



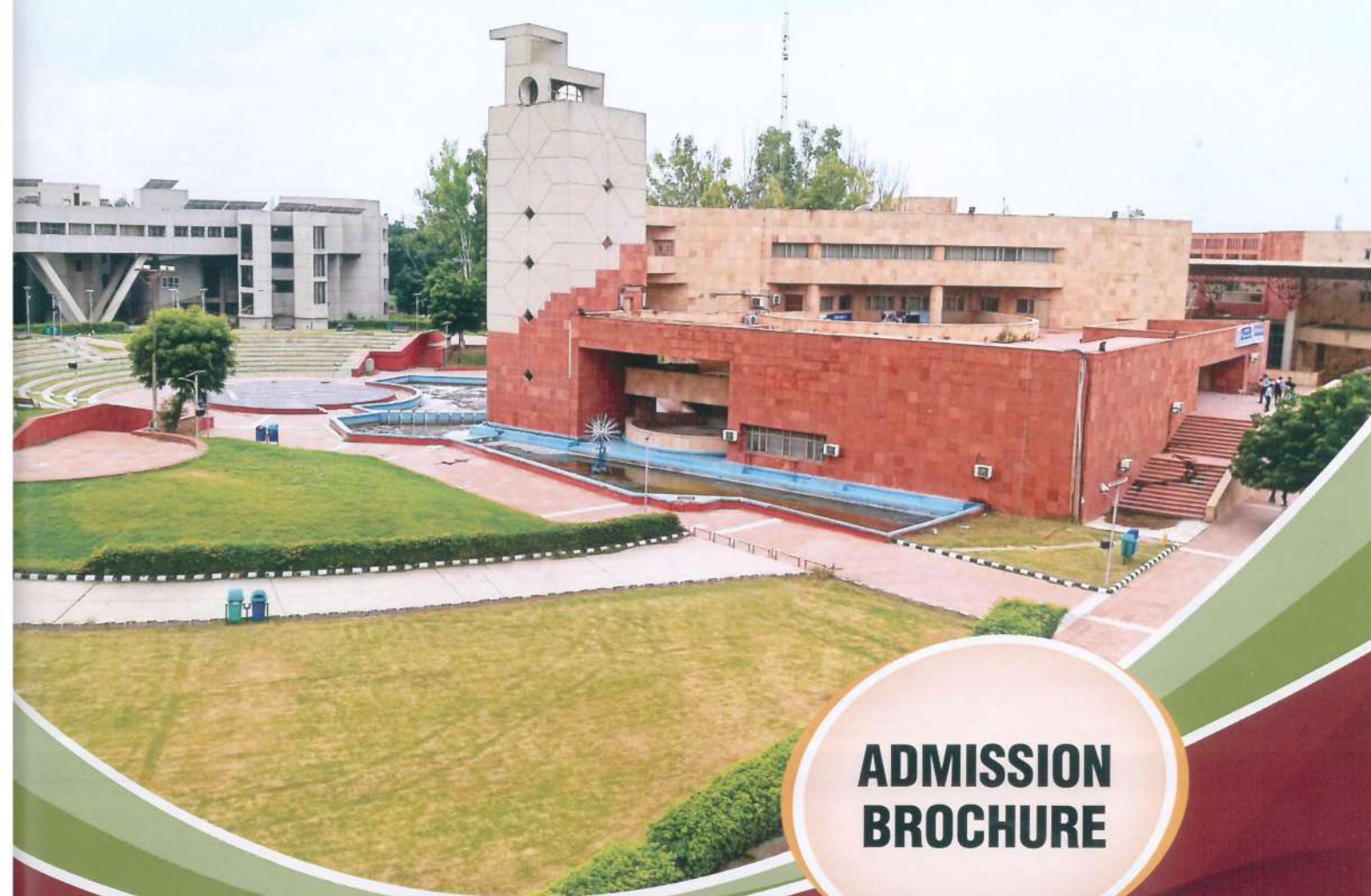
# DELHI TECHNOLOGICAL UNIVERSITY

*(Formerly Delhi College of Engineering)*

Govt. of NCT of Delhi

ISO 9001:2015 Certified

ACCREDITED with 'A' Grade (CGPA 3.22 out of 4.0) by NAAC



**ADMISSION  
BROCHURE**

## Ph.D.

Session January 2021



## TENTATIVE ADMISSION SCHEDULE AND IMPORTANT DATES:

(For Final Schedule & Important Dates, visit DTU website: [www.dtu.ac.in](http://www.dtu.ac.in))

