Delhi Technological University

(Established by the Govt. of NCT of Delhi vide Act 6 of 2009)

(Formerly Delhi College of Engineering)

Shahbad Daulatpur, Bawana Road, Delhi 110042

Accredited with 'A' Grade
(CGPA 3.22 out of 4) by NAAC
ISO 9001: 2015 Certified

M.Sc.
Programmes
2023-24

www.dtu.ac.in

ADMISSION
BROCHURE
(A.Y. 2023-24)

Tentative Admission Schedule with Important Dates*

(For the Final Schedule, visit DTU website: www.dtu.ac.in)

S. No.	Activity/Event
1.	Advertisement in newspapers
2.	Commencement of Online Registration on DTU Website
3.	Declaration of the Result by CUET - (PG) - 2023
4.	Last Day for Online Registration
5.	Merit List for 1st round of Counselling on the basis of CUET Score for admission to M.Sc. programme.
6.	1st round of admissions at DTU for all branches and freezing seats and preparing wait list (Selected candidates are required to report along with original documents and Bank Draft for payment of Fee).
7.	Display of vacant seats for spot round on DTU website: www.dtu.ac.in
8.	Spot round of admissions at DTU for all branches (Selected candidates are required to report along with original documents and Bank Draft for payment of a fee.)

For the Final Schedule & Important Dates, visit DTU website: www.dtu.ac.in (Details will be announced within a one week from the declaration of CUET result on DTU website)

* **Note :** *All the candidates desirous of seeking admission to M.Sc. Programme are hereby advised to read the brochure carefully and visit the website www.dtu.ac.in regularly for updates and other details/ additional information about the entire admission process. The contents and information provided in the Admission Brochure are based on the current instructions/guidelines issued by the Government of NCT of Delhi & CUET (PG) administered by NTA.*

Any Modification / Addition / further clarification about eligibility conditions and procedures for admission in the M.Sc. programmes, if required, will be notified on the University Website through separate notification.

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ADMISSION BROCHURE
M.Sc. Programmes
(A.Y. 2023-24)

Prof. Jai Prakash Saini
Vice - Chancellor

E-MAIL: vcdtu@dtu.ac.in

दिल्ली प्रौद्योगिकी विश्वविद्यालय
DELHI TECHNOLOGICAL UNIVERSITY
Established by Govt. of Delhi Act 6 of 2009
(Formerly Delhi College of Engineering)

स्वच्छ = भारत
एक कदम स्वच्छता की ओर

Message from the Vice - Chancellor

It is my immense pleasure to announce that Delhi Technological University is commencing postgraduate courses admissions for the academic year 2023-24 in May 2023.

Delhi Technological University is globally known for outstanding education, research and innovations. The University currently offers various interdisciplinary and industry relevant programmes in science, technology, management and allied areas at undergraduate, post-graduate and doctoral levels.

Students admitted to DTU through their dedication, discipline and steadfastness can go on, to become professionals and impactful leaders. DTU provides them an environment to shape their talent as DTU ensures that every step of a student's journey is designed keeping in mind the holistic development. This is coupled with a diverse range of extra- curricular activities throughout the year, which help students develop various skills to facilitate them throughout their lives.

Over the years, DTU has established itself as the University of unshakable repute. Hence, getting admission in DTU has scaled great heights on the national and international stages, and continue to make us proud. The conjoined efforts of relentless students, faculty, administration and the staff have preserved and exceptional environment in DTU that allows persistent exchange of information and upholds the unmatched excellence associated with this University for eight decades.

We aim at nurturing the students holistically and endeavour to foster a culture in which virtues and skills are instilled in them, along with a concern for society and its wellbeing.

(Prof. Jai Prakash Saini)

Contents

General Instructions

1. Admissions to the M.Sc. programmes for the academic year 2023-24 in the Delhi Technological University (DTU) will be done through the Common University Entrance Test: **CUET-(PG)-2023 conducted by the National Testing Agency (NTA).**

2. The admissions will be done purely based on the merit list prepared by CUET-(PG)-2023 rank among the registered students at the DTU portal.

3. The candidates are advised to go through the Admission Brochure carefully and acquaint themselves with all the requirements for filling up the Online Application Form at CUET (PG)-NTA (https://cuet.nta.nic.in/).

4. List of M.Sc. programmes offered by DTU: Academic Year 2023-24

S. No. (as per CUET Notification)	Programme Name	Test Paper Code 2023	CUET Paper Title	Date(s) of Examination
755	M.Sc. Mathematics	SCQP19	Mathematics	Will be announced later on CUET (PG) website
921	M.Sc. Physics	SCQP24	Physics	
162	M.Sc. Chemistry	SCQP08	Chemistry	Will be announced later CUET (PG) on website
593	M.Sc. Biotechnology	SCQP17	Life Sciences	

5. Candidates are hereby advised to register on the CUET (PG) portal and opt above mentioned subjects to join M.Sc. Programme at DTU.

6. Candidates are advised to regularly visit NTA website(s) www.nta.ac.in, https://cuet.nta.nic.in/ for the latest updates regarding the examination.

7. A separate registration form to apply for DTU's M.Sc. programme will be released around the time of the declaration of CUET PG results on the University's official website www.dtu.ac.in. Candidates will be required to fill in their CUET scores obtained in the respective courses in the registration form.

8. Admission process at DTU will be initiated within one week from the declaration of the CUET result.

9. The registration fee of Rs. 1500/- for GN/OBC/EWS/SC/ST/PwD, is to be paid online through credit Card/ net banking at the time of registration. After completing the registration form successfully if a candidate does not pay the registration fee, he/she will not be considered for any seat allotment in any round of the counselling. The fee paid for the registration for admission shall not be refundable.

10. It is the responsibility of the candidates to ascertain whether he/she possesses the requisite eligibility and qualifications for admission as specified in this brochure.

11. If a candidate is found ineligible at any stage before or after examination / declaration of result or during any stage of the programme, his / her candidature / admission will be cancelled without any notice and suitable action shall be initiated against him / her including forfeiture of the fee.

12. The applicants are advised to preserve the online registration form as well as Acknowledgements, if any for future reference.

13. While filling up the registration form, the candidate must verify the correctness of all the particulars furnished by him / her. In case any candidate is found to have furnished false information or is found to have concealed any material information in his / her application/registration form, he / she will be debarred from admission and forfeiture of the fee. Further, University reserves the rights to take suitable actions against the applicant in this regard.

14. After the registration form is complete in all respect and all the required documents have been uploaded, the candidate must confirm all the details before final submission. The candidate will not be permitted to edit/change details filled in the registration form once the candidate submits the form.

15. Candidates must ensure that Mobile Number and Email Address provided by them must be valid and should belong to the candidate or his/her immediate family members. These will be used by the University for future communications with the candidate. University would not be responsible for communication not being made due to non-existent/faulty communication details provided by the candidate.

16. It is in the interest of the candidate to remember his/her Password and keep it highly confidential, to avoid misuse by other candidates.

17. Merit list will be declared on the university website and display the ranks of only those candidates who are declared as qualified in the Entrance Examination conducted by the CUET. No separate intimation will be sent to the candidates regarding declaration of merit list and for admission.

18. Tentative dates of commencement of first and second-round admissions/detailed schedule and last date of admission will be uploaded on the DTU website (www.dtu.ac.in).

19. The candidates will be called for admission depending upon the number of seats available in each programme. The offer of admission shall be extended only to the qualified and eligible candidates strictly in order of merit.

20. The list of documents required for admission counselling is mentioned in section 6 of this brochure. **Candidates are advised to bring/upload, wherever specified, all the relevant documents as detailed in this brochure at the time of admission.**

21. The candidate seeking admission under reserved categories has to mandatorily produce the caste/category certificate in his/her name at the time of counselling. The certificate in the name of either of the parents (mother/father) or any other family member is not acceptable and the candidate will not be entitled even for provisional admission. The caste certificate must be uploaded in online admission portal as well.

22. It is the sole responsibility of the candidate to prove his / her eligibility for claiming reservation under any of the reserved categories. A candidate who is offered a seat under reserved category / sub-category in any round of seat allotment and fails to produce appropriate document in support, his/her allotted seat will be cancelled and he / she shall be considered for allotment in GENERAL (GN) category in subsequent rounds on submission of a written request by the candidate to University in this regard, subject to eligibility, availability of vacant seats and his/ her merit. University reserves the right to accept or reject such requests.

23. EWS and OBC (NCL) candidates are required to produce concerned certificate issued after March 31, 2023 from the authorities.

24. Candidates are advised to keep checking the website www.dtu.ac.in for further updates regarding the admission process for M.Sc. programme.

25. For any queries, please write to us at **mscoordinator@dtu.ac.in** .

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Delhi Technological University (DTU)

(Established by the Government of NCT of Delhi vide Delhi Act 6 of 2009)
(Formerly Delhi College of Engineering)

About DELHI TECHNOLOGICAL UNIVERSITY

Delhi Technological University (DTU) is a leading World Class Technological University, plays a vital role in National and Global Knowledge Network. It is empowering India with the Wings of Knowledge and Power of Innovations. With more than 82 years of tradition of excellence in "Engineering & Technological Education" and "Research & Innovations". DTU came into being after the reconstitution of the Delhi College of Engineering by the Government of NCT of Delhi in 2009, by Act 6 of 2009, passed by the assembly of the NCT of Delhi. It is a non-affiliating, teaching and research University, committed to achieve excellence in Engineering, Science, Technology, Management and allied areas and matters connected therewith or incidental thereto. The university, in its various avatars, namely, the 'Delhi Polytechnic' and 'Delhi College of Engineering' (DCE), has been serving the nation and the global community since its inception in 1941, by providing trained manpower of highest quality in the field of engineering and technology, and, is globally well known for its outstanding education, research and innovations. The University currently offers various inter-disciplinary and industry relevant programmes in Science, Technology, Management, and allied areas at Undergraduate, Postgraduate and Doctoral level. The University has established a strong academia-industry interface and has collaborations with reputed research organizations, industries, and premier institutions. A great many alumni of the institute have excelled at home and abroad and through their contributions to the profession of engineering. They have brought high honour and enhanced the dignity of engineering fraternity being rolled out from institutions in India. The University lays great emphasis on assisting students in the development of national character, self-confidence, leadership and fostering an ecosystem for creativity and imagination.

Location:

Delhi Technological University is situated at Shahbad Daulatpur, Rohini in North - West Delhi, India. It is approximately 32 kilometers from the Indira Gandhi International Airport, New Delhi and the nearest Metro stations are Samaypur Badli/Rithala. Once at Samaypur Badli/Rithala, board local transport, auto or bus to get down at DTU, which is 3-4 kms far from Samaypur Badli/ Rithala Metro Station.

Vision & Mission of DTU

Vision:

"To be a world class university through education, innovation, and research for the service of humanity"

Mission:

1. To establish centres of excellence in emerging areas of science, engineering, technology, management, and allied areas.
2. To foster an ecosystem for incubation, product development, transfer of technology, and entrepreneurship.
3. To create environment of collaboration, experimentation, imagination, and creativity.
4. To develop human potential with analytical abilities, ethics, and integrity.
5. To provide environment friendly, reasonable and sustainable solutions for local and global needs.

Programmes Offered

The University offers 14 Undergraduate engineering programmes (B.Tech.) and three bachelor programmes [i.e. B.Des., BBA, BA (Hons.) Economics], 25 M.Tech. programmes, 5 MBA programmes, 4 M.Sc. programmes, MA (Economics) and M.Des. Programme. The university offers Ph. D programmes in all areas of engineering, science, management, design and economics. The UG and PG programmes of DTU offer the most modern curricula, based on the Choice Based Credit System (CBCS), having rich mix of courses from science, engineering, management, social sciences, humanities, fine arts, liberal arts, classical music, sports, etc. The course curricula have been developed with a view to integrate advancements in science and engineering, while also incorporating industry relevant technologies. To provide further flexibility there is provision for credit transfer and earning credits through massive online courses (MOOCs) from different platforms such as NPTEL, SWAYAM, Coursera and Edx etc. The curriculum is regularly updated keeping in view of the new technologies and changes in the needs of industries and society.

