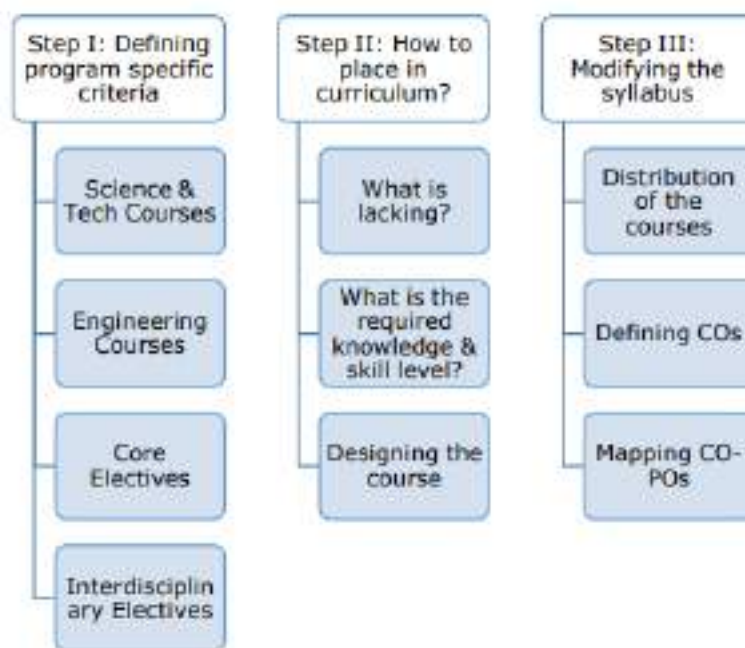
- I. **Subject centered:** To impart overall knowledge about the dyestuff technology as well as educate the learners with the newer concepts and technologies in the colorant industries
- II. **Problem centered:** To cater the need of the dyestuff and chemical industry and society.
- III. **Learner centered:** Emphasizes the needs and goals of the learner to foster spirit of innovation and creativity among them, leading to future ready workforce who could serve the needs of

the society scientifically and technologically.

**The criteria for defining curriculum are:**

- 1) Should satisfy Program Specific Criteria
- 2) Should meet the requirements of Program Outcomes (POs)
- 3) Curriculum should have appropriate blend of chemical, physical and mathematical sciences
- 4) Should have ideal balance between theory, and practical courses
- 5) Fundamental knowledge in chemical processes, reaction mechanisms and chemical technology
- 6) Detailed knowledge in Science and Technology of colorants (Dyestuff and Pigments)
- 7) Appropriate credit distribution for different subject components and domains
- 8) Should have enough components of project management, ethics, team management, modern instrument usages like Literature study, seminar, internship, projects and presentations

**The steps for developing curriculum are given below:**



**Programme Curriculum is revised on the basis of:**

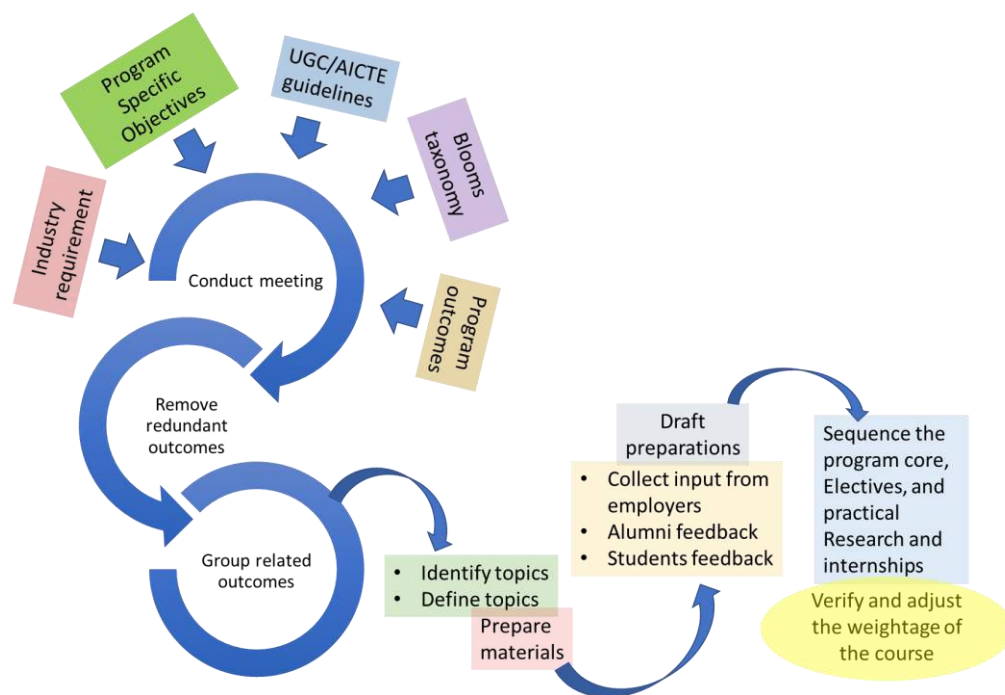
- Changing needs related to continuous developments in the field.
- Improvements required based on feedback from students, and alumni.
- Feedback from industry based on their requirements.
- Suggestions from faculty members, experts from Industry and Experts from other institutes/universities

### Decision Making loop and defining the Curriculum

The Departmental administrative committee comprising all faculties from department include HOD, formulates the initial draft for the curriculum. Then the initial draft was sent to:

- 1) Department alumni
- 2) External Examiners
- 3) Visiting Faculties
- 4) Subject experts from eminent institutes
- 5) Industry experts
- 6) Immediate past students for further suggestion.

Based on the suggestion received, the academic program/syllabus committee of the department discussed, critically analyzed the suggestion, and proposed the curriculum for the program. Then the faculty of the department prepared the final draft based on the proposal and circulated among the syllabus committee members for modifications/corrections. After receiving consensus from all, the drafted curriculum was finally accepted for implementation.



### Following points were considered for making curriculum:

- Based on the present needs of industry, the curriculum has been designed and courses are delivered to meet the vision of the department as well as vision of Institute
- Core subjects are designed based on Synthesis, unit process involved, Classification of Dyes, and their Synthesis.
- Practical courses are designed to have unique blend of synthesis, analysis and characterization scope
- Incorporation of assorted elective courses to imbibe cross-disciplinary knowledge in other subject domains

- In addition to the above, course includes a Seminar Presentation and Research project which enrich the student with skills of independent learning, thinking and innovation.
- They also build up self-confidence, to even become entrepreneurs. The in-plant training after sixth semester gives them a direct exposure to the industry adding immense value to learning.
- Finally researches on the thesis topic provide students opportunity to gain hand on training on design, synthesis, Process Development and application on Dyeing and technology involved in the subject.

The curriculum of each course has been set from course outcome levels to the subject matter comprising of topics, sub-topics, practical activity, project work, and other activities, as indicated in the following figure. The content has been developed in such a way that the desired abilities (PO and PSO) should be achieved within the stipulated time of the program curriculum. Program Outcomes (POs) and Program Specific outcomes (PSOs) are the macro level outcomes and modules are micro level outcomes.

The sequential steps used to develop the curriculum content are as follows: • Course outcomes has been arranged as per higher taxonomic levels in the cognitive, psychomotor, and affective domains. • The factual, conceptual, procedural, and Metacognitive knowledge that is required for the course outcomes have been identified through Micro, meso and macro level analysis. These have been presented as the 'Prerequisite courses' in the syllabus. • The course outcomes have been mapped with the Program Outcomes (POs) and Program specific outcomes (PSOs), as given in the following table.

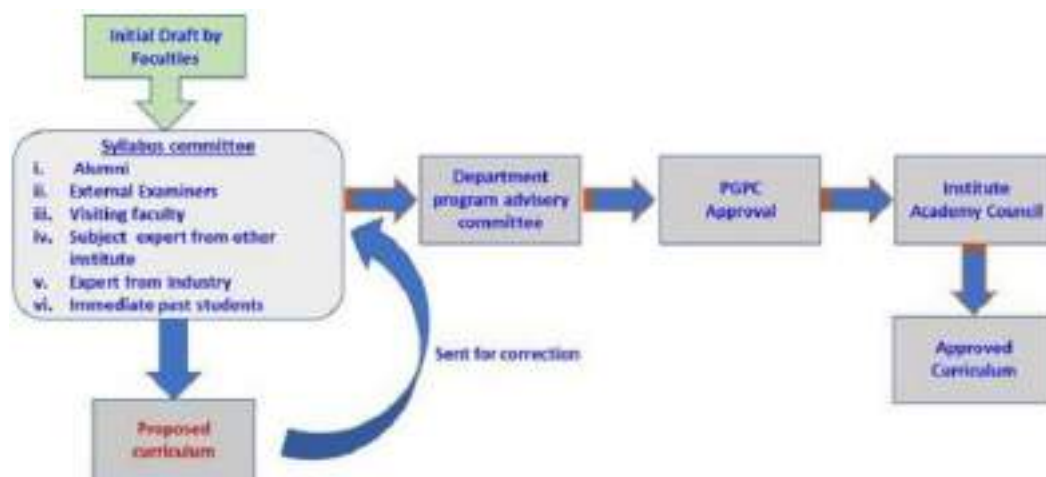
For the course **DYT1101**

<b>Course Outcomes (Students will be able to.....)</b>	
<b>CO1</b>	<i>Understand</i> the basics of dyestuff industry in terms of raw materials utilized (K2)
<b>CO2</b>	<i>Apprehend</i> basic benzene and naphthalene chemistry. (K2)
<b>CO3</b>	<i>Analyze</i> the various methods for synthesis of different intermediates used in dyes (K2)
<b>CO4</b>	<i>Know</i> the various technology and safety aspects for reactions. (K2)
<b>CO5</b>	<i>Identify</i> the substrates and chemistry to synthesize desired product (K2)

<b>Mapping of Course Outcomes (COs) with Programme Outcomes (POs)</b>															
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PSO2
		K3	K4	K6	K5	K6	K3	K3+S	K3	K3+A	K2+A	K3	K6+A+P	K3	K4
<b>CO1</b>	K2	2	2	1	1	0	1	0	0	0	0	2	0	2	2
<b>CO2</b>	K2	2	2	1	1	0	1	0	0	0	0	2	0	2	2
<b>CO3</b>	K2	2	3	3	3	0	1	0	0	0	0	2	0	2	2
<b>CO4</b>	K2	3	2	3	3	0	3	2	0	0	0	2	0	2	2
<b>CO5</b>	K2	2	3	2	3	0	2	2	0	-	0	2	0	2	2

3, Strong Contribution; 2, Moderate Contribution; 1, Low Contribution; 0– No Contribution  
K, knowledge level from cognitive domain; A, Affective domain; S, Psychomotor domain

**The schematic representation of the whole process of curriculum development is as shown below**



Feedbacks from external members were also collected for curriculum development.

**suggestions from Dr Raja Kaliappan (Huntsman)**  
4 messages

Prof. Dr. N. Sekar <nsekar@psnar.com>  
To: "Dr. Ganapat Shanabasing" <nshankarleg@gmail.com>, "Dr. G. S. Shanabasing" <gs.shankarleg@trnmb.edu.in>, Nelsando Sachidan <nnsachid@psnar.com>, Sarajit Saha <ssaha1989@gmail.com>, Sarajit Saha <nsekar2@gmail.com>, Nelsando Sachidan <nnsachid@trnmb.edu.in>, sarajit.saha@trnmb.edu.in

Dear Colleagues,  
In response to the request made by me on behalf of the Department Dr. Raja Kaliappan has sent the following suggestions:

BTech program  
(Comments)

1. Please include chemical and industrial visits to a relevant existing course.
2. Please include internships/visit covering organic/analytical.
3. In the communication course or a relevant course, please include training on scientific report writing/documentation.
4. OYPCAD: Should this cover all the modern methods of analysis/techniques?
5. Please include 'relevance' organic chemistry if it is not covered adequately in the organic chemistry courses. The four-year BTech graduates, if interested in a career in chemical industry, particularly MD/Manufacturing, need to have a good understanding.
6. For specialty chemicals, please include basic polymer chemistry and synthesis, textile chemicals synthesis, surfactant synthesis, emulsion etc.
7. Depending on the maturity/knowledge level of students, advanced course of ITC can be included too as a separate course.

Dr. Raja Kaliappan is BTech (Dyes), MTech (Dyes) and PhD (synthetic organic Chemistry, USA). After BTech and before pursuing MTech he has worked in a couple of Dyes manufacturing industries and he is occupying a senior position in Huntsman.

----- Forwarded message -----  
From: **Prakhar KASTURE** <kasturep@essilor.com.sg>  
Date: Mon, Jan 10, 2022 at 9:16 AM  
Subject: Re: Prakhar Kasture  
To: Prof. Dr. N. Sekar <nsekar@gmail.com>

Hello Sir,

In industry, I have noticed a few research areas which are really very important or key, at least in the optical industry

1. Photostability of colorant molecules
2. Narrow bands (absorption spectra) disperse dyes which have pure color and are easy to introduce into the substrate and could be used as a filter.
3. More stable Fluorescent molecules with a range of applications.
4. Tuning absorption and emission properties of FL dyes in specific wavelengths.

This should be already existing in the syllabus. However, more emphasis can be given while redesigning the scope or future research.

What do you think?

Regards  
Prakhar

Mr. Prakhar Kasture is a BTech (Dyes) and MTech (Dyes) from our department. He looks into the practical and industrial aspects of DFT computations in Essilor.

Fwd: Dr. Ambady Rajagopalan  



**Prof. Dr. N. Sekar** <nethi.sekar@gmail.com>

to: me, surajjit, Shankarling, Ganapatt, Nabanita, Nabanita, Surajit, surajit

Dear Dr. Saha,

These are the suggestions from Dr. Ambady R. You may keep this in the syllabus revision file.

----- Forwarded message -----

From: **AMBADY RAJAGOPALAN** <ambady.evlabz@gmail.com>

Date: Thu, Jan 20, 2022 at 2:45 PM

Subject: Re: Dr. Ambady Rajagopalan

To: Prof. Dr. N. Sekar <nethi.sekar@gmail.com>

Dear Prof. Sekar,

My suggestion for syllabus modification is as below :

**B Tech Dyes**

- 1) Basics of biology and application to technology
  - 2) Chemistry of oleochemicals and surfactants
- both may be removed (Sem III)

and

- 1) Basics of DFT
  - 2) Interpretation of IR, NMR and Mass spectra
- both can be included.

**M Tech Dyes**

- 1) Unit processes and operations in specialty chemical industry (Sem II)
  - 2) Crop protection chemistry (Sem II)
- both may be removed. However, keep an option in electives for Crop protection chemistry.

and

- 1) Statistical quality control
  - 2) Instrumental methods of analysis (GC, HPLC, UV)
- both can be included.

Regards,

Ambady





**Adherence to academic calendar:** Department prepares its own action plan in alignment with to academic calendar prior to the commencement of the semester. Action plan includes major routine tasks for timely execution of the teaching/learning and other academic activities.

**INSTITUTE OF CHEMICAL TECHNOLOGY  
ACADEMIC CALENDER 2021-22**

The following shall be the academic calendar:

<b>A) ODD SEMESTER</b>	
First Year (UG)	: To Be Announced
First Year (PG)	: Aug 02, 2021 (Mon) to Dec 17, 2021 (Fri)
Final Year (PG)	: Jul 01, 2021 (Thu) to Dec 31, 2021 (Fri)
Third Yr (UG)	: Jul 01, 2021 (Thu) to Dec 4, 2021 (Sat)
Final yr UG	: Aug 16, 2021 (Mon) to Dec 4, 2021 (Sat)
Second Year (UG)	: Oct 01, 2021 (Fri) to Jan 31, 2022 (Mon)
Diwali Vacation (UG and PG except SYUG)	: Nov 01, 2021 (Mon) to Nov 06, 2021 (Sat)
<b>MIDSEMESTER EXAMINATIONS</b>	
Second Year (UG)	: Nov 22, 2021 (Mon) to Nov 28, 2021 (Sun)
Third Year (UG)	: Aug 30, 2021 (Mon) to Sep 05, 2021 (Sun)
First Year (PG) Final Yr (UG)	: Oct 04, 2021 (Mon) to Oct 10, 2021 (Sun)
First Year (UG)	: To Be Announced
<b>END SEMESTER EXAMINATIONS</b>	
<b>a) Theory</b>	
Second Year (UG)	: Jan 17, 2022 (Mon) to Jan 25, 2022 (Tue)
Third Year (UG)	: Nov 15, 2021 (Mon) to Nov 23, 2021 (Tue)
First Year (PG) Final Yr (UG)	: Dec 06, 2021 (Mon) to Dec 14, 2021 (Tue)
First Year (UG)	: To Be Announced
<b>b) Practical</b>	
All practical examinations will be dealt separately as per prevailing situation.	
<b>c) Evaluation &amp; Results</b>	
: Within 28 days after examinations	
<b>B) EVEN SEMESTER</b>	
First Year (PG)	: Dec 20, 2021 (Mon) to May 08, 2022 (Sun)
First Year (UG)	: To Be Announced
Third & Final Year (UG)	: Dec 13, 2021 (Mon) to Apr 30, 2022 (Sat)
Final Yr UG	: Dec 20, 2021 (Mon) to May 7, 2022 (Sat)
Second Year (UG)	: Feb 01, 2022 (Tue) to Jun 18, 2022 (Sat)
Final Year (PG)	: Jan 01, 2022 (Sat) to Jun 30, 2022 (Thu)
<b>MIDSEMESTER EXAMINATIONS</b>	
Third, Final Year (UG)	: Feb 14, 2022 (Mon) to Feb 20, 2022 (Sun)
First Year (UG)	: To Be Announced
Second Year (UG)	: Apr 04, 2022 (Mon) to Apr 10, 2022 (Sun)
First Year (PG)	: Feb 21, 2022 (Mon) to Feb 27, 2022 (Sun)
<b>END SEMESTER EXAMINATIONS</b>	
<b>a) Theory</b>	
First Year (UG)	: To Be Announced
Third and Final Year (UG)	: April 18, 2022 (Mon) to Apr 26, 2022 (Tue)
Second Year (UG)	: Jun 06, 2022 (Mon) to Jun 14, 2022 (Tue)
First Year (PG)	: Apr 30, 2022 (Sat) to May 07, 2022 (Sat)
<b>b) Practical</b>	
First Year (UG)	: To Be Announced
Third and Final Year (UG)	: Apr 25, 2022 (Mon) to Apr 30, 2022 (Sat)
Second Year (UG)	: Jun 13, 2022 (Mon) to Jun 18, 2022 (Sat)
First Year (PG)	: May 06, 2022 (Fri) to May 08, 2022 (Sun)
<b>c) Evaluation &amp; Results</b>	
: Within 28 days after examinations	
<b>C) Summer Vacation</b>	
(UG and PG except SYUG)	: May 16, 2022 (Mon) to Jun 30, 2022 (Thu)

**Students Activities: No student activities till further notice.**

*R.R. Deshmukh*  
19-06-2021

## ACADEMIC CALENDER 2019-2020

The following shall be the Academic Calendar :

### (A) DIVISION OF SEMESTERS FOR ALL COURSES

<b>Odd Semester</b>	
First Year and Final Year (UG & PG)	: August 08, 2019 (Thu.) to December 31, 2019 (Tue.)
Second (UG & PG) & Third Year (UG)	: July 01, 2019 (Mon.) to November 30, 2019 (Sat.)
Garopoli Vacation (UG and PG)	: September 02 2019 (Mon.) to September 07, 2019 (Sat.)
Diwali Vacation (UG and PG)	: October 28, 2019 (Mon.) to November 05, 2019 (Tue.)
<b>Even Semester</b>	
First Year and Final Year (UG & PG)	: January 01, 2020 (Wed.) to May 16, 2020 (Sat.)
Second (UG & PG) & Third Year (UG)	: December 16, 2019 (Mon.) to May 16, 2020 (Sat.)
Summer Vacation	: May 17, 2020 (Sat.) to June 30, 2020 (Tue.)

### (B) EXAMINATION SCHEDULE FOR ALL COURSES

<b>Mid Semester Examination</b>	
<b>Odd Semester</b>	
First Year and Final Year (UG & PG)	: October 19, 2019 (Sat.) to October 25, 2019 (Fri.)
Second (UG & PG) & Third Year (UG)	: August 23, 2019 (Fri.) to August 30, 2019 (Fri.)
Even Semester (UG and PG)	: February 07, 2020 (Fri.) to February 14, 2020 (Fri.)

### (C) SEMESTER EXAMINATIONS FOR ALL COURSES

<b>Odd Semester</b>	
<b>a) Theory</b>	
First Year and Final Year (UG & PG)	: December 16, 2019 (Mon.) to December 23, 2019 (Mon.)
Second (UG & PG) & Third Year (UG)	: November 11, 2019 (Mon.) to November 19, 2019 (Tue.)
<b>b) Practical</b>	
First Year and Final Year (UG & PG)	: December 24, 2019 (Tue.) to December 31, 2019 (Tue.)
Second (UG & PG) & Third Year (UG)	: November 20, 2019 (Fri.) to November 30, 2019 (Mon.)
<b>c) Evaluation &amp; Declaration of Results</b>	
	: Within 45 days after examinations
<b>Even Semester</b>	
<b>a) Theory</b>	
First, Second and Final Year (UG)	: April 24, 2020 (Fri.) to May 04, 2020 (Mon.)
Third Year (UG)	: April 15, 2020 (Wed.) to April 22, 2020 (Wed.)
First and Second Year (PG)	: May 08, 2020 (Fri.) to May 16, 2020 (Sat.)
<b>b) Practical</b>	
First, Second and Final Year (UG)	: May 05, 2020 (Tue.) to May 16, 2020 (Sat.)
Third Year (UG)	: April 23, 2020 (Thu.) to April 30, 2020 (Thu.)
First and Second Year (PG)	: April 24, 2020 (Fri.) to May 07, 2020 (Thu.)
<b>c) Evaluation &amp; Declaration of Results</b>	
	: Within 45 days after examinations

### Students Activities:-

- Orientation programme for new students : Three weeks of academic session
- Psychometric analysis :-
  - 1) Final year of under graduate, second year of Master and Ph. D. students – March
  - 2) S.Y, T.Y. UG and F.Y. of P. G. students – during PG orientation programme
  - 3) First year under graduate students – during UG orientation programme
- Sharing and physical data analysis :-
  - 1) First year of under graduate and first year of Master students – November
  - 2) Final year of under graduate and second year of Master students – April

### Technological Association festivals :-

Festival	2019-20	2020-21
<b>Funtech</b>	Jan 3-14, 2019 (14th January non-instructional day)	Jan 3-14, 2020 (14th January non-instructional day)
<b>Manzar</b> (Intercollegiate Cultural Festival)	Jan 31 to February 03, 2019 (31st Jan & 1st Feb non-instructional days)	Jan 31 to Feb 03, 2020 (31st Jan & 3rd Feb non-instructional days)
<b>Sportsaga</b> (Intercollegiate Sports Festival)	March 14-24, 2019	March 14-24, 2020
<b>Vortex</b> (Intercollegiate Technical Festival)	Sept 30 to October 03, 2019 (30th Sept & 03rd Oct non-instructional days)	

Dean (Academic Programmes)

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The registration and participation of students in MOOC Courses like NPTEL, Coursera and Edx are evidences of their self-learning capabilities Project-based learning Project Based Learning is significantly more effective than traditional instruction to train competent and skilled practitioners and it promotes long-term retention of knowledge and skills. It is an innovative practice that is used to implement Outcome Based Education. The students are encouraged to carry out research projects

in the final year. The departmental faculty collectively identifies the Projects based on societal need and issues and involves the students to work on it. At the end of the semester, projects are evaluated by the external members from industry or academia. Collaborative learning through collaborative learning students is exposed to learn various topics and hands-on experience under different laboratories, related to program curriculum as depicted in table. Assignments based problem solving: Assignments are given to students on problems and they solved by themselves. Assignments are based on COs which helps to achieve Program Outcomes. Student feedback of teaching learning process and actions taken After the End-semester exams, all the students are required to undergo filling the online feedback-form to apprise the faculty on the scale of 1 (low) to 5 (high). Based on the students' feedback, HOD of the Department and senior Professors will give valuable suggestions to improve the quality of teaching- learning wherever essential. Faculty development programmes are conducted by professional experts to enhance the teaching skills of faculty.

Class Room Discussion Lecture notes are distributed as per the lesson plan Special attention is given to the students who are lagging behind Possibilities of computer aided learning are always explored to assist students' learning Asking questions that engage students in innovative thinking or application of basic principles is encouraged. Use of Various instructional methods and pedagogical initiatives The faculty are now oriented towards outcome based education and are actively utilizing the OBE to cater the learning need of students by innovative methods. The faculty of department adopts various innovative Teaching & Learning methodologies to create the best learning environment for students. These methodologies include traditional black board teaching, presentations, video lecturing, collaborative learning methods etc. Students' projects and seminar presentations, various modes of continuous assessment such as MCQ tests, Quiz, group discussion, skits, poster making and ppt preparations on case studies, industrial visits etc help students to develop interpersonal skills, subject knowledge, team work and peer learning or cooperative learning , problem solving approach etc. Extramural Lectures: Extramural lectures are presented by the students to help them to improve thier presentation and public speaking skills. The student themselves selelct topic, prepare PPT and deliver presentation to faculty and students. ICT based learning: The institute is equipped with sufficient number of computers, LCD projectors, internet facility, application software, system softwares which are effectively used for teaching and learning. Some of the processes / initiatives that have been put in place for improving the Quality of teaching and learning are as follows.

A rigorous continuous evaluation process keeps the students engaged in daily learning and with continuous feedback. A special unique feature of this process is the administration of the Assignment in a theory course and enables the student to "think" and assimilate the material delivered in the lecture as well as come up with solutions of problems which can be solved by the knowledge assimilated from the theory lecture. These assignments are submitted in the class and evaluated and the solutions discussed.

Teaching-Learning in assignment submission follows a student-centric process employing experiential, participative, problem solving and constructivist methodologies, through (a) Teaching Methodology, (b) Experience-Based Courses, (c) Different Modes of learner-centered teaching

Experiential and Participatory Teaching-Learning methods used include:

- Seminar cum Group Discussions
- Individual and Group seminars
- Self-Study and presentations
- Case Analysis

- Self-study course and presentations on a self-learned topic
  - Seminar presentation
  - Research presentation
- (a) Experience-based/ Practice-oriented courses Based on the principle of 'Learning by Doing' a large proportion of courses have a high practical component to provide hands on learning experience to the students:
- Multiple practical's in II year, III year and IV year BTech.
  - In-plant training for 3 months
  - Compulsory research project in the final year of B.Tech
- (b) The curriculum has compulsory core courses in the UG programmes specially focused on the development of human values and professional ethics:
- Industrial psychology, taking care of human resource management
  - Scientific Methodology, environmental consciousness and industrial management: (to nurture a scientific temper and be aware of contemporary developments its impact on everyday life).
  - Sustainable scientific development in chemical industry: (to foster a fuller understanding of the industrial manufacturing with a view to appreciate properly the global environment)
  - Role of technology and chemistry in agricultural operations (to understanding of the contribution of chemical science and technology in the area of agrochemicals)
  - Co-curricular Activities (for all-round development of personality)
- (v) Special measures taken to support relatively slow learners, are:
- Assistance from classmates and senior students is arranged
  - Providing lectures notes and extra reading material to improve basic understanding of subject
  - Encouraging students to participate in various training programmes on developing soft skills to master understanding of language
  - Encouraging students to participate in various Co-Curricular and ExtraCurricular activities to develop social skills
- (c) The Institute offers a number of opportunities for advanced learners to augment their talent and meet their learning needs:
- Bombay Technologist Under-Graduate Research Program (BTUGRP) to encourage select bright UG students to undertake research projects.
  - Students are encouraged to make research contributions in their summer project at the UG level and publish their results in journals (Bombay Technologist/other peer reviewed journals) and also present it at National and International Conferences.
  - Students are encouraged to participate in Summer Research Fellowship programs at prestigious research institutes and laboratories in India and abroad.
  - The Institute, organizes various technological and scientific competitions regularly and gives prizes and awards.
  - Students are encouraged to work in laboratories of National and International Institutes and Universities

- Financial support is provided to students through TEQIP-III for participation in National and International Conferences and for industry visits.

<b>improving instruction methods using pedagogical initiatives such as real-world examples</b>	Instruction method practiced was a blend of online and offline lectures demonstrating videos, power points to conceptualize the ideas citing real-world examples
<b>collaborative learning</b>	Group seminar presentation allows collaborative learning and peer help to clarify the doubts. It also allows to inculcate team work, project management and building leadership skills.
<b>Online classes</b>	Allows to access wide array of study materials, videos and trains the students to become future ready and ability to enrol and participate in several open access courses of foreign universities.

Impact Analysis: 1. Improvement in the communication skills of the students 2. Active involvement of weaker students in coaching classes is observed 3. More number of students has undergoing internship in industries at national and international levels 4. More number of student's publication in national, international conferences and journals 5. Improvement in student's analytical capability, soft skills in their placements

### **2.2.2. Quality of end semester examination, internal semester question papers, assignments and evaluation (15) Self-Assessment Marks = 15**

The examinations are done at three levels: Continuous assessment, one mid semester and one end semester examinations are conducted. Though Mid and End semester examinations are purely written and practical examinations are based on experimentation followed by viva-voce, internal exams may include, seminar or topic presentations, skits, poster presentations, quiz's etc. The questions set to the students are at three level, knowledge and information level, justification and explanation level and last is comprehension and application for the problems solving. The whole syllabus till the last lecture becomes the syllabus for the test at a given time.