S. No.	Activity/ Event	Date
1.	Advertisement in Newspapers.	21.11.2020 (Saturday)
2.	Opening of website for Online Registration	21.11.2020 (Saturday) 10:00 AM onwards
3.	Last date for Online Registration and Fee Deposit	14.12.2020 (Monday) 12:00 Midnight
4.	Display of list of shortlisted candidates for written test on DTU website	22.12.2020 (Tuesday) 08:00 PM
5.	Date of Screening Test	28.12.2020 and 29.12.2020, (Monday & Tuesday)
6.	Declaration of Result on DTU website	30.12.2020 (Wednesday)
7.	Dates for Interview	04.01.2021 & 05.01.2021, (Monday & Tuesday)
8.	Declaration of final result on DTU website	08.01.2021 (Friday)
9.	Dates of Admission (Candidates are required to report along with original documents and bank draft for fee deposit)	11.01.21 & 12.01.2021 (Monday & Tuesday)
10.	Display of vacant seats for waitlisted candidates on DTU website	20.01.2021 (Wednesday) 05:00 PM
11.	Last round of admissions, if required (Candidates are required to report along with original documents and bank draft for fee deposit)	22.01.2021 (Friday) at 10:00 AM

DTU Website: [www.dtu.ac.in](http://www.dtu.ac.in)

**Note :** Candidates are advised to read the brochure carefully and to visit the website [www.dtu.ac.in](http://www.dtu.ac.in) regularly for updates and other details about the entire online admission process.