Faculty and Research

The university has a very talented pool of experienced, as well as young faculty members who are well qualified in their area of specialization and have very good national and International exposure. To engage the students and faculty in research and innovation, the university offers provisions like funding for students' innovative projects, financial assistance to students for attending internship overseas, research project grants to all faculty members etc. To celebrate the individual's excellence in research, the university offers **Research Excellence Awards** to researchers in three categories of awards annually, namely, Outstanding Research

Awards, Premier Research Awards, and Commendable Research Awards. The awards are open to all the researchers of DTU. The University provides funds to faculty and students to organize and attend various faculty development programmes, seminars, and conferences.

Ranking and Rewards

The University is accredited with 'A' grade by NAAC (National Assessment and Accreditation Council) and has been accorded 12-B status by the University Grants Commission (UGC). Several of its UG engineering programmes are also accredited by the National Board of Accreditation (NBA). The university has also been consistently ranked among the best 10 engineering institutions as per the various independent surveys on Best Engineering Institutions of the country. The University has got 1st position as per Times Engineering Ranking 2022. The University has been ranked 7th by India Today's best government engineering colleges ranking 2021. The 2022 NIRF rankings placed DTU at the 35th position among the engineering institutions and at 38th in the categories of universities. DTU has been placed at 601-800 bracket in the Times Higher Education World University Ranking 2023. DTU has got 2nd position in Atal Ranking of Institutions on Innovation Achievements (ARIIA Ranking -2021) in the category of University & Deemed to be University (Govt. & Govt. Aided) (Technical).

Campus and Infrastructure

DTU has 164 acres of a lush green, tech-savvy main campus, consisting of 16 academic departments, research centers, and residences for students, faculty, and staff. At present the university has around 15,000 students in its undergraduate, postgraduate, and Ph. D programmes. DTU has an EDUSAT Studio utilized for recording of lectures, events, and talks. Besides the main campus, the university has another campus in East Delhi, where some of the M.B.A. programmes, B. A (Hons.) Economics and B.B.A. programmes are offered. The newly established East Delhi Campus of DTU has been functional since the 2017-18 academic session. It is located at Vivek Vihar, Phase II, Delhi. This campus endeavours to provide quality education, research, and innovation in the emerging areas of management, relevant to industry and society.

Computer Centre

DTU has a well-equipped centralized computer centre to cater to the needs of students and faculty in the university. It is housed, in a magnificent state-of-the-art building having specialized laboratories to provide variety of platforms and computing environment for UG, PG and research students. The centre possesses a number of servers and over 230 Dell intel core i5 computer systems. In addition, the centre has more than 5 servers hosting different applications such as websites & application portals with softwares, SPSS, Mathematica, MatLab, DNS, LDAP, NetSSM, etc. for use by UG/PG/PhD students for their academic projects and research work. The center is networked through high-end intelligent Juniper/Avaya/CISCO/Brocade/Ruckus manageable switches secured with Palo Alto Firewall and two network leased lines of 10 Gbps link of NKN and 1Gbps link of Reliance Jio with shared bandwidth in different pipes for LAN & Wi-Fi connectivity in the Library, Academic Departments, Administrative Blocks, Sports Complex, Faculty Residence and Hostel blocks of the campus.

Central Library

Delhi Technological University library, with a collection of more than 2,00,000 text and reference books and a large number of e-journals, e-books, manuscripts in digital format, is one of the highly rich engineering libraries in the country. Library provides remote access facility to all its readers by using cloud based remote access software. The library also helps researchers to maintain proper integrity and ethics and provides the facility of similarity check to avoid instances of plagiarism. It has a very active presence on Facebook. Various current awareness services and user information literacy programmes are continually organized throughout the year. The library building is a four storied, aesthetically designed, centrally air-conditioned structure with a seating capacity of 500. Library is updated regularly by way of adding new literature in the form of text books, reference books, reports, proceedings, abstracts & indexes, encyclopaedias, data books, standards (National & International), Journals & database on CD-ROM.

Hostel

Hostel life is one of the most enjoyable and memorable times of one's life. There are 11 boy's hostels and three girl's hostels in DTU, besides, one separate hostel for International students (boys). Each hostel in the campus gives each individual ample opportunity to develop various qualities as each hostel is equipped with recreation room, reading room, mess and gymnasium. Additionally, every hostel subscribes to the latest magazines and newspapers for the residents. The hostels are connected to the campus via the campus wide wi-fi network and LAN which enables the residents to browse the internet and access the online library resources for their academic and research related work. The information of all available accommodation will be posted on the University website. However, limited seats could be provided inside the University premises. In addition, the mess facility at the University can be availed by all the students.

Centre for extension & field outreach

Centre for Extension and Field Outreach was established in DTU in the year 2018. The various activities/ programmes performed by the Centre is to sensitize the students to develop social values, widespread their responsibilities and knowledge in societal issues and problems by making them to involve with the community people. DTU is a Participating Institute under "Unnat Bharat Abhyan"- a Project of Ministry of HRD, Govt. of India and adopted five villages and are conducting classes in their schools. Directorate of Education, Govt. of NCT of Delhi awarded a Project "Youth for Education" and has launched "Desh Ke Mentor", which is one of the largest mentoring programmes in school education. Centre has also started a certificate course titled as "Basic Computer Course" under Lab on Wheels (LOW) Scheme for the candidates from the Government Schools of NCT of Delhi or from society. Centre at DTU is coordinating with Delhi Police conducting Skill development programme through one-month basic computer training to Juveniles in conflict with law/ weaker section in Rohini. Centre is regularly organizing Seminars/ online webinars/ workshops/ Awareness programmes etc and is working towards increasing productivity, enhancing skills and abilities, focusing on growth and helping people to work on their own future development.

Innovation and incubation foundation (DTU-IIF)

DTU-IIF is a Technology Business Incubator (TBI) established in 2016 as a non-profit section 8 company. Currently, this TBI is supported by the Government of Delhi and Delhi Technological University. DTU-IIF helps start-up companies and individual entrepreneurs to develop their business ideas by providing a range of services including co-working office space, mentoring support, funding support with venture capital financing, and other supports & resources they need, all under one roof. During last five years, IIF provided 70 lakhs of funds to 56 start-up companies. Also, DTU-IIF promotes the culture of innovation and Entrepreneurship by organizing various webinars/workshops/Hackathons, etc. The Business Review Committee screens the new ideas and recommends incubation at DTU-IIF. The Finance Review Committee recommends the investment of Rs. 7.5 lakh per start-up. Delhi Technological University established Technology Business Incubator (TBI) in the name of DTU Innovation and Incubation Foundation (DTU-IIF). DTU-IIF was incorporated as Section 8 Company on 06.09.2016.

Sports and Other Outdoor Activities

The students of DTU are provided with excellent facilities for indoor and outdoor games. DTU has 4 x 400 m racing track, fields for football, hockey, cricket, courts for volleyball, basketball, tennis, badminton, along with facilities for indoor games. A well-equipped gymnasium is also available in the campus in addition to gym facilities in each hostel. The university has appointed coaches in almost all the games to coach the students and prepare university teams. Students are encouraged to participate in various sporting events and tournaments held in, and around, NCR of Delhi. From academic year 2018-19, as per the revised curriculum, the university offers foundation electives to the students of first year and second year and in these sports have big share of electives.

A large number of bright and capable scholars, having graduated from the Institute, have distinguished themselves by means of their extraordinary achievements in their chosen professions and by their contributions to the society at large.

DCE-DTU Alumi Network

DCE-DTU Alumni are serving leadership positions in many of the best-known companies in India and abroad, in marketing, finance, human resources, information technology, research & analytics, innovation & entrepreneurship. And the worldwide network of illustrious alumni includes world-known personalities like Prof. Vinod Dham (Father of the Pentium Chip), Dr. Raj Soin (Founder, CEO of Soin, and LLC), Prof. D. Yogi. Goswami (Inventor, Author, Entrepreneur and Educator), Dr. Durga Das Aggarwal (President, CEO Piping Technology & Products, Inc). Mr. Vijay Shekhar Sharma, (Founder of Paytm), Sh. Karnal Singh (Former Chief of Enforcement Directorate), Sh. Arun Goyal (Member-CERC & Former Secretary, Cabinet Secretariat).

Alumni have been traditionally contributing generously towards placement opportunities, sponsorships/ Fellowship programs and infrastructural developments of their alma mater. Donations for Raj Soin Hall by Dr. Soin, Clean Energy Research Centre establishment by Prof. Yogi Goswami, and several scholarships for the students of DTU have shown the dedication of the alumni for the betterment of their alma mater.

Events and Festivals

The university organizes annual cultural, literary, sports and technical festivals. These festivals not just provide an opportunity to the students to connect with the professional world, but also display their creative and technical skills in several interesting events and activities organized during the fests. The **ENGIFEST**, one of the most well attended student's cultural event in northern India and the **YUVAAN**, the literary Fest, is annual cultural extravaganza of the university and offers a good mix of literary, cultural, and entertainment events. The **INVICTUS** is annual technical festival of the university where all technical societies of the university host various technical activities and competition. The **AAHVAAN** is the annual sports fest organized by DTU sports council.

Medical Facilities

DTU has a well-equipped health care centre. The medical practitioners are available to the students requiring medical attention. The healthcare centre has specialized medical practitioners including ENT, dental care, Physiotherapy, Nutrition, Gynaecology and Obstetrics etc. Further, medical camps are also being organized by the University on regular basis. In addition, Ambulance facility is also available in case of emergency. The University has also tie-ups with the major hospitals of Delhi for emergency cases.

More information about DTU can be accessed at *www.dtu.ac.in.*

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1. M. Sc. Programmes

1.1. Eligibility Conditions

The M.Sc. two-year degree programme offers quality education in the disciplines of Mathematics, Physics, Chemistry and Biotechnology. The course is designed to provide a basket of 'Elective' courses as an integral component of curriculum, for catering to the varied interests of the students, so that students can develop 'specialization' in the areas of their academic and professional interest. The interdisciplinary content of the curricula which is based on Choice Based Credit System (CBCS) guidelines issued by University Grants Commission (UGC) equips the students with the ability to utilize scientific knowledge foundation for practical and Industrial applications. The medium of instruction is English for the programme. The educational qualifications and eligibility conditions for admission is given in the Table-1.