1. The quality and the difficulty level of the question papers is adjusted based on the analysis of the performance of the students
2. Each course typically has continuous assessment evaluations (typically 3 to 4) based on the short tests, quizzes, presentations etc
3. The question paper typically has distribution catered to test the basic understanding, problem solving abilities as well as thinking capacity
4. For some courses, group assignments are also given such that a team building ability is developed. The presentations for the group are planned in such a way to test the understanding of all the team members
5. After each midterm examination, the course instructor discusses the model answers to the students and also tells the expectations for ideal solutions
6. An audit committee comprising COEs from other university /Institute is constituted to oversee the exam quality End-Semester examination: The semester end examination will cover the full syllabus of the course and will be conducted as per the Institutional time table at the end of each semester. For end –semester examinations in theory papers, duration of examination will be 1 hour for 3 credit courses and 2 hours for 4 credit courses

For the end semester evaluation of seminar/research work, student will be expected to submit a written report and also make a presentation. The evaluation will be based on the quality of the written report and presentation. The impact of delivery of course and course content is assessed in two ways: (1) examination/evaluation conducted by course teacher (2) students feedback about teacher and course

	Continuous mode	Mid Semester Exam	End Semester Exam	Components of continuous mode
<b>Theory</b>	20%	30%	50%	Quizzes, class tests (open or closed book), home assignments, group assignments, <i>viva-voce</i> assignments, discussions, presentations.
<b>Practical</b>	50%		50%	Attendance, <i>viva -voce</i> , journal, assignments, project, experiments, tests, presentations.
<b>Seminar/ Research work</b>	100%			Continuous evaluation not applicable, End semester evaluation is based on the written report evaluation and presentation in front of the external examiner within the Department

#### **In-Semester Evaluation (Continuous Assessment Test and Mid Semester Examination)**

- 1) It is expected that the professor would conduct at least two assessments (in any form as quizzes, tests, homework, group work etc.) under the continuous mode in a semester
- 2) The professor will announce at the beginning of the respective course the method of conducting the tests under the continuous mode and the assignment of marks
- 3) In-semester performance of all students should be displayed and sent to the academic office by the teacher at least 15 days before the end-semester examination
- 4) For the theory courses, there will be one mid-semester test for each course to be held as per the schedule fixed in the Academic Calendar.
- 5) For mid –semester examinations in theory papers, duration of examination is 1 hour for 3 credit courses and 2 hours for 4 credit courses

#### **End-Semester examination:**

- 1) The semester end examination covers the full syllabus of the course and is conducted as per the Institutional time-table at the end of each semester.
- 2) For end –semester examinations in theory papers, duration of examination is 1 hour for 3 credit courses and 2 hours for 4 credit courses.
- 3) For the end semester evaluation of seminar/research work, student is expected to submit a

written report and make a presentation. The evaluation is based on the quality of the written report and presentation.

**Credit system:** There are mainly two types of courses in the Institute - lecture courses and laboratory courses. Lecture courses consist of lecture (L) and tutorial (T) hours. Laboratory courses consist of practical (P) hours. The credit (C) for a course is dependent on the number of hours of instruction per week in that course, as given below:

- 1h/week of lecture (L) or tutorial (T) = 1 credit
- 2h/week of Practical (P) = 1 credit
- Credit (C) for a theory course = No. of hours of lectures per week + No. of hours of tutorials per week = L + T
- Credits (C) for a Laboratory course =  $\frac{1}{2}$  x No. of hours of laboratory course per week

**Grades:** The total marks (in-semester + end-semester) of a candidate in a subject head are converted into a letter grade, based on the relative (and sometimes the absolute) performance of the student. For granting class a grade point of 6.0 and above will be considered equivalent to First class.

<b>Letter Grade</b>	AA	AB	BB	BC	CC	CD	DD	EE
<b>Grade Point</b>	10	9	8	7	6.5	6	5.5	5

**Repeat End-Semester Examination:** For those candidates who fail in a subject head or are eligible for appearing at the repeat examination, Repeat End-Semester Examination is conducted within one month from the declaration of the results of the regular end-semester examination. The marks obtained by candidates in the in-semester examinations (continuous assessment and periodic test) will be carried forward in such cases.

**Improvement of performance:** A candidate will be allowed to appear at the entire examination after the regular end-semester examination as per the respective rules to improve the performance.

### Sample End Semester Examination (Question Paper)





## INSTITUTE OF CHEMICAL TECHNOLOGY

(University under Section - 3 of UGC Act 1956) formerly UDCI, UCT, Mumbai  
Elite Status and Centre of Excellence Govt. of Maharashtra  
NBA Accredited 'A' Grade by MHRD; UNIVERSITY PAR EXCELLENCE  
Mumbai, Mumbai - 400019, India

FINAL YEAR BACHELOR OF TECHNOLOGY (SEMESTER - VII)  
EXAMINATION DECEMBER 2021

DYT1105- TECHNOLOGY OF CATIONIC & SULFUR COLORANTS  
(DYES)

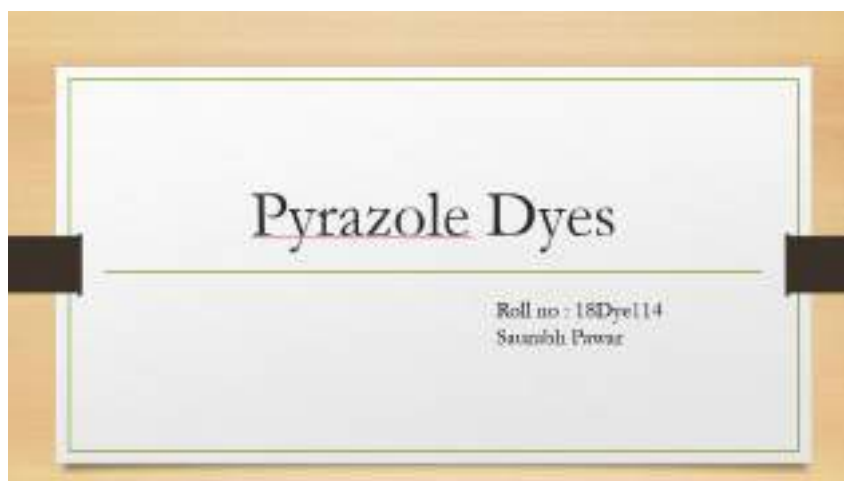
DATE : DECEMBER 16, 2021  
DAY : THURSDAY

TIME : 11:00 A.M TO 2:00 P.M  
MARKS : 50

Note: Students to ignore CO no.

Que No.	CO No.	Question	Marks
1	CO2 K2	Critically compare the coloristic and fastness properties of conventional basic dyes with pendant basic dyes.	5
2	CO2 K2	Whether cyanine dyes can be used on acrylic fibres. Give reasons with examples.	5
3	CO2 K3	Would it be possible to have an azo chromophoric system with a pendant cationic charge.	5
4	CO2 K3	Discuss the similarities and differences between hemicyanines and diaza hemicyanines.	5
5	CO3 K2, K3	Discuss in detail the chemistry of oxazine dyes.	10
6	CO2 K3, K4	Benzaldehyde-2,4-disulphonic acid is condensed with two moles of N-benzyl-N-ethylamine under acidic conditions which on oxidation gave a dye A. The same reaction was repeated with benzaldehyde-3-sulphonic acid to give another dye B. (a) Whether the solubility of the dyes A and B can be further improved? If yes, how? If no, why? (b) Compare the dye A and B in connection with absorption characteristics.	10
7	CO3 K2, K3	Write short notes on the following: (a) Thiazine dyes (b) Ketoximine dyes	10

### Sample Assignment Topic



### Sample Answer booklet



No. of main answer sheet + supplements:

1 + 0 = 1

# INSTITUTE OF CHEMICAL TECHNOLOGY

एनआयन रसायन संस्था

University under Section-3 of UGC Act 1956

Top Elite Institute & Centre of Excellence - Government of Maharashtra

I. C. T.  
17 MAY 2018  
MATUNGA, MUMBAI 40

Institute Seal and Date  
I. C. T.  
MAY 2018  
MATUNGA, MUMBAI-40

Supervisor's Name: Amol Waghmode

Signature with Date: [Signature] 21/5/2018

Candidate's Seat Number:

150YE1020

### INSTRUCTIONS TO CANDIDATES:

- During examination, do not bring any books, notes, scribbling papers, mobile phones or any other critical devices into the examination hall. Do not speak or communicate in any manner to any other candidate, or do not take any other answer-book, notebook or tablet, while leaving the hall.
- Exchange of writing materials, calculators, mathematical instruments, etc. is strictly prohibited.
- Declare your seat number at least 10 minutes before start of the examination and MARK YOUR presence by signing the attendance sheet.
- Ensure that the answer-book contains twelve pages and that the pages are correctly numbered.
- Do not take off any sheet from the answer-book or attach to it any additional papers.
- Write correct seat number on your answer-book.
- Ensure that your answer-book has an IIT seal, Date of Examination and name & signature of the Supervisor.
- Each section shall be answered in separate answer-books, if so instructed.
- Do not put name, signature or any writing that is not relevant to the answer anywhere in the answer-books.
- Rough work, when necessary, should be done on the left hand-side and beyond only.
- Do not discuss answer with other candidates and do not write your name on the answer.
- You are not permitted to leave the examination hall until half-an-hour after the question papers are distributed.
- The use of mobile phones is strictly prohibited during the examination. If you are found using the same, you will be liable for disciplinary action.

Q. No.	Marks Awarded
1	2
2	1
3	2
4	1
5	4
6	07
7	04
8	
9	
10	
<b>Total</b>	<b>21</b>

Examiner's Name and Signature with date:  
[Signature]  
21/5/2018

**TO BE FILLED BY THE CANDIDATE:**

Course: Ty-BTech

Branch: Dyestuff

Semester (I to V): VII

Subject Code No.: DYT 1204

Subject Title: Heterocyclic chemistry (Dyes)

Section: ---

Date: 02/05/18

### PLEASE NOTE:

- Candidates are requested to go through the provisions of the Maharashtra Act No. 3300 of 1962, for details for preventing malpractices at examinations, published in the Maharashtra Government Gazette, 6862 28th October, 1962. Every officer under this Act is a cognizable non-official police officer.
- A candidate who displays any malpractices or who is guilty of malpractices or dishonest behaviour is liable for disciplinary action to be taken against him/her by the Institute.

## 2.2.3. Quality of student projects (15) Self-Assessment Marks = 15

**Project identification:** The project topic selection is based on the commercial importance of the compound, feasibility of the synthesis in lab, toxicity profile and cost.

All the student projects are based on synthesis and process optimization of different dye or dye intermediates with emphasis on the process sustainability, and process development. A student project is evaluated based on the students' performance in successfully conducting the experiments as well as final viva-vice in presence of external and departmental faculties.

The Research project is concerned with detailed literature review of the assigned research area in consultation with the departmental faculties followed by the route scouting and proceeding for performing the experiments after getting the approval from the faculties. At this stage, a student analyzes the existing literature for the assigned research topic and develop detailed plan of experiments/simulations. It also includes modelling activity to accomplish the set objectives. The students are required to optimize the process and carry out the synthesis of the target molecules (dyes/pigments or dye intermediates) in multiple batches, isolate and purify the desired product and characterize them by several analytical techniques. The students are also required to carry out the

cost calculation as well as come up with a plant design to produce that compound in ton scale. After successful completion of the projects the students are required to submit the project report for evaluation. The technical report writing is as per the suggested guidelines and based on the actual work carried out by the student

**Project allotment:** Project allotment is done through lottery and students are assigned the topic which has been allotted to them by lottery.

**Evaluation tools and techniques including Rubrics:**

The project work is then evaluated by the departmental faculties as well as external examiners from other academic institution or industry. A suitable combination of the marks for report and presentation will be considered for the final evaluation.

All the student projects are relevant to the needs of the Dyestuff Technology. Students are encouraged to bring in new dimensions in the project considering the latest trends. Periodic meetings are planned by each professor to check the progress of the project. The periodic evaluation helps the students to adjust the progress of the project and also ensure the correctness. Students are encouraged to search the available e-resources to get the required information on process design and economic analysis. Students are also required to present brief summary on the complete project and justify the feasibility of the project.

Project I ((Semester VII, DYP1007, include the Literature Survey, Route scouting, retrosynthesis, Planning and Cost estimation of Project. Project II ((Semester VIII, DYP1008) include the Experimental Part with proper design, Data Analysis, Report Submission and Viva Voce. A typical Project Report consists of sections viz. Introduction, Literature Review, Materials & Methods, Results and Discussion, Cost Estimation, Summary and Conclusion. The report is evaluated by one External and Internal departmental faculties and the students defend their Project work in front of batchmates and faculty.

Guidelines for assessing students project report:

Descriptors	Criteria				Marks
	4	3	2	1	
<b>Introduction/Hypothesis</b>	Students properly narrates the subject	Students narrates the subject without understanding	Students' presentation is inaccurate	Students' presentation is with the help of a teacher	
<b>Quality of the work presented</b>	Excellent	Good	Average	Below average	
<b>Questions/Answers</b>	Excellent	Fair	Below average	Poor	
<b>Report presentations</b>	Well organized with logical sequencing	Well organized without logical sequencing	Average quality with poor sentence structure	Weakly organized	
<b>Presentation/Grammer and spelling</b>	Punctuations is correct i	Few syntax errors	More than 10% errors in punctuation	More than 15% errors in punctuation	

The project is evaluated of 150 marks and the rubric for evaluation is given below.

RUBRICS	Details	Max. Marks
<b>LITERATURE</b>	Understanding of Research Area	<b>20</b>
	Problem formulation/Experimental design/Mathematical Modelling	<b>30</b>
<b>PRESENTATION</b>	Quality of Work done	<b>20</b>
	Analysis and Interpretation of Results	<b>20</b>
	Quality of Report Submitted	<b>10</b>
<b>VIVA-VOCE</b>	Understanding the objective of the project and achieving the deliverables	<b>20</b>
	Answer to Question raised during Viva-voce	<b>30</b>
<b>TOTAL</b>		<b>150</b>

Recommendation: The Bachelor of Dyestuff Technology project submitted by the candidate is:

1. Acceptable and may be regarded as final in the present form.
2. Acceptable with minor revisions. The revisions have been indicated to the student during open defence examination.

Finally, the external examiner in consultation with the departmental faculty member recommends whether the project submitted by the student is acceptable, may be regarded as final in present form or acceptable but with minor revisions based on the viva-voce performance.

- A steady improvement in quality of the project has been seen as it is evident from the gradually increasing average score of the students. The process optimization, modelling, design and engineering component has been increased gradually in the project
- Incorporation of more experimental design, various isolation, characterization and analysis using modern state-of the art instrument in the Research component include are facilitating the improvement.

A sample evaluation report of one external examiner who has evaluated the final year project presentation is shown here as a reference:

Dr. Rajesh Kumar Singh

**DEPARTMENT OF SPECIALITY CHEMICALS TECHNOLOGY**  
**B.Tech. SEM VIII 2021-22**  
**DYP1007 Project I**

Sr. No.	Roll No.	Name of the Students	Literature 30	Presentation 30	Viva 30	Total 90
1	17DYE108	Avinash Kumar	—	—	—	—
2	18DYE101	Abhishek Nilesh Muthiyam	35	35	35	105
3	18DYE102	Allen Ignatius Elbert Mathias	40	35	38	113
4	18DYE103	Arpeet Achyut Nandvate	40	40	40	120
5	18DYE104	Dhruvil Narendra Vekaria	30	30	30	90
6	18DYE105	Divyaxa Agnihotri	30	40	35	105
7	18DYE106	Harshit Rajnish Sorde	35	35	35	105
8	18DYE107	Prabhat Nishikant	30	40	35	105
9	18DYE108	Ka Pratik Patilchavan	35	40	35	110
10	18DYE109	Ka Pratik Patilchavan	30	37	39	110
11	18DYE110	Rohit Kishor Kulkarni	30	35	35	100
12	18DYE111	Rudra Deepak Iyer	35	42	43	120
13	18DYE112	Sai Sanik Nekkati	40	40	40	120
14	18DYE113	Saurabh Suryakant Patil	33	36	33	102
15	18DYE114	Shamika Hrishabh Subbarao	30	40	30	100
16	18DYE115	Shruti Sonke	35	40	40	115
17	18DYE116	Shubham Dhawal Wadhvani	33	38	33	104
18	18DYE117	Shubham Suresh Khandogre	35	35	35	105
19	18DYE118	Aniket Anand Salve	30	40	38	110

Dear Professor Sir, please find attached my Solution. This is along with the report submitted / Presentation and Viva voce form. You have been continuously working people for last 4 years. You can make an orange or feel free to give additional marks for hours and deserving students.

Yours sincerely  
R. Rajesh

**DYP 1007 and DYP1008: Project I and Project II – Project and Project report submission**

B. Tech Dyestuff Technology, 2021-2022 Assessment Year				
Sr No.	Roll no.	Student Name	Project Title	Broad category of the subject
1	17DYE108	Avinash Kumar	Synthesis of Reactive Red RB	Synthesis and analysis
2	18DYE101	Abhishek Nilesh Muthiyam	Synthesis of 2-phenyl indole from aniline	Synthesis and analysis
3	18DYE102	Allen Ignatius Elbert Mathias	Synthesis of 2-nitro benzaldehyde	Synthesis and analysis
4	18DYE103	Arpeet Achyut Nandvate	Synthesis of meta-amino acetophenone	Synthesis and analysis
5	18DYE104	Dhruvil Narendra Vekaria	Synthesis of C.I. Pigment Yellow 104	Synthesis and analysis
6	18DYE105	Divyaxa Agnihotri	Synthesis of 1-nitro anthraquinone	Synthesis and analysis
7	18DYE106	Harshit Rajnish Sorde	Synthesis of 5-nitroindazole from 2-amino 5-nitro toluene	Synthesis and analysis
8	18DYE107	Prabhat Nishikant	Synthesis of 2-carboxy-3-hydroxy	Synthesis and

		Shanwar	naphthalene 7-sulfonic acid	analysis
9	18DYE108	Pranjali Prakash Tambe	Synthesis of 4-methoxy benzophenone from benzoic acid	Synthesis and analysis
10	18DYE110	Ria Pratik Patkeshwar	Synthesis of anthraquinone -1-sulfonic acid without using Hg-catalyst	Synthesis and analysis
11	18DYE111	Rohit Krishna Kulkarni	Green synthesis of Fluorescein	Synthesis and analysis
12	18DYE112	Ruchira Deepak Iyer	Synthesis of 2,6- dibromo-4-methyl aniline	Synthesis and analysis
13	18DYE113	Sai Sanjiv Nehete	Synthesis of C.I. Pigment Red 177	Synthesis and analysis
14	18DYE114	Saurabh Suryakant Pawar	Synthesis of 7-amino coumarin	Synthesis and analysis
15	18DYE115	Shaunak Hrishikesh Badamkar	Synthesis of 1,2- naphthaquinone	Synthesis and analysis
16	18DYE116	Shruti Verma	Synthesis of benzimidazole from OPDA	Synthesis and analysis
17	18DYE117	Shubham Bhojraj Wankhede	Synthesis of 5-nitro naphthaquinone	Synthesis and analysis
18	18DYE118	Shubhankar Sanjay Khandagale	Synthesis of C.I. Acid Red 1	Synthesis and analysis
19	18DYE120	Aniket Anand Gaikwad	6- Amino N- methyl quinazoline 2,4-dione	Synthesis and analysis

<b>B. Tech Dyestuff Technology, 2020-2021 Batch</b>				
<b>Sr No.</b>	<b>Roll no.</b>	<b>Student Name</b>	<b>Project Title</b>	<b>Broad category of the subject</b>
1	17DYE112	Darshan Chheda	“SYNTHESIS OF 5-NITRO-1,4-NAPHTHOQUINONE”	Synthesis, characterization and analysis
2	17DYE122	Shruti Kini	“Synthesis of 4-Formyl benzenesulfonic acid from Toluene”	Synthesis, characterization and analysis
3	17DYE101	Parth Patel	“SYNTHESIS OF 1-AMINO-2-METHYL ANTHRAQUINONE”	Synthesis, characterization and analysis
4	17DYE102	Rushikesh Mandlik	SOLVENT RED 207	Synthesis, characterization and analysis
5	17DYE103	Mallika Chaukar	MANUFACTURING OF 1,8-DINITRONAPHTHALENE	Synthesis, characterization and analysis
6	17DYE104	Richa Patil	‘SYNTHESIS OF 2-AMINO-4-NITROPHENOL FROM 2, 4-DINITROCHLOROBENZENE’	Synthesis, characterization and analysis
7	17DYE109	Aditya Solanki	“Manufacturing of C.I. Acid Black 1”	Synthesis, characterization

				and analysis
8	17DYE110	Amol Tatode	Synthesis of 2,4-Diaminophenol from 2,4-Dinitrophenol	Synthesis, characterization and analysis
9	17DYE111	Swapnali Kale	Synthesis of 2,6-Dibromoaniline	Synthesis, characterization and analysis
10	17DYE113	Raj Jain	“SYNTHESIS OF 1,4-DIAMINO-2,3-DIPHENOXY ANTHRAQUINONE”	Synthesis, characterization and analysis
11	17DYE116	Darshan Deore	SYNTHESIS OF 6-NITRO-1,2,4 DIAZO ACID	Synthesis, characterization and analysis
12	17DYE117	Sumedha Dhote	SYNTHESIS OF “C.I. VAT BLUE – 4”	Synthesis, characterization and analysis
13	17DYE118	Shreya Bhagat	“SYNTHESIS OF PIGMENT RED 177”	Synthesis, characterization and analysis
14	17DYE119	Krishna Jaiswal	SYNTHESIS OF C.I. SOLVENT RED 80	Synthesis, characterization and analysis
15	17DYE120	Prapti Shetty	“SYNTHESIS OF 3 – PHENOXYBENZANTHRONE FROM BENZANTHRONE”	Synthesis, characterization and analysis
16	17DYE123	Sandesh Kesarkar	“SYNTHESIS OF N-PHENYL PERI ACID (ANS)”	Synthesis, characterization and analysis
17	16DYE121	Tanmaya Agnihotri	Synthesis of 1-Amino-2-bromo-4-hydroxyanthraquinone	Synthesis, characterization and analysis

<b>B. Tech Dyestuff Technology, 2019-2020 Batch</b>				
<b>Sr No.</b>	<b>Roll no.</b>	<b>Student Name</b>	<b>Project Title</b>	<b>Broad category of the subject</b>
1	15DYE1008	Saily Bhagwat	SYNTHESIS OF 4,4'-DIAMINOSTILBENE-2,2'-DISULFONIC ACID FROM 4-NITROTOLUENE-2-SULFONIC ACID	Synthesis, characterization and analysis
2	16DYE101	Aniket Sole	Synthesis of 4-Amino-3-chlorobenzenesulfonic acid from ortho nitro chloro benzene	Synthesis, characterization and analysis
3	16DYE104	Atharwa Thigale	“SYNTHESIS OF 2-NITRO-para-ANISIDINE FROM para-ANISIDINE”	Synthesis, characterization and analysis
4	16DYE105	Kalyani Chavali	Synthesis of 3,4-phthaloyl acridone from 1-chloro anthraquinone	Synthesis, characterization and analysis
5	16DYE107	Ketan Gawande	DESIGN A PLANT TO PRODUCE	Synthesis,

			100 KGS PER BATCH OF DIRECT ORANGE 34	characterization and analysis
6	16DYE108	Khushal Agarwal	<i>Ortho</i> – anisidine para – sulfonic acid synthesis from ortho –nitro anisole	Synthesis, characterization and analysis
7	16DYE109	Kunal Koli	SYNTHESIS OF 2-CHLORO-4-NITROTOLUENE	Synthesis, characterization and analysis
8	16DYE110	Lavanya Kudli	Synthesis OF C. I. Vat yellow 12	Synthesis, characterization and analysis
9	16DYE112	Mukesh Choudhary	Synthesis of Naphthalene-1,3,6-trisulphonic acid from naphthalene	Synthesis, characterization and analysis
10	16DYE113	Nishant Shah	SYNTHESIS OF 2,4-DICHLOROANILINE	Synthesis, characterization and analysis
11	16DYE114	Pratik raj	Synthesis of Pigment Red 190	Synthesis, characterization and analysis
12	16DYE115	Rohan Thawal	Synthesis of Reactive Black 5	Synthesis, characterization and analysis
13	16DYE116	Rushali Kakurle	Synthesis of 2 – Amino – 6 chloro 4-nitro phenol (from 2-chloro 4-nitro aniline)	Synthesis, characterization and analysis
14	16DYE117	Satish prasad	Synthesis of CI vat Orange 11 (from 1,5-diamino A Q 1- Chloro A Q)	Synthesis, characterization and analysis
15	16DYE118	Shivam Gusain	Conversion of 1,5-diamino anthraquinone to mono and bis benzoylamino anthraquinone	Synthesis, characterization and analysis
16	16DYE119	Shivani Santosh Dhanmeher	Synthesis of CI Direct Black 19	Synthesis, characterization and analysis
17	16DYE120	Shonraj patil	Synthesis of Benzanthrone to isoviolanthrone and process optimization by DOE	Synthesis, characterization and analysis

#### Details of POs and PSOs addressed through the projects

#### Course Outcomes (students will be able to)

Subject: DYP1007	
Course Outcomes (Students will be able to.....)	
CO1	Develop critical thinking to identify the research gap for the project (K5)
CO2	Formulate a scientific question and approach to solve it (K6)
CO3	Plan the experimental methodology for the project (K5)
CO4	Develop skills to communicate the research plan effectively (K6)
CO5	Develop skills for writing a scientific document on the research work (K6)



Subject: DYP1008	
Course Outcomes (Students will be able to.....)	
CO1	Perform experiments & troubleshoot to generate reliable data (K5)
CO2	Apply different statistical tools for scientific data analysis (K4)
CO3	Evaluate critically the experimental data and draw meaningful inferences (K5)
CO4	Develop skills to communicate the research outcome effectively (K6)
CO5	Develop skills for writing a complete document on the project work (K6)

Subject			PO1	PO2	PO3	PO4	PO5
Subject: DYP 1007			K4	K5	K6	K4	K5
	CO1	K4	3	3	3	3	3
	CO2	K5	2	3	3	2	3
	CO3	K5	3	3	3	2	2
	CO4	K6	2	3	2	3	3
	CO5	K6	2	3	3	3	3
	Course	K6	3	3	3	3	3

Subject			PO1	PO2	PO3	PO4	PO5
Subject: DYP 1008	CO1	K4	3	3	3	3	3
	CO2	K5	2	3	3	2	3
	CO3	K5	3	3	3	2	2
	CO4	K6	2	3	2	3	3
	CO5	K6	2	3	3	3	3
	Course	K6	3	3	3	3	3

#### Quality:

- The student projects are conducted in a planned and methodological manner.
- Their objectives are well defined and appropriate technical terms have been indicated in the projects.
- The projects are clearly designed to set a plan for the experiments to be conducted.
- Good quality literature survey has been done and cited.
- The projects are well presented along with valid justification of the results obtained.

#### 2.2.4. Initiatives related to industry interaction, industry internship/summer training (10) Self-Assessment Marks = 10

The department welcomes industry specialists to deliver, guide, and discuss/update the students on current technical breakthroughs in order to learn about the difficulties and current practises of the sector. This provides an opportunity for students to interact with and learn from industry experts about industrial processes. It also benefits the industry because students are more prepared to work in the industry. As a result of this exposure, the technology gap between institutes and industry is minimised, and students' employability increases.

#### A. Industry Supported Laboratories.

The institute encourages association with Industry Leaders for their contribution in teaching-learning and research related activities. These experts are appointed as Visiting/Adjunct/Emeritus faculty, wherein many of them actively participate in conducting UG/PG/PhD courses as well as several activities related to mentoring students for project, seminar etc.

Further details of these Industry Stawarts association with the Department and the Institute are provided in the relevant section.

**Our laboratory is supported by a few industries,**

- 1) Colourtex Industries Pvt. Ltd.
- 2) Astik Dyestuff Pvt. Ltd.
- 3) Lakhani Dyestuff Pvt. Ltd.
- 4) Bharat Organics
- 5) Gauri Fine Chemicals
- 6) Dhiren Chemical Industries
- 7) S.K Dyestuff & Organic Chemicals Pvt. Ltd.
- 8) Vasant Chemicals Pvt. Ltd.
- 9) Diamond Dyechem Ltd.
- 10) Neelikon Food, Dyes & Chemicals
- 11) Gopinath Chemtech
- 12) QV labs, Ankleshwar
- 13) Deepak Nitirte



**B. Industry involvement in partial delivery of any regular courses for students**

The program curriculum has been designed considering the feedback from industry personnel. In each academic year of B.Tech Dyestuff Technology, faculty from industry takes the course.

Assessment year (2021-2022)			
Sl. No	Name of Visiting faculty	Subject	Hours/week
1	Nikhil Pravin Mamaniya	Engineering Applications of Computers <b>MAP 1201</b>	4

2	Aniruddha Shenvi	Chemical Engineering Operations <b>(CET1401)</b>	3
3	Mr. Vijay Sane	Technology of Azo colorants <b>DYT 1103</b>	2
4	Mr. Vijay Sane	Technology of Intermediates II	2
5	Mr. Vijay Sane	Process and Plant Design	2
6	Visiting Faculty	Industrial Management <b>HUT 1105</b>	4
7	Rachana Giara	Industrial Psychology and Human Respurce Management <b>HUT 1103B</b>	3
8	Rachana Riara	Industrial management I <b>HUT 1104B</b>	3
9	A. V. Joshi	Envrnmental Science and Technology <b>HUT 1106</b>	3
<b>Assessment year (2020-2021)</b>			
Sl. No	Name of Visiting faculty	Subject	Hours/week
1	Prof. Vijay Y Sane, Gharda Chemicals Pvt. Ltd.	Technology of Intermediates II <b>DYT 1102</b>	2
2	Mr. Dilip G Udas, Ultraconserve Pvt. Ltd.	Case Studies in Dyestuff Industry	2
3	Visiting faculty	Organometallic and Transition Metals	3
4	Mr. Vijay Sane	Process and Plant Design	2
5	Rachana Giara	Industrial Psychology and Human Respurce Management <b>HUT 1103B</b>	3
6	Rachana Riara	Industrial management I <b>HUT 1104B</b>	3
7	A. V. Joshi	Envrnmental Science and Technology <b>HUT 1106</b>	3
8	Rachana Riara	Value Education	1
<b>Assessment year (2019-2020)</b>			
Sl. No	Name of Visiting faculty	Subject	Hours/week
1	Gail Camerio	Aromatic and Heteroaromatic Chemistry <b>CHT 1136</b>	2
2	Gomati Sridhar	Aromatic and Heteroaromatic Chemistry <b>CHT 1136</b>	2
3	Vijay Sane	Technology of Intermediates-1	2
4	Nikhil Mamaniya	Engineering Applications of Computers	4
5	Aniruddha Shenvi	Chemical Engineering Operations <b>(CET1401)</b>	3
6	Mr. Vijay Sane	Technology of Azo colorants <b>DYT 1103</b>	2
7	Visiting faculty	Industrial Management 2	2
8	Vijay Sane	Technology of Intermediates-2 <b>DYT 1102</b>	2
9	Rama Iyer	Industrial Psychology and Human Respurce Management <b>HUT 1103B</b>	3
10	Rama Iyer	Industrial management I <b>HUT 1105</b>	3
11	Visiting Faculty	Envrnmental Science and Technology <b>HUT 1106</b>	3

### C. Industrial training of 4-6 months and post training Assessment

Students spend 3 months in a company for in-plant training where they get a direct exposure of a company, their various products in the market, production of the product, process design, analytical techniques, idea of product innovation, and product commercialisation. Moreover, a student learns about the various processes for Major Products (no confidential proprietary information may be

included), chemistry of processes (in case of innovation for new product) based on Journal papers, Patents, Books, etc., Safety and Health (Material Safety Data Sheets, Safety Policy), Environmental Protection (measures used and general description of the processes and facilities used). A student gets an opportunity to work under an industry mentor.