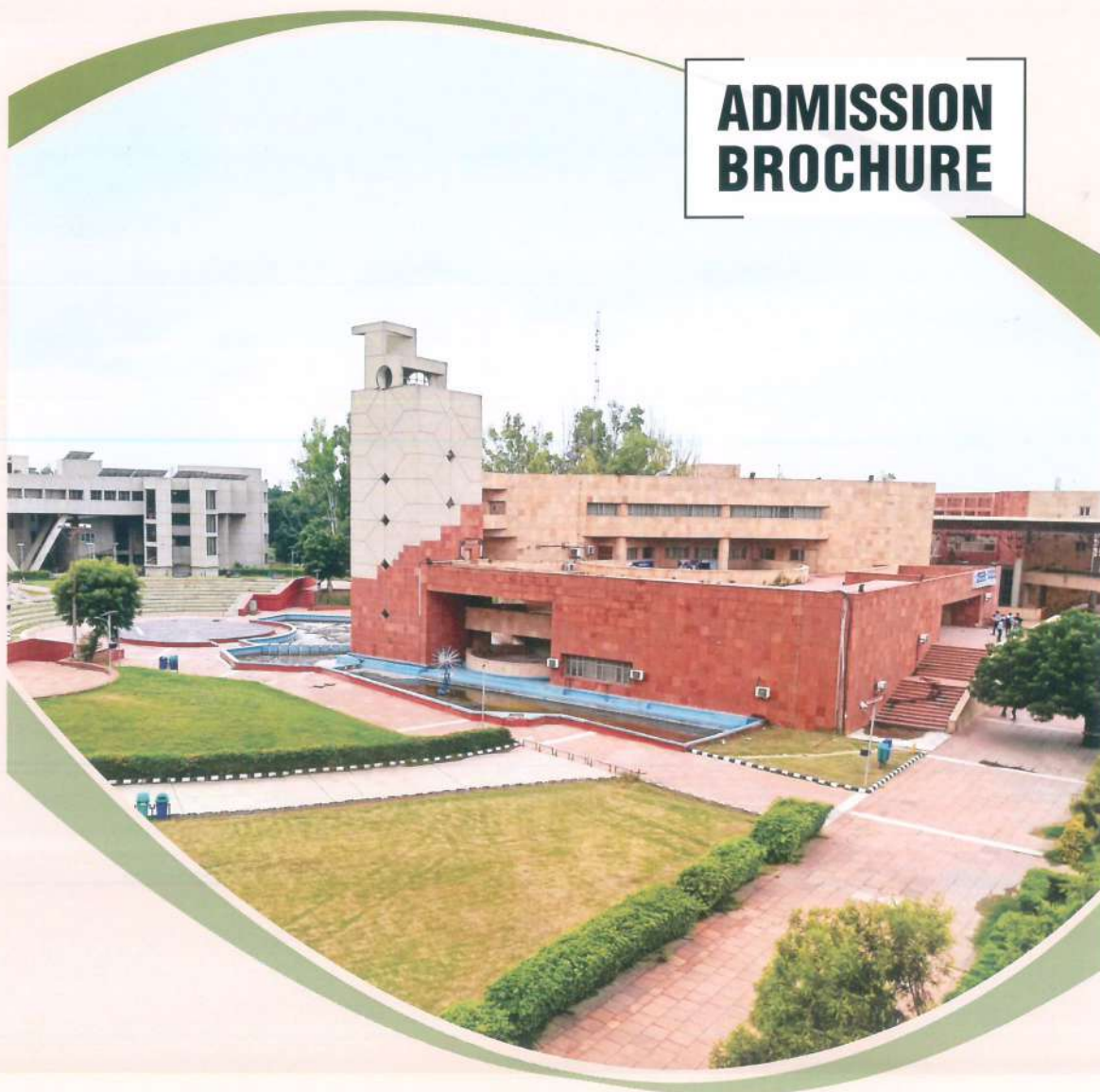


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## Ph.D.

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# दिल्ली प्रौद्योगिकी विश्वविद्यालय DELHI TECHNOLOGICAL UNIVERSITY

Established by Govt. of Delhi vide Act 6 of 2009

(Formerly Delhi College of Engineering)



**Prof. Yogesh Singh**  
Vice-Chancellor



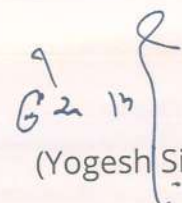
## Message

It is my immense pleasure to announce that Delhi Technological University is commencing Ph.D. admissions Session January, 2020-21.

Delhi Technological University has a long legacy of honing talent and a home to students who moved on to achieve greatness. 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 a University of unshakeable repute. Hence, getting admission into DTU Alumni have 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 an exceptional environment in DTU that allows persistent exchange of information and upholds the unmatched excellence associated with this University for eight decades.

Every year, DTU produces competent engineers, fully equipped with the knowledge and confidence to go forth and achieve greatness. We believe the incoming batch is yet another example of the same, and will one day change the world for the better.

  
(Yogesh Singh)

Shahabad Daulatpur, Bawana Road, Delhi – 110042, INDIA

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# About **Delhi Technological University**





# About

## Delhi Technological University

Delhi Technological University (Formerly known as Delhi College of Engineering) is one of the most well-known engineering institutions of India, with over 79 years of glorious tradition behind it. A non-affiliating, teaching and research University, DTU is poised to create an environment of synergetic partnership between academia and industry. It aims to cause a major departure from the conventional system of education and research and aspires to imbibe a culture of scientific research in its technology disciplines and technology temper in its scientific research and education by providing a seamless environment for integration of science and engineering. The University also endeavours to provide the thrill of a corporate R&D environment with a planned focus on industrially relevant projects and technology incubation. DTU has consistently been ranked among the top engineering institutions of the country in reputed surveys.

Currently the University offers 17 Full time UG Programmes, 20 Full Time and Part Time M. Tech. Programmes, 05 Full time MBA programmes, 01 Executive MBA Weekend programme, 03 M.Sc. programmes and Ph.D. programme in various disciplines. Further, teachers from various engineering colleges also join University for the doctoral programmes under Quality Improvement Programme (QIP). The University on an average admits 2500 candidates for the Undergraduate Programmes and about 900 candidates for different Postgraduate programmes and Doctoral programmes every year.

The University is located in about 164 acres of natural flora and fauna, DTU is one of the greenest residential campuses in the country. It has added the dimension of research and caused innovations in plenty, which has received high national and international acclaim. The University has the desired autonomy to excel and shape itself as a world class Technological University.

More information about DTU can be accessed at [www.dtu.ac.in](http://www.dtu.ac.in)



## VISION

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

## MISSION

To establish centres of excellence in emerging areas of science, engineering, technology, management and allied areas.

To foster an ecosystem for incubation, product development, transfer of technology and entrepreneurship.

To create environment of collaboration, experimentation, imagination and creativity.

To develop human potential with analytical abilities, ethics and integrity.

To provide environment friendly, reasonable and sustainable solutions for local & global needs.