Table-1

S. No.	Name of the Department	Programme Name	Number of Seats*	Essential qualifications
1.	Applied Mathematics	M.Sc. Mathematics (MSCMAT)	60	BA/B.Sc. (Gen. OR Hons.) with 55% or equivalent CGPA provided by the concerned Institute/ University with **Mathematics as one of the main subjects.**
2.	Applied Physics	M.Sc. Physics (MSCPHY)	60	B.Sc.(Gen./Hons.) with 55% or equivalent CGPA provided by the concerned Institute/ University with **Physics as one of the main subjects.**
3.	Applied Chemistry	M. Sc. Chemistry (MSCCHEM)	60	B.Sc. (Gen/Hons.) with 55% or equivalent CGPA provided by the concerned Institute/ University with **Chemistry as one of the main subjects.**
4.	Biotechnology	M.Sc. Biotechnology (MSCBT)	60	B.Sc.(Gen/Hons.) with 55% or equivalent CGPA provided by the concerned Institute/ University with **Biology as one of the main subjects.**

* Candidates are advised to visit university website regularly for updates.
In case CGPA or conversion formula has not been provided by the concerned Institute/ University then equivalent CGPA will be computed as per the following

$$\text{Percentage of Marks} = 10 \times \text{CGPA}$$

1.2. Seat Matrix

Relaxation in minimum percentage requirement will be granted to the candidates belonging to SC/ST/PwD categories as given in **Table 2**. The aggregate marks awarded for the qualifying degree will be considered for eligibility. Admission to the M.Sc. programmes as given in Table-1, will be made on the basis of merit in the written test CUET-(PG)-2023 to be conducted by the NTA.

a. Final year students who will be completing all the requirements of their qualifying examination including back paper(s)/ supplementary(ies) before the date of admission may also apply. Such candidates will be required to submit a certificate as per the proforma given in **Annexure-1** along with the registration form. Such candidates may be admitted provisionally but they will be required to produce the proof of having

passed the qualifying degree with the required percentage of marks or CGPA latest by **September 30, 2023**, failing which their admission shall be cancelled and fees will be forfeited.

b. Detailed seat matrix indicating seats in various departments under different categories is given below:

Seat Matrix for M.Sc. Programme for the Session 2023-2024

Category	Department/ Branch	AM Mathematics	AP Physics	AC Chemistry	BT Biotech.	Total
GN	Open	22	23	22	22	
	PwD	1	1	1	1	
	Defence (CW)	1	1	1	1	
Total Gen Seats		24	25	24	24	97
SC	SC	8	8	8	8	
	SC-PwD	0	1	0	1	
	Defence (CW)	1	0	1	0	
Total SC Seats		9	9	9	9	36
ST	ST	4	3	4	5	
	ST-PwD	1	0	0	0	
	Defence (CW)	0	1	0	0	
Total ST Seats		5	4	4	5	18
OBC	OBC	15	15	15	14	
	OBC-PwD	1	0	1	1	
	Defence (CW)	0	1	1	1	
Total OBC Seats		16	16	17	16	65
EWS	EWS	5	5	5	5	
	EWS-PwD	0	1	1	0	
	Defence (CW)	1	0	0	1	
Total EWS Seats		6	6	6	6	24
Total Seats		60	60	60	60	240

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2. Reservation of Seats for Different Categories and Relaxation in Essential Qualifications

Admissions to the M.Sc. programmes will be made on All India basis. The university follows the reservations rules of Govt. of NCT of Delhi. In addition to this, 01 (One) seat in each M. Sc. programme of DTU, over and above their normal intake, is earmarked for Single Girl Child (SG) candidate and 01 (one) seat in each M. Sc. programme is reserved for Kashmiri Migrant. However, there will be no relaxation in the minimum eligibility criteria for SG and KM.

Table 2 indicates the percentage of reservations for various categories and relaxation in minimum eligibility conditions as applicable for the academic session 2023– 2024 is given below.

Table-2

S. No.	Category	Seats reserved	Relaxation in Essential qualification
1	Scheduled Castes (SC)	15%	5%
2	Scheduled Tribes (ST)	7.5 %	5%
3	Other Backward Classes (OBC)	27%	NIL
4.	Economically Weaker Section (EWS)	10%	NIL
5.	Sub Category Defence Personal (CW)	5%	NIL
6.	Sub Category Persons with Disability (PwD)	5%	5%

2.1 Reservation Policy:

a. **Scheduled Caste (SC):** 15 % of the total seats are reserved for Scheduled Caste candidates.
b. **Scheduled Tribe (ST):** 7.5 % of the total seats are reserved for Scheduled Tribe candidates.
c. **Other Backward Class (OBC- NCL):** 27% of the total seats are reserved for Other Backward Class (Non-Creamy Layer) candidates.
d. **Economically Weaker Section (EWS):** 10% of the total seats are reserved for Economically Weaker Section candidates.

Sub-categories namely 'Defence' and 'Person with Disability' are available under each category (General, SC, ST, OBC-NCL, EWS).

e. **Defence Personnel (CW):** 5% of the total seats (Horizontal) in each category are reserved for candidates belonging to Defence sub-category in the following priority:

Priority I - Widows/wards of Defence Personnel killed in action.
Priority II - Wards of disabled in action and boarded out from service.
Priority III - Widows/wards of Defence Personnel who died in peace time with death attributable to Military Service.
Priority IV - Wards of disabled in service and boarded out from service with disability attributable to military service.
Priority V - Wards of serving Defence Personnel and ex-servicemen who are in receipt of the following Gallantry Awards:* 1. ParamVir Chakra 2. Ashok Chakra 3. Mahavir Chakra 4. Kirti Chakra 5. Vir Chakra 6. Shaurya Chakra 7. Sena/ NauSena/ Vayu Sena Medal 8. Mention-in-Despatches 9. President's Police Medal for Gallantry 10. Police Medal for Gallantry
Priority VI - Wards of Ex-servicemen.
Priority VII - Wives of:
    i. Defence personnel disabled in action and boarded out from service.
    ii. Defence personnel disabled in service and boarded with disability attributable to military service.
    iii. Ex-servicemen and serving personnel who are in receipt of Gallantry awards.
Priority VIII - Wards of Serving personnel.
Priority IX - Wives of Serving personnel.

Note: * These medals are awarded for Gallantry as well as for distinguished service. Accordingly, it is notified in correspondence as under: (a) Sena Medal (G)/ NauSena Medal (G)/ Vayu Sena Medal (G) for the medal awarded for Gallantry. (b) Sena Medal (D)/ NauSena Medal (D)/ Vayu Sena Medal (D) for the medal awarded for Distinguished Service. However, for the purpose of reservation, only notification which states that the Medal has been awarded for Gallantry will be accepted and the Medal for Distinguished Services will not be accepted.

f. **Person with Disability (PwD):** 5% of the total seats (Horizontally) in each category are reserved for candidates belonging to 'Person with Disability' sub-category. Candidate's seeking admission must fulfil the eligibility conditions as detailed earlier. The 5% reservation horizontally for persons with disability may be allocated as detailed in Seat Matrix. The format of disability certificate is available at **Annexure-3.**

Against the seats identified for each disability, of which, one percent each shall be reserved for persons with benchmark disabilities under clauses (a), (b), and (c) and one percent, under clauses (d) and (e).

(a) Blindness and low vision;
(b) Deaf and hard of hearing;
(c) Locomotors disability including cerebral palsy, leprosy cured, dwarfism, acid attack victims and muscular dystrophy;
(d) Austin, intellectual disability, specific learning disability and mental illness;
(e) Multiple disabilities from amongst persons under clauses (a) to (d) including deaf-blindness.
(f) Physically handicapped applicants are permitted 5% marks of equivalent CGPA relaxation in eligibility requirement in line with the policies of Govt. of NCT of Delhi. They will not be allowed any other

relaxation beyond this limit even if they belong to SC/ST category.

g) Kashmiri Migrants (KM) (Supernumerary):
01 (One) seat over and above the total intake of all programme is available.

h) Single Girl Child (SG) (Supernumerary): 01 (One) seat in each programme, over and above their normal intake, is earmarked for Single Girl Child candidate (Girl having no brother and sister alive).

2.2. Seat Conversion rules:

a. After exhausting the complete list of PwD and CW subcategories, if there are vacant seats, the vacant seats in these subcategories will be transferred to respective main category (GEN/SC/ST/OBC/EWS).

b. After exhausting the complete list of SC, ST, OBC and EWS candidates, the vacant seats will be treated as unreserved in the Spot Round. The conversion of vacant seats will be done only in the Spot Round as per the following procedure:

    i. If the complete list of ST candidate exhausts, then the remaining vacant seats under this category will be filled from the list of SC, category candidates or vice versa as per merit.

    ii. If the complete list of SC/ST candidate exhausts, then the remaining vacant seats under this category will be filled by creating equal number of seats in GN, category as per merit.

    iii. If the complete list of EWS candidate exhausts, then the remaining vacant seats under this category will be filled from the list of GN, category candidates as per merit.

    iv. If the complete list of OBC candidate exhausts, then the remaining vacant seats under this category will be filled from the list of GN, category candidates as per merit.

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3. Online Registration Process/Counselling Process

For admission to M.Sc. programmes 2023, candidates need to register and fill the registration form ONLINE only by accessing **www.dtu.ac.in** after releasing CUET Score.

The guidelines indicated in the Online registration form must be carefully read by all applicants before filling the Online registration form. The registration process is completed only when a print out of the filled ONLINE registration form is taken after successful registration and candidates paying ONLINE registration fee, which has to be submitted/uploaded at the time of admission/counselling in the University along with two good quality photographs **(same as uploaded on online application form)** affixed in the appropriate place on the form.

Candidates, whose final year result is awaited, may also fill the online registration form provided he/she has score in CUET exam. Once the candidate has registered and paid the registration fee, he/ she would be required to upload an Undertaking as per the format given in the Brochure (Annexure-I) while filling up the registration form. The candidates would require to submit their final mark lists/ degree by September 30, 2023. Detailed notification in this regard will be published on University website.

3.1. Registration Fee

The registration fee of Rs. 1500/- for GN/OBC/EWS/SC/ST/PwD/CW, is to be paid online through credit/net banking at the time of registration and choice filling. The registration shall not be completed without payment of registration fee which is non-refundable and would not be adjusted towards any other fee. Convenience charge (online transactions) will be charged over and above the Online Registration as per the charges for the payment gateway on every online registration fee payment.

If a candidate wishes to apply in more than one MSc programmes, then he/she must apply separately in each department by paying separate online registration fee.

3.2. Details of Entrance Test

The admission to the following M.Sc. programmes for the academic year 2023-24 will be based on the rank obtained in the entrance test Common University Entrance Test: **CUET-(PG)-2023 conducted by the National Testing Agency (NTA)**. The details of test paper codes and respective programme names mentioned in the following table:

S. No. (as per CUET Notification)	Programme Name	Test Paper Code 2023	CUET Paper Title	Date(s) of Examination
755	M.Sc. Mathematics	SCQP19	Mathematics	Will be announced later on CUET (PG) website
921	M.Sc. Physics	SCQP24	Physics	
162	M.Sc. Chemistry	SCQP08	Chemistry	Will be announced later on CUET (PG) website
593	M.Sc. Biotechnology	SCQP17	Life Sciences	

The students are advised to check the CUET (PG)-NTA (https://cuet.nta.nic.in/) & DTU (www.dtu.ac.in) websites regularly for updates and additional information.

3.3. Rules for Seat Allotment

a. Merit list will be prepared based on the CUET (PG)-2023 score/rank among registered students at DTU.

b. Tentative schedule and the merit list will be displayed on the University's website, **www.dtu.ac.in.** No separate intimation will be sent to the candidates individually.

c. Merit list will be declared on the university website and display of the ranks only those candidates who are declared as qualified in the Entrance Examination conducted by the CUET. No separate intimation will be sent to the candidates regarding declaration of merit list and for admission.

d. To resolve and determine inter-se-merit of candidates having same CUET (PG) score, following criterion will be used in the stated order of preference.

   # In unlikely event of their CUET (PG) score is being the same, then preference will be based on the All India Rank.

   # Date of Birth will be compared and elder candidate will be given preference;

   # In highly unlikely event of date of birth is same, then rank will be decided on the basis of marks/ CGPA obtained in the qualifying degree.

3.4. First round of admission

a. The merit list will be displayed for the first round of admissions along with first round admission schedule on the university website **www.dtu.ac.in** and department notice boards. In case, some seats remain unfilled then second round of counselling may be conducted.

b. The selected candidates in the first round of admission shall pay the requisite fee through online (or) demand draft in Favour of **"Registrar, Delhi Technological University" payable at New Delhi** and submit a copy of fee receipt back to the respective department. Admission shall not be valid without payment of fee and

submitting the fee receipt to the department.

c. The candidate shall have to produce the relevant documents in original (as notified in section 6) for verification at the time of admission. If a candidate fails to report for admission on the scheduled date or he/ she is not able to submit the required documents or fee, he/ she shall forfeit his/her claim for admission and the seat shall be offered to the next eligible candidate in the order of merit. Further, the candidate will not be eligible for subsequent rounds.

d. A candidate can send his authorized representative with all the required documents and fee to report for admission in case he/she is unable to report for admission in person. The authorized representative must come with the authorization letter duly signed by the candidate.

e. The candidate may freeze his/her admission in a particular M.Sc Programme, by filling up a freezing form and submitting the same in the department concerned as per the schedule displayed on the admission website.