- After the end of the sixth semester examination and before the start of the seventh semester, every student will have to undergo an internship. This internship will be of 50 marks
- The internship (preferably and industrial internship) would be assigned to the student by the departmental internship coordinator, with the approval of the head of the department.
- The total duration of the internship would be for a period equivalent to 12 calendar weeks. This period will typically start from 1<sup>st</sup> May and end before 30<sup>th</sup> July every year. This means the end semester examination of T. Y. Tech (Semester VI) should be completed by 25<sup>th</sup> April every year. The Semester VII (4<sup>th</sup> Year B. Tech) should commence with effect from 1<sup>st</sup> August every year. The internship may be completed in one or more organization as described below.
- The internship could be of the following forms:  
Industrial internship in a company (within India or Abroad) involved in R&D/ design/ manufacturing (QA/QC/ Plant Engineering/ Stores and Purchase)/ marketing/ finance/ consultancy/ Technical services/ Engineering/ Projects, etc. -Research internship in reputed institutes (within India or Abroad) like ICT, IIT's, NIT's, IISC, NCL, IICT etc.
- At the end of the internship, each student will submit a written report based on the work carried out during the internship. The report will be countersigned by the supervisor from industry/ institute as the case may be.
- Performance of the student will be assessed based on the written report and a presentation to a committee consisting of two faculty members from the department
- Students will be assigned a grade based on the written report and a presentation; evaluated by a committee of faculty members

#### Details of B. Tech. Students went for in-plant training in the industry

Students completing inplant training in 2021-2022			
Sl. No	Roll No.	Name	Project topics and Industry
3	18DYE101	Abhishek Nilesh Muthiyan	Design of Chemical Reactors, Vanati Organics Ltd
4	18DYE102	Allen ignatius Elbert Mathias	Synthesis and Separation of Para Tert-Butyl Toluene, Vanati Organics Ltd
5	18DYE103	Arpeet Achyut Nandvate	FILTERS AND COATINGS ON FILTERS, Dow Chemical International Pvt. Ltd.
6	18DYE104	Dhrumil Narendra Vekaria	
7	18DYE105	Divyaxa Agnihotri	Antimicrobials for Synthetic Leather, SANITIZED AG, Lyssachstrasse 95,CH-3400 Burgdorf,Switzerland
8	18DYE106	Harshit Rajnish Sorde	TALCUM POWDER BENEFIT IMPROVEMENTS, Dow Chemical International Pvt. Ltd.
9	18DYE107	Prabhat Nishikant Shanwar	Production of API Named 'Nimesulide' in Industry, Bajaj Healthcare Ltd.
10	18DYE108	Pranjali Prakash Tambe	Rapid detection of microbial

			contamination in paints and coatings, Sanitized AG   Lyssachstrasse 95   3401 Burgdorf   Switzerland
11	18DYE110	Ria Pratik Patkeshwar	EXISTING METHODS OF TREATING FABRICS AND CREATION OF FINISHES FOR INSECT AND PEST REPELLENT FABRICS, C Tech Corporation
12	18DYE111	Rohit Krishna Kulkarni	EXPLORING INNOVATIVE TECHNOLOGIES IN WASTEWATER TREATMENT TO EXPAND PRODUCT PORTFOLIO, Murugappa Organo Water Solution Pvt. Ltd.
13	18DYE112	Ruchira Deepak Iyer	DEVELOPMENT OF A ZERO LIQUID DISCHARGE SYSTEM FOR WATER CONSERVATION AND REUSE, Henkel
14	18DYE113	Sai Sanjiv Nehete	Process Design Engineering, Amine Regeneration Unit Project, Worley
15	18DYE114	Saurabh Suryakant Pawar	Development of Zeolites for Thermal Cracking Technologies, Vinati Organics Ltd.
16	18DYE115	Shaunak Hrishikesh Badamikar	TALCUM POWDER BENEFIT IMPROVEMENTS, Dow Chemical International Pvt. Ltd.
17	18DYE116	Shruti Verma	COMMERCIALY IMPORTANT ANTHRAQUINONE DERIVATIVES, Ultramarine and Pigment Ltd
18	18DYE117	Shubham Bhojraj Wankhede	Market research on Technical Textiles, Nanotech Chemical Brothers
19	18DYE118	Shubhankar Sanjay Khandagale	TALCUM POWDER BENEFIT IMPROVEMENTS, Dow Chemical International Pvt. Ltd.
20	18DYE120	Aniket Anand Gaikwad	Inorganic Red Pigments, Ultramarine and Pigments Ltd.

<b>Students completing inplant training in 2020-2021</b>			
<b>Sl. No</b>	<b>Roll No.</b>	<b>Name</b>	<b>Project topics and Industry</b>
2	17DYE112	Darshan Chheda	
3	17DYE122	Shruti Kini	Manufacturing of 1,8-Dihydroxy-4,5-Dinitroanthraquinone
4	17DYE101	Parth Patel	Manufacturing of Disperse Brown 4
5	17DYE102	Rushikesh Mandlik	Manufacturing of C.I. Reactive Blue 19 and C.I. reactive Blue 8
6	17DYE103	Mallika Chaukar	Manufacturing of 2-amino 3,5-dinitrothiophene
7	17DYE104	Richa Patil	Manufacturing of Disperse Red 11
8	17DYE109	Aditya Solanki	Manufacturing of Reactive Red 66
9	17DYE110	Amol Tatode	Manufacturing of C.I. Reactive Red 65
10	17DYE111	Swapnali Kale	Manufacturing 1,8-Dinitronaphthalene and 1,8-diamino naphthalene
11	17DYE113	Raj Jain	Use of different catalysts in Hydrogenation of Aromatic Nitro compounds to Amines.
12	17DYE116	Darshan Deore	Selective Nitration of 1-Nitroanthraquinone from Anthraquinone.

13	17DYE117	Sumedha Dhote	Synthesis of Bromamine acid
14	17DYE118	Shreya Bhagat	Manufacturing of Disperse Blue 148
15	17DYE119	Krishna Jaiswal	Recovery of sulfuric acid from spent acid
16	17DYE120	Prapti Shetty	MANUFACTURE OF 1-AMINOANTHRAQUINONE FROM 1- NITROANTHRAQUINONE
17	17DYE123	Sandesh Kesarkar	SELECTIVE NITRATION OF 1-AMINOANTHRAQUINONE FROM ANTHRAQUINONE
18	16DYE121	Tanmaya Agnihotri	Recent Developments in Scholl Reaction in Manufacturing of Anthraquinone dyes

<b>Students completing inplant training in 2019-2020</b>			
<b>Sl. No</b>	<b>Roll No.</b>	<b>Name</b>	<b>Training at the industry</b>
3	16DYE101	Aniket Sole	Colortex
4	16DYE104	Atharwa Thigale	Colortex
5	16DYE105	Kalyani Chavali	Rane Sir
6	16DYE107	Ketan Gawande	Jay Chemicals
7	16DYE108	Khushal Agarwal	Huebach
8	16DYE109	Kunal Koli	Huebach
9	16DYE110	Lavanya Kudli	HPCL
10	16DYE112	Mukesh Choudhary	UPL
11	16DYE113	Nishant Shah	CUNY's ARSC
12	16DYE114	Pratik raj	Vedant
13	16DYE115	Rohan Thawal	Vedant
14	16DYE116	Rushali Kakurle	Eksay Dyestuffs Pvt. Ltd.
15	16DYE117	Satish prasad	Jay Chemicals
16	16DYE118	Shivam Gusain	UPL
17	16DYE119	Shivani Santosh Dhanmeher	Eksay Dyestuffs Pvt. Ltd.
18	16DYE120	Shonraj patil	Eksay Dyestuffs Pvt. Ltd.

After the end of the in-plant training tenure, a student submits a written report on the project assigned to them by the company to the institute. The report consists of background of the project, details of the experiment performed, product design, and application, details of the product known in the market, techno-economic feasibility and finally analysis of data including conclusion. The project report was assessed based on writing skills including formatting as per given instruction. Moreover, the student gives a presentation on the work performed in the industry before the research mentor and other faculties of the department. The assessment of the presentation was done based on the presentation skill of the student and the ability of data analysis by the student. In addition, marks from the industry mentor are also collected and recommendation from the industry mentor is also considered for the final evaluation.

The rubrics for evaluation are given below,

Sr. No.	Details	Max. Marks	Research mentor	External Examiner
1.	Background of Project			-
2.	Experiment performed/Mathematical modelling if any/Design/Techno-economic feasibility/Analysis of data			-
3.	Conclusion			-
4.	Writing Skills including formatting as per given instruction			-
5.	Presentation based on the work performed and its analysis/Presentation Skills			-
6.	Marks Given by Industry Mentor			-
	<b>Total</b>			

#### Impact analysis:

1. Improvement in analytical/logical abilities of students
2. Innovative project ideas are derived in class
3. Improvement in placement in reputed dyestuff companies.
4. Able to apply knowledge for implementing academic projects in multidisciplinary environments.
5. Able to work as an individual or in a team
6. Able to comprehend and document the reports

#### 2.2.5. Initiatives towards the New Education Policy (5) **Self-Assessment Marks = 5**

NEP 2020 is one of the important policies framed by the Government of India with a distinct vision to orient the young generation in the path of development and righteous living. NEP 2020 emphasizes on the holistic and multi-disciplinary education for future generation. Initiatives are undertaken by our Institute towards the implementation of the Policy in true spirits.

**Training the teachers:** First teachers need to be trained for implementation. Then the challenge of actual implementation

**Skill based learning:** Engineering students shall have the freedom to choose side by side, variety of multi-disciplinary vocational and skill-based diplomas/certificate courses and choose electives of their choice and passion.

**Dual degree:** NEP through AICTE would also allow two engineering degrees to be pursued side by side, such as CSE and Mechanical Engineering.

ICT-IoC Bhubaneswar is already running Integrated M.Tech courses which gives an option of choosing major in Chemical Engineering and minor in Polymer and Materials Engineering/Food Engineering and Technology/Fibre and Textile Processing Technology/Energy Engineering/Petrochemical Engineering/Chemical Technology

**Introduction of new courses:** Implementation of Open Elective course/Mandatory ability enhancement courses and universal human value/blended form of learning.

The syllabus of B.Tech courses has been revised and now in the curriculum there are departmental elective courses as well as institute elective courses. The institute elective courses offers a wider variety of subjects which the students and choose from where as departmental electives are mostly programme specific.

### Email form the institute encouraging faculties to participate in the online workshop on NEP

Fw: Online Workshop on "Implementation of NEP 2020 in the Institutes of National Importan  
PM to 5:00 PM

Teqip ICT <teqip.ict@ictmumbai.edu.in>  
to Allfaculty

Respected all,

Please find below trailing mail regarding Online Workshop on "Implementation of NEP 2020 in the institutes of National importance" on Mr

Thanking you

TEQIP Office  
**Institute of Chemical Technology**  
(Deemed University under Section 3 of UGC Act 1956)  
Nathalal Parakh Marg, Matunga(E), Mumbai, 400019  
Tel: 91-22-3361 1029/1035; fax: 91-22-3361 1020  
email: [teqip.ict@ictmumbai.edu.in](mailto:teqip.ict@ictmumbai.edu.in)

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----- Forwarded message -----  
From: NPIU MHRD <[npiu.mhrd@nic.in](mailto:npiu.mhrd@nic.in)>  
Date: Fri, Mar 26, 2021 at 11:24 AM

### Email form the institute encouraging faculties to participate in the online workshop on NEP

Teqip ICT <teqip.ict@ictmumbai.edu.in>  
to Allfaculty

Dear colleagues,

All institutes have been asked to understand the NEP, deliberate on SPECIFIC THEMES in NEP relevant to their Institutes and sub will not take much time to read. The NEP document is attached for your ready reference.

The themes ICT has chosen are

1. **OPTIMUM LEARNING ENVIRONMENTS AND SUPPORT FOR STUDENTS (Part II, Section 12)**
2. **ONLINE AND DIGITAL EDUCATION ENSURING EQUITABLE USE OF TECHNOLOGY (Part III, Section 19)**

(For your convenience: You can click on the topic in the index page and it will take you directly to the relevant section)

You are requested to read that section of the document and respond with any additional suggestions, comments and any other in the google form. The link is provided below.  
LINK: <https://forms.gle/TS2rdqBKCcEQPvIA6>

This data needs to be compiled and then sent to NPIU, and will play an important role in showing collective participation of ICT i

In case any of you wish to suggest on any other theme you may kindly do so under point 3 in the google form.

LINK: <https://forms.gle/TS2rdqBKCcEQPvIA6>



<b>CRITERION 3</b>	<b>Students' Performance</b>	<b>75</b>
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**Table B.3a.**

<b>Item (Information to be provided cumulatively for all the shifts with explicit headings, wherever applicable)</b>	<b>CAY (2021-2022)</b>	<b>CAYm1 (2020-2021)</b>	<b>CAYm2 (2019-2020)</b>
Sanctioned intake of the program (N)	20	20	20
Total number of students admitted in first year minus number of students migrated to other programs/institutions, plus no. of students migrated to this program (N1)	16	19	20
Number of students admitted in 2nd year in the same batch via lateral entry (N2)	0	0	0
Separate division students, if applicable (N3)	0	0	1
Total number of students admitted in the Program (N1 + N2 + N3)	16	19	21

CAY – Current Academic Year

CAYm1- Current Academic Year minus1= Current Assessment Year

CAYm2 - Current Academic Year minus2=Current Assessment Year minus 1

LYG – Last Year Graduate

LYGm1 – Last Year Graduate minus 1

LYGm2 – Last Year Graduate minus 2

**Table B.3b**

Year of entry	N1 + N2 + N3 (as defined above)	Number of students who have successfully graduated without backlogs in any semester/year of study (Without Backlog means no compartment or failures in any semester/year of study)			
		I year	II year	III Year	IV year
<b>CAY (2021-2022)</b>	16				
<b>CAYm1 (2020-2021)</b>	19	18			
<b>CAYm2 (2019-2020)</b>	21	11	16		
<b>CAYm3 (2018-2019)</b>	21	11	13	18	
<b>CAYm4(LYG) (2017-2018)</b>	19	7	11	12	16
<b>CAYm5 (LYGm1) (2016-2017)</b>	19	11	14	16	16
<b>CAYm6 (LYGm2) (2015-2016)</b>	19	13	11	16	15

**Table B.3c**

Year of entry	N1 + N2 + N3 (as defined above)	Number of students who have successfully graduated in stipulated period of study) [Total of without Backlog + with Backlog]			
		I year	II year	III Year	IV year
CAY	16				
CAYm1	19	18+4 = 22			
CAYm2	21	11+6 = 17	16+1 = 17		
CAYm3	21	11+6 = 17	13+5 = 18	18+0 = 18	
CAYm4(LYG)	19	7+10 = 17	11+6 = 17	12+5 = 17	16+1= 17

<b>(2017-2018)</b>					
CAYm5 (LYGm1) <b>(2016-2017)</b>	19	11+6 = 17	14+2 = 16	16+0 = 16	16+1 = 17
CAYm6 (LYGm2) <b>(2015-2016)</b>	19	13+3 = 16	11+5 = 16	16+0 = 16	15+0 = 15

### 3.1. Enrolment Ratio (15)

**Table B.3.1.**

Students enrolled at the First Year Level on average basis during the previous three academic years starting from current academic year	marks
Number of students enrolled in first year in 2021-2022: <b>16</b>	<b>15</b>
Number of students enrolled in first year in 2020-2021: <b>19</b>	
Number of students enrolled in first year in 2019-2020: <b>21</b>	
<b>Avg = 18.33 93.33%</b>	

### 3.2. Success Rate in the stipulated period of the program (15)

#### 3.2.1. Success rate without backlogs in any semester/year of study (10)

SI= (Number of students who have graduated from the program without backlog)/ (Number of students admitted in the first year of that batch and actually admitted in 2nd year via lateral entry and separate division, if applicable) Average SI = Mean of Success Index (SI) for past three batches Success rate without backlogs in any semester/year of study = 10 × Average SI

**Table B.3.2.1**

Items	Last Year of Graduate, LYG (2017-2018)	Last Year of Graduate minus 1, LYGm1 (2016-2017)	Last Year of Graduate minus 2 LYGm2 (2015-2016)
Number of students admitted in the corresponding First Year + admitted in 2nd year via lateral entry and separate division, if applicable	19	19	19
Number of students who have graduated without backlogs in the stipulated period	16	16	15
Success Index (SI)	0.842	0.842	0.789
Average SI	0.824		
Success rate without backlogs in any semester/year of study	10 × Average SI = 8.24		

### 3.2.2. Success rate in stipulated period of study [Total of with backlog + without backlog] (5)

SI= (Number of students who graduated from the program in the stipulated period of course duration)/ (Number of students admitted in the first year of that batch and actually admitted in 2nd year via lateral entry and separate division, if applicable) Average SI = mean of Success Index (SI) for past three batches Success rate = 5 × Average SI

**Table B.3.2.2**

	Last Year of Graduate, LYG (CAYm4) (2017-2018)	Last Year of Graduate minus 1, LYGm1 (CAYm5) (2016-2017)	Last Year of Graduate minus 2, LYGm2 (CAYm6) (2015-2016)
Number of students admitted in the corresponding First Year + admitted in 2nd year via lateral entry and separate division, if applicable	19	19	19
Number of students who have graduated in the stipulated period	1+16 = 17	1+16 = 17	0+15
Success Index (SI)	0.894	0.894	0.789
Average Success Index	0.859		
Success rate without backlogs in any semester/year of study	10 × Average SI = 8.59		

Note: If 100% students clear without any backlog then also total marks scored will be 15 as both 3.2.1 & 3.2.2 will be applicable simultaneously

### 3.2. Academic Performance in Second Year (5)

Academic Performance = 0.5 \* Average API (Academic Performance Index), where API = ((Mean of 2 Year Grade Point Average of all successful Students on a 10-point scale) or (Mean of the percentage of marks of all successful students in Second Year/10)) x (number of successful students/number of students appeared in the examination) Successful students are those who are permitted to proceed to the Third year.

**Table B.3.3**

Academic Performance	CAYm1 (2020-2021)	CAYm2 (2019-2020)	CAYm3 (2018-2019)
Mean of CGPA or Mean Percentage of all successful students (X)	7.90	6.996	7.276
Total no. of successful students (Y)	17	17	11
Total no. of students appeared in the examination (Z)	25	22	19
API = X* (Y/Z)	5.372	5.406	4.212
Average API = (AP1 + AP2 + AP3)/3	4.996		

### 3.3. Academic Performance in Third Year (5)

Academic Performance =  $0.5 * \text{Average API (Academic Performance Index)}$  API = ((Mean of 3 Year Grade Point Average of all successful Students on a 10-point scale) or (Mean of rd the percentage of marks of all successful students in Third Year/10)) x (number of successful students/number of students appeared in the examination) Successful students are those who are permitted to proceed to the final year.

**Table B.3.4**

Academic Performance	CAYm1 (2020- 2021)	CAYm2 (2019- 2020)	CAYm3 (2018- 2019)
Mean of CGPA or Mean Percentage of all successful students (X)	7.35	7.466	7.333
Total no. of successful students (Y)	18	13	16
Total no. of students appeared in the examination (Z)	18	18	16
API = $x * (Y/Z)$	7.35	5.392	7.33
Average API = $(AP1 + AP2 + AP3)/3$	6.690		

### 3.5. Placement, Higher Studies and Entrepreneurship (15)

**Table B.3.5**

Items	CAYm1 (2020- 2021)	CAYm2 (2019- 2020)	CAYm3 (2018- 2019)
<b>Total No. of Final Year Students (N)</b>	17	17	15
<b>No. of students placed in companies or Government Sector (x)</b>	16	16	10
<b>No. of students admitted to higher studies with valid qualifying scores (GATE or equivalent State or National Level Tests, GRE, GMAT etc.) (y)</b>	0	0	5
<b>No. of students turned entrepreneur in engineering/technology (z)</b>	1	1	0
<b><math>x + y + z =</math></b>	17	17	15
<b>Placement Index: <math>(x + y + z)/N</math></b>	1	1	1
<b>Average placement= <math>(P1 + P2 + P3)/3</math></b>	1		
<b>Assessment Points = <math>15 \times \text{average placement}</math></b>	15		

### 3.6. Professional Activities (20)

#### 3.6.1. Professional societies/chapters and organizing engineering events (5) Self-Assessed Marks = 5



**Vortex:** Vortex is India's largest ChemFest combining a wide array of fields such as Chemical Engineering, Polymers and coatings, Dyes, Oils, Foods, Pharmacy & Pharmaceutical Technology, Biotechnology & Biological Sciences, Business, Management and fun general events. Vortex is unique in its scope and ideas. Considering the stalwarts and leaders from industry and academia, representatives of industries and the brightest students from across a plethora of disciplines, Vortex expects a footfall of 7000 people. The first edition of Vortex: The chemfest (2013) was a grand success.

Having the tough task of replacing two of the most common terms in a chemical technology students' dictionary, Exergy for Undergraduates and YRC-YICC for Post Graduates, Vortex set a new landmark for chemistry related fests everywhere. Vortex (2013) was honoured with the BEST STUDENTCHAPTER AWARD by the iiche (Indian Institute of Chemical Engineers). The following editions, Vortex 2014, Vortex 2015 and Vortex 2016 greatly added to the legacy by its predecessor. With an increased number of participants and industries which it is associated with, Vortex has created a formidable reputation of delivering on every promise made to sponsors and participants alike. It has been praised by veterans and enjoyed thoroughly by participants. Vortex 2015 and Vortex 2018 received the highest form of support given by UNESCO to any non-profit organization – the UNESCO Patronage. Vortex has also received support and recognition from the Royal Society of Chemistry.

VORTEX (Technical Fest) Industry-Defined Problems Master Class: Lecture Series Papyrus: Oral Presentations Manifesto : Poster Presentations PharmWiz (Quiz Competitions) Quantity Sufficient (QS

**TEDx ICT Mumbai:** TEDxICTMumbai is an event that is organised independently by the students of the Institute of Chemical Technology, Mumbai operated by an official license obtained by TED. The main purpose of conducting this event is to propagate new ideas, innovation and inventions. As the world races towards innovating and making breakthrough discoveries in the field of science, technology, commerce and the arts, Institute of Chemical Technology, Mumbai also finds it important to expose its students to the ever-changing world around them. With this TEDx ICT Mumbai endeavour, ICT plans to inculcate the spirit of sharing ideas, discovering new ways of looking at the way things happen, and promoting the path of innovation among the students. The world is a global village and ICT intends on making sure that its students are citizen of this new world. In a world where the way we exchange, understand, and innovate in ways which are constantly evolving, TED and TEDx are great tools to interact with the world without having to travel around the world to do so. This makes information and ideas easier to access, enables collaborations between citizens of different countries and above

all promotes the harmonious exchange of innovation, something that is the need of the hour in the 21st century.

### Extra-Curricular Activities

- Manthan (Marathi Clu)
- Art Club of ICT
- Music Club of ICT
- Literary Club of ICT
- Manzar (Cultural Festival)
- SPORT-saga
- Nature Trek
- Hostel Day Celebrations
- All religious festivals
- Clean-Up Drive

### UDCT Alumni Association (UAA) Activities

Inauguration of The UDCT Alumni Association (UAA) East Coast Chapter based in Atlanta 17 Sep 2016

+

### 3.6.2. Publication of technical magazines, newsletters, etc. (5) Self-Assessment Marks = 5

**Bombay Technologist:** The Bombay Technologist is the in-house peer reviewed research Journal of the Institute of Chemical Technology published semi-annually. It was started in 1951, by the erstwhile Technological Association, the highest decision-making student body of the institute.



Professor K. Venkatraman, a pioneer in Chemical Technology himself, envisioned the concept of an in-house research journal run by the institute and thus laid the foundation of Bombay Technologist. The Institute of Chemical Technology is itself an internationally renowned center for research. It churns out hundreds of quality research publications and numerous patents every year solely in Chemical Engineering and Technology. Such a distinction is enjoyed by few, globally. Six decades later, there is no

looking back. Over sixty volumes have been published since. The latest issue is Volume 64.

BOMBAY TECHNOLOGIST provides an offer to the talented undergraduates a coveted opportunity to directly apply their theoretical knowledge into practice via cutting-edge research through its RESEARCH PROGRAM (BTUGRP). Motivate students to explore research as an exciting career option.

Provide a platform to students who wish to gain crucial research experience for further studies. Under the BTUGRP, students will be given a sought-after break to conduct research in the institute throughout the academic year, under the guidance of our faculty members, be it on free afternoons, weekends, short breaks or even during evenings. Thus, this program is highly specific and targets highly motivated students, willing to devote a considerable amount of time to research along with their academics.

**Editor Name:** Dr. Anant Kapdi (till April 2022) and Dr. Nitin Trivedi (since May 2022)

Apart from that student are encouraged to train themselves at the research laboratories. Few of the students also have published their results in national/international peer reviewed journals.

<b>Student publications in international peer reviewed journal as evidence of solving complex problems</b>			
Sl. No.	Name	Journal	Details
1	Saily Bhagwat (15DYE1008)	<i>Current Science</i> 2017, 113, 228-235	Worked with Dr. Prerna Goswami and M. A. K. Kerawalla, Department of General Engineering as summer intern
2	Kalyani Chavali (16DYE105)	<i>Journal of Materials Science</i> , 2020, 55, 14197-14210	Worked as a summer intern with Dr. S. Some of Department of Dyestuff Technology as summer intern
3	Prapti Shetty (17DYE120)	<i>ChemPlusChem</i> , 2022, (in minor revision)	Worked as a summer intern with Dr. S. Saha at the department of Dyestuff Technology as summer intern

### 3.6.3. Participation in inter-institute events by students of the program of study (5) **Self-Assessment Marks = 5**

Department shall provide a table indicating those publications, which received awards in the events/conferences organized by other institutes)

**E Cell:** E-Cell ICT aims to enhance the outlook of students towards entrepreneurship, helping them convert their idea into business models or patents. We also aim to create a culture of creativity, innovation and entrepreneurship by organizing lectures, events and workshops on basic business prerequisites-finance, stock market, marketing, business communication and many others.



**SportSaga:** Sportsaga is the annual sports festival of ICT, Matunga. Currently being in its fifteenth edition, Sportsaga has grown to become one of the largest and most awaited sports festival where ardent sports personalities participate from all over the country. It provides a key platform for all the sports enthusiasts in an array of sports like cricket, volleyball, basketball, athletics, badminton and many more, creating an extraordinary spectacle of inimitable emphasis in sports talent. The event, embraced by the remarkable presence of celebrated sports personalities and spirited audience, has always endeavored unwavering for attaining new zeniths in the pursuit of excellence and vibrancy. The 10 exhilarating days of Sportsaga have many reverberating experiences for participants and supporters, creating a lifetime of memories

**Manzar:** Manzar is the annual cultural festival of the Institute of Chemical Technology (formerly UDCT), Mumbai. Incepted in 2007, it has grown to be one of the fastest growing festivals in Mumbai. With a footfall of close to 10,000 people growing each year, from 100 different colleges across Mumbai, Manzar is a vibrant festival organized by this premier research institution.

**Specialities:** Social Change, Fashion Shows, Arena Concerts, Cultural Dance Performances, Film Making, Photography, The Big Band Theory, Drama, Literary Arts, Workshops, and Bulls and Bears.

**Manthan:** Manthan, the Marathi Literary club was started in 1980's and is the oldest club that was introduced in Technological Association. Originally it was started as a club dedicated only for Marathi singing programs but over the period it covered a lot different aspects of Marathi literature. Along with these programs Manthan organizes different speeches and interviews of distinguished personalities who have succeeded in different fields. The club provides a platform to both experts and amateurs to participate in events, interact with great personalities and show their talents, qualities and aspirations. The club receives huge participation, huge support and a long-lasting love from the students of ICT.

**3.6.4. Participation in national/international competitive events by students of the program of study (5) Self-Assessed Marks = 5**

Sl. No.	Name of the student	Participation in national/international competitive events
1	Divyaxa Agnihotri (18DY105)	Winner of Bombay Stock Exchange Startup Hackathon (Entrepreneurship competition) (August 2019)
2	Subhankar Khandagale (18DYE118)	Participated in ICT Sportsaga- Football Participated in ICT Sportsaga- Table Tennis Member of Performing Arts and Lit (Literature) Club



3	Sai Nehete (18DYE113)	<ul style="list-style-type: none"> <li>▪ Headed a PAN-India event IGNITE and its subset intra-college event INCITE as the <b>Event Head</b> (2019)</li> <li>▪ Promoted the fest as a <b>Public Relations Coordinator</b> (2019)</li> <li>▪ Finalist in INCITE – sub event of IGNITE (2018)</li> <li>▪ TEDxICTMumbai Organised an online TEDx event and supervised the creation of various informative series for TEDx social media pages as the <b>Director of Content and Editorials</b> (2020-2021)</li> <li>▪ Curated talks of speakers and contributed in outreach of the platform as a <b>Content and Public Relations Coordinator</b> (2018-2019 and 2019-2020)</li> </ul> <p>Contributed articles for UDAAN magazine (September 2018 edition and January 2020 edition)</p>
4	Ruchira Iyer (18DYE112)	<ul style="list-style-type: none"> <li>• Runner-up in the Revive and Survive Competition of E-Cell, ICT Mumbai (March 2021).</li> <li>• Runner-up in the Social Defined Problem (Pharma) Competition of Vortex 8.0, ICT Mumbai (March 2021).</li> <li>• Participated in Hariyali Drive organized by ICT Mumbai.</li> </ul>
5	Saurabh Pawar (18DYE114)	<ul style="list-style-type: none"> <li>• Won 2<sup>nd</sup> prize in 'ONE DOLLER VENTURE' Event held at Ecell – Summit 2020</li> <li>• Won 2<sup>nd</sup> prize in Chess tournament at Funtech and Yuvam</li> <li>• 6<sup>th</sup> place out of 178 photos at online State level Photography contest</li> </ul>
6	Shruti Verma (18DYE116)	<ul style="list-style-type: none"> <li>• Participated in Chem triathlon – Organised by Thadomal Shahani Engineering College.</li> <li>• Intern for Chemtech SOP</li> </ul>
7	Allen Ignatius Mathias (18DYE102)	<ul style="list-style-type: none"> <li>• Bagged Second Position in Papyrus Review Writing/Defending Competition [March 2021]</li> <li>• Papyrus is a Review paper writing and defending completion where out of varied range of</li> <li>• topics we are expected to write review paper on one of the, and to present and defend it in</li> <li>• front of a panel of experts.</li> </ul>



Winning team of ICT at BSE Hackathon  
2nd year dyes tech, Divyax is at the centre, Ruchi and Sahil from textile, Chahat from oils, Divyaxa from dyes.