## 1. RESEARCH FACILITIES AT DTU

All the academic departments of the university have well equipped research laboratories and workshop facilities. In addition, there are a number of central facilities such as Central Workshop, Solar Energy Centre, Central Instrumentation, Centres for Advanced Studies & Research in Automotive Engineering, TIFAC-CORE, Central Library and Computer Centre. The Central Library has more than 200,000 books, a large collection of back volumes of periodicals, standard specifications and other literature. It subscribes more than 36,000 current journals in Science, Engineering, Humanities and Social Sciences as e-resources. DTU has a well-equipped centralized Computer Centre which provides state of art high-end networked computing facilities to students and staff.

The University has many research collaborations with leading universities and Institutes in Korea, Singapore, France, Florida USA, Africa and China. As part of these collaborations, the students get opportunities to carry out joint research projects with faculty and students from these institutions.

The location of DTU in close proximity to several leading R&D Centres namely NPL, INMAS, FICCI, CSIR, etc. and other major industrial establishments offers excellent opportunities to interact with them and plan research programmes and projects in collaboration with them.

## 2. STUDENTS AMENITIES AT DTU

The University has 9 Boys and 6 Girls hostels in the campus that can accommodate around 1600 students. Each hostel is an independent entity with its own mess facilities, recreation areas, etc. However, students are

also permitted to have their own arrangements for accommodation outside campus.

Every hostel has its own common room 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 Well-planned Students' Welfare societies routinely organize several vibrant extracurricular events. These activities include Sports, Cultural programmes, technical festival and Social Service.

## 3. Ph.D. PROGRAMME

The University is inspired by talent and driven by innovations and is firmly committed to provide industry-relevant, socially-responsible manpower to meet the challenges of 21<sup>st</sup> Century. The vibrant culture of research and innovations in DTU campus inspires students from UG level onwards to engage in cutting edge technology development and discover the value and worth of the knowledge acquired by them during their studies.

The University offers Ph.D. programme in a wide range of areas in Engineering, Sciences and Humanities. The academic programme leading to the Ph.D. degree is broad-based and involves a course credit requirement and a research publications leading to thesis submission. Facilities for research work leading to the Ph.D. degree are available in Departments of Mechanical Engineering, Information Technology, Environmental Engineering, Electrical Engineering, Electronics & Communication Engineering,



Humanities & USME, Design, Delhi school of Management, Computer Science & Engineering, Civil Engineering, Biotechnology, Applied Physics, Applied Mathematics, Applied Chemistry & Polymer Science & Technology.

#### 4. ADMISSION CATEGORIES

The applicant for admission to the Ph.D. programme shall be classified under any one of the following categories which will be decided and recommended by DRC/SRC.

##### 4.1 Full-time Research student/ Candidate

Full Time University Research student/candidate (With Fellowship or without Fellowship).

- i. Full-Time students without Fellowship can be admitted over and above DTU Fellowship seat matrix. The number of such seats will be based on suitability of candidates and availability of slots with prospective supervisors.
- ii. Full Time Sponsored Research student /candidates-Fully financed by the Govt. / Semi-Government Organizations like QIP, CSIR, UGC, NET, DAE, DST, DBT, NBHM, ICCR, ICAR, ICMR, GPAT, NDF, INSPIRE etc., Government / Private funded Research/Development Organisation, Public Sector Undertaking, Educational Institution or a reputed industry etc. **These seats with Fellowship from other agencies shall be over and above the seat matrix with University Fellowship.**
- iii. Full Time / Part Time Sponsored Research student/candidate nominated by the organization having MOU with the University, foreign students who apply

through Ministry of Human Resource Development or under a Cultural Exchange Fellowship Programme by Government of India.

##### 4.2 Part - Time Research student/ candidate

- i. Research student / Candidate working in other organizations having MOU with Delhi Technological University.
- ii. Faculty or Scientists from Educational Institutions, R&D organizations, and Government Department / Public Sector Undertaking / Candidates from industry of high repute and a medium sized enterprise with turnover Rs. 75 crores or above along with standing commitment to the exemplary standards namely ISO/CMM level 3 or similar standard of respective area provided that the applicant possesses the minimum eligibility qualifications for the degree.
- iii. Students with valid JRF may also be considered for admission in Part-Time Ph. D. Programme without fellowship.

##### 4.3 Candidate / Staff under R & D project

Project staff under projects sponsored by DST/ UGC/ any government agency, industry or centres established from grant in aid from government or international agencies at University.