3.5. Second/ subsequent rounds of admission (Subject to availability of seats)

a. A list of seats available for admission during second/spot round of admission will be displayed on the DTU admission website as per the schedule given. Candidates are advised to check the DTU website regularly for instructions and Merit list.

b. The second/ subsequent rounds for all the programmes will be held at the same venue i.e. respective department. No separate individual communication will be sent in this regard.

c. The candidate shall have to produce the relevant documents in original (as notified in section 6) for verification at the time of admission. If a candidate fails to report for admission on the scheduled date or he/ she is not able to submit the required documents or fee, he/ she shall forfeit his/her claim for admission and the seat shall be offered to the next eligible candidate in the order of merit. Further, the candidate will not be eligible for subsequent rounds. However, such candidates are eligible for spot round of counselling.

d. No admission will be made directly to second or higher semester of any programme.

3.6. Spot round of admission (Subject to the availability of seats)

a. The SPOT ROUND shall be conducted depending upon the availability of vacant seats in programmes offered.

b. All the registered and eligible candidates who have not secured a seat till the second round of counselling i.e. candidates who have been allotted but not accepted a seat and those who have not been offered a seat till the second round of counselling, are eligible for spot round. The registered candidates who were allotted seat in some round of counselling, but the seat was cancelled due to some deficiency (or legitimate reason) are also eligible for this round provided the deficiencies are removed.

c. For detailed information on spot round, candidates are advised to visit the University website **www.dtu.ac.in.**

d. Participating candidates need to report in person at the Spot Round venue (Respective Department Office) as per spot round schedule and mark their attendance within reporting time. No candidates shall be allowed after the reporting time.

e. Candidates who cannot come physically can authorize their parent/relative/guardian/friends as their

representative to participate in SPOT round on their behalf and complete admission formalities. No other relaxation will be given in the procedure of admission. Such candidates are also advised to send a copy of signed authorization letter on admission support email **(mscoordinator@dtu.ac.in)** and the authorized representative must come with the authorization letter duly signed by the candidate.

f. Candidates will be called in order of their merit rank and allowed to opt for their choice of seat as per vacant seat availability.

g. The selected candidates in spot round of admission shall deposit the requisite fee through online (or) **demand draft in favour of "Registrar, Delhi Technological University" payable at New Delhi** and submit a copy of fee receipt back to the respective department. Admission shall not be valid without payment of fee and submitting the fee receipt to the department.

h. **Withdrawal of seat is not allowed for SPOT round seats and admission Fee will not be refunded.**

*Special spot round may be conducted by the university after the spot round depending upon the availability of vacant seats.

** Any change in the counselling schedule due to unforeseen circumstances shall be announced on the university website. Candidates are advised to visit the website regularly.

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4. Fee Structure

The detailed fee structure for M.Sc. Programme is given below:

S.No.	Particulars	Fee in AY 2023 – 2024 1st Year (Rs.)	Fee in AY 2024 – 2025 2nd Year (Rs.)
1.	Tuition Fee	20,000/-	23,000/-
2.	**Non Govt. Component**		
2.1	Student welfare fee (Co-curricular activities, Training & placement, extra curricular activities, Annual gathering, Students welfare, Institutional development, outsourcing, conference, seminar, workshop, innovative projects, skill development activities and miscellaneous expenditure on unspecified items)	10,000/-	10,000/-
2.2	Facilities and services charges (Research initiatives, training programmes, Awards, automation, facilities, entrepreneurship activities and any miscellaneous expenditure on unspecified items)	1,500/-	1,500/-
2.3	Economically weaker section fund	5,000/-	5,000/-
2.4	Examination fee (Examination infrastructure strengthening, expenditure on examination activities, confidential printing etc.)	5,000/-	5,000/-
2.5	DTU Medical facilities and premium amount for Mediclaim of student (per-annum)	700/-	700/-
	GRAND TOTAL	**Rs. 42,200/-**	**Rs.45,200/-**

The annual fee of the M.Sc. programme will have to be deposited online by the candidate at the time of admission on the university website. Candidates must note that the admission fee must be paid in single instalment failing which the admission offer will be withdrawn immediately. Waitlisted candidates (if offered admission during counselling) will be given one-day time to deposit the admission fee.

If the admission fee is not paid within the stipulated date and time, then the offer of admission given to them will be withdrawn automatically and the seat will be offered to the next eligible candidate.

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5. Withdrawal / Refund Policy

The University follows the following policy for the remittance and refund of fee, if a student chooses to withdraw from programme of study in which he / she is enrolled:

S.No.	Percentage of Refund of aggregate fee	Point of time when application for withdrawal of admission received
1.	100%	15 days before the formally notified last date of admission.
2.	80%	Not more than 15 days after the formally notified last date of admission.
3.	50%	More than 15 days but less than 30 days after the formally notified last date of admission.
4.	00% (NIL)	More than 30 days after the formally notified last date of admission.

Note: Last date of admission will be notified separately on DTU website before the start of counselling. Candidates are advised to visit DTU website www.dtu.ac.in regularly for notifications.

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6. Documents Required

Candidates are required to submit the following documents in original along with ONE set of self-attested photo-copies of the original documents, two recent passport size photographs, printout of the registration form duly signed by the candidate and annual admission fee receipt paid online on the university website, for the purpose of verification at the time of admission. The original documents will be returned to the students after verification. Candidates are advised to visit University website regularly for notification in this regard.

1. Date of Birth proof /10th certificate.
2. All mark sheets and certificate of qualifying examination (Graduation).
3. If Result for final semester is not declared, then candidate will be required to submit an Undertaking as per format placed at **Annexure-1**.
4. SC/ST/OBC/Persons with disability Certificate(s) whichever applicable, on the basis of which reservation is claimed.
5. Candidates applying for any reserved seat (i.e. EWS, SC, ST, OBC-NCL, SG, CW, KM) must produce the original certificates (as applicable) issued from an approved district authority, at the time of document verification.
6. OBC (NCL) candidates are required to produce a caste certificate issued after March 31, 2023 from the authorities as mentioned in **Annexure 2**. However, if the certificate is issued prior to March 31, 2023, it must be accompanied with an additional certificate regarding the present non-creamy layer status of the candidate, issued by the same competent authority. This additional certificate must have reference of his / her already issued original caste certificate.
7. Candidates applying for admission to seat reserved for Differently Abled Person (PwD) sub-category, the candidate must produce the certificates in original at the time of document verification as per **Annexure-3**.
8. The benefit of reservation under EWS can be availed by persons who are not covered under the scheme of reservation for SCs, STs and OBCs upon production of an Income and Asset Certificate issued by a competent authority based upon the Income and Assets criteria. The details and prescribed format issued by the Competent Authority is detailed at **Annexure-4**.
9. For admission to a seat reserved for Defence sub-category (CW), candidate must produce the following certificates (as applicable), in original, at the time of document verification as per format available at **Annexure-5**.
10. The candidates seeking admission under SG category can submit an affidavit duly attested by competent authority as per **Annexure-6**.
11. The candidates seeking admission under Kashmiri Migrants (KM) seats must produce the following documents, in original, at the time of document verification:
    a. Certificate of registration as Kashmiri Migrants issued by the Relief Commissioner, Jammu or Divisional Commissioner, Delhi to establish the status of the applicant as registered migrants as per **Annexure-7**.
    b. Proof of property in Kashmir of the parent of the candidate.

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7. Academic Department Details & Course Curriculum Offered For M.Sc. Programmes

7.1 Department of Applied Mathematics

The Department runs a four-year B. Tech. programme in Mathematics & Computing. This programme is an amalgamation of Mathematics with Computer Science and Financial Engineering. More than 25 research students are registered in the Department for Ph.D programme. The department has a team of committed faculty members from the disciplines of Pure Mathematics, Applied Mathematics, Computer Engineering, Statistics and Operation Research.

Research Areas: Information Theory, Graph Theory, Discrete Mathematics, Numerical Analysis, General Relativity and Cosmology, Optimization Technique, Complex Analysis, Mathematical Modelling, Approximation Theory, Stochastic Processes, Fuzzy logic and optimization, Algebra and Mathematical Finance.

Course Scheme for M.Sc. (MATHEMATICS)

FIRST SEMESTER	SECOND SEMESTER
Abstract Algebra	Complex Analysis
Real Analysis	Partial Differential Equations
Ordinary Differential Equations	Topology
Discrete Mathematics	Linear Algebra
Mathematical Statistics	Numerical Analysis
Programming Lab- I	Programming Lab- II
Communicative English	Fundamentals of Computers

THIRD SEMESTER	FOURTH SEMESTER
Functional Analysis	Measure and Integration
Operation Research	Dissertation-II
Dissertation-1	Discipline Specific Elective-3/Track-I
Discipline Specific Elective-1/ Track-I	Discipline Specific Elective-4
Discipline Specific Elective-2	Generic Elective Courses-2
Generic Elective Course-1	

List of Electives	
Stochastic process	Financial Mathematics
Analysis and Design of Algorithms	Data Mining
Number Theory	Optimization Techniques
Mathematical Modelling and Simulation	Approximation Theory
Calculus of Variation	General Relativity and Cosmology
Graph Theory	Finite Element Method
Database Management System	Machine Learning
Integral Transforms & Equations	Advanced Partial Differential Equations
Cryptography and Coding Theory	Univalent Function Theory
Classical Mechanics	Fuzzy Sets and Applications

In addition to these departmental electives, student can opt for other elective courses depending on his/ her interest offered by any other department offering courses in M.Sc. and B.Tech. programmes.

Track 1 option is by research work. Candidate will be finally evaluated at the end of the semester IV on the basis of his/her publication (accepted or published in SCI/SCIE journals).

Further, besides conventional modes of teaching such as lectures, videos, power points and reading materials, Students are encouraged to earn some credits through self-paced custom elearning in the areas of interest through MOOCs, SWAYAM and NPTEL digital platforms.

7.2 Department of Applied Physics

Applied Physics Department is providing cutting edge research, innovation and education in the emerging areas of science and technology. Department offers the undergraduate Academic Programme (B.Tech.) in Engineering Physics and Post Graduate programme (M.Tech.) in Material Science and Technology and one M.Sc. programme in Physics is offered from the Department. The department has well-equipped state of art laboratories for undergraduate, postgraduate and Ph.D. students. Faculty members of the department are actively involved in National and International collaborations for R & D activities.

Research Areas: Nanotechnology: Carbon Nanotube / Carbon Nano fibre and Graphene. Plasma Physics/ Dusty plasma/THz Radiation Emission/High power microwave devices, Photonics and Photonic Crystals. Glass Science and Technology Phosphors, Photoluminescence, Organic & Nano-Material, Time-resolved spectroscopy, Micro electronic Devices and Solar Cells-Application Oriented Modelling and Simulation, Waveguide based devices. Fibre and Integrated optics, Luminescent Materials, Material science, Experimental Lithium Ion battery, Multiferroic materials, Atomic & molecular physics, Gas sensors, Atmosphere Sciences, Memory Devices.

Course Scheme for M.Sc. (PHYSICS)

FIRST SEMESTER	SECOND SEMESTER
Mathematical Physics	Advanced Quantum Mechanics
Classical Mechanics	Statistical Mechanics
Quantum Mechanics	Computational Methods
Applied Optics	Electrodynamics
Electronics	Solid State Physics
Physics Lab-I	Physics Lab-II
Communicative English	Fundamentals of Computers

THIRD SEMESTER	FOURTH SEMESTER
Atomic and Molecular Physics	Advanced Semiconductor Devices
Nuclear and Particle Physics	Discipline Specific Elective-2/ Track-I
Dissertation-I	Generic Elective Course-2
Discipline Specific Elective-1/ Track-I	Advanced Physics Lab -II
Generic Elective Course-1	Dissertation-II
Advanced Physics Lab -I	

List of Electives	
Fibre and Integrated Optics	Space and Atmospheric Science
Advanced Condensed Matter Physics	Lasersand Spectroscopy
Advanced Numerical Physics	Spintronics
Plasma Physics	Advanced Electronics
Characterization Techniques	Advanced Functional Materials

In addition to these departmental electives, student can opt for other elective courses depending on his/ her interest offered by any other department offering courses in M.Sc. and B.Tech. programmes.