<b>CRITERION 4</b>	<b>Faculty Information and Contributions</b>	<b>100</b>
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**Table B.4**

Name of the Faculty Member	Degree (highest degree)	University	Date of Receiving Highest Degree	Association with the institute	Designation	Date (Designated as Prof/Assoc. Prof.).	Date of joining the institution	Specialization
Prof. N. Sekar	PhD	ICT Mumbai	01/02/1988	Regular	Professor	28/07/2008	17/02/1988	Organic Chemistry, Organic colorants, Functional fluorescent colorants and Dyestuff Technology
Prof. G. S. Shankarling	PhD	ICT Mumbai	01/08/2000	Regular	Professor	20/02/2012	20/02/2006	Organic Chemistry, Dyestuff and Intermediate Technology, Plant and Process Design, Green Chemistry
Dr. S. Garimella	PhD	USA	24/04/2010	Regular	Assistant Professor	-	11/04/2019	Intermediate, dye synthesis and fibre analysis, Chemical Technology, Spectroscopic analysis
Dr. Surajit Some	PhD	IIT KGP	17/03/2008	Regular	Assistant Professor	-	17/09/2014	Organic Chemistry and Dyestuff Technology, Organic Spectroscopy
Dr. N. Sadhukhan	PhD	IIT Kanpur	14/12/2009	Regular	Assistant Professor	-	01/04/2016	Chemistry of Intermediates, Inorganic Colorant Chemistry and Dyestuff Technology, Dyeing
Dr. Satyajit Saha	PhD	IIT Kanpur	28/05/2011	Regular	Assistant Professor	-	2/2/2015	Organic Chemistry & colorants, Analysis of colorants, Functional colorants, Dyestuff & Technology
Prof. Prakash M. Bhate	PhD	USA		Contractual	Professor	-	01/08/2008	Organic chemistry, Dyestuff Technology
Prof. Anniruddha Bhalchandra Pandit	PhD	University of Mumbai	31/07/1984	Regular	Professor	01/01/1996	01/01/1991	Chemical Engineering, Chemical Project Engineering and Economics

Prof. Anand Vinayak Patwardhan	PhD	UDCT Mumbai	13/07/1988	Regular	Professor	18/12/2007	18/12/2007	Chemical Engineering, Membrane separation, Heterogeneous reaction, Transport Phenomenon
Prof. Pushpito K Ghosh	PhD	Princeton University	21/05/1980	Regular	Professor	-	15/04/2015	Chemical Engineering
Dr. Sachin Jadhav	PhD	ICT Mumbai	03/03/2016	Regular	Assistant Professor	-	22/05/2018	Chemical Engineering, Instrumentation and Process Control
Dr. Manish Kumar Yadav	PhD	ICT Mumbai	19/03/2019	Regular	Assistant Professor	-	24/09/2019	Chemical Engineering, Chemical Reaction Engineering
Prof. Parag Ratnakar Gogate	PhD	UDCT Mumbai	20/06/2006	Regular	Professor	05/07/2018	03/07/2007	Chemical Engineering, Transport Phenomenon
Prof. Virendra Kisan Rathod	PhD	UDCT Mumbai	01/02/2006	Regular	Professor	21/07/2011	01/04/2003	Chemical Engineering, Design and Analysis of Experiments
Prof. Prakash Dhundiraj Vaidya	PhD	UDCT Mumbai	04/01/2005	Regular	Professor	12/02/2018	01/08/2007	Physics, Color Physics
Dr. Ashwin Mohan	PhD	Dresden University of Technology, Germany	13/11/2014	Regular	Assistant Professor	-	09/12/2015	Physics, Color Physics
Prof. Vineeta Dinesh Deshpande	PhD	Delhi University	19/12/2009	Regular	Professor	01/01/2009	02/05/1991	Electrical Engineering, Electronics and General Engineering
Mr. Mohammed Amin Kassamali Kerawalla	M.Tech	UDCT	29/09/1984	Regular	Associate Professor	15/03/1997	16/02/1987	Electrical Engineering, Electronics and General Engineering

Prerna Goswami	PhD	ICT Mumbai	28/03/2018	Regular	Associate Professor	18/02/2017	06/06/1998	Engineering Mechanics, Strength of Materials
Prof. Dilip Dhondur Sarode	PhD	IIT Bombay	15/02/2010	Regular	Professor	01/03/2014	12/06/1997	Textile Processing, Fibre and Textile Processing Technology
Dr. Kedar Kulkarni	PhD	UDCT Mumbai	02/08/2005	Regular	Assistant Professor	-	12/02/2018	PHARMACEUTICAL SCIENCES AND TECHNOLOGY, Value Education
Prof. Pradeep Ratilal Vavia	PhD	BVPPER, Departme nt of Chemical Technolog y, Mumbai	01/07/1991	Regular	Professor	08/04/2003	01/12/1993	Physics, Color Physics
Dr. Archana Kalekar	PhD	Chonnam National University Gwangju	14/05/2015	Regular	Assistant Professor	-	01/06/2018	Organic Chemistry, Industrial Organic and Inorganic Chemistry
Prof. Bhalchandra Mahadeo Bhanage	PhD	NCL Pune	01/02/1996	Regular	Professor	02/12/2013	31/12/2003	Chemical Engineering, Chemical Reaction Engineering
Dr. Stuti Borgohain	PhD	IASST, Guwahati, Assam	08/02/2012	Contractua l	Assistant Professor	29/08/2018	29/08/2018	Engineering Applications of Computers, MATHEMATICS
Dr. Usha Afroz Syed	PhD	UDCT Mumbai	02/02/1998	Regular	Associate Professor	29/09/1998	29/09/1987	Dyeing and Printing Technology, Fibre Technology
Prof. Ravindra Dondiba Kale	PhD	UDCT Mumbai	01/02/2012	Regular	Professor	01/07/2019	08/04/2003	Textile Processing, Textile Technology, Textile Dyeing
Prof. Ravindra Dattatraya Kulkarni	PhD	UDCT Mumbai	02/08/2005	Regular	Professor		04/11/2016	OILS, OLEOCHEMICALS AND SURFACTANTS TECHNOLOGY

Dr. Shamlan M.S Reshamwala	PhD	IITB	18/08/2012	Regular	Assistant Professor		20/08/2014	Design and Analysis of Experiments, Biotechnology
Prof. J. B. Joshi	PhD	UDCT	01/01/1977	Contractual	Professor	01/08/1986	03/10/1972	Reactor design and CFD, Chemical Engineering

Name of the faculty	Research paper publications	Ph.D guidance	Faculty receiving Ph.D degree during the assessment years	Currently associated (Y/N) If No, date of leaving	Nature of association (regular/contractual)
Prof. N. Sekar	324	42	-	Yes	Regular
Prof. G. S. Shankarling	147	20	-	Yes	Regular
Dr. S. Garimella	11	1	-	30/01/2021	Regular
Dr. Surajit Some	52	3	-	Yes	Regular
Dr. N. Sadhukhan	15	0	-	Yes	Regular
Dr. Satyajit Saha	25	1	-	Yes	Regular
Prof. Prakash M. Bhate	21	3	-	No, 31/10/2018	Regular
Prof. Anniruddha Bhalchandra Pandit	360	50	-	Yes	Regular
Prof. Anand Vinayak Patwardhan	158	13	-	Yes	Regular
Prof. Pushpito K Ghosh	89	8	-	Yes	Regular
Dr. Sachin Jadhav	9	0	-	Yes	Regular
Dr. Manish Kumar Yadav	10	0	-	Yes	Regular
Prof. Parag Ratnakar Gogate	342	21	-	Yes	Regular
Prof. Virendra Kisan Rathod	140	27	-	Yes	Regular
Prof. Prakash Dhundiraj Vaidya	100	24	-	Yes	Regular
Dr. Ashwin Mohan	23	1	-	Yes	Regular
Prof. Vineeta Dinesh Deshpande	27	7	-	Yes	Regular
Mr. Mohammed Amin Kassamali Kerawalla	18	0	-	Yes	Regular
Purna Goswami	33	0	Yes (2018)	Yes	Regular
Prof. Dilip Dhondu Sarode	26	2	-	Yes	Regular
Dr. Kedar Kulkarni	7	0	-	Yes	Contractual
Prof. Pradeep Ratilal Vavia	137	43	-	Yes	Regular
Dr. Archana Kalekar	34	0	-	Yes	Regular
Prof. Bhalchandra Mahadeo Bhanage	423	44	-	Yes	Regular
Dr. Stuti Borgohain	18	0	-	Yes	Contractual
Dr. Usha Afroz Syed	81	3	-	No, 30/11/2021	Regular
Prof. Ravindra Dondiba Kale	65	5	-	Yes	Regular
Prof. Ravindra Dattatraya Kulkarni	63	12	-	Yes	Regular
Dr. Shamlan M.S Reshamwala	10	0	-	Yes	Contractual
Prof. J. B. Joshi	>500	91	-	Yes	Regular

#### 4.1. Student-Faculty Ratio (SFR) (15) Self-Assessment Marks = 15

(To be calculated at Department Level)

No. of UG Programs in the Department (n): 1

No. of PG Programs in the Department (m): **2**

No. of Students in UG 2<sup>nd</sup> year = u1 (**20**)

No. of Students in UG 3<sup>rd</sup> year = u2 (**20**)

No. of Students in UG 4<sup>th</sup> year = u3 (**20**)

No. of Students in PG 1 Year= p1 (**18+18**) = 36

No. of Students in PG 2 year = p2 (**18+18**) = 36

No. of Students = Sanctioned Intake + Actual admitted lateral entry students

(The above data to be provided considering all the UG and PG programs of the department) S=Number of Students in the Department = UG1+UG2+UG3+PG1+PG2

F = Total Number of Faculty Members in the Department (excluding first year faculty)

**Student Faculty Ratio (SFR) = S / F**

**The SFR calculation in the pre-qualifier was done not done by considering the fractional workload. Each individual faculties contribution towards this course was considered 100%.**

No. of UG Programs in the Department : 1		No. of PG Programs in the Department : 2	
Description	2021-22	2020-21	2019-20
Total No. of Students in the Department(S)	110 Sum total of all (UG+PG) students	100 Sum total of all (UG+PG) students	118 Sum total of all (UG+PG) students
No. of Faculty in the Department(F)	28 F1	27 F2	26 F3
Student Faculty Ratio(SFR)	3.93 SFR1=S1/F1	3.70 SFR2=S2/F2	4.54 SFR3=S3/F3
Average SFR	4.73 SFR=(SFR1+SFR2+SFR3)/3		
F= Total Number of Faculty Members in the Department (excluding first year faculty)			

The SFR is calculated based on the fractional work-load of the faculties who are taking courses from 3<sup>rd</sup> Sem to 8<sup>th</sup> Sem of the B.Tech (Dyestuff Technology) course. The SFR calculation is shown for each assessment years considering their fractional workload in the concerned programme. Teaching hours in week (A) is only corresponding to the subjects of the program under consideration (BTech (Dyes). Additional work load (B) has been assigned to faculties who are appointed as HoD/Dean/Course coordinator/Dean. Working hours for practical courses (C) has been assigned based on the actual workload for that subject. Additional work load for research related activities (D) has also been assigned to all the concerned faculties who were having UG/PG research students under their guidance.

**Table B.4.1**

Year	CAY (2021-2022)	CAYm1 (2020-2021)	CAYm2 (2019-2020)
UG 2 <sup>nd</sup> year	20	20	20
UG 3 <sup>rd</sup> year	20	20	20
UG 4 <sup>th</sup> year	20	20	20
PG (M. Tech (Dyes) 1 <sup>st</sup> Year	18	18	18
PG (M. Tech (Dyes) 2 <sup>nd</sup> Year	18	18	18



PG (M. Tech (Perfumery) 1 <sup>st</sup> Year	18	18	18
PG (M. Tech (Perfumery) 2 <sup>nd</sup> Year	18	18	18
Total No. of Students in the Department (S)	132	132	132
No. of Faculty in the Department (F)	F1 = 12.26	F2 = 13.40	F3 = 13.58
Student Faculty Ratio (SFR)	$SFR1 = S1/F1 = (132/12.26) = 10.77$	$SFR2 = S2/F2 = (132/13.40) = 9.84$	$SFR3 = S3/F3 = (132/13.58) = 9.72$
Average SFR	$SFR = (SFR1 + SFR2 + SFR3) / 3 = 10.11$		

### SFR Calculation:

The detailed workload calculation for all the concerned faculties who are teaching B.Tech (Dyes) courses (Sem 3 to Sem 8) as obtained from the time table is shown below (Cells with dark shade corresponds to odd semester workload and the cells without any color represents the even semester).

Assessment Year 2021-22								
Sr. No.	Faculty Name	(A) Teaching hrs in week	(B) Weekly involvement in hours as HoD+ Coordinator+ Dean+Director	(C) Working hrs in week for practical	(D) Working h in week for research (UG/PG)	(E) Total working hrs for all stream according to the time table	(F) Working hr according to AICTE rule for Prof/ Assoc. Prof/Assistant. Professor	(G) Fractional workload for PFT (A+B+C+D/E or F# (# = we have to consider either E or F depending on which one has larger value)
1	Dr Satyajit Saha	3	0	8	1	14	16	0.75
		2	0	8	1	16	16	0.69
2	Dr. Nabanita Sadhukhan	2	0	8	1	13	16	0.68
		6	0	8	1	18	16	0.83
3	Dr. Surajit Some	3	0	0	1	3	16	0.25
		3	0	0	1	17	16	0.23
4	Prof. Ganapati S. Shankarling Prof.	4	2	0	1	15	12	0.47
		3	0	2	1	16	12	0.37
5	Prof. Nagaiyan Sekar	11	0	0	1	18	12	0.66
		8	2	0	1	11	12	0.92

6	Prof. Anniruddha Bhalchandra Pandit	4	2	0	1	4	12	0.58
7	Prof. Pushpito K Ghosh	2	0	0	1	8	12	0.25
8	Dr. Sachin Jadhav	3	0	4	1	7	16	0.50
9	Dr. Manish Kumar Yadav	4	0	0	1	10	16	0.31
10	Prof. Parag R. Gogate	3	2	0	1	7	12	0.5
11	Prof. Vineeta Dinesh Deshpande	1	0	4	1	15	12	0.40
12	Mr. Mohammed Amin Kassamali Kerawalla	0	0	4	1	19	14	0.26
13	Prerna Goswami	0	0	4	1	19	14	0.26
14	Prof. Dilip Dhondu Sarode	4	2	0	1	5	14	0.5
15	Prof. Pradeep Ratilal Vavia	3	2	0	1	7	12	0.5
16	Dr. Archana Kalekar	1	0	0	1	12	16	0.12
17	Prof. Bhalchandra Mahadeo Bhanage	6	2	0	1	6	12	0.75
18	Dr. Usha Afroz Syed	4	0	0	1	8	14	0.36
19	Prof. Ravindra Dondiba Kale	0	0	4	1	17	12	0.29
20	Prof. Ravindra Dattatraya Kulkarni	4	2	0	1	11	12	0.58
21	Dr. Shamlan M.S Reshamwala	3	0	0	1	12	16	0.25

**No. of Faculty in the Department considering fractional workload (F)**

**12.26**

**Student Faculty Ratio (SFR)**

**10.77**

**Assessment Year 2020-2021**

Sr. No.	Faculty Name	(A) Teaching hrs in week	(B) HoD+ Coordinator+ Dean+Director	(C) Working hrs in week for practical	(D) Working h in week for research	(E) Total working hrs for all stream	(F) Working hr according to AICTE rule for Prof/ Assoc. Prof/Assistant. Professor	(G) fractional workload for PFT (A+B+C+D/E or F)# (# = we have to consider either E or F depending on which one has larger value)
1	Dr Satyajit Saha	3	0	0	1	12	16	0.25

		5	0	0	1	8	16	0.37
2	Dr. Nabanita Sadhukhan	8	0	4	1	18	16	0.72
		6	0	8	1	22	16	0.68
3	Dr. S. Garimella	4	0	8	0	20	16	0.60
		0	0	8	0	16	16	0.5
4	Prof. Ganapati S. Shankarling	2	2	0	1	21	12	0.24
		6	2	2	1	23	12	0.48
5	Prof. Nagaiyan Sekar	13	0	0	1	14	12	1
		7	0	0	1	10	12	0.67
6	Prof. Prakash M. Bhate	6	0	0	0	6	12	0.5
		3	0	0	0	3	12	0.25
7	Prof. Anniruddha Bhalchandra Pandit	3	2	0	1	3	12	0.5
8	Prof. Pushpito K Ghosh	2	0	0	1	7	12	0.25
9	Dr. Sachin Jadhav	4	0	3	1	10	16	0.5
10	Dr. Manish Kumar Yadav	2	0	0	1	8	16	0.19
11	Prof. Parag Ratnakar Gogate	4	0	0	1	10	12	0.42
12	Prof. Virendra Kisan Rathod	2	0	0	1	17	16	0.18
13	Prof. Prakash Dhundiraj Vaidya	4	2	0	1	16	16	0.44
14	Dr. Ashwin Mohan	1	0	0	1	19	16	0.10
	Dr. Ashwin Mohan	1	0	4	1	25	16	0.24
15	Prof. Vineeta Dinesh Deshpande	2	0	0	1	11	16	0.19
	Prof. Vineeta Dinesh Deshpande	2	0	4	1	25	12	0.28
16	Mr. Mohammed Amin Kassamali Kerawalla	3	0	4	1	19	14	0.42
17	Prerna Goswami	3	0	4	1	19	14	0.42
18	Prof. Dilip Dhondu Sarode	3	0	0	1	7	14	0.28
19	Prof. Pradeep Ratilal Vavia	2	2	0	1	10	12	0.42
20	Prof. Bhalchandra Mahadeo Bhanage	2	2	0	1	7	12	0.42

21	Dr. Stuti Borgohain	0	0	4	1	11	16	0.31
	Dr. Stuti Borgohain	3	0	0	1	6	16	0.25
22	Dr. Usha Afroz Syed	4	0	0	1	14	14	0.36
23	Prof. Ravindra Dondiba Kale	0	0	4	1	15	12	0.33
24	Prof. Ravindra Dattatraya Kulkarni	6	2	0	1	14	12	0.64

**No. of Faculty in the Department considering fractional workload (F)** **13.4**

**Student Faculty Ratio (SFR)** **9.84**

**Assessment Year 2019-2020**

Sr. No.	Faculty Name	(A) Teaching hrs in week	(B) HoD+ Coordinator+ Dean+Director	(C) Working hrs in week for practical	(D) Working h in week for research	(E) Total working hrs for all stream	(F) Working hr according to AICTE rule for Prof/ Assoc. Prof/Assistant. Professor	(G) fractional workload for BTEch (A+B+C+D/E or F)
1	Dr Satyajit Saha	3	0	4	1	13	16	0.5
		5	0	0	1	11	16	0.37
2	Dr. Nabanita Sadhukhan	4	0	8	1	12	16	0.81
		4	0	8	1	12	16	0.81
3	Prof. Ganapati S. Shankarling	4	2	0	1	22	12	0.32
		4	2	4	1	19	12	0.58
4	Dr. S. Some	3	0	8	1	14	16	0.75
5	Prof. Nagaiyan Sekar	7	0	0	1	11	12	0.67
		7	0	0	1	13	12	0.61
6	Dr. Garimella Subramanian	0	0	8	0	11	16	0.5
7	Prof. Prakash M. Bhate	4	0	0	0	4	12	0.33
	Prof. Prakash M. Bhate	2	0	0	0	2	12	0.16
8	Prof. Anniruddha Bhalchandra Pandit	3	2	0	1	3	12	0.5

9	Dr. Ashwin Mohan	2	0	4	1	23	16	0.30
10	Prof. Vineeta Dinesh Deshpande	2	0	4	1	22	12	0.32
11	Mr. Mohammed Amin Kassamali Kerawalla Even sem	3	0	4	1	19	14	0.42
12	Prerna Goswami	3	0	4	1	19	14	0.42
13	Prof. Dilip Dhondu Sarode	4	0	0	1	10	14	0.36
14	Prof. Pradeep Ratilal Vavia	3	2	0	1	15	12	0.4
15	Dr. Archana Kalekar even sem	1	0	4	1	16	16	0.37
16	Dr. Manish Yadav	2	0	0	1	14	12	0.21
17	Prof. V. K. Rathod	2	0	0	1	12	12	0.17
18	Prof. R. D. Kale	0	0	4	1	16	12	0.31
19	Prof. B. M. Bhanage	4	2	0	1	11	12	0.58
20	Prof. P. K Ghosh	4	0	0	1	10	12	0.42
21	Dr. Stuti Borgohain	2	0	4	1	12	16	0.44
22	Prof. R. D Kulkarni	4	2	0	1	14	12	0.5
23	Prof. P. R. Gogate	3	0	0	1	6	12	0.33
24	Prof. P. D. Vaidya	3	0	0	1	7	12	0.33
25	Dr. Usha Sayed	4	0	0	1	17	14	0.29
26	Dr. Sachin Jadav	3	0	4	1	11	16	0.5
<b>No. of Faculty in the Department considering fractional workload (F)</b>								<b>13.58</b>
<b>Student Faculty Ratio (SFR)</b>								<b>9.72</b>

Note: All the faculty whether regular or contractual (except Part-Time), will be considered. The contractual faculty (doing away with the terminology of visiting/adjunct faculty, whatsoever) who have taught for 2 consecutive semesters in the corresponding academic year on full time basis shall be considered for the purpose of calculation in the Faculty Student Ratio. However, following will be ensured in case of contractual faculty: 1. Shall have the AICTE prescribed qualifications and experience. 2. Shall be appointed on full time basis and worked for consecutive two semesters during the particular academic year under consideration. 3. Should have gone through an appropriate process of selection and the records of the same shall be made available to the visiting team during NBA visit

4.1.1. Provide the information about the regular and contractual faculty as per the format mentioned below:

Table B4.1.1

	Total number of regular faculty in the department (Considering the Dyestuff Technology Department only) <sup>#</sup>	Total number of contractual faculty in the department
CAY (2021-2022)	5	0
CAYm1 (2020-2021)	6	0
CAYm2 (2019-2020)	6	0

<sup>#</sup>Only concerned departmental faculties are considered here

#### 4.2. Faculty Cadre Proportion (10) Self-Assessed Marks = 10

The reference Faculty cadre proportion is 1(F1):2(F2):6(F3)

F1: Number of Professors required =  $1/9 \times$  Number of Faculty required to comply with 20:1 Student-Faculty ratio based on no. of students (N) as per 4.1

F2: Number of Associate Professors required =  $2/9 \times$  Number of Faculty required to comply with 20:1 Student-Faculty ratio based on no. of students (N) as per 4.1

F3: Number of Assistant Professors required =  $6/9 \times$  Number of Faculty required to comply with 20:1 Student-Faculty ratio based on no. of students (N) as per 4.1

**F1** =  $1/9 \times$  (Number of Faculty required to comply with 20:1 Student- Faculty ratio based on no. of students (N) as per 4.1) =  $6.6/9 = 0.73 = 1$  (approx.)

**F2** =  $2/9 \times$  (Number of Faculty required to comply with 20:1 Student- Faculty ratio based on no. of students (N) as per 4.1) =  $2 \times (6.6/9) = 1.46 = 1$  (approx.)

**F3** =  $6/9 \times$  (Number of Faculty required to comply with 20:1 Student- Faculty ratio based on no. of students (N) as per 4.1) =  $6 \times (6.6/9) = 4.4 = 4$  (approx.)

Table B.4.2

Year	Professors		Associate Professors		Assistant Professors	
	Required F1	Available <sup>#</sup>	Required F2	Available <sup>#</sup>	Required F3	Available <sup>#</sup>
CAY (2021-2022)	1	2	$2/9 \times 1.5 = 1$ (approx)	0	4	3
CAYm1 (2020-2021)	1	2	$1.5 = 1$ (approx)	0	4	4
CAYm2 (2019-2020)	1	2	$1.5 = 1$ (approx)	0	4	4
<b>Average Numbers</b>	RF1= 1	AF1= 2	RF2 = 1	AF2 = 0	RF3 = 4	AF3 = 3.67

<sup>#</sup>Only concerned departmental faculties are considered here

**Cadre proportion calculation:**

$$AF1/RF1 = 2/1 = 2$$

$$AF2/RF2 = 0/1 = 0$$

$$AF3/RF3 = 3.6/4 = 0.9$$

$$\text{Cadre proportion marks} = (2*1+0*0.6+0.9*0.4)*5 = 2.36*5 = 11.8 = \text{limited to 10}$$

FQ = (10X +4Y)/F) where x is No. of available faculty with Ph.D., Y is No. available faculty with M. Tech., F is No. available faculty required to comply 20:1 Faculty Student ratio (no. of faculty and no. of students required are to be calculated as per 4.1)

**Table B.4.3**

	X	Y	F	FQ = (10X +4Y)/F
<b>CAY</b>	5	0	6.6 = 7 (approx.)	7.14
<b>CAYm1</b>	6	0	6.6 = 7 (approx.)	8.57
<b>CAYm2</b>	6	0	6.6 = 7 (approx.)	8.57
Average Assessment				8.05 = 8 (approx.)

#### 4.4. Faculty Retention (5) **Self-Assessed Marks = 4**

No. of regular faculty members in CAYm1= 6                      CAY = 5

**Table B.4.4**

Item (% of faculty retained during the period of assessment keeping CAYm2 as base year)	Marks
>=75% of required Faculty members retained during the period of assessment keeping CAYm2 as base year	4

#### 4.5. Faculty competencies in correlation to curriculum (5) **Self-Assessment Marks = 5**

**Components of the curriculum:**

Sl. No.	Components of the curriculum (Semester III to Semester VIII)	Subject codes
1	Basic Science (Physics, Chemistry and Mathematics)	CHT1124, MAP 1201, PYT 1202, CET 1105, PYP 1203, MAT1106
2	General Engineering	GET 1116, GEP 1106, GET 1105,
3	Chemical Engineering	CET 1105, CET 1401, CET 1212, CET 1713, CEP 1713, CET 1514
4	Dyestuff Technology	DYT 1101, DYT 1202, DYP 1001, DYT 1102, DYT 1103, DYT 1104, DYP 1002, DYP 1003, DYT 1203, DYT 1204, DYP 1004, DYP1003, DYT 1105, DYT1206, DYP 1006, DYP 1007, DYT 1106, DYT 1205, DYT 1107, DYT (Elective -III), DYP 1008, DYP 1009

5	Textile Technology/Oleochemicals and Surfactants/Chemical Technology	<b>TXP 1013, TXT 1215, OLT 1102</b>
6	Humanities and Social Science	<b>HUT 1103, HUT 1104, HUT 1106, HUT 1105</b>

Sl. No.	Name of the faculty	Research specialization	General Competencies
1	Dr Satyajit Saha	Organic Chemistry & colorants, Analysis of colorants, Functional colorants, Dyestuff & Technology	Chemical Science and Dyestuff Technology
2	Dr. Nabanita Sadhukhan	Chemistry of Intermediates, Inorganic Colorant Chemistry and Dyestuff Technology, Dyeing	Chemical Science and Dyestuff Technology
3	Dr. S. Garimella	Intermediate, dye synthesis and fibre analysis, Chemical Technology, Spectroscopic analysis	Chemical Science and Dyestuff Technology
4	Dr. Surajit Some	Organic Chemistry and Dyestuff Technology, Organic Spectroscopy	Chemical Science and Dyestuff Technology
5	Prof. Ganapati S. Shankarling	Organic Chemistry, Dyestuff and Intermediate Technology, Plant and Process Design, Green Chemistry	Chemical Science and Dyestuff Technology
6	Prof. Nagaiyan Sekar	Organic Chemistry, Organic colorants, Functional fluorescent colorants and Dyestuff Technology	Chemical Science and Dyestuff Technology
7	Prof. Prakash M. Bhate	Organic chemistry, Dyestuff Technology	Chemical Science and Dyestuff Technology
8	Prof. Anniruddha Bhalchandra Pandit	Chemical Engineering, Chemical Project Engineering and Economics	Chemical Engineering
9	Prof. Anand Vinayak Patwardhan	Chemical Engineering, Membrane separation, Heterogeneous reaction, Transport Phenomenon	Chemical Engineering
10	Prof. Pushpito K Ghosh	Chemical Engineering	Chemical Engineering
11	Dr. Sachin Jadhav	Chemical Engineering, Instrumentation and Process Control	Chemical Engineering
12	Dr. Manish Kumar Yadav	Chemical Engineering, Transport Phenomenon	Chemical Engineering
13	Prof. Parag Ratnakar Gogate	Chemical Engineering, Chemical Reaction Engineering	Chemical Engineering
14	Prof. Virendra Kisan Rathod	Chemical Engineering, Transport Phenomenon	Chemical Engineering



15	Prof. Prakash Dhundiraj Vaidya	Chemical Engineering, Design and Analysis of Experiments	Chemical Engineering
16	Dr. Ashwin Mohan	Physics, Color Physics	Physics
17	Prof. Vineeta Dinesh Deshpande	Physics, Color Physics	Physics
18	Mr. Mohammed Amin Kassamali Kerawalla	Electrical Engineering, Electronics and General Engineering	General Engineering
19	Purna Goswami	Electrical Engineering, Electronics and General Engineering	General Engineering
20	Prof. Dilip Dhondu Sarode	Engineering Mechanics, Strength of Materials	General Engineering
21	Dr. Kedar Kulkarni	Textile Processing, Fibre and Textile Processing Technology	Textile Technology
22	Prof. Pradeep Ratilal Vavia	PHARMACEUTICAL SCIENCES AND TECHNOLOGY, Value Education	Pharmaceuticals and Value education
23	Dr. Archana Kalekar	Physics, Color Physics	Physics
24	Prof. Bhalchandra Mahadeo Bhanage	Organic Chemistry, Industrial Organic and Inorganic Chemistry	Chemical Science
25	Dr. Stuti Borgohain	Engineering Applications of Computers, MATHEMATICS	Mathematics
26	Dr. Usha Afroz Syed	Dyeing and Printing Technology, Fibre Technology	Textile Technology
27	Prof. Ravindra Dondiba Kale	Textile Processing, Textile Technology, Textile Dyeing	Textile Technology
28	Prof. Ravindra Dattatraya Kulkarni	OILS, OLEOCHEMICALS AND SURFACTANTS TECHNOLOGY	Chemical Technology
29	Dr. Shamlan M.S Reshamwala	Design and Analysis of Experiments, Biotechnology	Mathematics/Statistics/Biotechnology
30	Prof. J. B. Joshi	Reactor design and CFD, Chemical Engineering	Chemical Engineering