##### 4.4 Research student/Candidate working as a regular employee

Permanent academic staff of the Delhi Technological University (Including the academic staff of erstwhile Delhi College of Engineering).



## 5. ADMISSION ELIGIBILITY

Academic Department	Disciplines Offered	Discipline Specific Eligibility Criteria
Applied Chemistry	1. Chemistry	Master's degree in Sciences in Chemistry/ Applied Chemistry/ Industrial Chemistry/ Polymer Chemistry/ Polymer Science/ Electrochemistry/ Pharmaceutical Chemistry/ Material Chemistry/ Material Science /Drug Chemistry/ Medicinal Chemistry/ Green Chemistry/ Environment Chemistry/ Environment Science/ Chemical Science/ Biochemistry/ Nanomaterials/ Nanoscience/ Food Science/ Metallurgy/ Agrochemicals/ and Chemistry related disciplines with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU
	2. Chemical Engineering	<p>Bachelor's degree in Engineering/Technology and Master's degree in Engineering/Technology in Chemical Engineering/ Chemical Technology/ Polymer Engineering/ Polymer Technology/ Textile Engineering/ Textile Technology/ Nanotechnology/ Biotechnology/ Biochemical technology/ Biochemical Engineering/ Bioprocess Engineering/ Environmental Engineering/ Food Technology and Chemical Engineering related disciplines with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU</p> <p>OR</p> <p>Bachelor's degree in Engineering/Technology in Chemical Engineering/ Chemical Technology/ Polymer Engineering/ Polymer Technology/ Textile Engineering/ Textile Technology/ Nanotechnology/ Biotechnology/ Biochemical technology/ Biochemical Engineering/ Bioprocess Engineering/ Environmental Engineering/ Food Technology and Chemical Engineering related disciplines with a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.</p>
Applied Physics	1. Physics	<p>Master's degree in Engineering/Technology/ Sciences in relevant disciplines or equivalent with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU</p> <p>OR</p> <p>Bachelor's degree in Engineering/Technology in relevant discipline or equivalent with a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.</p>
	2. Engineering Physics	<p>Master's degree in Engineering/Technology in relevant disciplines or equivalent with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU</p> <p>OR</p> <p>Bachelor's degree in Engineering/Technology in relevant discipline or equivalent with a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.</p>



Academic Department	Disciplines Offered	Discipline Specific Eligibility Criteria
Applied Mathematics	1. Mathematics	Master's degree in Sciences/Arts in relevant disciplines or equivalent with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU
	2. Mathematics and Computing	<p>Bachelor's degree in Engineering/Technology and Master's degree in Engineering/Technology in relevant disciplines or equivalent with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU</p> <p>OR</p> <p>Bachelor's degree in Engineering/Technology in relevant discipline or equivalent with a minimum 75% in aggregate or equivalent CGPA as determined by DTU and having proven research capability</p> <p><b>NOTE: Entrance Exam will be 30% in Mathematics Domain and 70% in Computing Domain</b></p>
Civil Engineering	1. Civil Engineering	<p>Master's degree in Engineering/Technology in relevant discipline or equivalent with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU</p> <p>OR</p> <p>Bachelor's degree in Engineering/Technology in relevant discipline or equivalent with a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.</p>
Computer Science & Engineering	1. Computer Science and Engineering	<p>Bachelor's degree in Engineering/Technology and Master's degree in Engineering/Technology in Computer Science and Engineering/Software Engineering/Information Technology/Mathematics and Computing/Electronics and Communication Engineering or equivalent with a minimum 55% in aggregate or equivalent CGPA as determined by DTU</p> <p>OR</p> <p>Bachelor's degree in Sciences/Computer Applications and Master's degree in Computer Applications (with Mathematics at B.Sc./B.C.A level) with a minimum 75% in aggregate or equivalent CGPA as determined by DTU and having proven research capability</p> <p>OR</p> <p>Bachelor's degree in Engineering/Technology in Computer Science and Engineering/Software Engineering/Information Technology/Mathematics and Computing/Electronics and Communication Engineering. or equivalent with a minimum 75% in aggregate or equivalent CGPA as determined by DTU and having proven research capability</p>
Electronics & Communication Engineering	1. Electronics and Communication Engineering	<p>Master's degree in Engineering/Technology in relevant discipline or equivalent with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU</p> <p>OR</p> <p>Bachelor's degree in Engineering/Technology in relevant discipline or equivalent with a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.</p>