Track 1 option is by research work. Candidate will be finally evaluated at the end of the semester IV on the basis of his/her publication (accepted or published in SCI/SCIE journals).

Further, besides conventional modes of teaching such as lectures, videos, power points and reading materials, Students are encouraged to earn some credits through self-paced custom elearning in the areas of interest through MOOCs, SWAYAM and NPTEL digital platforms.

7.3 Department of Applied Chemistry

Department of Applied Chemistry holds the foundation of the reputation of Delhi Technological University as it is one of the core disciplines of DTU founded at the time of its inception. The department offers B.Tech. in Chemical Engineering (4 yrs); M.Tech. in Polymer Technology (2 yrs); and M.Sc. in Chemistry (2 yrs); and Ph.D. in Chemistry and Chemical Engineering. The department is providing cutting edge research, innovation and education in the emerging areas of chemistry and chemical engineering. The department has well-equipped state of art laboratories for undergraduate, postgraduate and Ph.D. students. The faculty members of the department are actively involved in research and collaborations. The department have published quality research papers in peer-reviewed journals and contributed towards conference proceeding and book chapters of national and international repute.

Research Areas: Inorganicchemistry, bioinorganic chemistry, cell imaging, organic chemistry, organic synthesis, bioorganic chemistry, medicinal chemistry, biomimetic reactions, bio-polymer, nutraceuticals & functional foods, conducting polymer, sensors, electrochemistry, natural products, medical textiles, effluent treatment, nano & environmental biotechnology, surface chemistry, reaction engineering, chemical engineering, polymer blends &composites, hydrogels.

Course Scheme for M.Sc. (Chemistry)

FIRST SEMESTER	SECOND SEMESTER
Inorganic Chemistry-1: Chemical Bonding, Stability Constant and Supramolecular Chemistry	Inorganic Chemistry-2: Molecular symmetry and Group Theory
Organic Chemistry-1: Stereochemistry and Reaction Intermediates & Mechanism	Organic Chemistry-2: Photochemistry & Pericyclic reactionsand Spectroscopy
Physical Chemistry-1: Quantum chemistry, electrochemistry and chemical kinetics	Physical Chemistry-2: Thermodynamics, Chemical bonding, and Surface chemistry
Elementary Topics for Chemists	Generic Elective Courses-1
Chemistry practical (inorganic/organic/physical)	Chemistry practical (inorganic/organic/physical)
Communicative English	Fundamentals of Computers

THIRD SEMESTER	FOURTH SEMESTER
Organic Chemistry-3: Methods and Reagents in Organic Synthesis	Inorganic Chemistry-4: Spectroscopy for Inorganic Chemists Organic Chemistry-4: Medicinal and Natural product chemistry PhysicalChemistry-4: Advance electrochemistry
Physical Chemistry-3: Physical aspects of spectroscopic methods	Dissertation-I
Specialization Laboratory	Generic Elective Courses-2
Discipline Specific Elective-1/Track-I	Discipline Specific Elective-2/Track-I
Inorganic Chemistry-3: Organometallic Chemistry and its Applications	Dissertation-II

List of Electives	
Chemistry of Nanomaterials	Advanced Methods in Organic Synthesis
Inorganic Reaction Mechanisms and Bioinorganic Chemistry	Agrochemicals and food chemistry
Organic Synthesis and Heterocyclic Chemistry	Chemistry of Life Processes and Bioactive Compounds
Solid State Chemistry	Macromolecules
Analytical Techniques for Inorganic Chemists	Advanced Molecular Spectra
Material, Nuclear and Radiochemistry	

In addition to these departmental electives, student can opt for other elective courses depending on his/ her interest offered by any other department offering courses in M.Sc. and B.Tech. programmes.

Track 1 option is by research work. Candidate will be finally evaluated at the end of the semester IV on the basis of his/her publication (accepted or published in SCI/SCIE journals).

Further, besides conventional modes of teaching such as lectures, videos, power points and reading materials, Students are encouraged to earn some credits through self-paced custom elearning in the areas of interest through MOOCs, SWAYAM and NPTEL digital platforms.

7.4 Department of Biotechnology

The main objective of the Department is to provide academic training and conduct research in the interdisciplinary areas of biotechnology with particular emphasis on extending the knowledge generated from these studies toward the development of technologies of commercial significance.

The Department is running postgraduate programmes in Biotechnology, Bioinformatics, and Industrial Biotechnology. Department of Biotechnology is also running research-oriented Ph.D. programme. The department has undertaken sponsored projects funded by ICMR, CSIR, DST, DBT, UGC, etc. The department has 10 state-of-the-art laboratories.

Research Areas: Aquaculture, Algal Biotechnology, Bioremediation, Biosensor, Functional Genomics, Genome informatics, Immunology, Immunostimulation, Molecular Neuroscience, Nano- biotechnology, Neuro-oncology, Radiation Biology, Water Quality Management.

Course Scheme for M.Sc. (BIOTECHNOLOGY)

FIRST SEMESTER	SECOND SEMESTER
Biochemistry	Immunology
Cell and Developmental Biology	Microbiology and Industrial Applications
Molecular Biology	Genetic Engineering
Analytical Techniques	Genetics
Biostatistics andComputer Applications	Generic Elective Courses-1
Seminar	Project Proposal Presentation
Communicative English	Fundamentals of Computers

THIRD SEMESTER	FOURTH SEMESTER
Bioprocess Engineering and Technology	Project Work
Immunotechnology and Molecular Virology	Genomics and Proteomics
IPR & Biosafety	Generic Elective Courses-2
Discipline Specific Elective-1	
Discipline Specific Elective-2	
Lab based on elective	

List of Electives	
Microbial Technology	Diagnostics
Computational Biology	Cancer Genetics
Animal Biotechnology	Evolutionary Genetics
Plant Biotechnology	Model Genetic Systems
Environmental Biotechnology	Pharmacogenomics
Nano-biotechnology	Stem Cell Biology
Protein Engineering	Vaccines
Molecular Virology	Metabolic Engineering
Industrial & Food Biotechnology	Molecular Therapeutics

In addition to these departmental electives, student can opt for other elective courses depending on his/ her interest offered by any other department offering courses in M.Sc. and B.Tech. programmes.

Track 1 option is by research work. Candidate will be finally evaluated at the end of the semester IV on the basis of his/her publication (accepted or published in SCI/SCIE journals).

Further, besides conventional modes of teaching such as lectures, videos, power points and reading materials, Students are encouraged to earn some credits through self-paced custom elearning in the areas of interest through MOOCs, SWAYAM and NPTEL digital platforms.

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8. Syllabus for CUET Examination for M. Sc. Admissions

8.1 Syllabus for M.Sc. Mathematics (SCQP19), CUET Examination

Algebra: Groups, subgroups, Abelian groups, non-abelian groups, cyclic groups, permutation groups; Normal subgroups, Lagrange's Theorem for finite groups, group homomorphism and quotient groups, Rings, Subrings, Ideal, Prime ideal; Maximal ideals; Fields, quotient field.

Vector spaces, Linear dependence and Independence of vectors, basis, dimension, linear transformations, matrix representation with respect to an ordered basis, Range space and null space, rank-nullity theorem; Rank and inverse of a matrix, determinant, solutions of systems of linear equations, consistency conditions. Eigenvalues and eigenvectors. Cayley-Hamilton theorem. Symmetric, Skew symmetric, Hermitian, Skew-Hermitian, Orthogonal and Unitary matrices.

Real Analysis: Sequences and series of real numbers. Convergent and divergent sequences, bounded and monotone sequences, Convergence criteria for sequences of real numbers, Cauchy sequences, absolute and conditional convergence; Tests of convergence for series of positive terms-comparison test, ratio test, root test, Leibnitz test for convergence of alternating series.

Functions of one variable: limit, continuity, differentiation, Rolle's Theorem, Cauchy's Taylor's theorem. Interior points, limit points, open sets, closed sets, bounded sets, connected sets, compact sets; completeness of R, Power series (of real variable) including Taylor's and Maclaurin's, domain of convergence, term-wise differentiation and integration of power series.

Functions of two real variable: limit, continuity, partial derivatives, differentiability, maxima and minima. Method of Lagrange multipliers, Homogeneous functions including Euler's theorem.

Complex Analysis: Functions of a complex Variable, Differentiability and analyticity, Cauchy Riemann Equations, Power series as an analytic function, properties of line integrals, Goursat Theorem, Cauchy theorem, consequence of simply connectivity, index of a closed curves.

Cauchy's integral formula, Morera's theorem, Liouville's theorem, Fundamental theorem of Algebra, Harmonic functions.

Integral Calculus: Integration as the inverse process of differentiation, definite integrals and their properties, Fundamental theorem of integral calculus. Double and triple integrals, change of order of integration. Calculating surface areas and volumes using double integrals and applications. Calculating volumes using triple integrals and applications.

Differential Equations: Ordinary differential equations of the first order of the form $y'=f(x,y)$. Bernoulli's equation, exact differential equations, integrating factor, Orthogonal trajectories, Homogeneous differential equations-separable solutions, Linear differential equations of second and higher order with constant coefficients, method of variation of parameters. Cauchy-Euler equation.

Vector Calculus: Scalar and vector fields, gradient, divergence, curl and Laplacian. Scalar line integrals and vector line integrals, scalar surface integrals and vector surface integrals, Green's, Stokes and Gauss theorems and their applications.

Linear Programing: Convex sets, extreme points, convex hull, hyper plane & polyhedral Sets, convex function and concave functions, Concept of basis, basic feasible solutions, Formulation of Linear Programming Problem (LPP), Graphical Method of LPP, Simplex Method.

8.2 Syllabus for M.Sc. Physics (SCQP24), CUET Examination

Mathematical Methods: Calculus of single and multiple variables, partial derivatives, Jacobian, imperfect and perfect differentials, Taylor expansion, Fourier series. Vector algebra, Vector Calculus, Multiple integrals, Divergence theorem, green's theorem, Stokes' theorem. First order equations and linear second order differential equations with constant coefficients. Matrices and determinants, Algebra of complex numbers.

Mechanics and General Properties of Matter: Newton's laws of motion and applications, Velocity and acceleration in Cartesian, polar and cylindrical coordinate systems, uniformly rotating frame, centrifugal and Coriolis forces, Motion under a central force, Kepler's laws, Gravitational Law and field, Conservative and non-conservative forces. System of particles, Center of mass, equation of motion of the CM, conservation of linear and angular momentum, conservation of energy, variable mass systems. Elastic and inelastic collisions. Rigid body motion,fixed axis rotations, rotation and translation, moments of Inertia and products of Inertia, parallel and perpendicular axes theorem. Principal moments and axes. Kinematics of moving fluids, equation of continuity, Euler's equation, Bernoulli's theorem.

Oscillations, Waves and Optics: Differential equation for simple harmonic oscillator and its general solution. Superposition of two or more simple harmonic oscillators. Lissajous figures. Damped and forced oscillators, resonance. Wave equation, traveling and standing waves in one-dimension. Energy density and energy transmission in waves. Group velocity and phase velocity. Sound waves in media. Doppler Effect. Fermat's Principle. General theory of image formation. Thick lens, thin lens and lens combinations. Interference of light, optical path retardation. Fraunhofer diffraction. Rayleigh criterion and resolving power. Diffraction gratings. Polarization: linear, circular and elliptic polarization. Double refraction and optical rotation.