#### 4.6. Innovations by the Faculty in Teaching and Learning (5) Self-Assessed Marks: 5

Innovative teaching methodologies help faculty to deliver their lectures in a faster and efficient manner thereby allowing the students to keep abreast of technological advancements. In addition, innovative teaching aids also impart rationale thinking and self-sufficient thought process in the

mindsets of students by making them more proactive. Few of the innovative teaching techniques adopted in the department are briefly tabulated below:

<b>Innovative Teaching Execution Plan</b>	The teacher explains some topics in their regular teaching process using Software Tools /Animation / Videos to simplify their presentation.	<b>Expected Outcomes:</b> 1. Simple way of presenting subject knowledge than from the regular teaching practices. 2. Student can understand the concepts in a better way.
<b>Each One, Teach One</b>	Each One, Teach One is collaboration between the faculty and students with the opportunity to learn and share knowledge about their peers. The idea is to spread knowledge for the betterment of their batch. This methodology helps the students to improve their presentation, communication skills, knowledge levels in the concepts by self-preparation and presentation. It helps the students to enrich themselves towards self - learning and employability. Group presentation, group experiments, are regularly practiced.	<b>Expected Outcomes:</b> • Improvement of self-learning • Improvement of presentation skills • Improvement of subject knowledge
<b>E-Learning</b>	Advanced Learners are encouraged to read subjected related materials published by the faculties in research journals and also encouraged to take up various certification courses. The recent pandemic has helped students to register for several online courses offered by different foreign universities. Students and faculty members are encouraged to register for the NPTEL program/ online certification courses of their own areas of teaching and research interests, for enhancing their teaching skills, smooth conduct of the teaching process in the regular class room teaching and for understanding the potential concepts much effectively. List of few students who have taken the online courses from Coursera. <b>Shruti Verma (18DYE116):</b> <ul style="list-style-type: none"> <li>• Industrial Biotechnology (University of Manchester)</li> <li>• Chemicals and Health (John Hopkins)</li> <li>• Design Thinking by Innovation (University of Virginia)</li> <li>• Introduction to Physical Chemistry (University of Manchester)</li> <li>• Fundamentals of Macroscopic and Microscopic thermodynamics (University of Colorado)</li> <li>• Quantum Mechanics (University of Colorado)</li> <li>• Phyton for Everybody (University of Michigan)</li> </ul> <b>Ruchira Iyer (18DYE112)</b>	<b>Expected Outcomes:</b> <ul style="list-style-type: none"> <li>• Improvement in the ability to learn independently</li> <li>• Improvement in the knowledge on modern research</li> <li>• Improvement in the IT knowledge skill</li> </ul>

	<ul style="list-style-type: none"> <li>• Drug Discovery (University of San Diego)</li> <li>• Drug Development (University of Sandiego)</li> <li>• Chemicals and Health (John Hopkins)</li> <li>• EdX courses Management in Engineering: Accounting and Planning (MIT)</li> </ul> <p><b>Ria Patkeshwar (18DYE110)</b></p> <ul style="list-style-type: none"> <li>• Finicial Markets (Yale University)</li> <li>• Finance for non-finance professionals (University of California)</li> <li>• Excel skills: Essentials (Macquarie University)</li> </ul> <p><b>Sai Nehete (18DYE113)</b></p> <ul style="list-style-type: none"> <li>• Chemicals and Health (John Hopkins)</li> <li>• Introduction to Molecular Spectroscopy (University of Manchester)</li> </ul> <p><b>Subhankar Khandagale (18DYE118)</b></p> <ul style="list-style-type: none"> <li>• Nanotechnology: A makers Course (Univ of North Carolina)</li> </ul> <p>Nanotechnology: Introduction, Essentials and Oppurtunities (Udemy)</p> <p><b>Abhisekh Muthiyan (18DYE101)</b></p> <ul style="list-style-type: none"> <li>• Personal and Family Financial Planning (University of Florida)</li> <li>• Programming for Everybody (University of Michigan)</li> <li>• “Safety in Utility Industry (University of Buffalo)</li> </ul> <p>Now a MOOC course has been incorporated in the revised syllabus in the final year where students are free to choose any course form the online learning platform after discussion with the departmental HoD (refer the revised syllabus provided at the end of the assessment from). Various online training programmes has also been arranged for the faculty members:</p> <ol style="list-style-type: none"> <li>1. Training on JoVE</li> <li>2. Training on Grammerly</li> </ol>	
<b>Employability Training</b>	<p>In view of the employability of the students, Department has been providing the technical and soft skills training by organizing industry readiness programmes in the form of workshops. The Soft skills trainings for all the students were conducted by eminent trainers. The training covers Communication Skills, Email Etiquettes, Resume Writing and personality development.</p> <ul style="list-style-type: none"> <li>• <b>Industry Readiness programme</b> was held in ICT for Textile and Dyes Final Year B Tech students held on 27<sup>th</sup> Feb 2019. The talk was conducted by Mr Lalit Khurana, Associate Vice President and Operations Head -Bharat Bill Payment System and Mrs Aparna</li> </ul>	<p><b>Expected Outcomes:</b></p> <ul style="list-style-type: none"> <li>• Improvement in soft skills</li> <li>• Improvement in personality</li> <li>• Improvement in employability of the student</li> </ul>

	<p>Khurana, India Head, Azelis Ltd. from 3.00 to 6.00 pm. The programme covered important topics like resume preparation, how to handle the interview, soft skills, communication skills etc.</p> <ul style="list-style-type: none"> <li>• <b>Industry Readiness Programme conducted for the 3rd and 4<sup>th</sup> Year B.Tech (Dyes) students:</b> Date: 9<sup>th</sup> Nov 2019, Venue: KV Auditorium, Time: 9:30 am to 1:30 pm, Resource person: Colonel Mukundrai Kamath (ex-Indian Army). Training on soft skills and interview handling.</li> </ul>	
<p><b>Innovative Instructional Methods</b></p>	<ul style="list-style-type: none"> <li>• Use of modern teaching aids like LCD projectors, and such other methods are deployed in classrooms and other student learning environments.</li> <li>• Academic discussions: Individual faculty and/or expert faculty initiate and monitors academic discussions on selected topics in class room among students while sharing study material in respect of these topics.</li> <li>• Project based learning: Project based learning, case studies. The case studies in respect of selective topics are placed in the website. They are discussed in the class in details</li> <li>• Digital library and Open-source platforms: Digital library facilitate the faculty and students with E-journal (ACS/RSC/Wiley/Springer etc),</li> <li>• Enhancement of teaching skills: Faculty members use department library, digital library and other faculty development programmes to enhance their teaching skills. The faculty members are encouraged to participate in short term courses, faculty development programs and workshops on advanced topics to keep pace with the advanced level of knowledge and skills.</li> <li>• Interactive Learning It is a creative learning that encourages student to independently learn through the use of computer technology or electronic media. It is a hands-on, real-world approach to education. These are practiced in this department with the following methodologies.</li> </ul> <p>One of our departmental students Divyaxa Agnihotri <b>(18DYE105)</b> won the BSE Impact Hackathon August 2019 challenge. BSE Hackathon provides innovative ideas regarding various issues.</p>	<ul style="list-style-type: none"> <li>• Expected outcomes:</li> <li>• Improvement in collaborative learning ability</li> <li>• Improvement in the ability to learn independently</li> <li>• Improvement in the teaching skills</li> </ul>



*Winning team of ICT at BSE Hackathon  
2nd year dyes tech, Divyax is at the centre, Ruchi and Sahil  
from textile, Chahat from oils, Divyaxa from dyes.*



**Figure.** Industry readiness programmes conducted by the department.

**Fw: Training Session on JoVE Resources for Faculty Members**

1 message

VC <vc@ictmumbai.edu.in>

12 March 2021 at 17:33

To: All faculty members of ICT <allfaculty@ictmumbai.edu.in>

Dear Faculty members,

Prof. M M Sharma invites you for a training session (online webinar) on JoVE (Video Journals) for ICT faculty members focusing on 'Using JoVE In your Classroom: Embedding videos for Off-campus access- Microsoft PPT, Microsoft Teams, Zoom.'

The Training webinar is scheduled on

Date: 19th March 2021

Time: 3pm

Register Here: <https://info2.jove.com/ICTwebinar>

**JoVE | Peer Reviewed Scientific Video Journal - Methods and Protocols**

JoVE publishes peer-reviewed scientific video protocols to accelerate biological, medical, chemical and physical research. Watch our scientific video articles.

[info2.jove.com](http://info2.jove.com)

Attached please find the flyer of the webinar.

Thanks & regards,

Madhavi Wadkar

Sr. Librarian

Prof. M M Sharma Library

Institute of Chemical Technology

**BridgePeople**  
Technology Solutions

Invites you to an online workshop on  
**Improving research writing using**  
**grammarly**  
The world's No. 1 Research Writing Software

**Exclusively for**  
**Institute of Chemical**  
**Technology**

- 40+ Checks on Grammar than nearest Word editor.
- Ensure perfect style, structure and format of technical English.
- Preventive Audit with Citation Audit tool to prevent plagiarism before it happens.
- Use Grammarly where you want with its MS Word, Outlook and Browser Plugins.
- Improve author confidence and improve publication efficacy.

Presenter :  
  
**Kishish Iyer**  
Treasurer  
Bridge People Technology Solutions

**11 JAN**  
**2022**  
Tuesday  
3:00 PM to 4:00 PM

**register NOW!**

<https://meet.zoho.in/eFBVefFukh>

Participation based on Registration on first come first serve basis

Co-ordinator : Madhavi Wadkar | [m.wadkar@ictmumbai.edu.in](mailto:m.wadkar@ictmumbai.edu.in)

Use of Email to communicate with the students – Notices, Assignments, Deadlines etc. are communicated to the students via email thereby making communication very prompt. The college website/MIS/GEMS has been made very student friendly wherein academic year are made available to the students via their individual log- ins. The best way to judge the student’s grasping of a subject is by the means of class tests and assignments. As a part of our continuous efforts to groom our students, Final Year BTech students are encouraged to take up a research project. The findings of their research are then published in international journal so that others can make use of their findings.

**4.7. Faculty as participants in Faculty development/training activities/STTPs (10) Self-Assessed Marks: 5**

- A Faculty scores maximum five points for participation
- Participation in 2 to 5 days Faculty/Faculty development program: 3 Points
- Participation >5 days Faculty/ Faculty development program: 5 points

**Table B.4.7**

CAYm1 (2020-2021)				
Sl. No.	Name of the Faculty	Faculty Participation as (Resource person/participant)	Activity Details and number of days	Number of days
1	Dr. Satyajit Saha	Participant	Two days International Seminar on Chemical and biological sciences 8/1/2020 to 9/1/2020	2
2	Dr. Satyajit Saha	Participant	Video Presentation in Seminar on " Recent Advances in Chemistry and Material Sciences"	2
3	Dr. Satyajit Saha	Participant	Attended International Seminar on " Recent Advances in chemistry & Material Sciences"	2
4	Dr. Satyajit Saha	Participant	Attended Virtual e-conference VirtCon 2020	1
5	Dr. Satyajit Saha	Participant	Oral Presentation on 57th Annual Convention of Chemists and International Conference on Recent Trends in Chemical Science 26/12/2020 to 28/12/2020	3 days
6	Dr. Satyajit Saha	Participant	Research Interaction/ Membership and Discounted Registration fees for subsequent conferences 29/11/2020 to 1/12/2020	3 days
7	Dr. Satyajit Saha	Participant	International conference on Sustainable Research Technology and Development (IOCSRT-2020)	>5 days

			24/9/2020 to 25/9/2020	
8	Prof. N. Sekar	Participant	Online Professional Development Training 7/12/2020 to 9/12/2020	3 days
9	Prof. G. S. Shankarling	Participant	Professional development Training 14/12/2020 to 18/12/2020	5 days
10	Dr. G. S. Shankarling	Participant	Online The Art of Living Productivity Enhancement Program (PEP) 17/8/2020 to 20/8/2020	4 days
11	Dr. N. Sadhukhan	Participant	Online training Planner FY 2020-21 Ministry of Micro Small & Medium Enterprises Fragrance and flavour Development Centre, Kannauj organised " Training cum Workshop on Essential Oil, Perfumery and Aromatherapy"	1 day
12	Dr. N. Sadhukhan	Participant	Visit to Indian Jute Industries Research association Kolkata to learn the application of jute fibre for sanitary pad production	5 days
<b>CAYm2 (2019-2020)</b>				
1	Dr. Satyajit Saha	Participant	Workshop on " Strategic Quality Initiatives in Technical Education"	1 day
<b>CAYm2 (2018-2019)</b>				
1	Prof. N. Sekar,	Participant	Pedagogy and Management Capacity Enhancement Programme for Teaching Staff 25/02/2018 to 01/03/2018	5 days
2	Prof. N. Sekar	Participant	Science writing skills for Better paper writing, book writing 16/04/2018 to 21/04/2018	5 days
3	Dr. Nabanita Sadhukhan	Participant	Orientation Programme at UGC Human Resource development centre ,University of Mumbai 5/10/2018 to 2/11/2018	>5 days
4	Dr. Satyajit Saha	Participant	<u>Refresher course in Chemistry Advance in Chemical Science and Technology</u> 12/11/2018 to 1/12/2018	>5 days
5	Dr. N. Sekar	Participant	Training programme on National Workshop on NBA and NAAC Accreditation for all TEQIP-III Funded Universities and Institutions 18/07/2018 to 22/07/2018	5 days
6	Prof. N. Sekar	Participant	Learn the electronic structure theory and quatum mechanical corruption 14/01/2019 to 19/01/2019	>5 days
7	Dr. G. S. Shankarling	Participant	Participate in Silver Jubilee Seminar on Technology Options for sustainable Growth of Indian Chemical Industry	2 days



			8/01/2019 to 9/01/2019	
8	Dr. Nabanita Sadhukhan	Participant	Attend an Orientation Programme as essential part of my curriculum to get higher level promotion that a rule set by UGC under career advancement scheme 1/02/2019 to 28/02/2019	>5 days
9	Dr. N. Sekar	Participant	Two week Workshop on "Recent Advances in Solar Energy Technologies for Sustainable Development" 29/04/2019 to 11/05/2019	>5 days
10	Dr. Satyajit Saha	Resource person	Invited to deliver an invited talk on "Characterization of Materials" 9/05/2019	1 day
11	Prof. Prakash M. Bhate	Resource person	Sustainable waste management: Municipal solid waste and E-waste, IGCS Winter School IIT Madras, 1 day	1 day

#Faculty names not included who does not belong to the Department of Dyestuff Technology

#### 4.8. Research and Development (30)

##### 4.8.1. Academic Research (10) **Self-Assessment Marks: 10**

Academic research includes research paper publications, Ph.D. guidance, and faculty receiving Ph.D. during the assessment period.

- Number of quality publications in refereed/SCI Journals, citations, Books/Book Chapters etc. ( 7 )
- Ph.D. guided /Ph.D. awarded during the assessment period while working in the institute ( 3 )

All relevant details shall be mentioned.

Assessment Year: 2020-2021										
Sl. No.	Name of the faculty	Number of publications			Number of Ph.D awarded /guided			Ph.D degree received		
		CAYm1	CAYm2	CAYm3	CAYm1	CAYm2	CAYm3	CAYm1	CAYm2	CAYm3
1	Prof. N. Sekar	7	52	53	0	4	8	0	0	0
2	Prof. G. S. Shankarling	5	8	18	0	1	5	0	0	0
3	Dr. S. Saha	6	4	2	0	1	0	0	0	0
4	Dr. S. Some	10	4	3	0	3	0	0	0	0
5	Dr. N. Sadhukhan	0	0	0	0	0	0	0	0	0
6	Dr. S. Garimella	0	0	0	0	0	0	0	0	0
7	Prof. Prakash M. Bhate	1	0	0	1	1	2	0	0	0
8	Prof. Anniruddha Bhalchandra Pandit	14	20	11	3	5	2	0	0	0

9	Prof. Anand Vinayak Patwardhan	2	2	3	0	2	2	0	0	0
10	Prof. Pushpito K Ghosh	2	0	10	0	0	0	0	0	0
11	Dr. Sachin Jadhav	1	2	10	0	0	0	0	0	0
12	Dr. Manish Kumar Yadav	3	1	4	0	0	0	0	0	0
13	Prof. Parag Ratnakar Gogate	49	24	27	4	4	1	0	0	0
14	Prof. Virendra Kisan Rathod	23	25	25	1	4	6	0	0	0
15	Prof. Prakash Dhundiraj Vaidya	5	8	11	0	2	5	0	0	0
16	Dr. Ashwin Mohan	0	1	0	0	0	0	0	0	0
17	Prof. Vineeta Dinesh Deshpande	3	2	5	0	0	1	0	0	0
18	Mr. Mohammed Amin Kassamali Kerawalla	0	0	0	0	0	0	0	0	0
19	Purna Goswami	1	2	0	0	0	0	0	0	0
20	Prof. Dilip Dhondu Sarode	2	2	1	0	0	0	0	0	0
21	Dr. Kedar Kulkarni	5	0	0	0	0	0	0	0	0
22	Prof. Pradeep Ratilal Vavia	9	5	3	0	7	2	0	0	0
23	Dr. Archana Kalekar	1	2	0	0	4	1	0	0	0
24	Prof. Bhalchandra Mahadeo Bhanage	25	22	35	0	3	4	0	0	0
25	Dr. Stuti Borgohain	0	0	2	0	0	0	0	0	0
26	Dr. Usha Afroz Syed	5	1	0	0	0	0	0	0	0
27	Prof. Ravindra Dondiba Kale	3	6	8	1	1	2	0	0	0
28	Prof. Ravindra Dattatraya Kulkarni	5	0	5	0	0	0	0	0	0
29	Dr. Shamlan M.S Reshamwala	2	7	0	1	0	0	0	0	0
30	Prof. J. B. Joshi	22	20	32	0	0	0	0	0	0

#### 4.8.2. Sponsored Research (10) Self-Assessment Marks: 10

- Funded research from outside:

(Provide a list with Project Title, Funding Agency, Amount and Duration) Funding Amount

(Cumulative during CAYm1, CAYm2 and CAYm3):

Assessment year: 2020-2021				
Sl. No.	Name of the faculty Project title	Duration	Amount	Funding agency
1	(Dr. Satyajit Saha and Prof. G. S. Shankarling), PURSE, Synthesis of N-heterocycles and anthraquinone derivatives through sustainable route	4 years	DST-PURSE	26.0 crore (shared among multiple PIs)
2	Dr. Nabanita Sadhukhan, "Synthesis and characterization of novel photosensitizer textile dyes with photo-inactivation ability of	3 years	BRNS	29,34,050/-

	viruses and microbes: An expeditious approach to make self-cleaning and self-sterilizing fabric".			
<b>Assessment year: 2019-2020</b>				
Sl. No.	Name of the faculty Project title	Duration	Amount	Funding agency
1	<b>(Prof. GS Shankarling, Prof. N. Sekar, Dr. S. Saha, Dr. S. Some and Dr. N. Sadhukhan)</b> DST-FIST	5 Years	DST	20850000.00
2	<b>Prof. G. S. Shankarling</b> , Synthesis and Purification of Spectroscopic Grade Cucurbit[7]uril for Hig	1 Year	DAE-BRNS	636800.00
3	<b>Prof. G. S. Shankarling</b> , Laser Dyes	3 years	DAE-ICT	3482500.00
4	<b>Prof. N. Sekar</b> , DSSC3	3 years	DST - CERI	4190412.00
5	<b>Dr. S. Some</b> , Development of Graphene-based Supercapacitor employing improved protocols for prep	1 year 6 months	ONGC	1470000.00
6	<b>Dr. S. Some</b> , Development spongy Graphene materials for Recovery of Crude oil from Effluent water.	1 year 3 months	ONGC	1459000.00
<b>Assessment year: 2018-2019</b>				
Sl. No.	Name of the faculty Project title	Duration	Amount	Funding agency
1	<b>Dr. Satyajit Saha</b> , Design and synthesis of novel organic dyes with twisted architecture for applications in DSSC	1 year (2018-19)	ICT Mumbai-Golden Jubilee Research Grant	40000.00
2	<b>Dr. Satyajit Saha</b> , Process intensification by continuous-flow production of 2-aryl- 1,2,3,4-tetrahydroquinox	20 months	TEQIP-III	750000.00
3	<b>Prof. G. S. Shankarling</b> , Deep Eutectic Solvents as a greener media for oxidation reactions	18 months	TEQIP-3	635000.00
4	<b>Dr. S. Some</b> , Green approach towards the synthesis of conductive paint from biomass	2 years 1 month	TEQIP	857073.00
5	<b>Dr. Nabanita Sadhukhan</b> , Novel approach to make tailored design molecular glue from bioinspired dye molecule: e	3 years	CSIR	1298667.00
<b>Cumulative funding during CAYm1, CAYm2 and CAYm3 &gt;50 lakhs</b>				Total Amount(Y): 38606102

#Faculty names not included who does not belong to the Department of Dyestuff Technology

#### 4.8.3. Development activities (5) Self-Assessment Marks: 10

Assessment years (2018-2019)		
Sl. No.	Name of the faculty	Development activities (product development) (Patent filing on developed products)
1	Dr. Surajit Some	Patent filling on the Topic" Synthesis Polymer functionlized graphene composite efficient flame retardant"
2	Dr. Surajit Some	Patent filling for " Development of Greener method to synthesize the biodegradable Polymer"
3	Dr. Surajit some	Development of efficient flame retardant material for effective smoke absorption application
8	Dr. Surajit Some	Patent Filling for Preparation of green cosmetics from natural preareness
14	Prof. P. M. Bhate	Noval reactive dye system based on diazonium salt and preparation disperse a2o dyes from cyclic and ethers
Assessment year (2019-2020)		
Sl. No.	Name of the faculty	Development activities (product development) (Patent filing on developed products)
1	Prof. G. S. Shankarling	Patent application number 201621010043
2	Prof. G. S. Shankarling	Patent application number 211/MUM/2011
Assessment year (2020-2021)		
Sl. No.	Name of the faculty	Development activities (product development) (Patent filing on developed products)
1	Dr. G. S. Shankarling	Patent application number 211/MUM/2011
2	Dr. G. S. Shankarling	Patent application number 201621010043
3	Dr. G. S. Shankarling	Patent entitled "Lignin sulphonate AZO derivatives as leather Dyes and Process of Preparation Thereof"
4	Dr. G. S. Shankarling	Patent application no 201621012243
5	Dr. Surajit Some	Manufacturing Method of Biobased flame retardants functionalised with graphane
6	Dr. Surajit Some	Development of sustainable Black conductive paint
7	Dr. Surajit Some	Green approach towards the synthesis of cosmetics from natural Precursors

#Faculty names not included who does not belong to the Department of Dyestuff Technology

#### Renovation of the department building:

- Pilot plant building was renovated into Process Innovation Lab.
- Generous donation was done by Colortex.
- Modern laboratory facility
- AC offices
- Instrumental room
- Fume hoods installed

### Infrastructural Facility

- All the faculties have their individual cabins.
- All classrooms are equipped with white/blackboard, computer, internet, projectors, and a biometric attendance system
- All the computers in the department are equipped with relevant software and internet facility
- During a pandemic, Internet speed increased from 50 Mbps to 100 Mbps
- G suit and zoom licenses for all departments
- Off-campus online access to library

#### 4.8.4. Consultancy (from Industry) (5) Assessed marks = 5

<b>Assessment year: 2020-2021</b>					
Sl. No.	Name of the faculty	Project title	Funding agency	Amount	Duration
	Prof. G.S.Shankarling	Process and product development	M/s.Indo Borax & Chemicals Limited	50000	1
		Process and product development	M/s. Colorband Dyest off Pvt Ltd	750000	1
<b>Assessment year: 2019-2020</b>					
Sl. No.	Name of the faculty	Project title	Funding agency	Amount	Duration
1	Prof. G.S. Shankarling	Process and product development	M/s. Heubach Colour Pvt Ltd	50000	1
		Process and product development	M/s. Serra Fine Chemical pvt ltd	75000	1
		Process and product development	M/s. Astik Dyestuff pvt Ltd	360000	1
		Process and product development	M/s. SBL Colortech Pvt Ltd	600000	1
2	Prof. N. Sekar	Process and product development	M/s Essilor Research Development	450000	1
		Process and product development	M/s. Wool Research Association	25000	1

		Process and product development	M/s. Gopinath Chemtech Ltd	105000	1
<b>Assessment year: 2018-2019</b>					
Sl. No.	Name of the faculty	Project title	Funding agency	Amount	Duration
1	Prof. Prakash Bhate	Process and product development	M/s. Sulfast Chemicals Industries (1st Installment )	600000.00	1
		Process and product development	M/s. Nocil Ltd.	750000.00	1
2	Prof. G.S. Shankarling	Process and product development	M/s. A-One organics Pigments Pvt. Ltd.	100000	1
		Process and product development	M/s. Borax Manufactures Association of India	50000	1
	Prof. N. Sekar	Process and product development	M/s. Deepak Nitrate Limited	900000	1

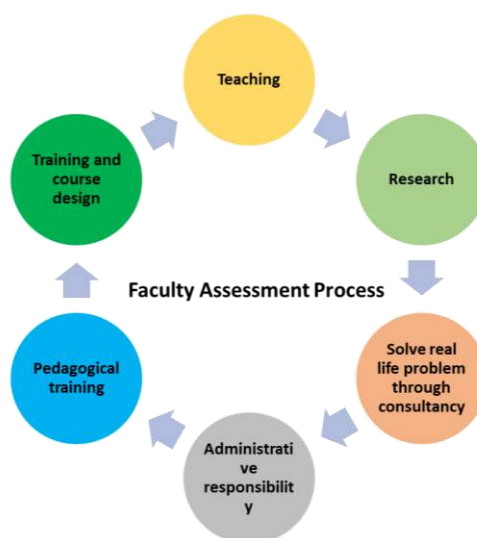
#### 4.9. Faculty Performance Appraisal and Development System (FPADS) (5) **Self-Assessment Marks = 5**

**Well-defined system for faculty appraisal:** Faculty members of Higher Educational Institutions today have to perform a variety of tasks pertaining to diverse roles. In addition to instruction, Faculty members need to innovate and conduct research for their self-renewal, keep abreast with changes in technology, and develop expertise for effective implementation of curricula. They are also expected to provide services to the industry and community for understanding and contributing to the solution of real-life problems in industry. Another role relates to the shouldering of administrative responsibilities and cooperation with other Faculty, Heads-of-Departments and the Head of Institute. An effective performance appraisal system for Faculty is vital for optimizing the contribution of individual Faculty to institutional performance. Faculty members regular undergo subject training, pedagogical training and management training conducted by UGC, ASC, TEQIP, AICTE, DST-SERC and other agencies. Apart from the trainings, they are actively involved in online course designs, short term certificate courses and technological event managements. Participation of faculty members in the faculty development programs. The assessment of the faculty is based on their teaching, research, consultancy, administrative responsibilities, course developments along with their regular pedagogical training to upgrade their knowledge and skills. Faculty performance appraisal is through the feedback received from the students, research output, consultancy, PhD/M.Tech guidance, administrative responsibilities, as well as self-improvement through pedagogical trainings. A faculty appraisal form also needs to be submitted to the administrative department with confidential report from the HoD for the faculty appraisal.

The faculty performance is assessed annually by the Self-Appraisal method, Peer Evaluation and a robust Student Feedback System. The analysis is done based on the following parameters: Results,

number of seminars, conferences and QIPs attended, contribution to the college and community, books, papers and patents published, grants received and special awards, consultancy work; student feedback is however, given top priority and this is duly communicated at personal level by the HoD to the teacher. The “Best Teacher” award has also been instituted wherein a teacher receives a certificate and memento during the annual function at the hands of the Chief Guest. The college also encourages Faculty Self Development through upgrading education by offering full support in terms of facilities provided. Faculty participation in continuing education programs, various national and international conferences, sponsored registration and workshops is encouraged. This appraisal system has given way for further enhancement and up-gradation of their skills and knowledge.

<b>Faculty appraisal system</b>	Teaching	Research & Consultancy	Faculty development programmes
	Student Feedback	Pedagogical trainings	Administrative responsibilities



**Implementation and effectiveness:** The institute also has “Best Teacher Award” which creates a sense of competition to excel in their performance. A sample feedback report of faculty is shown here:

Institute of Chemical Technology						
Institute Of Chemical Technology						
Feedback Report						
Feedback Jan- May 2021						
Total No Of Student Who given feedback: 14						
Total No Of Student For This Course: 17						
Student Feedback Jan-May 2021						
Course Name : DYT1107- TECHNOLOGY OF PIGMENTS						
Course Evaluation Parameters	Poor (%)	Inadequate (%)	Average (%)	Good (%)	Very Good (%)	Excellent (%)
1. Your satisfaction about examination in terms of questions being based on syllabus adequately, Assessment of paper being fair and answer-books being shown/revised	0	0	14.29	14.29	35.71	35.71
2. Your satisfaction about availability and approach-ability of teacher as well as his/her attitude towards students.	0	0	14.29	21.43	28.57	35.71
3. Your satisfaction about the ability of teacher to present ideas clearly, control the class adequately being enthusiastic in generating interest in the subject.	0	0	14.29	14.29	35.71	35.71
4. Your satisfaction about the syllabus coverage, lecture being organized well, and being helpful in developing understanding, use of the board and appropriate modern tools.	0	0	14.29	21.43	28.57	35.71
5. Overall grade	0	0	14.29	14.29	35.71	35.71

A well-defined self-appraisal system is implemented effectively. A screenshot of the Performance Based Appraisal Form is given below. The Head of the department evaluates every faculty member based on their performance each year.

-Since Sep 2021, a revised career advancement scheme (CAS) has been implemented by the institute which includes the 360-degree feedback as given below. Every activity has been assigned specific marks. In this way, these activities are recognized and rewarded during the promotion.