Academic Department	Disciplines Offered	Discipline Specific Eligibility Criteria
Electrical Engineering	1. Electrical Engineering	Master's degree in Engineering/Technology in relevant discipline or equivalent with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU OR Bachelor's degree in Engineering/Technology in relevant discipline or equivalent with a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.
Environmental Engineering	1. Environmental Engineering	Master's degree in Engineering/Technology/Sciences/Management in the relevant discipline (Environmental Engineering/Civil Engg./ Biotechnology/ Chemical Engg./ other relevant branch) or equivalent with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU OR Bachelor's degree in Engineering/Technology in relevant discipline or equivalent with a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.
Mechanical Engineering	1. Mechanical Engineering	Master's degree in Engineering/Technology or a Master's degree by Research in Engineering/Technology in Mechanical with specialization in Thermal/ Production / Design / Industrial Engineering having a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU with Bachelor's degree in Engineering/Technology in Mechanical / Production / Production and Industrial / Mechanical and Automation / Automobile Engineering or Equivalent OR Bachelor's degree in Engineering/Technology in Mechanical / Production / Production and Industrial / Mechanical and Automation / Automobile Engineering or equivalent having a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.
Delhi School of Management	1. Management	Master's degree in Engineering/Technology/ Sciences/ Management/Humanities and Social Sciences in relevant discipline or equivalent with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU.



Academic Department	Disciplines Offered	Discipline Specific Eligibility Criteria
Information Technology	1. Information Technology	<p>Bachelor's degree in Engineering/Technology and Master's degree in Engineering/Technology in Computer Science and Engg/Software Engg/Information Technology/Mathematics and Computing/Electronics and Communication Engg. Or equivalent with the minimum 55% in aggregate or equivalent CGPA as determined by DTU.</p> <p>OR</p> <p>Bachelor's degree in Science/Computer Applications and Master's degree in Computer Applications (with Mathematics at B.Sc./B.C.A level) with a minimum 75% in aggregate or equivalent CGPA as determined by DTU and having proven search capability.</p> <p>OR</p> <p>Bachelor's degree in Engineering/Technology in Computer Science and Engg/Software Engg/Information Technology/Mathematics and Computing/Electronics and Communication Engg. or equivalent with a minimum 75% in aggregate or equivalent CGPA as determined by DTU and having proven search capability.</p>
USME	1. Management	<p>Master's degree in Management/Engineering/ Technology/ Commerce/Economics and other behavioral sciences and allied relevant disciplines, or equivalent, with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU.</p> <p>OR</p> <p>Bachelor's degree in Engineering/Technology in relevant discipline or equivalent with a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.</p>
	2. Economics	<p>Master's degree in Economics/Business Economics / Behavioral economics/allied social sciences; humanities and management in relevant disciplines; or equivalent with a minimum 55% marks in aggregate or equivalent CGPA as determined by the DTU</p> <p>OR</p> <p>Bachelor's degree in Engineering/Technology in relevant discipline or equivalent with a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.</p>
	3. Entrepreneurship Innovation & Venture Development	<p>Master's degree in Management/Entrepreneurship/ allied areas related to innovation, venture development and in relevant disciplines, or equivalent, with a minimum 55% marks in aggregate or equivalent CGPA as determined by the DTU</p> <p>OR</p> <p>Bachelor's degree in Engineering/Technology in relevant discipline or equivalent with a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.</p>

**In addition to the above Discipline Specific Eligibility Criteria, the following admission guidelines are applicable to all the Disciplines/Departments:**



1. Five percent (5%) relaxation in marks at the level of qualifying degree will be given to SC/ST category students for determining the eligibility conditions to apply for Ph. D. admission.
2. Part-time applicants will be considered as per 4.2 and will be eligible if
  - the applicant possesses the minimum eligibility qualifications for the degree as given as per 5.
  - the applicant is in position to complete mandatory course requirements along with regular counterparts;
  - the applicant proves to the satisfaction of the University that his official duties permits him to devote sufficient time to research;
  - facilities for research are available at the applicant's place of work in the chosen field of research or the applicant can spare sufficient time to pursue research in the Department of the Delhi Technological University on daily basis, residing in the vicinity of the University; and
  - he/she will be required to reside at the Delhi Technological University for a period of not less than 6 months during his admission period for the Ph.D. programme. (This condition of minimum residence will be automatically waived for candidates who are working in National Capital Region (NCR) of Delhi or in organisations/institutions located within a distance of 50 km from the Delhi Technological University).
3. The candidate seeking admission to Ph.D. programme as project fellow at Delhi Technological University may be given administrative clearance to seek admission on full time / part time basis subject to recommendations of the concerned Principal Investigator of the said project/centre and approval of the Vice Chancellor, if the candidate is selected in project as project fellow through proper selection. However, he/

she must fulfil the minimum eligibility criteria. No relaxation will be given in screening test.