Electricity and Magnetism: Coulomb's law, Gauss's law. Electric field and potential. Electrostatic boundary conditions, Solution of Laplace's equation for simple cases. Conductors, capacitors, dielectrics, dielectric polarization, volume and surface charges, electrostatic energy. Biot-Savart law, Ampere's law, Faraday's law of electromagnetic induction, self and mutual inductance. Alternating currents. Simple DC and AC circuits with R, L and C components. Displacement current, Maxwell's equations and plane electromagnetic waves, Poynting's theorem, reflection and refraction at a dielectric interface, transmission and reflection coefficients (normal incidence only). Lorentz Force and motion of charged particles in electric and magnetic fields.

Kinetic theory, Thermodynamics: Elements of Kinetic theory of gases. Velocity distribution and equipartition of energy. Specific heat of Mono-, di- and tri-atomic gases. Ideal gas, van-der-Waals gas and equation of state. Mean free path. Laws of thermodynamics. Zeroth law and concept of thermal equilibrium. First law and its

consequences. Isothermal and adiabatic processes. Reversible, irreversible and quasi-static processes. Second law and entropy. Carnot cycle. Maxwell's thermodynamic relations and simple applications. Thermodynamic potentials and their applications. Phase transitions and Clausius-Clapeyron equation. Ideas of ensembles, Maxwell-Boltzmann, Fermi- Dirac and Bose Einstein distributions.

Modern Physics: Inertial frames and Galilean invariance. Postulates of special relativity. Lorentz transformations. Length contraction, time dilation. Relativistic velocity addition theorem, mass energy equivalence. Blackbody radiation, photoelectric effect, Compton Effect, Bohr's atomic model, X-rays. Wave-particle duality, Uncertainty principle, the superposition principle, calculation of expectation values, Schrödinger equation and its solution for one-, two- and three-dimensional boxes. Solution of Schrödinger equation for the one-dimensional harmonic oscillator. Reflection and transmission at a step potential, Pauli Exclusion Principle. Structure of atomic nucleus, mass and binding energy. Radioactivity and its applications. Laws of radioactive decay.

Solid State Physics, Devices and Electronics: Crystal structure, Bravais lattices and basis. Miller indices. X-ray diffraction and Bragg's law Intrinsic and extrinsic semiconductors, variation of resistivity with temperature. Fermi level. p-n junction diode, I-V characteristics, Zener diode and its applications, BJT: characteristics in CB, CE, CC modes. Single stage amplifier, two stage R-C coupled amplifiers. Simple Oscillators: Barkhausen condition, sinusoidal oscillators. OPAMP and applications: Inverting and non-inverting amplifier. Boolean algebra: Binary number systems; conversion from one system to another system; binary addition and subtraction. Logic Gates AND, OR, NOT, NAND, NOR exclusive OR; Truth tables; combination of gates; de Morgan's theorem.

8.3. Syllabus for M.Sc. Chemistry (SCQP08), CUET examination

<u>**Physical Chemistry**</u>

1. **Gaseous State:** Behavior of real gases: Deviations from ideal gas behavior, compressibility factor, and its variation with pressure for different gases. Causes of deviation from ideal behavior. van der Waals equation of state, its derivation and application in explaining real gas behaviour; van der Waals equation expressed in virial form, Boyle temperature. Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state, critical and van der Waals constants, law of corresponding states.

   Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path and viscosity of gases, including their temperature and pressure dependence, relation between mean free path and coefficient of viscosity, calculation of σ from η; variation of viscosity with temperature and pressure. Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities.

2. **Liquid State :** Structure and physical properties of liquids; vapour pressure, surface tension, viscosity, and their dependence on temperature, Effect of addition of various solutes on surface tension, cleansing action of detergents. Structure of water.

3. **Ionic Equilibria :** Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono-, di- and tri-protic acids. Salt hydrolysis, hydrolysis constants, degree of hydrolysis and pH for different salts. Buffer solutions; Henderson equation, buffer capacity, buffer range, buffer action, applications of buffers in analytical chemistry, Solubility and solubility product.

Brönsted-Lowry concept of acid-base reactions, solvated proton, relative strength of acids, types of acid-base reactions, levelling solvents, Lewis acid-base concept, Classification of Lewis acids, Hard and Soft Acids and Bases (HSAB) Application of HSAB principle. Qualitative treatment of acid – base titration curves (calculation of pH at various stages). Theory of indicators; selection of indicators and their limitations. Multistage equilibria in polyelectrolytes.

4. **Solid State :** Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Analysis of powder diffraction patterns of NaCl, CsCl and KCl. Various types of defects in crystals, Glasses and liquid crystals.

5. **Thermodynamics:** Intensive and extensive variables; state and path functions; isolated, closed and open systems; zeroth law of thermodynamics. First law: Concept of heat, q, work, w, internal energy, U, and statement of first law; enthalpy, H, relation between heat capacities, calculations of q, w, U and H for reversible, irreversible and free expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions.

Thermochemistry:

Heats of reactions: standard states; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data, effect of temperature (Kirchhoff's equations), pressure on enthalpy of reactions.

Second Law:

Concept of entropy; thermodynamic scale of temperature, statement of the second law of thermodynamics; molecular and statistical interpretation of entropy. Calculation of entropy change for reversible and irreversible processes.

Third law of thermodynamics:

Third Law of thermodynamics, residual entropy, calculation of absolute entropy of molecules.

Free Energy Functions:

Gibbs and Helmholtz energy; variation of S, G, A with T, V, P; Free energy change and spontaneity. Relation between Joule-Thomson coefficient and other thermodynamic parameters; inversion temperature; Gibbs-Helmholtz equation; Maxwell relations; thermodynamic equation of state.

6. **Partial molar quantities :** Partial molar quantities, dependence of thermodynamic parameters on composition; GibbsDuhem equation, chemical potential of ideal mixtures, change in thermodynamic functions in mixing of ideal gases.

7. **Dilute solutions or Colligative Properties :** Dilute solutions; lowering of vapour pressure, Raoult's and Henry's Laws and their applications. Excess thermodynamic functions. Thermodynamic derivation using chemical potential to derive relations between the four colligative properties: [(i) relative lowering of vapour pressure, (ii) elevation of boiling point, (iii) Depression of freezing point, (iv) osmotic pressure] and amount of solute. Applications in calculating molar masses of normal, dissociated and associated solutes in solution.

8. **Molecular Spectroscopy & Photochemistry :**

Unit-I

Interaction of electromagnetic radiation with molecules and various types of spectra; BornOppenheimer approximation. Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution. Vibrational spectroscopy: Classical equation of vibration, computation of force constant, amplitude of diatomic molecular vibrations, anharmonicity, Morse potential, dissociation energies, fundamental frequencies, overtones, hot bands, degrees of freedom for polyatomic molecules, modes of vibration, concept of group frequencies. Vibration-rotation spectroscopy: diatomic vibrating rotator, P, Q, R branches.

Unit-II

Raman spectroscopy: Qualitative treatment of Rotational Raman effect; Effect of nuclear spin, Vibrational Raman spectra, Stokes and anti-Stokes lines; their intensity difference, rule of mutual exclusion. Electronic spectroscopy: Franck-Condon principle, electronic transitions, singlet and triplet states, fluorescence and phosphorescence, dissociation and predissociation.

Unit-III

Photophysical and photochemical processes: laws of photochemistry, quantum yield. Jablonski diagrams: Franck-Condon principle, Law of photochemical equivalence, quantum efficiency, low and high quantum efficiency. kinetics of photochemical reactions ($H_2 + Br_2 \rightleftharpoons HBr$, $2HI \rightleftharpoons H_2 + I_2$), energy transfer in photochemical reactions (photosensitization and quenching), fluorescence, phosphorescence, chemiluminescence, Discussion of Electronic spectra and photochemistry (Lambert-Beer law and its applications).

9. **Chemical Kinetics :** Order and molecularity of a reaction, rate laws in terms of the advancement of a reaction, differential and integrated rate laws for first, second and fractional order reactions, pseudounimolecular reactions, determination of the order, kinetics of complex reactions (limited to first order): (i) Opposing reactions (ii) parallel reactions and (iii) consecutive reactions and their differential rate equations (steady-state approximation in reaction mechanisms) (iv) chain reactions. Temperature dependence of reaction rates; Arrhenius equation; activation energy. Collision theory of reaction rates, Lindemann mechanism, qualitative treatment of the theory of absolute reaction rates.

10. **Catalysis :** Types of catalyst, specificity and selectivity, mechanisms of catalyzed reactions at solid surfaces; effect of particle size and efficiency of nanoparticles as catalysts. Enzyme catalysis, MichaelisMenten mechanism, acid-base catalysis.

11. **Surface chemistry :** Physical adsorption, chemisorption, adsorption isotherms (Freundlich, Temkin, Derivation of Langumuir adsorption isotherms, surface area determination), BET theory of multilayer adsorption (no derivation), Adsorption in solution.

12. **Phase Equilibria :** Concept of phases, components and degrees of freedom, derivation of Gibbs Phase Rule for nonreactive and reactive systems; Clausius-Clapeyron equation and its applications to solid liquid, liquid-vapour and solid-vapour equilibria, phase diagram for one component systems, with applications. Phase diagrams for systems of solid-liquid equilibria involving eutectic, congruent and incongruent melting points, solid solutions. Three component systems, waterchloroform-acetic acid system, triangular plots. Binary solutions: Gibbs-Duhem-Margules equation, its derivation and applications to fractional distillation of binary miscible liquids (ideal and nonideal), azeotropes, lever rule, partial miscibility of liquids, CST, miscible pairs, steam distillation. Nernst distribution law: its derivation and applications.

13. **Introduction to Quantum Chemistry:**

Unit-I

Introduction to black-body radiation and distribution of energy, photo-electic effect, concept of quantization, wave particle duality (de-Broglie's hypothesis), The uncertainty principle, The wave function: wave function and its interpretation, conditions of normalization and Orthogonality and its significance. Basic idea about operators, eigen function and values, Schrodinger equation and application to free-particle

and particle in a box, boundary conditions, wave functions and energies, degeneracy, hydrogen atom, Schrodinger equation in polar coordinates, radial and angular parts of the hydrogenic orbitals, degeneracies, spherical harmonics, representations of hydrogenic orbitals.

Unit-II

Quantitative treatment of simple harmonic osciallator model, setting up of Schodinger equation and discussion of solution of wave functions. Rigid rotator model and discussion of application of Schrodinger equation. idea about transformation to spherical polar coordinate, discussion on solution.

Unit-III

Qualitative treatment of hydrogen atom and hydrogen-like ions: setting up of Schrödinger equation in spherical polar coordinates, radial part, quantization of energy (only final energy expression). Average and most probable distances of electron from nucleus. Valence bond and molecular orbital approaches, LCAO-MO treatment of H_2, H_2^+ ; bonding and anti-bonding orbitals, Comparison of LCAO-MO and VB treatments of H_2 (only wavefunctions, detailed solution not required) and their limitations.

14. **Conductance** : Arrhenius theory of electrolytic dissociation. Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Molar conductivity at infinite dilution. Kohlrausch law of independent migration of ions. Debye-Hückel-Onsager equation, Wien effect, Debye-Falkenhagen effect, Walden's rules. Ionic velocities, mobilities and their determinations, transference numbers and their relation to ionic mobilities, determination of transference numbers using Hittorf and Moving Boundary methods. Applications of conductance measurement: (i) degree of dissociation of weak electrolytes, (ii) ionic product of water (iii) solubility and solubility product of sparingly soluble salts, (iv) conductometric titrations, and (v) hydrolysis constants of salts.

15. **Electrochemistry** : Quantitative aspects of Faraday's laws of electrolysis, rules of oxidation/reduction of ions based on half-cell potentials, applications of electrolysis in metallurgy and industry. Chemical cells, reversible and irreversible cells with examples. Electromotive force of a cell and its measurement, Nernst equation; Standard electrode (reduction) potential and its application to different kinds of half-cells. Application of EMF measurements in determining (i) free energy, enthalpy and entropy of a cell reaction, (ii) equilibrium constants, and (iii) pH values, using hydrogen, quinone-hydroquinone, glass and SbO/Sb_2O_3 electrodes. Concentration cells with and without transference, liquid junction potential; determination of activity coefficients and transference numbers. Qualitative discussion of potentiometric titrations (acid-base, redox, precipitation).