Teachers Training Workshop organized as a part of faculty development system. The virtual programme was conducted on June 28<sup>th</sup> 2021. Faculties across all the campuses of ICT participated in this training workshop



### परिशिष्ट - ब (भाग - २)

घट "अ" ते घट "क" चे शासकीय अधिकारी / कर्मचारी यांच्यासाठी गोपनीय अहवालाचे स्वयंमूल्यान्वयनिर्धारण अहवाल प्रपत्र

#### स्वयंमूल्यान्वयनिर्धारण अहवाल लिहिताऱ्या अधिकाऱ्यांना / कर्मचाऱ्यांना सूचना

- जर उद्दिष्टे ठरवून देण्यात आली असतील तर ती उद्दिष्टे सर्वसाधारण सूचनांनुसार अथवा विशेष सूचनांनुसार ठरवून देण्यात आली होती का अद्यापसाठीच तसेनुसार ठरविण्यात आली होती.
- सर्व दैनंदिन कामाची यादी वेळे वेळे नवे फक्त टाळक, वैशिष्ट्यपूर्ण व उल्लेखनीय कामगिरीचा उल्लेख करावा. (उद्दिष्टे ठरवून देण्यात आली असल्यास उद्दिष्टांचा संदर्भ देऊन) संदिग्ध विधाने टाळावीत व नेपके विधान करावे.
- तुमच्या कामगिरीबाबतचे तुमचे अधिष्ठापक दिलेल्या जागेवरुद्धे मर्यादित ठेवावेत. काहीही सहाय्ये त्यास जोडू नयेत. ती गोपनीय अहवालाच्या नमूनेत ठेवली जाणार नाहीत व कर्मचाऱ्यांस परत करण्यात येतील.
- "मी माझ्या बरिष्ठतेने समाधान / पूर्ण समाधान हाईपरवीत काम केले" किंवा "बरिष्ठांना माझे काम नवाजले" अशी किंवा अशासारखी विधाने करू नयेत. अशी विधाने केल्यास ती दुर्लक्षित करण्यात येतील.
- स्वयंमूल्यान्वयनिर्धारण अहवाल अर्ध्या पानातच लिहवा.
- स्वयंमूल्यान्वयनिर्धारण अहवाल अधिकारी / कर्मचारी यांचे त्यांना प्राप्त झाल्यापासून १५ दिवसांच्या आत प्रतिवेदन अधिकाऱ्यांकडे द्यावे.

#### प्रतिवेदन अधिकाऱ्यांना सूचना

- गोपनीय अहवाल लिहिताऱ्या कर्मचाऱ्यांनी भाग-३ मध्ये लिहिलेल्या स्वयंमूल्यान्वयनिर्धारण अहवाल विचारात घ्यावा व तसा तो घेतला गेला असल्याचा विशिष्ट उल्लेख गोपनीय अहवालात करावा.
- घरील सूचना क्रमांक ६ अनुसार स्वयंमूल्यान्वयनिर्धारण अहवाल प्राप्त न झाल्यास प्रतिवेदन अधिकारी स्वतः गोपनीय अहवाल लिहू शकत.
- प्रतिवेदन अधिकाऱ्यांनी गोपनीय अहवालाच्या प्रपत्रात दिलेल्या पर्यायांची एक पर्याय निवडून त्यापोवती वस्तुतः उदा. अ.क्र.४ उद्योगप्रियता व कार्यक्षमता या समोर उत्कृष्ट असे श्रेरे द्याव्याचे असल्यास ते खालीलप्रमाणे देण्यात यावेत.

अत्युत्कृष्ट      उत्कृष्ट      चांगले      साधारण      साधारणपेक्षा कमी

- काणासवगीय अधिकारी / कर्मचारी यांना येणाऱ्या अहवालाची समजूत घेऊन त्या दूर करण्याच्या दृष्टीने अधिकारी / कर्मचारी यांनी केलेले प्रयत्न व त्यांच्याबाबतचा दृष्टिकोन याबाबतची नोंद परिशिष्ट "ब" (भाग-४) मधील बाब क्रमांक १० येथे नमूद करावी.
- (अ) गोपनीय अहवालाच्या प्रपत्रातील बाब क्र. ३, ९, १०, ११ व १८ या समोरील श्रेरे, तसेच प्रतकारी स्वतःच्या हस्ताक्षराने लिहावी.  
 (ब) प्रतकारी नमूद करताना ती अहवालातील रकान्यासमोरील अधिप्रापारी मिळती जुळती राहिल याची दखल घ्यावी.  
 (क) अत्युत्कृष्ट श्रेरे नोंदविताना गोपनीय अहवाल काळातील कर्मचाऱ्यांच्या कामकाजाच्या मूल्यांकनासाठी ठेवलेल्या कळ्या टिपणावरून (Ephemeral Roll) अत्युत्कृष्ट श्रेऱ्यांच्या पृष्ठवर्ष वस्तुस्थितीदरमक समर्पन गोपनीय अहवालात देणे आवश्यक आहे.  
 (ड) साधारण, सर्वसाधारण, बरा, ठीक, सुखा या श्रेऱ्यांची वर्गीवारी प्रतिकूल स्वरुपाची असल्याचे प्रतिवेदन अधिकाऱ्यांनी लक्षात घ्यावे.

#### पुनर्विलोकन अधिकाऱ्यांना सूचना

- अधिकारी / कर्मचारी यांच्या कामाबाबतची प्रतकारी लिहावी.
- प्रतकारी नमूद करताना ती अहवालातील रकान्यासमोरील अधिप्रापारी मिळती जुळती राहिल याची दखल घ्यावी.
- अत्युत्कृष्ट श्रेरे नोंदविताना त्यांच्या पृष्ठवर्ष वस्तुस्थितीदरमक समर्पन नोंदकावे.

**ANNEXURE - B**

**Institute Notification No. CAS Policy/7<sup>th</sup> pay commission/95/2021, dated 1<sup>st</sup> September, 2021**

**CALCULATION OF 360<sup>th</sup> FEEDBACK SCORE**

Name	
Present Position	
Period of Assessment	

**a. Teaching Process (maximum points 25)**

SN	Semester	Course Code/ Name	No. of scheduled classes	No. of actually held classes	Points earned (x/25)	Enclosure
1						
2						
<b>Total</b>						

\*Refer Annexure – 1

**b. Students feedback (maximum points 25)**

SN	Semester	Course Code/ Name	Average student feedback on the scale of 25	Enclosure No.
1				
2				
<b>Total average</b>				

\*Refer Annexure – 2

**c. Departmental activities (maximum points 20)**

Sr. No.	Semester	Activity	Credits	Criteria	Enclosure No.
1					
2					

\*Refer Annexure – 3

**d. Institutional activity (maximum points 20)**

Sr. No.	Semester	Activity	Credits	Criteria	Enclosure No.
1.					
2.					

\*Refer Annexure – 4

**e. Annual Confidential Report (maximum points 10)**

Sr. No.	Year	Activity	Credits	Criteria	Enclosure No.
1.					
2.					

\*Refer Annexure – 5

*RRR*

Proposed Teachers' Training Workshop on June 28, 2021, ICT

link <http://meet.google.com/qgx-sdfr-mwd>

No	Time	Session		Title
1	0900-0920	Inauguration	Vice Chancellor, Dean AP	Opening remarks
2	0930-1030	Session I	Prof A W Patwardhan	Tips for Effective Teaching and Evaluation
3	1045-1145	Session II	Dr Savita Ladage, HBCSE	Learning and assessment in undergraduate laboratory courses: Some reflections
4	1200-1300	Session IV	Dr Anala Pandit, VJTI	Offline to Online: Changes, Do's and Don'ts
	1300-1400	Lunch		<i>Wish we could have it together!</i>
5	1400-1500	Session III	Prof A. B. Pandit, ICT	Purpose and Objectives of classroom teaching and Do's and Don'ts of interactions with students outside classroom
6	1515-1615	Session V	Dr Rajeev Basurdekar	How students learn in classroom & How to know what they have learnt.
7	1630-1730	Session VI	Mr Dilip Udas, UAA	Corporate expectations and syllabus
8	1730	Conclusion	Vice Chancellor, Dean AP	Concluding remarks

#### 4.10. Visiting/Adjunct/Emeritus Faculty etc. (5) **Self-Assessment Marks = 1+2 = 3**

Sl. No	Name of the faculty	Subject	CAYm1 (2021-2022) Hours taken/week	CAYm2 (2020-2021) Hours taken/week	CAYm3 (2019-2020) Hours taken/week
1	Nikhil Pravin Mamaniya	Engineering Applications of Computers <b>MAP 1201</b>	4 h/w (45 hours total)	-	4 h/w (45 hours total)
2	Aniruddha Shenvi	Chemical Engineering Operations ( <b>CET1401</b> )	3 h/w (30 hours total)	-	3 h/w (30 hours total)
3	Rachana Giara	Industrial Psychology and Human Resource Management <b>HUT 1103B</b>	3 h/w (30 hours total)	3 h/w (30 hours total)	-
4	Visiting Faculty	Industrial management I <b>HUT 1104B</b>	3 h/w (30 hours total)	3 h/w (30 hours total)	-
5	Rachana Giara	Value Education	-	1 h/w (15 hours total)	-
6	A. V. Joshi	Environmental Science and Technology <b>HUT 1106</b>	3 h/w (30 hours total)	3 h/w (30 hours total)	-
7	Gail Camerio	Aromatic and Heteroaromatic Chemistry <b>CHT 1136</b>	-	2 (15 hours)	-

8	Gomati Sridhar	Aromatic and Heteroaromatic Chemistry <b>CHT 1136</b>	-	2 (15 hours)	-
9	Rama Iyer	Industrial Psychology and Human Respurce Management <b>HUT 1103B</b>	3 h/w (30 hours total)	-	3 h/w (30 hours total)
10	Visiting Faculty	Industrial management I <b>HUT 1105</b>	3 h/w (30 hours total)	-	3 h/w (30 hours total)
11	Vijay Sane	Technology of Azo colorants <b>DYT 1103</b>	15 hours total	-	15 hours total
		Technology of Intermediates II	15 hours total	15 hours total	-
		Technology of Intermediates-1	-	-	2
		Process and Plant Design	15 hours total	15 hours total	-
12	Mr. Dilip G Udas, Ultraconserve Pvt. Ltd.	Case Studies in Dyestuff Industry	-	30 hours total	-
13	Visiting Faculty	Envrnmental Science and Technology <b>HUT 1106</b>	-	-	30 hours total

Adjunct faculty also includes Industry experts. Provide details of participation and contributions in teaching and learning by visiting/adjunct/Emeritus faculty etc. for all the assessment years:

- Provision of visiting/adjunct/Emeritus faculty (1)
- Minimum 50 hours per year interaction with a visiting/adjunct/Emeritus faculty from industry/retired /retired professors etc. (4)

(Minimum 50 hours interaction in a year will result in 2 marks for last two year; 2 marks x 2 years= 4 marks)

CRITERION 5	Resources	75
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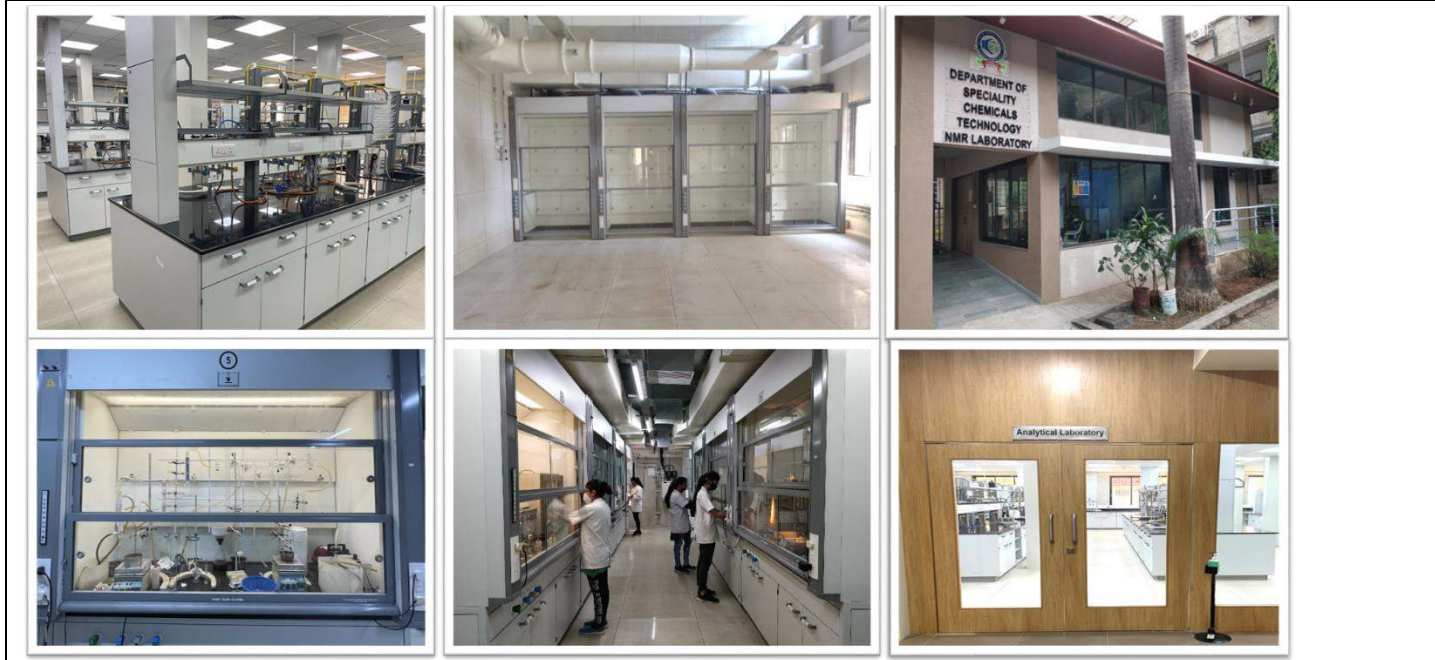
**5.1 Adequate and well-equipped laboratories, and technical manpower (25) Self-Assessed Marks = 25**

**Table B.5.1**

Sr. No.	Name of the Laboratory	Number of students per set up (batch size)	Name of the important equipment	Weekly utilization status (all the courses for which lab is utilized)	Technical Manpower support		
					Name of the technical staff	Designation	Qualification
1	Synthesis laboratory 2000 sq.ft	48	Fuming hoods – 16 Rotary Evaporators – 7 Ice machine -1 Sonicator – 1 Flash Chromatography instruments – 2 Centralised, nitrogen, vacuum and water supply Ovens – 4	100%	Mr. A. M. Patil and Mr. P. B. Rana	Lab assistant And Lab attendant	1. B.Sc (Chemistry) 2. S.S.C
2	Analytical Laboratory 2000 sq.ft	48	Centralized nitrogen, LPG and water supply. Ice machine – 1 Working table with stands and clamps for holding the glass apparatus for analytical experiments	50%	Mr. A. R. Rawool and Mr. Y. S. Chandiwade (retired on 31st May 2022)	Lab assistant and lab assistant	1. H.S.C 2. S.S.C
3	Instrumentation Laboratory 800 sq.ft.	20	UV-Visible Spectrometer – 2 Fluorimeters – 2 Solid state Fluorimeter - 1 IR spectrometer -1 Mass analyzer – 1 GC instrument – 1 Water Contact Angle Measuring Device – 1 Cyclic voltammetry – 1 DSC-TGA – 1 HPLC -1 Flow reactor-1	100%	Mr. Chetan Bhogulkar	Lab assistant	B.Com
4	Process Intensification Laboratory	24	For large scale reactions Ovens and furnaces DSSC fabrication system	50%	1. Mr. P. B. Rana	1. Lab attendant	1. S.S.C 2. B.Com

	1200 sq.ft.				2. Mr. Chetan Bhogulkar	2. Lab assistant	
5	NMR Laboratory 1750 sq.ft.	(Operator analyzes the sample for the students)	500 MHz NMR for NMR analysis	100%	Mr. Sulav (contractual employee)	NMR operator	M.Sc (Analytical Chemistry)
6	Engineering Lab	16 (2 students / group)	1. Unit Operations 2. Heat Transfer 3. Fluid Flow 4. Reaction Engineering 5. Mass Transfer Process Control	3 × 4 hours	Mr. P.P. Bhole Mr. V. Bhambid Mrs. S. Kurande	Lab Assistant Lab Assistant Lab Assistant	SSC BSc (Chemistry) MSc (Chemistry)
7	Inorganic Chemistry Lab	40* (2 students / group)	1. UV-Spectrophotometer 2. pH Meter 3. Ice making machine 4. Potentiometer	3 × 4 hours	Mr. A. P. Patil	Lab Assistant	H.S.C.
8	Organic Chemistry Lab	40* (2 students / group)	1. Buchner filter assembly 2. Fuming Hood 3. Ion Exchange Chromatography 4. Hot Air Oven	3 × 4 hours	Mr. P.S. Gaikwad	Lab Assistant	Graduate
9	Physics Lab	40* (2 students / group)	1. Piezo Meter 2. Manometer 3. Hall Effect 4. Newton Ring 5. Lees Disk 6. Ultrasonic Interferometer	2 × 4 hours	Mr. P. Nikam	Lab Assistant	Graduate
10	Electrical and Electronics Engineering Lab	40* (2 students / group)	1. Starters 2. Transformer 3. Ammeter 4. Voltmeter 5. Watts Meter	3 × 4 hours	Mr. P. Jadhav	Technician and Instrument mechanic	S.S.C.
11	Engineering Applications of Computers	40* (1 student / group)	1. Computers	3 × 4 hours	Information processing center (IPC) team led by systems engineer Ms. Madhuri Shete	Systems Engineer	Graduate
					Mr. Yogesh Raut	Lab Assistant	Graduate
					Mr. Abhishek Ghadi	Lab Assistant	Graduate

## Images of the laboratory at the department of Dyestuff Technology



### 5.2. Laboratories maintenance and overall ambiance (5) Self-Assessed Marks = 5

The department has the following laboratories:

1. Synthesis laboratory
2. Analytical laboratory
3. Instrumental laboratory
4. Process intensification laboratory

All the laboratories are well maintained and cleaned on daily basis. The general maintenance of the laboratory and the instruments are from the department. Department also has dedicated cleaning staffs who keeps the laboratory clean before the start of the days work. The laboratories are equipped with facilities which are at par with any international standard laboratory with all the necessary safety features. The synthesis laboratory, instrumental laboratory, computational laboratory and NMR laboratory are air conditioned. The laboratories are quipped with exhaust, fire extinguishers, fire alarms, eye wash stations, CCTV cameras, emergency exit doors and fireproof storage cabinets. The department also has 5 washrooms (2-for male, 2-for female and 1-faculty and visitors).

1. Laboratories are spacious, well-ventilated and the overall atmosphere is conducive towards learning. The well-furnished and well-equipped laboratory set-ups are the state-of-the-art facilities, specially designed to culminate a sense of research and professional attitude in students.

2. Lighting system is very effective, along with the natural light in every laboratory.

3. The instruments are arranged so that the students can be accommodated comfortably.

4. Student is provided with the sets of apparatus and a working desk. Some practicals are performed in groups. Each and every student have a complete hands-on experience and a clear understanding of the experiment being carried out.

5. At least one lab assistant and one lab attendant are always present during the practical sessions. They ensure that all the requirements of the experiments such as chemicals, apparatus, equipment's,

samples etc. are made available to all students at the ease. Well trained and qualified lab technicians are available for maintenance of equipment on regular basis in all the laboratories. It is ensured that the deputed technical staff has sufficient skills for handling the equipment and software pertaining to that particular laboratory.

6. Service, cleaning and maintenance of equipment is carried out regularly. Periodic lubrication of machines is must to avoid tare of machine. Calibration of laboratory equipment's is done by the lab technicians regularly. Minor repairs are carried out by the technical staff of the department based on available resources and expertise. Major repairs are outsourced by following the procedure of the Institute. 8. All laboratories are open for students and faculties for research

7. The records of the consumables and chemicals are updated timely. Procurement and maintenance of lab facilities is very well taken care by the support staff. In case of any equipment or instrument breakdown, prompt actions are taken by the support staff for the repair activities.

8. All laboratories have integrated safety measure according to the type of experiments being carried out. The support staff and the teachers ensure that all the safety protocols are followed by all the students while working in the lab.

9. The waste generated in the labs is well segregated and disposed off properly. Organic solvent waste is also collected separately and sent for disposal. Activities, emitting any toxic fumes are carried out strictly in fume hood ensuring proper safety. Empty bottles of chemicals are thrown out in every month.

### 5.3. Safety measures in laboratories (5) Self-Assessed Marks = 5

Table B.5.3

Sr. No.	Name of the Laboratory	Safety measures
1	Instrument laboratory (DYP1007, DYP 1008)	An elephant trunk exhaust system: It is a flexible duct or hose connected to an exhaust system to collect solvent vapours or other contaminants.
2	Research lab (DYP1004, DYP1009, DYP1007, DYP1008)	Fume hoods, fire extinguisher, eye splasher, shower, fume detector, CCT camera, fire proof safety cabinet, fire alarm, emergency exit door.
3	Analytical laboratory (DYP1001, DYP 1002, DYP1003)	Fire extinguisher, smoke detector, fire alarm, emergency exit door, CCTV camera
4	NMR laboratory	Smoke detector, fire alarm, fire extinguisher
5	Process intensification laboratory	Smoke detector, fire alarm, fire extinguisher

Some safety features installed in the lab are shown below:





#### 5.4. Project laboratory (15) Self-Assessed Marks = 15

The department has adequate research facilities with all the modern instruments placed at the department. The list of instruments and other facilities available at the department is listed below. Whole laboratory building of the department of dyestuff technology has been newly developed to attain the state-of-the-art facility for research and learning and analysis in the area of Dyestuff and intermediate Technology. The laboratory development work was sponsored by Colourtex India. This laboratory helps all the M.Tech. and Ph.D. students to carry out their research smoothly. The laboratory is equipped with thirteen fume hoods, all connected with centralized high vacuum pump and inert gas line. The laboratory has been designed following international safety standards. Laboratory has been equipped with various major and minor instruments required for the research and learning the subject. This laboratory helps all the M. Tech and Ph. D students to carry out their research smoothly.



Analytical lab in the building has been modernized with state-of-the-art facilities for research and analysis required for many UG –PG practical. This renovated modern lab is used by UGs, PGs, and Ph. D and renovation led to more spacious laboratory place equipped state-of-art high tech instrumentation facilities pertaining to the dyestuff and Intermediate Technology. This makes research and learning an enjoyable experience for students and faculty both. Thus, this facility definitely helps in increasing output and efficiency, in terms of the research publication. This also reflects in student's demand that a greater number of students are constantly getting job offers

not only from domestic companies but also international companies.



The department has made a new building to house the 500 MHz NMR instrument facility. Regular samples are analyzed in the NMR lab. This facility has immensely helped the UG/PG students to characterize and confirm their products. The **500 MHz NMR with Autosampler Facility was procured under 3047/CREATION OF CAPITAL ASSETS/PSA grant in the year 2012 from Agilent Technologies**



### List of facilities available at the department of Dyestuff Technology

Sr. No	Name of the Laboratory	Specialized Equipment Name	Equipment details	Utilization details from the perspective of PO attainment*
1	DRL	Autoclaves	Hastelloy – 300 mL, 1 lit	PO1 PO12 – 40%
2	DRL	Autoclaves	SS 316 – 3 x 600 mL, 5 lit	PO1 PO12 – 40%
3	DRL	Pressure reactor	-	PO1 PO12 – 40%
4	DRL	Refrigerated & Heating Circulator	Julabo	PO1 PO12 – 90%
5	DRL	Lyophilizer / Freeze dryer	-	PO1 PO12 – 40%
6	DRL	Ice-Machine	-	PO1 PO12 – 90%
7	DRL	Oven	-	PO1 PO12 – 90%
8	DRL	Microwave reactors	-	PO1 PO12 – 40%
10	DRL	Rotary evaporators	Heidolph	PO1 PO12 – 90%
11	DRL	High vacuum	-	PO1 PO12 – 90%
12	DRL	CVD furnace	-	PO1 PO12 – 30%
13	DRL	Muffle furnace	Labline	PO1 PO12 – 60%
14	DRL	Vaccum oven	Labline	PO1 PO12 – 60%
15	DRL	High Temperature Furnace	-	PO1 PO12 – 40%
16	DRL	Bath Sonicator	-	PO1 PO12 – 90%
17	DRL	Probe Sonicator	-	PO1 PO12 – 40%
18	DRL	Weighing Balance	-	PO1 PO12 – 100%
19	DRL	DI water system	MO-K-3	PO1 PO12 – 60%
20	DRL	Centrifuge machine	-	PO1 PO12 – 50%
21	DRL	Water bath shaker	-	PO1 PO12 – 60%
22	DRL	Tube furnace	-	PO1 PO12 – 40%
23	DRL	Ultra sound reactor	-	PO1 PO12 – 40%
25	New Dyes Building	Dye Sesnsitized solar cell	Exilir Technologies	PO1-PO12
26	New Dyes Building	Electroluminescence-photoluminescence	Sinsil International	PO1-PO12

27	New Dyes Building	Flow reactor	E-series easy medchem reactor/ vapourtec/SR.S1227/D3133	PO1-PO12-10%
28	New Dyes Building	IR spectrophotometer ATR	Alpha-II/ Bruker-Labindia	PO1-PO12 50%
29	New Dyes Building	Probe Sonicator	VCX-750-220/Ultra sonics processor	PO1-PO12-40%
30	New Dyes Building	TLC Extractor and Mass analyser	Expressions/Advion	PO1-PO12 40%

\*Both the PSOs are fulfilled to the extent to 70%

### 5.5. Feedback analysis and reward /corrective measures taken, if any for resources (5) **Self-Assessment Marks = 5**

Feedback collected for resources: YES

Percentage of student participated: **17** (2021-2022 batch)-feedback taken online

**8** (2018-2019 batch)-feedback taken offline

Feedback was collected from the passing out batches. The feedback was collected based on few parameters like quality of the project, quality of the research lab facilities, feasibility of the project, availability of the literature searching tools, laboratory safety, applicability of the training received while performing the project, etc. A sample feedback form is attached which is circulated among the final year students after their completion of their project. Based on the inputs and feedbacks received from the students' measures were taken after discussion with the departmental committee members. Changes, if any, are them implemented in the next academic session.

Feedback collection process: Feedback form submitted through google form and feedback received online from the concerned students. Link for the google form is [https://docs.google.com/forms/d/e/1FAIpQLSfcbmFuUu6SsRAq20MiUCZ32vVzoZivGSoCsxMISuLE\\_bpt3g/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSfcbmFuUu6SsRAq20MiUCZ32vVzoZivGSoCsxMISuLE_bpt3g/viewform?usp=sf_link)

Template of the feedback form:

Sl. No.	Feedback indices	Scale point				
		5	4	3	2	1
1	Overall quality of the project topic					
2	Facilities available in the lab to conduct the project					
3	Safety features available in the lab to conduct the project					
4	Feasibility of the project within the timeframe					
5	Availability of the literature searching tools					
6	Training facility for report writing					
7	Your ratings about the benefit of the project training received to tackle the real life industrial problem					

5: Excellent; 4: Very good; 3: Good; 2: Moderate; 1: Poor

**Feedback analysis process and number of corrective measures taken:** Since due to COVID pandemic physically coming to the laboratory and performing experiments was not possible in the last two years, so sample feedback was collected from the CAY batch who have partially worked in the project lab and CAYm3 (15DYE batch) who has entirely worked in the lab and the feedback report is shown here:

Roll Number	Overall quality of the	Facilities available in the lab	Safety features available	Feasibility of the project	Availability of the literature	Training facility for report writing	benefit of the project training received to tackle
18DYE108	5	2	3	5	5	4	5
18DYE107	3	4	4	2	5	3	3
18DYE116	5	5	5	4	5	4	5
18DYE102	5	4	5	2	5	4	5
18DYE117	5	5	5	5	5	5	5
18DYE105	3	3	3	3	3	3	3
18DYE114	3	3	3	2	3	1	1
18dye103	5	4	4	4	4	4	4
18DYE110	5	5	5	5	5	4	5
18DYE101	5	5	5	4	5	4	4
18DYE104	4	4	4	4	2	3	4
18DYE106	5	5	5	4	4	5	5
18DYE113	4	5	5	4	5	4	5
18DYE120	3	3	4	4	3	2	4
18DYE118	3	3	3	3	3	3	3
18DYE112	3	3	5	5	5	3	4
18DYE115	5	5	5	5	5	4	4

Questions Responses 17 Settings

17 responses

Summary Question Individual

prajal@arbol12@gmail.com 1 of 17

Responses cannot be edited

### Final Year Project Feedback Form\_2022

Your opinion and feedback about the final year project. 5: Excellent; 4: Very good; 3: Good; 2: Moderate; 1: Poor

\*Required

Email \*

prajal@arbol12@gmail.com

Name \*

Prajali

Roll Number \*

18DYE108

The feedback of the **15DYE** batch was collected offline and documented here.

Roll Number	Overall quality of	Facilities available in the lab	Safety features available	Feasibility of the project	Availability of the literature	Training facility for report writing	benefit of the project training received to tackle
15DYE1001	5	2	3	5	5	3	5
15DYE1002	3	3	2	4	5	3	4
15DYE1005	5	3	2	4	5	2	5
15DYE1010	5	3	2	4	5	4	5
15DYE1012	5	3	3	5	5	3	5
15DYE1014	4	2	3	4	4	3	4
15DYE1016	4	3	2	4	5	3	4
15DYE1020	5	3	2	4	4	3	5

Based on the feedbacks received from the student's number of corrective measures have been taken after discussion of the matter with the departmental committee. Some of the key issues which we have received has been implemented and are highlighted here:

Feedback received	Measures taken
<b>Safety</b>	Number of safety measures has been installed. Fire extinguishers has been installed at multiple positions. Eye splashes and showers has also been installed. Fume hoods has also been installed to perform the reactions. CC camera was installed to monitor the laboratory activity.
<b>Training for report writing and training on literature search</b>	Students are trained on report writing in the course "Seminar". Students are taught to do extensive literature search using online search engines like Reaxys, SciFinder as well as journals and periodicals available in the library. Time to time, library also organizes workshops and training programmes for students to train them about the literature search and scientific referencing.
<b>Instrumental facilities</b>	The department houses instrumental lab with all the necessary instrumental facilities for the analysis and characterization of the products. The list of instruments which are mostly required for the students are: Overhead stirrers, melting point apparatus, TLC chambers, UV-vis spectrophotometer, IR spectrometer, Fluorimeter, TLC Extractor and mass analyzer, ice machine, 500 MHz NMR spectrometer. Based on the received feedback we have procured melting point apparatus as well as TLC visualization chamber. We have even repaired the heating mantles, over-head magnetic stirrers and the ice machine.