4. Permanent academic staff of the Delhi Technological University (*Including the academic staff of erstwhile Delhi College of Engineering*) may be given administrative clearance to seek registration on part-time basis subject to recommendations of the concerned head of the department and approval of the Vice Chancellor. However, the applicant must fulfil minimum eligibility criteria. No relaxation will be given in screening test, except for the special cases as given below at 6(3) in selection procedure.

## 6. SELECTION PROCEDURE

1. The short listing of applications possessing the minimum educational qualifications, for the purpose of screening test & interview will be done by respective departments in consultation with the Ph.D. Coordinator nominated by the Vice-Chancellor. The entrance test will be of 90 minutes duration comprising of 60 multiple choice questions. The cut off for the same will be decided by the University.

Note: In view of the ongoing COVID 19 pandemic in the country, the mode of conducting the Admission/ Entrance Test shall be one of the following depending upon situation at the time of test:

- i. OMR Based Pen-Paper type at DTU Campus.
- ii. Computer Based Test at DTU Campus.
- iii. AI & Manually proctored Online Examination.
- iv. Any other mode as per the situation.

**The exact mode of examination shall be posted on the University Website prior to the Admission Test.**



2. The Departmental Research Committee (DRC) of the respective department shall decide the cut off for the screening test for short listing the candidates for the interview in consultation with Dean PG. Based on the academic record and the performance of the candidates in the interview, the DRC will recommend to the Dean PG the names of candidates.
3. Screening Test shall be waived only for UGC/CSIR/DST/DBT/ICMR/IARI -JRF fellowship holders, all foreign national students including those sponsored by ICCR/MHRD/MEA, and covered under MoU with Delhi Technological University, and faculty of the Delhi Technological University.
4. Moreover, Vice Chancellor may accord exemption from screening test to the Academic/Non-Teaching staff of the Delhi Technological University and the officers of Govt. of India/Govt. of NCT of Delhi, considering the merit of each case. Such candidates shall have an experience of 15 years, age should not be less than 45 years and will be registered as Part Time candidate without DTU fellowship
5. Students with JRF will also be exempted from the screening test for admission in Part Time - Ph.D. programme without fellowship.
6. All the shortlisted candidates on the basis of screening test are required to come along with small power point presentation on the topic of their interest during the interview.

## 7. RESERVATION OF SEATS

1. Reservation of seats with fellowships for applicants in each of the categories of the research scholars shall be in accordance with the policies of Govt. of NCT of Delhi. The percentage of reservations for

various categories and relaxation in minimum eligibility conditions as applicable for the academic session 2020-21 is tabulated below.

S. No.	Category	Seats reserved	Relaxation in Essential Qualification
1	Scheduled Castes (SC)	15%	5%
2	Scheduled Tribes (ST)	7.5 %	5%
3	OBC	27%	-
4	Persons with Disability	5% (Horizontal)	5%
5	EWS	10%	-

The reservations for persons with disabilities will be implemented department wise. Candidates seeking admission must fulfil the eligibility conditions as detailed earlier. The 5% reservation horizontally in seat matrix for persons with disability may be allocated as follows:

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. Locomotor disability including cerebral palsy, leprosy cured, dwarfism, acid attack victims and muscular dystrophy;
- d. Autism, intellectual disability, specific learning disability and mental illness;
- e. Multiple disabilities from amongst persons under clauses (a) to (d) including deaf-blindness.

1. Physically handicapped applicants are permitted 5% marks or 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.



2. Detailed seat matrix (i.e., seats with DTU fellowship) indicating seats in various departments under different categories is available at Annexure-1.