Organic Chemistry

1. **Basics of Organic Chemistry** : Organic Compounds: Classification, and Nomenclature, Hybridization, Shapes of molecules, Influence of hybridization on bond properties. Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment;

Organic acids and bases; their relative strength. Homolytic and Heterolytic fission with suitable examples. Curly arrow rules, formal charges; Electrophiles and Nucleophiles; Nucleophlicity and basicity; Types, shape and relative stabilities of reaction intermediates (Carbocations, Carbanions, Free radicals and Carbenes). Organic reactions and their mechanism: Addition, Elimination and Substitution reactions.

2. **Stereochemistry :** Concept of asymmetry, Fischer Projection, Newmann and Sawhorse projection formulae and their interconversions; Geometrical isomerism: cis–trans and, syn-anti isomerism E/Z notations with C.I.P rules. Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with two or more chiral-centres, Distereoisomers, meso structures, Racemic mixtures, Relative and absolute configuration: D/L and R/S designations.

3. **Chemistry of Aliphatic Hydrocarbons :**

Carbon-Carbon sigma bonds

Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz- Fittig Reactions, Free radical substitutions: Halogenation - relative reactivity and selectivity.

Carbon-Carbon pi-bonds.

Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations. Reactions of alkenes: Electrophilic additions their mechanisms (Markownikoff/ Anti Markownikoff addition), mechanism of oxymercuration demercuration, hydroboration- oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti-hydroxylation (oxidation). 1, 2- and 1, 4- addition reactions in conjugated dienes and, DielsAlder reaction; Allylic and benzylic bromination and mechanism, e.g. propene, 1-butene, toluene, ethyl benzene. Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions.

4. **Cycloalkanes and Conformational Analysis :** Cycloalkanes and stability, Baeyer strain theory, Conformation analysis, Energy diagrams of cyclohexane: Chair, Boat and Twist boat forms.

5. **Aromatic Hydrocarbons :** Aromaticity: Huckel's rule, aromatic character of arenes, cyclic carbocations/ carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directing effects of substituent groups.

6. **Chemistry of Halogenated Hydrocarbons :** Alkyl halides: Methods of preparation, nucleophilic substitution reactions – SN1, SN2 and SNi mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution vs. elimination.

Aryl halides: Preparation, including preparation from diazonium salts. nucleophilic aromatic substitution; SNAr, Benzyne mechanism. Relative reactivity of alkyl, allyl/benzyl, vinyl and aryl halides towards nucleophilic substitution reactions. Organometallic compounds of Mg and Li and their use in synthesis.

7. **Alcohols, Phenols, Ethers and Epoxides :** Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Bouvaelt-Blanc Reduction; Preparation and properties of glycols: Oxidation by periodic acid and lead tetraacetate, Pinacol-Pinacolone rearrangement.

    Phenols: Preparation and properties; Acidity and factors effecting it, Ring substitution reactions, Reimer–Tiemann and Kolbe's–Schmidt Reactions, Fries and Claisen rearrangements with mechanism.

    Ethers and Epoxides: Preparation and reactions with acids. Reactions of epoxides with alcohols, ammonia derivatives and LiAlH4

8. **Carbonyl Compounds :** Structure, reactivity and preparation; Nucleophilic additions, Nucleophilic addition-elimination reactions with ammonia derivatives with mechanism; Mechanisms of Aldol and Benzoin condensation, Knoevenagel condensation, Claisen-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann and Benzil-Benzilic acid rearrangements, haloform reaction and Baeyer Villiger oxidation, α-substitution reactions, oxidations and reductions (Clemmensen, WolffKishner, LiAlH4, NaBH4, MPV, PDC and PGC); Addition reactions of unsaturated carbonyl compounds: Michael addition. Active methylene compounds: Keto-enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.

9. **Carboxylic Acids and their Derivatives :** Preparation, physical properties and reactions of monocarboxylic acids: Typical reactions of dicarboxylic acids, hydroxy acids and unsaturated acids: succinic/phthalic, lactic, malic, tartaric, citric, maleic and fumaric acids; Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study of nucleophilic substitution at acyl group -Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann bromamide degradation and Curtius rearrangement.

10. **Sulphur containing compounds :** Preparation and reactions of thiols, thioethers and sulphonic acids.

11. **Nitrogen Containing Functional Groups :** Preparation and important reactions of nitro and compounds, nitriles and isonitriles Amines: Effect of substituent and solvent on basicity; Preparation and properties: Gabriel phthalimide synthesis, Carbylamine reaction, Mannich reaction, Hoffmann's exhaustive methylation, Hofmann-elimination reaction; Distinction between 1°, 2° and 3° amines with Hinsberg reagent and nitrous acid. Diazonium salts: Preparation and synthetic applications.

12. **Polynuclear Hydrocarbons :** Reactions of naphthalene phenanthrene and anthracene Structure, Preparation and structure elucidation and important derivatives of naphthalene and anthracene; Polynuclear hydrocarbons.

13. **Heterocyclic Compounds :** Classification and nomenclature, Structure, aromaticity in 5-numbered and 6-membered rings containing one heteroatom; Synthesis, reactions and mechanism of substitution reactions of Furan, Pyrrole (Paal-Knorr synthesis, Knorr pyrrole synthesis, Hantzsch synthesis), Thiophene, Pyridine (Hantzsch synthesis), Pyrimidine, Structure elucidation of indole, Fischer indole synthesis and Madelung synthesis), Structure elucidation of quinoline and isoquinoline, Skraup synthesis, Friedlander's synthesis, Knorr quinoline synthesis, Doebner-Miller synthesis, Bischler-Napieralski reaction, Pictet-Spengler

reaction, Pomeranz-Fritsch reaction Derivatives of furan: Furfural and furoic acid.

14. **Alkaloids**: Natural occurrence, General structural features, Isolation and their physiological action Hoffmann's exhaustive methylation, Emde's modification, Structure elucidation and synthesis of Hygrine and Nicotine. Medicinal importance of Nicotine, Hygrine, Quinine, Morphine, Cocaine, and Reserpine.

15. **Terpenes** : Occurrence, classification, isoprene rule; Elucidation of stucture and synthesis of Citral, Neral and α-terpineol.

16. Organic Spectroscopy :

Basic Principles of UV Spectroscopy:

Application of Woodward-Fiser rule in interpretation of Organic compounds: Application of visible, ultraviolet and infrared spectroscopy in organic molecules. Electromagnetic radiation, electronic transitions, λmax & εmax, chromophore, auxochrome, bathochromic and hypsochromic shifts. Application of electronic spectroscopy and Woodward rules for calculating λmax of conjugated dienes and α,β – unsaturated compounds

Basic principles of IR Spectroscopy:

Identification of Functional groups of various classes of organic compounds: Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).

NMR (1 H and 13C NMR):

Application of Chemical Shifts, Splitting of signals, Spin coupling and Over Houser effect in interpretation of NMR spectra, Isotopic exchange

Basic principles Mass Spectrometry:

Application of fragmentation rule in characterization of organic compounds. Problems on structure elucidation of organic compounds based on spectral data

8.4 Syllabus for M.Sc. Biotechnology (SCQP17), CUET Examination

Life Sciences (SCQP17)

1. **Techniques:** Principles and applications of chromatography, spectroscopy, microscopy, electrophoresis, centrifugation, blotting, PCR & radioisotope techniques
2. **Chromatin structure and function:** Organization of chromosomes in prokaryotes and eukaryotes, chromatin types, centromere, Telomere and concept of gene.

3. **Biochemistry:** Structure and functions of proteins, DNA, carbohydrates, lipids & vitamins. Bioenergetics, Glycolysis, TCA cycle, Electron Transport System and ATP synthesis, oxidation and synthesis of fatty acid, membrane structure and function

4. **Biotechnology:** Recombinant DNA technology, principles of gene cloning, applications of biotechnology in medicine, industry and agriculture, animal & plant cell culture, environmental biotechnology

5. **Microbiology:** Diversity of microbes, bacterial reproduction, antimicrobial agents, significance of microbes in the industry and agriculture, antigen, antibody, complement systems, immunity, vaccines, plant virus, animal virus and environmental microbiology.

6. **Molecular Genetics:** Principles of inheritance, linkage & crossing over, chromosomal aberrations, extrachromosomal inheritance, replication, transcription, translation, DNA repair and population genetics

7. **Plant Sciences:** Bryophytes, Pteridophytes, Gymnosperms, Angiosperms, Vascular system in plants, Economic important of plants, Photosynthesis, Photoperiodism, Vernalization, and Biogeochemical cycle

8. **Animal Sciences:** Characteristics of invertebrates and vertebrates, anatomy and physiology of different system of humans, nerve impulse transmission, endocrinology, human diseases Apoptosis and cancer, inherited diseases, animal cell culture.

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9. Certificates and Formats

9.1 ANNEXURE-1

CERTIFICATE FOR APPEARING IN THE FINAL SEMESTER/YEAR EXAMINATION

(Required from candidates who are yet to appear in the qualifying examination)

In connection with the application of Mr./Ms. _____ for admission to PG programme(s) at Delhi Technological University Delhi, I hereby certify that he/she is a bonafide student of our institution. He/she is yet to complete the requirements of qualifying examination including theory, practical project examination and back paper(s)/supplementary(is) for B.A./B.Sc. _____ which is to be scheduled later on (Strike out the non-applicable ones and write in the blank space if the degree is not mentioned) and the result is likely to be announced by _____ 2023. The percentage of aggregate marks/CGPA obtained by him/her upto pre final year examination is _____ His/her conduct and character during his/her stay at the University/University has been "GOOD".

Signature of the Principal/Dean/Registrar/

Dy. Registrar /Proctor/Administrative Officer

Name: _____   Seal : _____

Place: _____

Date:_____

UNDERTAKING BY THE CANDIDATE REGISTERED WITHOUT PRODUCTION OF PROOF OF PASSING THE QUALIFYINGEXAMINATION/APPEARED IN THE BACKPAPER(S)/ SUPPLEMENTARY(IES) TILL DATE OF REGISTRATION

I, _____son/daughter/ward of Mr./Ms _____

_____ hereby undertake that I have appeared in all the examinations including practicals/ projects/theory/back paper(s)/supplementary(ies) before the date of registration and only the result is awaited, which is likely to be declared by _____

Signature _____

Place: _____   Name _____

Date: _____   Address _____

AUTHORITIES WHO CAN ISSUE CASTE/TRIBE CERTIFICATE

Scheduled Caste (SC)/Scheduled Tribe (ST) /Other Backward Class (OBC-NCL): For admission to a seat reserved for Scheduled Caste/Scheduled Tribe/Other Backward Class (NCL), candidate must produce a certificate, in original, issued from an approved district authority stating the Scheduled Caste/ Scheduled Tribe/ Other Backward Class (NCL), to which the candidate belongs. A list of approved authorities is given below:

a. District Magistrate / Additional Magistrate / Deputy Commissioner / Collector / Additional Deputy Commissioner / Deputy Collector / 1st Class Stipendiary Magistrate / City Magistrate (not below the rank of 1st Class Stipendiary Magistrate), Sub-Divisional Magistrate / Taluka Magistrate / Executive Magistrate / Extra Assistant Commissioner.

b. Revenue Officer not below the rank of Tehsildar.

c. Sub-Divisional Officer of the area where the candidates and/or his/her family normally resides

d. Administrator/Secretary to Administration/Development Officer (Laccadive & Minicoy Islands).