#### 5.6. Program Specific Budget Allocation, Utilization (10) Self-Assessment Marks = 10

Total Budget at program level: For CFY, CFYm1, CFYm2 & CFYm3

CFY: Current Financial Year – CFYm1 (Current Financial Year minus 1) CFYm2 (Current Financial Year minus 2) CFYm3 (Current Financial Year minus 3)

**Table B.5.6a**

**For CFY (2021-2022)**

<b>Total Budget in CFY: 2021-2022</b>		<b>Actual expenditure in CFY (till ...):</b>		<b>Total number of students in CFY: 132</b>
Recurring	Non-recurring	Recurring	Non-recurring	Expenditure per student
493.06	55.83	-	-	-
<b>Total Budget in CFYm1: 2020-2021</b>		<b>Actual expenditure in CFY (till ...):</b>		<b>Total number of students in CFYm1: 132</b>
Recurring	Non-recurring	Recurring	Non-recurring	Expenditure per student
606.45	221.49	469.58	53.18	1.67
<b>Total Budget in CFYm2: 2019-2020</b>		<b>Actual expenditure in CFY (till ...):</b>		<b>Total number of students in CFYm2: 132</b>
Recurring	Non-recurring	Recurring	Non-recurring	Expenditure per student
410.45	345.87	362.59	277.33	2.62
<b>Total Budget in CFYm3: 2018-2019</b>		<b>Actual expenditure in CFY (till ...):</b>		<b>Total number of students in CFYm3:</b>
Recurring	Non-recurring	Recurring	Non-recurring	Expenditure per student
265.67	225.97	254.1	214.07	1.70

**Table B.5.6b**

Items	Budget ed in CFY (2021-2022)	Actual expens es in CFY (till ...) (2021-2022)	Budget ed in CFYm1 (2020-2021)	Actual expens es in CFYm1 (till ...)	Budget ed in CFYm2 (2019-2020)	Actual expens es in CFYm2 (till ...)	Budget ed in CFYm3 (2018-2019)	Actual expens es in CFYm3 (till ...)
Laboratory equipment	43.56	-	137.32	41.49	195.40	106.14	127.40	120.96
Software	-	-						
Laboratory consumable	16.33	-	34.30	15.55	22.0	26.51	13.83	13.62
Maintenanc e and spares	9.37	-	9.11	8.92	8.13	7.04	5.49	5.04
R & D	13.73	-	7.07	13.07	35.05	5.46	21.78	21.70
Training and Travel	9.51	-	14.79	9.06	25.47	11.43	15.94	15.77

Miscellaneous expenses *	9.11	-	13.05	8.68	5.24	10.09	3.56	3.24
<b>Total</b>	<b>101.61</b>	<b>-</b>	<b>215.64</b>	<b>97.77</b>	<b>291.29</b>	<b>166.67</b>	<b>188</b>	<b>180.33</b>

### 5.6.1. Adequacy of budget allocation (5) Self-Assessed Marks = 5

The budget allocation was adequate for the programme.

Sl. No.	Course	Budgeted in 2018-2019	Budgeted in 2019-2020	Budgeted in 2020-2021	Budgeted in 2021-2022
<b>Infrastructure Build-up</b>					
1	B.Tech (Dyestuff Technology)	77.04	79.20	132.14	34.11
2	M.Tech (Dyestuff Technology)	11.56	56.57	66.07	17.05
3	M.Tech (Perfumery and Flavour Technology)	73.19	67.88	66.07	17.05
<b>Library</b>					
4	B.Tech (Dyestuff Technology)	8.68	8.57	15.51	3.12
5	M.Tech (Dyestuff Technology)	1.30	6.12	7.76	1.56
6	M.Tech (Perfumery and Flavour Technology)	8.25	7.34	7.76	1.56
<b>Laboratory</b>					
7	B.Tech (Dyestuff Technology)	110.78	113.98	91.55	29.04
8	M.Tech (Dyestuff Technology)	16.62	81.42	45.77	14.52
9	M.Tech (Perfumery and Flavour Technology)	105.24	97.70	45.77	14.52
<b>Laboratory consumables</b>					
10	B.Tech (Dyestuff Technology)	12.03	12.83	22.87	10.89
11	M.Tech (Dyestuff Technology)	1.80	9.17	11.43	5.44
12	M.Tech (Perfumery and Flavour Technology)	11.43	11.0	11.43	5.44
<b>Teaching and non-teaching salary</b>					
13	B.Tech (Dyestuff Technology)	101.99	103.22	172.65`	185.73
14	M.Tech (Dyestuff Technology)	15.30	73.73	86.33	92.86
15	M.Tech (Perfumery and Flavour Technology)	96.89	88.48	86.33	92.86
<b>Maintenance and spare</b>					
16	B.Tech (Dyestuff Technology)	4.77	4.74	6.07	6.25
17	M.Tech (Dyestuff Technology)	0.72	3.39	3.04	3.12
18	M.Tech (Perfumery and Flavour Technology)	4.54	4.07	3.04	3.12
<b>Research and Development</b>					
19	B.Tech (Dyestuff Technology)	18.94	20.45	4.71	9.15
20	M.Tech (Dyestuff Technology)	2.84	14.61	2.36	4.58
21	M.Tech (Perfumery and Flavour Technology)	17.99	17.53	2.36	4.58
<b>Training and Travel</b>					
22	B.Tech (Dyestuff Technology)	13.86	14.86	9.86	6.34
23	M.Tech (Dyestuff Technology)	2.08	10.61	4.93	3.17
24	M.Tech (Perfumery and Flavour Technology)	13.17	12.74	4.93	3.17

Miscellaneous expenses					
25	B.Tech (Dyestuff Technology)	3.09	3.06	8.70	6.07
26	M.Tech (Dyestuff Technology)	0.46	2.18	4.35	3.04
27	M.Tech (Perfumery and Flavour Technology)	2.94	2.62	4.35	3.04
Other expenses (Consultancy/building expenses)					
29	B.Tech (Dyestuff Technology)	76.33	80.27	87.89	75.24
30	M.Tech (Dyestuff Technology)	11.45	57.34	43.94	37.62
31	M.Tech (Perfumery and Flavour Technology)	72.51	68.81	43.94	37.62

### 5.6.2. Utilization of allocated funds (5) Self-Assessed Marks = 5

Sl. No.	Course	Budgeted in 2018-2019	Actual Expenditure in 2018-2019	Budgeted in 2019-2020	Actual Expenditure in 2019-2020	Budgeted in 2020-2021	Actual Expenditure in 2020-2021	Budgeted in 2021-2022
Infrastructure Build-up								
1	B.Tech	77.04	73.08	79.20	89.37	132.14	32.48	34.11
2	M.Tech	11.56	10.96	56.57	63.83	66.07	16.24	17.05
3	M.Tech (Perf)	73.19	69.42	67.88	76.60	66.07	16.24	17.05
Library								
4	B.Tech	8.68	7.91	8.57	10.49	15.51	2.97	3.12
5	M.Tech	1.30	1.19	6.12	7.49	7.76	1.48	1.56
6	M.Tech (Perf)	8.25	7.51	7.34	8.99	7.76	1.48	1.56
Laboratory								
7	B.Tech	110.78	105.18	113.98	61.91	91.55	27.66	29.04
8	M.Tech	16.62	15.78	81.42	44.22	45.77	13.63	14.52
9	M.Tech (Perf)	105.24	99.92	97.70	53.07	45.77	13.83	14.52
Laboratory consumables								
10	B.Tech	12.03	11.84	12.83	15.46	22.87	10.37	10.89
11	M.Tech	1.80	1.78	9.17	11.05	11.43	5.18	5.44
12	M.Tech (Perf)	11.43	11.25	11.0	13.26	11.43	5.18	5.44
Teaching and non teaching salary								
13	B.Tech	101.99	95.25	103.22	116.76	172.65`	176.88	185.73
14	M.Tech	15.30	14.29	73.73	83.40	86.33	88.44	92.86
15	M.Tech (Perf)	96.89	90.49	88.48	100.08	86.33	88.44	92.86
Maintenance and spare								
16	B.Tech	4.77	4.38	4.74	4.11	6.07	5.95	6.25
17	M.Tech	0.72	0.66	3.39	2.93	3.04	2.97	3.12
18	M.Tech (Perf)	4.54	4.16	4.07	3.52	3.04	2.97	3.12
Research and Development								
19	B.Tech	18.94	18.87	20.45	3.19	4.71	8.72	9.15
20	M.Tech	2.84	2.83	14.61	2.28	2.36	4.36	4.58
21	M.Tech (Perf)	17.99	17.93	17.53	2.73	2.36	4.36	4.58
Training and Travel								



22	B.Tech	13.86	13.71	14.86	6.67	9.86	6.04	6.34
23	M.Tech	2.08	2.06	10.61	4.76	4.93	3.02	3.17
24	M.Tech (Perf)	13.17	13.03	12.74	5.72	4.93	3.02	3.17
<b>Miscellaneous expenses</b>								
25	B.Tech	3.09	2.82	3.06	5.89	8.70	5.78	6.07
26	M.Tech	0.46	0.42	2.18	4.20	4.35	2.89	3.04
27	M.Tech (Perf)	2.94	2.68	2.62	5.04	4.35	2.89	3.04
<b>Other expenses (Consultancy/building expenses)</b>								
29	B.Tech	76.33	74.07	80.27	59.44	87.89	71.66	75.24
30	M.Tech	11.45	11.11	57.34	42.46	43.94	35.83	37.62
31	M.Tech (Perf)	72.51	70.37	68.81	50.95	43.94	35.83	37.62

### 5.7. Library and Internet (10) **Self-Assessed Marks = 10**

Established in the year 1934, Prof. M M Sharma Library functions as the central library of the institute and can be called one of the best special libraries in the country. It performs a dual role of an Academic Library as well as a Research Library, catering to the information needs of the in-house students and faculty, in particular, and, the academic and research community, in general. It is housed in a separate Ground Plus two-storied building and follows a completely open-access system. It has a specialized collection in Chemical Engineering, Chemical Sciences, Chemical Technology and Pharmacy and its allied fields. The library follows Universal Decimal Classification scheme. The library can boast of rich heritage collection of old classic books and bound volumes dating back to 1930s. But along with the traditional collection it has a significant digital collection as well. Currently has access to more than 500 electronic journals. Has access to databases such as Reaxys, Sci-Finder, Scopus, Web of science, etc. The library is fully computerized using the library management software called KOHA. It can be termed as a hybrid library with best collection of printed and digital documents. The library is also a member of E-Shodh Sindhu Consortium. Library is under CCTV surveillance



Library Layout: The Library is a ground plus two storied building. Carpet Area of the library (in m2): 1391 Reading space (in m2): 1391 Total seats in reading space: 200. The Library is a three storied structure. First Floor: Book Collection & Circulation counter Ground Floor: Bound volumes (Back Issues) of Journals, Photocopying Section Second Floor: Current Journals (latest issues), Reference Book Section, Theses Section, Book Bank Section.

Library Staff: Professional staff: 3 (All 3 with Library Science Degree)

Semi-professional staff: 2 (1 with Library Science Degree)

Attendants (two shifts): 12

Trainee: 1

Total Staff with Library Science Degree: 4

Library Budget								
Sl. No.	Course	Budgeted in 2018-2019	Actual Expenditure in 2018-2019	Budgeted in 2019-2020	Actual Expenditure in 2019-2020	Budgeted in 2020-2021	Actual Expenditure in 2020-2021	Budgeted in 2021-2022
1	B.Tech	8.68	7.91	8.57	10.49	15.51	2.97	3.12
2	M.Tech	1.30	1.19	6.12	7.49	7.76	1.48	1.56
3	M.Tech (Perf)	8.25	7.51	7.34	8.99	7.76	1.48	1.56

#### 5.7.1. Quality of learning resources (hard/soft) (6) **Self-Assessed Marks = 6**

##### • Relevance of available learning resources including e - resources (Digital Resources)

Speciality areas of the library	Chemistry, Applied Chemistry, Chemical Technology, Chemical Engineering, Pharmacy, Energy & Environmental Engineering, Biotechnology, Food Technology & Fermentation, Polymer Science & Technology, Textile Science & Technology, Oils & Surfactants, Dyestuff Technology.
Services/Facilities offered	<ul style="list-style-type: none"> <li>• Circulation Service</li> <li>• Reference &amp; Referral service</li> <li>• Current awareness Service</li> <li>• Bibliographic Service</li> <li>• Photocopying service</li> <li>• User Orientation programs</li> <li>• E-resources Training Programs</li> <li>• Book Bank Service</li> <li>• Reading hall</li> </ul>

<b>Printed Resources</b>	The library collection comprises of various different types of media, viz, Books, Journals, Theses, CDs, Bound volumes, reports (Bios, Cios & Fiat) etc.
<b>eResources</b>	The library has access to a number of e-resources through subscription & through e-Shodhsindhu consortium
<b>Databases</b>	Sci-Finder, Scopus, Reaxys, Web of Science, eReference Module
<b>eJournals</b>	RSC, ACS, Science Direct, Thieme, Wiley, Taylor & Francis, Springer, Nature, Begell, etc.
<b>eBooks</b>	RSC, Elsevier, Pearson, ACS, Begell
<b>eTheses</b>	Digitized Theses, Shodhganga

#### Library at a glance:

<b>Total printed resources (Books, BV, standards, Reports, etc)</b>	77,988
<b>Theses (Doctoral &amp; Masters)</b>	5835
<b>Printed Journals</b>	31 (International 12+National 19)
<b>E-Databases</b>	♣ Scopus ♣ Reaxys ♣ Sci-Finder ♣ Web of Science (eSS) ♣ Derwent Innovation ♣ InCites
<b>E-Journals (4579)</b>	♣ ACS (eSS) (49) ♣ Begell Digital Lib. (51) ♣ Bentham Science (132) ♣ Elsevier SD (394) ♣ Emerald (62) ♣ IOP (68) ♣ Jove Video Journals (13) ♣ RSC (46) ♣ Sage (2) ♣ Springer (eSS) (1729)+ 10 Top up ♣ Taylor & Francis (eSS) (1079)+27 Topup ♣ Thieme (2) ♣ Wiley (915)
<b>E-Journals Archives (339)</b>	♣ Elsevier (190) ♣ RSC (59) ♣ Sage (5) ♣ T&F (43) ♣ Thieme (2) ♣ Wiley (40)
<b>E-Books (790)</b>	♣ ACS (115) ♣ Begell (139) ♣ Elsevier (193) ♣ Pearson (68) ♣ RSC (155) ♣ T&F (120)
<b>E-Research Tools</b>	♣ iThenticate ♣ Urkund (eSS) ♣ Grammarly ♣ Remote XS
<b>Digitization by ICT</b>	♣ Digitized Theses (1000 completed) ♣ BIOS, CIOS, FIAT report

**Specialty Area:** Chemistry, Applied Chemistry, Chemical Technology, Chemical Engineering, Pharmacy, Energy & Environmental Engineering, Biotechnology, Food Technology & Fermentation, Polymer Science & Technology, Plastics, Textile Science & Technology, Oils & Surfactants, Dyestuff Technology, etc.

- **Accessibility to students**

Library Timings	
<b>On Working days</b>	8:30 a.m. – 8:30 p.m.
<b>On 2nd and 4th Saturdays, Sundays and holidays</b>	11.00 a.m.– 6.00 p.m.
<b>Holidays</b>	library remains closed only on four days, viz. Independence day, Republic day, Ganesh Chaturthi, and Dassera.
<b>Access to all the library resources is through intranet Library Portal</b>	<a href="http://intranet.ict/Library.aspx/">http://intranet.ict/Library.aspx/</a>

Library caters to two broad categories of users viz. Internal users & External users. Library caters to two broad categories of users viz. Internal users & External users. Internal members are faculty, students (UG/PG/PhD) and staffs. External member includes daily membership, individual members and corporate/institutional members.

### Justification of counterpoints for deficiency

1. Library is expected to have 159750 volumes as against the reported 73400 volumes available. The available volumes are the Total available book volumes. If the entire volumes in the library collection including bound journals, Theses and so on is included then the total volumes would be about 100000 or so. Still if there appears a difference it is due to the fact that our institute caters to very special and limited subject areas where in the number of publications is limited. Also, we are very particular about the kind and the quality of the book volumes added to the collection in the library. We have relevant and quality book volumes added to our library collection every year from various reputed international publishers.
2. The same reasoning applies to the deficiency in the number of titles required and available.
3. As regards the deficiency in the number of national journals, it is due to the fact that we subscribe about 105 international journals in print and over 2000 journals are made available electronically to the library users across the campus.

### E-REFERENCE SOURCES:

**Begell Heat Exchanger Design Handbook (HEDH)** – Multimedia edition: <https://hedhme.com/> Reference source for heat exchanger design and associated technologies. The print edition has been converted to a fully searchable interactive web-based multimedia product. The content is presented in an exciting interactive HTML format with in-text unit conversion and references, widgets for key heat transfer calculations, wizards to guide heat exchanger selection and 3D interactive visualization of equipment.

Access: IP based access to multimedia handbook is available throughout ICT campus.

- ii. **Jove Video Journals:** <https://www.jove.com/> Scientific video journal. Peer reviewed. Multi-disciplinary. Indexed in PubMed and Web of Science. JoVE publishes peer-reviewed scientific video protocols to accelerate biological, medical, chemical and physical research. Watch our scientific video articles. The Journal of Visualized Experiments is a set of scientific video journals dedicated to advancing science by increasing reproducibility and efficient knowledge transfer. Articles combine high-quality video demonstrations of experiments with detailed text protocols. All content is peer-reviewed and indexed in Medline, PubMed, Web of Science, and other relevant databases. Video Journals include, Behavior, Biochemistry, Bioengineering, Biology, Cancer Research, Chemistry, Developmental Biology, Engineering, Environment, Genetics, Immunology

and Infection, Medicine, Neuroscience.

- iii. E-Books Access to a collection of electronic Books published by RSC, ACS, Elsevier, Begell, T&F and Pearson eTextbooks is available. <https://pubs.acs.org/> <https://www.begellhouse.com/> <https://www.sciencedirect.com/> <https://www.rsc.org/> <https://taylorandfrancis.com/> <https://ebookcentral.proquest.com/>

Access: IP based access to all ebooks is available throughout ICT campus.

- iv. E-Theses The e-theses of ICT as well as other universities are available on inflibnet consortia e-Shodhganga.

Access: Link is accessible through the library portal. <http://shodhganga.inflibnet.ac.in/>

- iv. eResearch Tools The library supports the research students with tools like • Reference Manager (Mendeley, endnote, Zotero) <https://www.mendeley.com/> <https://endnote.com/> <https://www.zotero.org/> • Grammar Skills (Grammarly) [www.grammarly.com/edu](http://www.grammarly.com/edu) • Plagiarism Check (Urkund, iThenticate) <https://www.ouriginal.com/login/> [https://app.ithenticate.com/en\\_us/login](https://app.ithenticate.com/en_us/login) vi. Services: • Circulation • Bibliographic Service • User Orientation • Reference Service • Training programs, Workshops & Events • Book Bank Service • Reading Hall • Internet (ports & wi-fi) • eLibrary Terminals • Photocopying Service

### • Support to students for self - learning activities

**Library organizes** training Session for Web of Science, Training Session for Scopus & Mendeley, Training sessions on publishing workshops regularly for the students (UG/PG). Events/Training Programs: Training programs for the usage of e-resources is organized by the library regularly. Such programs & events are announced through emails. Also Author workshops & Literature Survey workshops are regularly organized by the library for PG & PhD Scholars.

A two-day (Saturday 16th and 23rd Nov. 2019) workshop on "Effective ways to use E-resources" organized by Department of Dyestuff Technology, ICT in collaboration with Prof. M. M. Sharma Library, ICT for the students of Dyestuff Technology department. The workshop found out to be very useful for students as it covered all the aspects related to the Literature Survey; right from how to build a query and types of documents involved in research to use of proper research and reference management tools. The workshop concluded by a very informative session on Research Ethics by Mr. VivekPatkar, renowned Mathematician and Researcher.



Prof. M M Sharma Library held an online training program for Grammarly. Below are the details of the program.

**Program: Improving Research Writing Using Grammarly**

**Type: Online workshop**

**Date: 11th January 2022**

**Time: 3.00pm**

BridgePeople  
Invites you to an online workshop on  
**Improving research writing using**  
**grammarly**  
The world's No. 1 Research Writing Software  
Exclusively for  
**Institute of Chemical Technology**

Presenter:  
**Rishik Iyer**  
Trainer  
Bridge People Technology Solutions

- 400+ Checks on Grammar, Spelling, Word choice
- Ensure perfect style, structure and format of technical English
- Preventive Audit with Citation Audit tool to prevent plagiarism before it happens
- Use Grammarly where you want with MS Word, Outlook and Browser Plugins
- Improve author confidence and improve publication success

**11 JAN 2022**  
Tuesday  
3:00 PM to 4:00 PM

#### **Some Event Details organized so far:**

- Prof. M M Sharma Library and ACS had organized a virtual event “ACS on Campus” on 24th February 2022, 11am to 01pm, for PG Students, covering topics “Effective Science Writing” - Ramesh L. Gardas, AE, The Journal of Chemical & Engineering Data, IIT Madras, “Managing Your Data” Dipankar Das (D.D.) Sarma, Senior Editor, ACS Energy Letters, Indian Institute of Science.
- Prof. M M Sharma Library had organized an online training program for Grammarly titled, Improving Research Writing Using Grammarly on 11th January 2022, 3.00pm
- Prof. M M Sharma Library with VES College of Science, Arts and Commerce Library had jointly organized one-day webinar on 'Emerging Technologies for Academic Libraries and Future Librarianship' on the occasion of Librarian's Day celebration and to commemorate the 129th Birth Anniversary of Dr. S R Ranganathan on 13th August 2021, 1.45pm
- Prof. M M Sharma Library had organized a webinar on Know your Library: Resources and Access on 15th July 2021 & 3rd Oct 2021, for ICT Community.
- Prof. M M Sharma Library with VES College of Science, Arts and Commerce Library had jointly organized 7-day National Level Capacity Building Programme (Virtual) under TEQIP-III Twinning programme titled “eShodhyatra: Emerging Trends & Technologies in Scholarly Communication” from 23rd November - 4th December 2020, Prof. Gagandeep Kang, FRS The Wellcome Trust Research Laboratory Division of Gastrointestinal Sciences Christian Medical College, Vellore, & Padma Vibhushan Prof. M.M. Sharma, FRS Emeritus Professor & Former Director, Institute of Chemical Technology, Mumbai were the Keynote Speaker and Guest of Honour respectively.
- Technological Association's Bombay Technologists had invited Senior Librarian for a talk titled “Beyond the walls of the library: reach the relevant e-information & services” on 20th November 2020.
- On the occasion of Vachan Prerana Din & World Food Day, Prof. M M Sharma Library had organized

a Virtual Book Talk on “The Science and Technology of Chapatti and Other Indian Flatbreads, 15th October 2020, 4.00pm, Prof. S.S. Lele Director, Institute of Chemical Technology, Marathwada campus, Jalna, Prof. Laxmi Ananthanarayan Professor, Department of Food Engineering and Technology, Institute of Chemical Technology, Mumbai, Dr. Anamika Banerji Technical consultant, Baking Technology Platform, General Mills Indian Pvt. Ltd.

- Prof. M M Sharma Library had arranged for an online introductory session to Patenting in Academia and using Derwent Innovation on Saturday, August 1, 2020, 11.30am
- Prof. M M Sharma Library with VES College of Science, Arts and Commerce Library had jointly organized a National Webinar on Rethinking and Recreating the Academic Library: Lessons from the Pandemic E-Library 22nd –25th July 2020, for Academic Librarians, Prof. Ramesh Gaur Dean & Director (Lib & Inf.)/ Head - Kala Nidhi Division Indira Gandhi National Centre for Arts (IGNCA) Autonomous body of Ministry of Culture, Government of India was the Keynote Speaker.
- Prof. M M Sharma Library with VES College of Science, Arts and Commerce Library had jointly organized a National webinar on Copyright: Concerns & Challenges for Online Education, 15 JULY 2020 11.00 AM to 1.30 PM, DR. AKHTAR PARVEZ University Librarian, Maulana Azad National Urdu University (MANUU), DR. SHRIRAM PANDEY Assistant Professor, Department of Library and Information Science, Banaras Hindu University
- Prof. M M Sharma Library & Elsevier had arranged for an online training programme on “Drug Repurposing Using Reaxys” on July 02, 2020 at 11.30am.
- Prof. M M Sharma Library & Elsevier had arranged for a web training session on Reaxys database on 4th June 4, 2020 at 11 am.

#### **5.7.2. Internet (4) Self-Assessed Marks = 4**

Information Processing Center (IPC) provides internet and intranet connectivity to entire ICT through fiber optic backbone with copper to the desktop. IPC houses dedicated servers for catering the different requirements of the institute viz. Siddhi server for intranet connectivity; email server for providing email access to research and teaching staff of the institute; proxy server for internet connectivity and Vighnagar server for windows-based applications like Aspentech, Mathcad, Centralized Antivirus tools etc. IPC also houses 150 personal computers (97 exclusively used for the undergraduate laboratories and 53 exclusively used for post-graduate/internet access). Computer access to students is by NIS authentication and NFS Homeserver. IPC also has two laptops and one LCD projector which are available for the entire institute for guest/visiting lectures, seminars, workshops. IPC is also looking after the office automation project and has recently launched the system of web-based e-circulars in the institute. IPC is currently looking after the development of the network connectivity in the institute and has procured latest technology servers, workstations, networking switches through the TEQIP/World Bank project to enhance the connectivity in the institute.

- **Name of the Internet provider:** Bharti, TATA, NKN-NIC
- **Available bandwidth:** 75Mbps, 100Mbps and 1Gbps respectively
- **Wi Fi availability:** Yes

• **Internet access in labs, classrooms, library and offices of all Departments:** These Leased Lines are distributed throughout the ICT Campus (Faculty, Support Staff and all Students). LAN users in the all-buildings 1000+ and 2 LAN points in each room of Hostel-5. Wireless Network at Hostel No. 1 to 4 (availability 24 x 7) and at some part of the main building area. Institute also has a studio for Videoconferencing, connectivity to off-campus at a time.

• **Cyber Security measures:** Firewalls: Sophos xg 310 (2 No's)

CCTV: Campus – 400+ camera's

<b>1. Name of the Internet provider</b>	<ul style="list-style-type: none"> <li>NKN, Bharti, Reliance</li> </ul>
<b>2. Available bandwidth</b>	<ul style="list-style-type: none"> <li>75Mbps - Bharti</li> <li>100Mbps - Tata</li> <li>1Gbps - NKN – NIC</li> <li>These Leased Lines are distributed throughout the ICT Campus (Faculty, Support Staff and all Students).</li> </ul>
<b>3. Wi Fi availability</b>	<ul style="list-style-type: none"> <li>Whole campus</li> </ul>
<b>4. Internet access in labs, classrooms, library and offices of all Departments</b>	<ul style="list-style-type: none"> <li>Available in all Labs.</li> <li>Available in all Computing Labs</li> <li>Availability in departments and other units Lecture theatres, Class and Tutorial Rooms, Labs, Departments, Library, Administrative Office, Hostels.</li> <li>Availability in faculty rooms.</li> <li>LAN users in the all-buildings 1000+ and 2 LAN points in each room of Hostel-5</li> <li>Wireless Network at Hostel No. 1 to 4 (availability 24 x 7) and at some part of the main building area.</li> </ul>
<b>5. Cyber Security measures</b>	<ul style="list-style-type: none"> <li>Eset antivirus, Hardware Firewall installed, Mac address authentication of the systems for local network/internet access &amp; user id for internet access</li> </ul>

**Table B. 5.7.2**

**Other informative sources/ measures**

<b>1. Informative Website</b>	<i>ictmumbai.edu.in</i>
<b>2. Intranet</b>	<i>intranet.ict</i>
<b>3. Computers</b>	<b>IPC Dept:</b> UG Lab - 100 Computers, (All-in-One, i7,16Gb RAM, 1TB HDD), 35 Computers (All-in-One, i3, 2Gb RAM, 500 GB HDD) in internet access room for all students All are connected to Network having Internet facility.
<b>4. Servers</b>	<b>Lenovo Servers</b> 3No's (virtualization of servers with Hyper-V. Libsys, TallyERP, Ridgeline, ESSL, Solidworks) and DHCP, DNS connected to EMC SAN Box, NFS server <b>HP blade</b> – Class Room Lecture Recording, connected to HP SAN Box <b>Lenovo Server</b> – Estores Software
<b>5. Firewalls</b>	<b>Sophos</b> x g 310 (2 Nos)
<b>6. CCTV</b>	<b>Campus</b> – 400+ cameras
<b>7. Studio</b>	Video-Conferencing, connectivity to off-campus at a time.
<b>8. License Software</b>	<ol style="list-style-type: none"> <li>Microsoft Campus Licensing Agreement (Windows and Server o/s, Office 365, SQL Processor Based license)</li> <li>MATLAB 2009b - (50 users)</li> <li>Aspen – single user Research license</li> <li>MOE- single user license</li> <li>SolidWorks - (60 users)</li> <li>Ansys CFD - (35 users)</li> <li>Ansys Mechanical - (5 users)</li> <li>Gabbi - Academic - 50 users, professional - 1</li> </ol>



<b>CRITERION 6</b>	<b>Continuous Improvement</b>	<b>75</b>
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### 6.1. Actions taken based on the results of evaluation of each of the COs, POs & PSOs (30)

**Self-Assessed Marks = 30**

**Continuous Improvement:** Primary ways to improve POs were considered as follows, Being one of the premier departments in the country on Dyestuff Technology, and one of a kind in India, this department offers best teaching, learning process through low teacher-students' ratio, direct interaction with the experts from specialised industry, Industry visit, mandatory industry internship, hand on experience in analytical instruments during practical and research on thesis projects. The department of dyestuff technology has been engaged in promoting basic and advanced knowledge in dyestuff and intermediate technology, cutting edge research and technical skill, and level of problem-solving aptitude among the post-graduating students. In addition, considering rapidly developing technology, students with varied intellectuality and background, audio-video portions were incorporated in the teaching methods. Teachers are encouraged to attend subject specific short-term courses and also on pedagogical methods. In parallel, department organises various workshops, symposium and conferences where attendance of Post graduate students is made compulsory. Department of dyestuff technology is one of the organising partners of international Convention on Colorants (COC; <http://conventiononcolorants.org/> (<http://conventiononcolorants.org/>)). It also organises National Symposium on functional application of Colorants in the ICT premises where students from the department take part.