(Certificate issued by any other authority will not be accepted.)
Prescribed Format for OBC Certificate

FORM OF CERTIFICATE TO BE PRODUCED BY OTHER BACKWARD CLASSES

This is to certify that Shri / Smt. / Km._____ Son / Daughter of Shri / Smt. _____ of Village/ Town _____District/Division _____ in the State belongs to the _____Community which is recognized as a backward class under:

i. Resolution No. 12011/68/93-BCC(C) dated 10/09/93 published in the Gazette of India Extraordinary Part I Section I No. 186 dated 13/09/93.

ii. Resolution No. 12011/9/94-BCC dated 19/10/94 published in the Gazette of India Extraordinary Part I Section I No. 163 dated 20/10/94.

iii. Resolution No. 12011/7/95-BCC dated 24/05/95 published in the Gazette of India Extraordinary Part I Section I No. 88 dated25/05/95.

iv. Resolution No. 12011/96/94-BCC dated 9/03/96. (v)Resolution No. 12011/44/96-BCC dated 6/12/96 published in the Gazette of India Extraordinary Part I Section I No. 210 dated 11/12/96.

v. Resolution No. 12011/13/97-BCC dated 03/12/97.

vi. Resolution No. 12011/99/94-BCC dated 11/12/97.

vii. Resolution No. 12011/68/98-BCC dated 27/10/99.

viii. Resolution No. 12011/88/98-BCC dated 6/12/99 published in the Gazette of India Extraordinary Part I Section I No. 270 dated 06/12/99.

ix. Resolution No. 12011/36/99-BCC dated 04/04/2000 published in the Gazette of India Extraordinary Part I Section I No. 71 dated04/04/2000.

x. Resolution No. 12011/44/99-BCC dated 21/09/2000 published in the Gazette of India Extraordinary Part I Section I No. 210dated21/09/2000.

xi. Resolution No. 12015/9/2000-BCC dated 06/09/2001.

xii. Resolution No. 12011/1/2001-BCC dated 19/06/2003.

xiii. Resolution No. 12011/4/2002-BCC dated 13/01/2004.

xiv. Resolution No. 12011/9/2004-BCC dated 16/01/2006 published in the Gazette of India Extraordinary Part I Section I No. 210 dated 16/01/2006.

Shri / Smt. / Kum. _____ and / or his family ordinarily reside(s) in the _____ District / Division of _____ State. This is also to certify that he/she does not belong to the persons/sections (Creamy Layer) mentioned in Column 3 of the Schedule to the Government of India, Department of Personnel & Training O.M. No. 36012/22/93-Estt. (SCT) dated 08/09/93 which is modified vide OM No. 36033/3/2004 Estt. (Res.) dated 09/03/2004.

Dated: _____

<div align="right">

District Magistrate / Deputy Commissioner

Competent Authority

Seal
</div>

NOTE

a. The term 'Ordinarily' used here will have the same meaning as in Section 20 of the Representation of the People Act, 1950.

b. The authorities competent to issue Caste Certificates are indicated below:

   i. District Magistrate / Additional Magistrate / Collector / Deputy Commissioner / Additional Deputy Commissioner / DeputyCollector / Ist Class Stipendiary Magistrate / Sub-Divisional magistrate / Taluka Magistrate / Executive Magistrate / Extra Assistant Commissioner (not below the rank of Ist Class Stipendiary Magistrate).

   ii. Chief Presidency Magistrate / Additional Chief Presidency Magistrate / Presidency Magistrate.

   iii. Revenue Officer not below the rank of Tehsildar and

   iv. Sub-Divisional Officer of the area where the candidate and / or his family resides.

<div align="center">

Declaration/undertaking - for OBC Candidates only
</div>

I, _____ son/daughter of Shri _____ resident of village/town/city _____ district _____ State _____ hereby declare that I belong to the _____ community which is recognized as a backward class by the Government of India for the purpose of reservation in services as per orders contained in Department of Personnel and Training Office Memorandum No.36012/22/93- Estt. (SCT), dated 8/9/1993. It is also declared that I do not belong to persons/sections (Creamy Layer) mentioned in Column 3 of the Schedule to the above referred Office Memorandum, dated 8/9/1993, which is modified vide Department of Personnel and Training Office Memorandum No.36033/3/2004 Estt. (Res.) dated 9/3/2004.

<div align="right">

Signature of the Candidate
</div>

Place: _____

Date: _____

9.3 ANNEXURE-3

## PERSON WITH DISABILITY SUB-CATEGORY

For admission to seat reserved for Differently Abled Person (PwD) sub-category, the candidate must produce the following certificates in original at the time of document verification for PwD candidates:

a. A certificate of physical disability issued by a duly notified Medical Board of a District/Government Hospital set up for examining the physically challenged candidates under the provision of the Person with Disability (equal opportunities, protection of rights and full participation) Act 1995.The certificate should indicate the extent (i.e. percentage) of the physical handicap and should bear the Photograph of the candidate concerned. The certificate should be countersigned by one of the Doctors constituting the Board issuing the certificates.

b. A certificate duly recommended by Vocational Rehabilitation Centre for the Handicapped, 9-11 Vikas Marg, Karkardooma, Delhi 110092.

Certificate for Person with Disability
To be issued by Medical Board from Government Hospital

Name of the candidate: Mr./Ms.* _____

Father's Name: _____

Permanent Address: _____

_____

_____
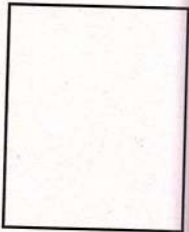
Percentage loss of earning capacity (in words): _____

Whether the candidate is otherwise able to carry on the studies and perform the duties of an engineer/architect satisfactorily: _____

Name of the disease-causing handicap: _____

Whether handicap is temporary or permanent: _____

Whether handicap is progressive or non-progressive: _____

The candidate is FIT / UNFIT to pursue further studies.

(*Strike out whichever is not applicable)

Member   **Member**   **Principal Medical Officer**
                                                    (Orthopaedic Specialist)
Date: Seal of Office:

NOTE: 1. The medical board must have one orthopaedic specialist as its member.

2. Candidate having temporary or progressive handicap will not be considered against the seats.

CERTIFICATE FOR ECONOMICALLY WEAKER SECTION (EWS)

Government of _____

(Name & Address of the authority issuing the certificate)

INCOME & ASSET CERTIFICATE TO BE PRODUCED BY CANDIDATE SEEKING RESERVATION UNDER ECONOMICALLY WEAKER SECTIONS

Certificate No. _____   Date: _____

VALID FOR THE YEAR _____

1. This is to certify that Shri/Smt. /Kumari_____ Son /Daughter/Wife of _____ permanent resident of Village/Street _____ Post office_____District _____ in the State/ Union Territory_____Pin code _____whose photograph is attested below belongs to Economically Weaker Sections, since the gross annual income* of his/ her family** is below Rs 8 lakh (Rupees Eight Lakh Only) for the financial year _____. His/ her family does not own or possess any of the following assets***.

i.   5 Acres of agricultural land and above;

ii.   Residential flat of 1000 sq. Ft. And above;

iii.   Residential plot of 100 sq. Yards and above in notified municipalities;

iv.   Residential plot of 200 sq. Yards and above in areas other than the notified municipalities.

Shri/Smt./Kumari_____belongs to the caste _____which is not recognized as a Scheduled Caste, Scheduled Tribe and Other Backward Classes (Central List).

Signature with seal of office: _____

Name: _____

Designation:

Recent Passport size attested photograph of the applicant

*Note 1: Income covered all sources i.e. salary, agriculture, business, profession etc.

**Note 2: The term "Family" for this purpose include the person, who seeks benefit of reservation, his/ her parents and siblings below the age of 18 years as also his/ her spouse and children below the age of 18 years.

***Note 3: The property held by a " Family" in different locations or different places/ cities have been clubbed while applying the land or property holding test to determine EWS status.

INCOME & ASSET CERTIFICATE ISSUING AUTHORITY

The Income and Asset Certificate issued by any one of the following authorities in the prescribed format as given above shall only be accepted as proof of candidate's claim as 'belonging to EWS':-

i.   District Magistrate / Additional District Magistrate / Collector / Deputy Commissioner / Additional Deputy Commissioner / Ist Class Stipendiary Magistrate / Sub-Divisional magistrate / Taluka Magistrate / Executive Magistrate / Extra Assistant Commissioner,

ii.   Chief Presidency Magistrate / Additional Chief Presidency Magistrate / Presidency Magistrate.

iii.   Revenue Officer not below the rank of Tehsildar' and

iv   Sub-Divisional Officer of the area where the candidate and / or his family normally resides.

<u>CERTIFICATE IN RESPECT OF DEFENCE CATEGORY (CW)</u>
<u>(CERTIFICATE FOR AVAILING ADMISSION AGAINST DEFENCE QUOTA</u>
<u>OFFICE OF THE ZILA/RAJYA SAINIK BOARD)</u>

This is to certify that Mr./ Ms. _____ son/ daughter of _

_____ resident of _____

_____ the above named officer/ JCO/ OR pertains to the category marked below:

(Select one from below)

a. Killed in action on _____ during _____

b. Disabled in action on_____ and boarded out from service on _____

during_____

c. Died in peace time on _____ with death attribute to military service.

d. Disabled in peace time and boarded out from service with disability attributable to military service.

e. Gallantry Award winner (_____)

f. Ex- serviceman.

g. Serving soldier

(Category _____ above)

Mr./ Ms. _____ son/ daughter of _____

_____the above named officer/ JCO/ OR

Is eligible for admission in DTU against the Defence quota under priority His/ Her Ex-serviceman widow

identify card No. Is DLH-01 _____ .

NO _____/

                                                                     RSB Secretary

(Round stamp of office)

                                                      (Zila/ Rajyasainik board)

AFFIDAVIT FOR SINGLE GIRL CHILD

For claiming admission in this category, the Father/Mother/Guardian (in case parents are deceased) shall have to submit affidavit/ self-attested to this effect duly attested by area District Magistrate/Additional Magistrate/ Deputy Commissioner/Collector/Additional Deputy Commissioner/Deputy Collector / Ist Class Stipendiary Magistrate /City Magistrate (not below the rank of Ist Class Stipendiary Magistrate)/Sub-Divisional magistrate / Taluka Magistrate / Executive Magistrate / Extra Assistant Commissioner.

SPECIMEN OF AFFIDAVIT/SELF ATTESTED FOR ONLY (SINGLE) GIRL CHILD CATEGORY
(on non-judicial PAPER OF Rs. 20/- duly attested by Ist Class Magistrate)

I _____ (name) father/mother of Miss _____

_____ resident of _____

_____ (full address to be given)

do hereby, solemnly declare and affirm as under:

1. That I am a citizen of India.

2. That Miss _____ born on _____ is the only

(Single) Girl Child of the deponent.

3. That the deponent has no living male/female child other than the above one.

Place: _____

Dated: _____

<div align="right">DEPONENT</div>

VERIFICATION

Verified that the contents of the above affidavit/self attested are true and correct to the best of my knowledge and belief and nothing has been concealed therein.

<div align="right">DEPONENT</div>

Place: _____

Dated: _____

CERTIFICATE FOR AVAILING ADMISSION AGAINST KASHMIRI MIGRANT QUOTA

KASHMIRI MIGRANT QUOTA

(To be submitted at the time of admission)

Certified that Shri/ Km/Smt. _____ son/ daughter/

wife of _____ resident of _____

_____ is registered as migrant from Jammu and Kashmir. The registration

number is _____ dated _____.

It is also certified that Shri/ Km/Smt. _____

Is registered in Delhi/ _____ as J & K Migrant on _____.

Name & Signature of

Deputy Commissioner/ Competent authority

(Office stamp)

Place:

Date:

Note: No Document other than this will be accepted by the University for claiming reservation against the Kashmiri Migrant Seat.

For all the queries related to

M.Sc. admission 2023-24

Email: mscoordinator@dtu.ac.in

M.Sc. Chairperson

Delhi Technological University

Shabad Daulatpur, Bawana Road, Delhi-110042

Website: www.dtu.ac.in

Delhi Technological University

(Established by the Govt. of NCT of Delhi vide Act 6 of 2009)

(Formerly Delhi College of Engineering)

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