Sl. No.	List of Conferences/workshops/Training Programmes organized by the department	Continuous improvements from the perspective of PO attainment
1	Prof. S. V. Sunthankar Memorial Seminar, 16 <sup>th</sup> March 2018	<b>PO5</b> Awareness on the recent happenings and challenges faced by the dyestuff industry
2	Workshop on Statistical Design of Experiments (2 days), 1 <sup>st</sup> and 2 <sup>nd</sup> Feb 2019	<b>PO1, PO2, PO4 and PO5</b> Ability to use mathematical tool to solve complex engineering problem related to process and product development in dyestuff industry
3	K K G Menon Memorial Lecture Title of the seminar: Solving Societal Problems Through Organic Chemistry Speaker: Dr. D. Srinivas Reddy, NCL Pune, 9 <sup>th</sup> April 2018	<b>PO5</b> Awareness on the recent happenings and challenges faced by the dyestuff industry
4	Technical Session on the eve of the felicitation of Prof. P. M. Bhate, 28 <sup>th</sup> Oct 2018 <b>Topic:</b> Sustainability in Chemical Industry Speaker: Mr. Adnan Ahmad <b>Topic:</b> Trends in Fine Chemicals Speaker: Mr. Promod Karlekar	<b>PO5</b> Awareness on the recent happenings and challenges faced by the dyestuff industry

	<b>Topic:</b> Case studies of innovative solutions to problems of industrial and social relevance Speaker: Prof. P. K. Ghosh		
5	<b>K K G Menon Memorial Lecture, 8<sup>th</sup> April 2019</b> Dr. Arun Chandravarkar, Biocon		<b>PO5</b> Awareness on the recent happenings and challenges faced by the dyestuff industry
6	Topic: Job scenario of for dyes and allied industries in US Speaker: Dr. Ram Sabnis Date: 1 <sup>st</sup> Jan 2019		General awareness
7	International Convention on Colorants (COC-19), 28 <sup>th</sup> Feb and 1 <sup>st</sup> March 2019		<b>PO5</b> Awareness on the recent happenings and challenges faced by the dyestuff industry
8	Topic: Discussion on Management studies Speaker: Sohom D'souza Date: 22 <sup>nd</sup> March 2019		General awareness
9	Department of Dyestuff Technology Lecture under "Sauradip Chemical Industries Pvt. Ltd. Visiting Fellow in the areas of Dyestuff Technology and Textiles Processing Technology" 15 <sup>th</sup> April, 2019 Topic: Challenges of Dyestuff Industry Speaker: Dr. Nilesh Mistry		<b>PO5</b> Awareness on the recent happenings and challenges faced by the dyestuff industry
10	Industrial visit at Vedant Dyestuff Industries Ltd. Date: 2 <sup>nd</sup> Oct 2018		<b>PO3, PO4 and PO5</b> Awareness about the Dyestuff Industry
11	Industry Readiness Programme Date: 27 <sup>th</sup> Feb 2019		<b>PO2</b> <ul style="list-style-type: none"> <li>• Improvement in soft skills</li> <li>• Improvement in personality</li> <li>• Improvement in employability of the student</li> </ul>
12	Industry Readiness Programme, 9 <sup>th</sup> of Nov 2019 Resource person: Colonel Mukundrai Kamath		<b>PO2</b> Improvement in the communication skills
13	Industry Readiness Programme, 17 <sup>th</sup> March 2021 Resource person: Mr. Ravindra Wagmare		<b>PO2</b> Improvement in the communication skills, interview facing ability, personality development
<b>Training for non-teaching staffs as a part of continuous improvement</b>			
<b>Sl. No.</b>	Chetan Bhogulkar	Staff Development Training Programme	25-26 <sup>th</sup> Sept 2018
	Chetan Bhogulkar	Personal Reengineering for Professional Development Training for Lab attendant	8-10 <sup>th</sup> Feb 2019

	Ankush R. Rawool	Personal Reengineering for Professional Development Training for Class 2 and 3 support staff	11-13 <sup>th</sup> Jan 2019
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**PROF S. V. SUNTHANKAR MEMORIAL SEMINAR AND DYES DAY CELEBRATION**

16<sup>th</sup> March, 2018

Venue: Mysore Association Hall (2<sup>nd</sup> Floor AC Hall), 393, Bhau Daji Road, Next to Café Madras, Matunga (E), Mumbai

Schedule

<i>Welcome Address</i>	2:30-2:35 P.M
<i>Address by Prof. V. Kanetkar Prof. S. V. Sunthankar (The stalwart in dyestuff technology)</i>	2:35- 2:55 P.M
<i>Address by Mr. Hemant Sunthankar Prof. S. V. Sunthankar (The family man)</i>	2:55-3:05 P.M
<i>Lecture 1 by Dr. Dileep Wakankar (Vice President &amp; Head Product Stewardship, Asia- Archroma India Pvt. Ltd) on "Product Stewardship"</i>	3:05-3:55 P.M
<i>Lecture 2 by Mr. Janak Mehta (Former President-The Dyestuff Manufacturers Association of India-DMAI) on "Commercial scenario in the colorant industry"</i>	3:55-4:40 P.M
<i>Lecture 3 by Mr. C. Devarajan (Chief Manager – R &amp; D ,FMC- Cheminova India Ltd. ) on "Opportunities in process development through learning and unlearning!"</i>	4:40-5:30 P.M
<i>Vote of Thanks</i>	5:30-5:35 P.M
<i>High Tea</i>	5:35-6:00 P.M
<i>Dyes Day Cultural Celebration</i>	6:00 -8:00 P.M
<i>Dinner</i>	8:00 P.M Onwards





**POs & PSOs Attainment Levels and Actions for improvement – CAYm1 only**

**Table B.6.1.**

<b>(2020-2021)-17DYE Batch</b>			
<b>POs</b>	<b>Target Level</b>	<b>Attainment Level</b>	<b>Observations</b>
<b>PO1: Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems			
<b>PO1</b>	70-75%	<b>68.33%</b>	The engineering knowledge of the graduates was satisfactory; however, in some cases, there needs some improvement.
<p><b>Action 1:</b> Fundamental courses on intermediates, dyes and colorants are well implemented to strengthen their knowledge in the specific domain.</p> <p><b>Action 2:</b> Correlating the fundamental knowledge with the application-based knowledge by providing complex problems which the students are going to solve in the form of their project.</p> <p><b>Action 3:</b> Students are given many assignment topics as extensions to classroom teaching in various courses to promote self-learning and learning beyond the defined syllabi</p> <p><b>Action 4:</b> In the revised syllabus, more hands-on training or practical courses on basic engineering sciences has been increased.</p> <p><b>Action 5:</b> In the core engineering courses, the focus will be given to more active learning and case studies</p>			
<b>PO2: Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.			
<b>PO2</b>	70-75%	<b>69.33%</b>	The attainment is satisfactory; the attainment has almost reached the target value.
<p><b>Action:</b> In the revised syllabus, the tutorial slot for ‘Seminar’ in Sem VI has been increased to 6 hours a week. The student selects a topic of the seminar of their choice and tries to develop a critical understanding while going through the literature. Now, remote access to the e-Library has also been given to students. • The BTech Project is for two semesters (Sem VII and VIII). In Sem VII, the assessment is revised to give more emphasis on Literature review and Problem Analysis. It is expected that this PO attainment will increase further in the coming batches.</p>			
<b>PO3: Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.			
<b>PO3</b>	70-75%	<b>68%</b>	The attainment is satisfactory; however, the target value has not been achieved.
<p><b>Action 1:</b> Projects based on New Product Development (NPD) and process development are given.</p> <p><b>Action 2:</b> Seminar topics based on current trends in the dyes and pigments technology sector are presented.</p> <p><b>Action 3:</b> In the core engineering courses like the emphasis on complex engineering problems has been given.</p> <p><b>Action 4:</b> In the project work topics are given to facilitate the develop solutions to engineering problems.</p>			

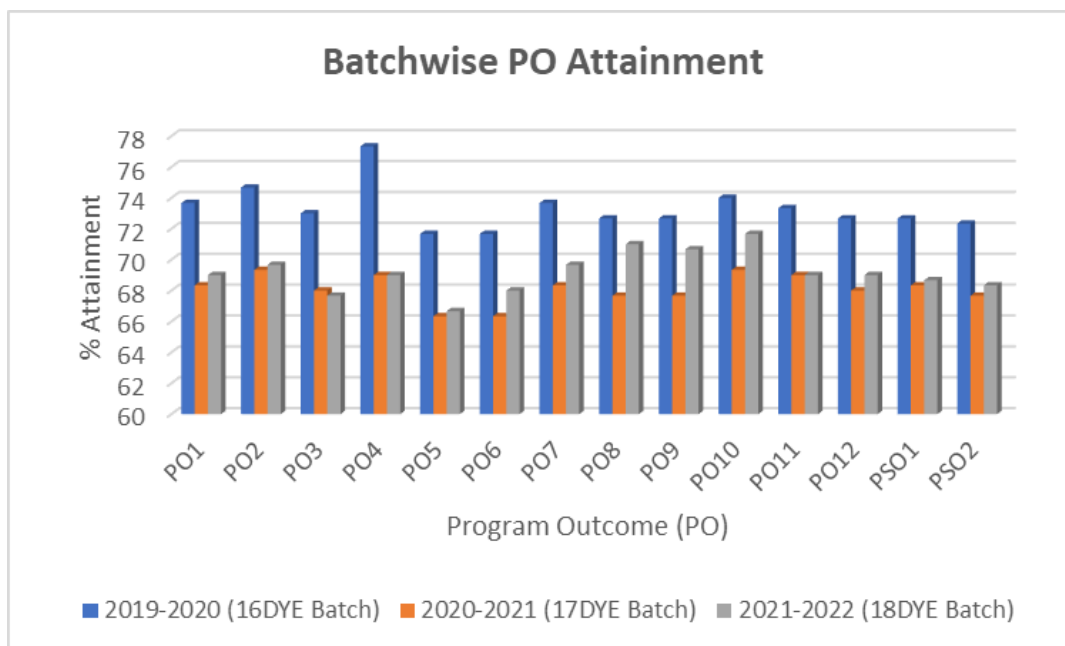
<b>PO4: Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions			
<b>PO4</b>	70-75%	<b>69%</b>	The attainment is satisfactory; the attainment has almost reached the target value.
<b>Action:</b> The UG Project is for two semesters (Sem VII and VIII). The project component in Sem VIII is entirely experimental, and emphasis is given to experimental design, synthesis, data analysis, and interpretation. In Sem VIII, a separate presentation by students is conducted on experimental design of the route to synthesize the target molecules before the initiation of the project work. They become aware about designing the route to access the target compound. The students study the subject Design and Analysis of Experiments in Sem V. It is expected that this PO attainment will increase further in the coming batches.			
<b>PO5: Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations			
<b>PO5</b>	70-75%	<b>66.33%</b>	The PO5 attainment is satisfactory. The student requires more training to adhere to the skills and life-long knowledge for offering solutions to the chemical colorant industry
<b>Action 1:</b> The laboratory was modernized and analytical instruments were procured which will be beneficial for the students for product and process development. <b>Action 3:</b> Non-operational instruments were repaired or new instruments were procured (UV visualization chamber, melting point apparatus from UAA) <b>Action 3:</b> Modern methods of analysis and characterization of the products was introduced in the final year laboratory course to train the students to operate those analytical instruments. Demonstration of high-end equipment has been started in the final year practical classes. Graduates are introduced to cutting-edge instruments, facilities, and state-of-the-art technology in Sem VIII..			
<b>PO6: The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.			
<b>PO6</b>	70-75%	<b>66.33%</b>	The attainment is satisfactory; however, the target value has not been achieved.
<b>Actions:</b> The BTech curriculum has one subject on Industrial Psychology and Human Resource Management. The courses also cover certain aspects of societal responsibilities of the graduates in sustainable developments where concepts about the role of developments of colorants for the future considering the health, safety and legal issues are discussed.			
<b>PO7: Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development			

<b>PO7</b>	70-75%	<b>68.33%</b>	The attainment is satisfactory; however, the target value has not been achieved.
<b>Actions:</b> One subject on Environmental Science and Technology has been introduced into the curriculum. Additionally, the seminar and project topics set for the BTech graduates are in line with achieving sustainability in the colorant industry. It is expected that this PO attainment will improve further.			
<b>PO8: Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.			
<b>PO8</b>	70-75%	<b>67.66%</b>	The attainment is satisfactory; however, the target value has not been achieved.
<b>Actions:</b> Institute is organizing a set of seminars on different aspects of professional ethics. The duration of In-plant training has been increased, which will benefit them to learn professionalism and ethics. The lecture taken by visiting industrial faculty shares their thoughts, which indirectly helps students achieve this PO			
<b>PO9: Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings			
<b>PO9</b>	70-75%	<b>67.66%</b>	The attainment is satisfactory; however, the target value has not been achieved.
<b>Action 1:</b> The In-plant training duration has been increased from 6 weeks to 10-12 weeks. During that, the students are assigned various group activities. It is expected that this PO will improve further. <b>Action 2:</b> There are various team-based competitions organized at the department and institute levels. <b>Action 3:</b> Some of the practical sessions have been organized through a team-based activity.			
<b>PO10: Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.			
<b>PO10</b>	70-75%	<b>69.33%</b>	The attainment is satisfactory; the attainment has almost reached the target value.
<b>Action 1:</b> In the core theory courses, students are asked to give presentations and group discussions <b>Action 2:</b> Writing a journal is mandatory for each laboratory course. This will improve their technical writing skill. <b>Action 3:</b> Department faculty organizes sessions on how to write seminar and project reports. A detailed guideline on the same is provided to the students. This will eventually help their technical writing skill <b>Action 4:</b> Report submission follows presentation so that students get an opportunity to implement corrective feedback received during presentation in their report. <b>Action 5:</b> Scheduling all presentation-based activities with report submission in advance thereby giving students sufficient time to prepare for these academic activities. <b>Action 6:</b> Providing robust specifications for preparation of all technical documents (reports) has helped improve the report quality <b>Action 7:</b> Seminar topic allocation are done at the beginning of the VII semester and students are allocated faculty guides. Students are continuously monitored by the respective faculties and guide them on literature search, report writing and presentation.			

<p><b>Action 8:</b> More weightage of evaluation given to report thereby encouraging students to submit well compiled reports</p> <p><b>Action 9:</b> In the revised syllabus, seminar has been introduced in Sem VI, so that students get ample time to get trained on scientific and technical communication before they graduate.</p>			
<p><b>PO11: Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.</p>			
<b>PO11</b>	70-75%	<b>69%</b>	The attainment is satisfactory; the attainment has almost reached the target value.
<p><b>Action 1:</b> All the B. Tech projects are given a problem statement in which the inclusion of Project Management and Finance are mandatory. Also, they study these subjects in their curriculum.</p> <p><b>Action 2:</b> Institute organizes various talks on these aspects through which students will be benefitted.</p>			
<p><b>PO12: Life-long learning:</b> Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.</p>			
<b>PO12</b>	70-75%	<b>68%</b>	The attainment is satisfactory; the attainment is very close to the target value.
<p><b>Actions:</b> Students are encouraged to active learning. We have been familiarized with multimedia tools in online teaching during the pandemic situation in the last two years. These made the classroom a blended learning environment. It is expected that this will reflect on their performance next year.</p>			
<p><b>PSO1: Specialization in the synthesis, analysis and application and knowledge of dyeing techniques:</b> Our graduates will be totally in tune with the current needs of the dyestuff industry and have considerable problem-solving acumen</p>			
<b>PSO1</b>	70-75%	<b>68.33%</b>	The attainment is satisfactory; the attainment has almost reached the target value.
<p><b>Action 1:</b> Fundamental courses on intermediates, dyes and colorants are well implemented to strengthen their knowledge in the specific domain.</p> <p><b>Action 2:</b> Laboratory courses have been suitably modified to give them a better hands-on experience on the synthesis, purification and analysis of colorants.</p> <p><b>Action 3:</b> The inclusion of industrial training of 3 weeks with credits assigned and proper evaluation has helped students to realize practical problems related to colorant industry</p> <p><b>Action 4:</b> Imparting industrial experience in terms of in-plant training provides real time experiences which complement the academic training</p> <p><b>Action 5:</b> Students are given seminar topics on advanced happenings on colorant industry to write a report and present in order to promote self-learning and learning beyond the defined syllabi.</p> <p><b>Action 6:</b> Project topics on dyes and intermediates are given to allow students to independently work on a problem and offer a solution</p>			
<p><b>PSO2: Core organic chemistry, technology development and implementation:</b> Our graduates have strong foundation in chemistry, and thus combined with their engineering skills and independent ability to develop new dyestuff and allied chemical industry related technologies and successfully implement them at an industrial scale.</p>			



<b>PSO2</b>	70-75%	<b>67.66%</b>	The attainment is satisfactory; the attainment is close to the target value.
<p><b>Action 1:</b> Fundamental courses on intermediates, dyes and colorants are well implemented to strengthen their knowledge in the specific domain</p> <p><b>Action 2:</b> Imparting industrial experience in terms of in-plant training provides real time experiences which complement the academic training</p>			



**Observation:** The PO attainment levels were well within the target region during the assessment year 2019-2022. However, the attainment has slightly dropped during the assessment years when the classes were held online and the students could not physically perform the experiments in their final year as well as could not physically perform the internship as well as project. However, with both the students, and faculties acclimatized with the blended mode of learning (online-offline) the attainment level is slowly raising as observed in the above chart.

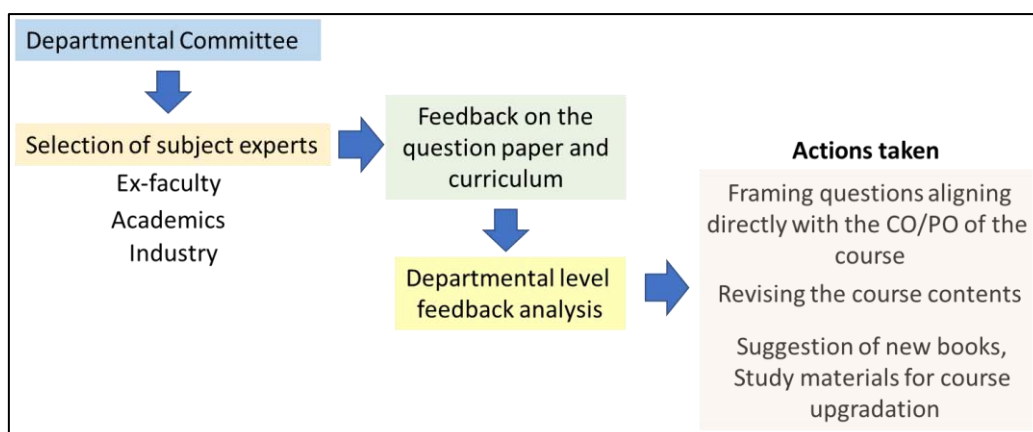
## 6.2. Academic Audit and actions taken thereof during the period of Assessment (10) **Self-Assessed Marks = 10**

Academic audits were performed regularly after the end-semester examination. Feedback of the course and the question papers are asked from the subject experts and industry experts. The academic audit is based on the quality of the question paper, its correlation with the course objectives as well as the knowledge level of the end semester examination and the ability of the question paper to assess a student.

A sample feedback form is provided here:

Academic Question Paper Review Form						
Name of the Subject:						
Subject Code						
Course						
Sl. No.	Questionnaire	Your Response				
		Strongly agree	Agree	Disagree	No opinion	
1	The course content supported the learning objectives	-	-	-	-	
2	The course length was sufficient to deliver the content	-	-	-	-	
3	The question paper aligned with the course content and syllabus	-	-	-	-	
4	The time allotted to finish the question paper was sufficient	-	-	-	-	
5	The topics provided new knowledge	-	-	-	-	
6	The depth of coverage was adequate	-	-	-	-	
7	The question paper prompted logical reasoning	-	-	-	-	
8	Questions were clear and precise	-	-	-	-	
9	Balanced weightages for questions of different learning objectives	-	-	-	-	
10	Balanced weightages for questions of different knowledge levels	-	-	-	-	
Please provide (tick mark) wherever applicable for each question.						
Sl. No.	Questionnaire	Your rating				
		5	4	3	2	1
1	To what extent the questions are adequate to check the understanding level	-	-	-	-	-
2	To what extent the questions are adequate to check the application level	-	-	-	-	-
3	To what extent the questions are adequate to check the analysis level	-	-	-	-	-
4	To what extent the questions are adequate to check the evaluation level	-	-	-	-	-
5	To what extent the questions are adequate to check the creation level	-	-	-	-	-
5 = highest; 1 = lowest						
Please provide any suggestion you have about the question paper:						

Once the feedbacks are received, the departmental committee discusses over the feedback and implements the necessary suggestions after discussion with the committee.



Actions taken to implement the suggestions based on the feedback from the academic experts	Analysing the feedback report in the departmental meeting
	Balanced weightages on different learning objectives were given in the question paper
	Questions were set with balanced ratios of knowledge levels on understanding, application, analysis, creation, design and synthesis

### 6.3. Improvement in Placement, Higher Studies and Entrepreneurship (15) Self-Assessed Marks = 15

Sl. No.	Items	CAY (2021-2022)	CAYm1 (2020-2021)	CAYm2 (2019-2020)
1	Placement number	13	17	17
2	Students opting for core industry	4	5	3
3	Students opting for non-core industries	5	4	3
4	Students opting for Higher studies	4	7	6
5	Admission in premier institutes	<ul style="list-style-type: none"> <li>University of Florida (Rank: 99 in Best Global Universities)</li> <li>University of Pennsylvania (13th World University Rankings 2022)</li> <li>University of Bath, UK (166<sup>th</sup> in the QS World ranking)</li> </ul>	<ul style="list-style-type: none"> <li>Carnegie Mellon (QS world ranking = 53)</li> <li>Pennsylvania, USA</li> <li>Upsala University (QS Ranking = 124)</li> <li>University of Duke (QS Ranking = 127)</li> <li>TU Delft</li> <li>Arizona State University</li> <li>University of Stirling, Scotland</li> <li>Cranfield University</li> </ul>	<ul style="list-style-type: none"> <li>Univ of Florida</li> <li>Rensselaer Polytechnic Institute, USA</li> <li>UIUC Champaign, Illinois</li> <li>University of Michigan</li> <li>Martin-Luther-University of Halle-Wittenberg, Germany</li> </ul>
6	Entrepreneurs	Not applicable	1	1

7	Highest pay package for students opting for jobs in India	9.12 lakhs p.a	6.5 lakhs p.a	5.0 lakhs p.a
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**Entrepreneurship effort by B.Tech Student: Name: Kalyani Chavali (16DYE105, B.Tech Dyes 2020 pass out):** Founder of Sahrudaya Food Technologies. She along with Vigyan Ashram and Chaitanya Foundation started this rural-India organization. They work with village ladies and help them to put forth their healthy yet yummy recipes on a global platform. Currently, they have two of their products Morninga Bar and Nutri 7. These two products are from the village called Pabal, Pune. Morninga Bar is exclusively made from moringa leaves and Nutri 7 are handcrafted laddus made from pearl millets, melon seeds, flax seeds etc. She works directly with the village women, help them standardize and modify their own recipes. (<https://www.sahrudayafoods.com/>)

**6.4. Improvement in the quality of students admitted to the program (10) Self-Assessment Marks = 10**

Assessment is based on improvement in terms of ranks/score in qualifying state level/national level entrances tests, percentage marks in Physics, Chemistry and Mathematics in 12 Standard and the percentage marks of the lateral entry students.

**Table B.6.4**

Item (For B.Tech (Dyestuff Technology))		CAY (2021-2022)	CAYm1 (2020-2021)	CAYm2 (2019-2020)
National Level Entrance Examination	No. of Students admitted	2	3	3
	Opening Score/Rank	99.73	92.83	96.74
	Closing Score/Rank	79.97	91.86	26.54
State Level Entrance Examination	No. of Students admitted	14	16	18
	Opening Score/Rank	97.21	97.97	99.09
	Closing Score/Rank	14.95	74.43	5.46
Name of the entrance examination for lateral entry	No. of Students admitted	0	0	0
	Opening Score/Rank	0	0	0
	Closing Score/Rank	0	0	0
Average CBSE/Any other Board Result of admitted students (Physics, Chemistry & Mathematics)		<b>90.5</b>	<b>83.77</b>	<b>76.21</b>

**6.5. Remedial action taken on the observations made during last accreditation visit/New initiatives taken/New Facilities Introduced/Improvement made after last visit. (10) Self-Assessed Marks = 10**

Sl. No.	Comments	Remedial action taken
1	Students, faculties, parents and staffs are not fully aware of the vision, mission, POs and Cos of the	The department vision, missions are written in the departmental website as well as in the institute handbook. The COs and POs are provided in the syllabus copy of the B.Tech (Dyestuff Technology). The syllabus copy is available at the departmental website. Also, at the beginning of semester, students are

		made aware of the course objectives of that particular course.
2	Continuous assessment needs improvement	Continuous assessments are in the form of written exam, report submission, presentation. The weightage for CAT is 10 marks for 50 marks course and 20 marks for 100 marks course.
3	DAC meeting frequency needs to be enhanced	We have organized regular departmental meeting to discuss upon the various activities of the department. All the minutes of the meeting are documented in the minutes of the meeting book available at the HoD cabin.
4	Experts from other institutes may included for bringing in curriculum and learning methods	Industry experts and ex-faculty members of the department are involved in formulating the curriculum. Based on their feedback the learning methods and curriculum are revised. Experts from industry and academics like Mr. Prakhar Kasture (Ellisor), Prof. Anindya Dutta (IITB), Raja Kaliappan (Huntsman), Mr. Ambady Rajagopalan
5	Feedback is on daily basis, but analysis is not done on daily basis and hence there is no use of daily feedback	The daily feedback method has been changed to a semester wise feedback method and the feedbacks are available in the MIS system which can be accessed by the individual faculty members.
6	There is no structured plan for faculty development except pedagogical and other programmes through TEQIP. Faculty development programmes for skill development should be organized	TEQIP-II and TEQIP-III has arranged several faculty development programmes, teaching, learning workshops. Teachers Training workshop was organized on Monday June 21, 2021 to train the young faculties about the essence of teaching by expert faculty members of the institute.
7	Students prefer to go outside for higher studies. Institute should plan strategy to minimize such brain drain	Almost more than 50% of the students stay in India for jobs in different sectors (technical, marketing, sales etc.). Last two years has seen students have taken up entrepreneurship. Institute has also set up a ICT Innovation and Start-up policy to nurture students to set up their own venture in India. The details of the ICT Innovation and start-up cell can be found at the institute website
8	Fund crunch prohibits faculty and admin to undertake various initiatives for growth of students. More sponsored projects may be taken.	Departmental faculties have taken up several projects funded by DST-SERB, DST-PURSE, CSIR, UGC, BRNS, UGC and TEQIP-III. Recently department has also received support from DST-FIST. Faculties also take up industrial projects on regular basis.
9	Students are placed mostly in technical activities like production activities. For better career as per their choice, placement in sales,	Students placement are not only in core branches but students are getting job offers

	marketing, and management should also be organized	from other non-core areas also like marketing, sales, management.
10	Involvement and interaction of institute, parents and other institute should be more focussed and widespread	Departmental faculties interact with the other institute faculty members while framing the syllabus or getting feedback from them regarding any curriculum revision.
11	Feedback is taken on daily basis which is not feasible for daily analysis and action. Either it may be software oriented or may be changed on periodical basis for purposeful action.	Feedback system has now been changed and feedbacks are now taken semester wise.
12	No provision of industry expose to the faculties which leaves a grey area. If faculty do not have practical knowledge how can they be a best teacher for technical institute	Due to pandemic, there was restriction in movement. However, it was discussed in the departmental meeting that faculties must be encouraged to go for industrial training during their summer vacation.
13	Laboratory staffs are less qualified and there are limitations to induct qualified and experienced staffs. Hence, they should be given proper training.	Training programmes are arranged for the laboratory staffs.
14	The classrooms must be acoustically sound proof so that there is no echo. Class rooms are of very old generation type and not fitting the taste of new generation.	The old class-rooms of the dyes building are non-operational and all the classes are held in the main building. Also, in the last two years due to pandemic all the classes were online.
15	Lack of decentralization of the financial powers hinders the initiative for growth in the departmental activities.	Institute administrative has taken proper action.
16	Lab equipment maintenance and functionality requires improvement through proper AMC etc.	Department has received funds from DST-FIST for the AMC of the instruments as well as maintaining the instruments.
17	Project reports are neither signed by the students nor by the guide. There is no evidence of having undertaken the project by the student though assessment is done separately.	Final year project reports are signed.
18	More attention, supervision and guidance is required for students in the lab work.	Faculties are monitoring the laboratory activities of the students and interacting with them and guiding them during their lab work.
19	Industry training and exposure to the students must be enhanced.	All students has to undergo compulsory in-plant training where they gain knowledge about the functioning of industry.
20	Overall poor governance is observed in the institute may be due to insufficient fund. General cleanliness and hygiene are missing in washrooms and campus.	The department has a new building and labs, washrooms are well maintained and cleaned.

### Declaration

I undertake that, the institution is well aware about the provisions in the NBA's accreditation manual concerned for this application, rules, regulations, notifications and NBA expert visit guidelines in force as on date and the institute shall fully abide by them. It is submitted that information provided in this Self-Assessment Report is factually correct. I understand and agree that an appropriate disciplinary action against the Institute will be initiated by the NBA in case any false statement/information is observed during pre-visit, visit, post visit and subsequent to grant of accreditation.

*N. Sekar*  
N. Sekar, HoD

**Prof. (Dr.) N. SEKAR**  
HEAD SPECIALITY CHEMICALS TECHNOLOGY  
INSTITUTE OF CHEMICAL TECHNOLOGY  
MATUNGA, MUMBAI-400 019.

Date  
Place

*N. Sekar*  
4/6/22

Signature & Name  
Head of the Institution with seal

**I/C. VICE CHANCELLOR**  
Institute of Chemical Technology  
(University under Section-3 of UGC ACT OF 1956)  
N. P. Marg, Matunga, Mumbai - 400 019.



## ANNEXURE I

<b>PO1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO3</b>	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
<b>PO4</b>	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
<b>PO5</b>	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
<b>PO6</b>	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
<b>PO7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
<b>PO10</b>	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
<b>PO11</b>	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
<b>PO12</b>	<b>Life-long learning:</b> Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
<b>PSO1</b>	<b>Specialization in the synthesis, analysis and application and knowledge of dyeing techniques:</b> Our graduates will be totally in tune with the current needs of the dyestuff industry and have considerable problem-solving acumen.
<b>PSO2</b>	<b>Core organic chemistry, technology development and implementation:</b> Our graduates have strong foundation in chemistry, and thus combined with their engineering skills and independent ability to develop new dyestuff and allied chemical industry related technologies and successfully implement them at an industrial scale.