## 8. APPLICATION PROCESS

For admission to Ph.D. programmes 2021, all candidates need to register and fill the application ONLINE only by accessing [www.dtu.ac.in](http://www.dtu.ac.in) from November 21, 2020 to December 14, 2020. The application process is completed only when a print out of the filled ONLINE application form is taken after paying online the registration fee. The candidate must bring a duly signed copy of the same along with two good quality photo (**same as uploaded on online application form**) affixed in the appropriate place on the form on the day of counselling.

Candidates are requested to ensure that they must fulfil all such requirements before filling and applying for such programmes as their choices. Incomplete application due to any reason is liable for rejection by the University. In this regard, no communication will be entertained.

### Application Fee

The registration fee of Rs.1000/- for Gen/OBC/EWS and Rs.500/- for SC/ST/PwD, is to be paid online through credit/debit card /net banking at the time of registration and choice filling. The registration shall not be complete without the payment of registration fee which is non-refundable and would not be adjusted towards any other fee. A convenience charge (online transaction) will be extra as per banking gateway on every online registration fee payment. **If a candidate wishes to apply for admission in a programme offered by different departments then he/she will have to register separately in that department by paying separate online registration fee.**

## 9. Information about Academic Departments

### 1. Department of Applied Chemistry

The department aims to provide state-of-art knowledge and practical skills to the UG and PG students in the diverse subjects of Applied Chemistry, Polymer Science and Chemical Technology. The department runs four year course of B. Tech Polymer Science and Chemical Technology and post graduate course in Polymer Technology. Department has produced nearly 60 Ph. Ds, 230 M. Tech. students and 400 B. Tech students. The Department has well-established laboratories in Applied Chemistry, Polymer Science and Chemical Technology. The department has undertaken and completed successfully large numbers of research and industry projects funded by AICTE, CSIR, UGC, DRDO, DST, BARC etc. Active national and International collaborations for R&D activities in different fields have been established by the department.

**Research Areas:** Chemistry including synthetic organic chemistry, Bio inorganic chemistry, Bio organic chemistry, Inorganic Chemistry, Material Chemistry, Green Chemistry Cheminformatics; Medicinal Chemistry; including gene delivery applications, Bio Materials, Drug Delivery systems; Polymer Science including fiber Technology, Conducting Polymers, Composites, Hydrogels; Chemical Engineering including Reaction engineering, Multi phase reactor systems and design, Pollution abatement technology and gene; Advance materials development, Separation processes, Transport Phenomena, Pharmaceuticals sciences, Food Science.



## 2. 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, Natural Language Processing (NLP) and Artificial Intelligence (AI).

## 3. 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 in Engineering Physics and Postgraduate program in Nanoscience and Technology and one Interdisciplinary M. Tech. programme in Microwave and Optical Communication Engineering (MOCE) is offered from the Department in association with Electronics and Communication Engineering Department. The department has well-equipped state of art laboratories for undergraduate, postgraduate and Ph.D. students. Faculties 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, Microelectronic Devices-FinFETs, Tunnel FETs, Nanowires, MOSFETs-Application Oriented Modeling and Simulation, Waveguide based devices. Fibre and Integrated optics, Luminescent Material, Material science, Experimental Lithium Ion battery, Multiferroic materials, Atomic physics, Gas sensors, Atmosphere Science, Memory Devices.

## 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 towards the development of technologies of commercial significance.

The Department is running postgraduate programmes in 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, 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.

## 5. Department of Civil Engineering

The Department offers undergraduate programme with an intake of about 120. The post graduate Programmes are offered in Hydraulics and Flood Control, Structural Engineering, Environmental Engineering, and Geotechnical Engineering with the intake of about 90 students. The Department is well equipped with laboratories related to Structure, Concrete testing, Soil Mechanics, Highway Engineering, Experimental Stress Analysis, etc. The department lays greater emphasis on quality research of industrial design and development, Structural Engineering and Structural Dynamics.

**Research Areas:** Structural Engineering, Concrete Technology, Cementitious Materials, Prestressed Concrete, Tall Structures and Rehabilitation of Structures, Geotechnical Engineering, Rock Mechanics, Soil Mechanics, Geo-Environment Engineering, Water Resources Engineering, Pavement Engineering. Hyper Spectral Microwave and LIDAR Remote Sensing.

### Multidisciplinary Centre for Geoinformatics

Geoinformatics / Geospatial Technologies include Earth Observation (EO) Technologies, Remote Sensing (RS), Geographic Information System (GIS), Global Navigation Satellite System (GNSS) etc. Geoinformatics is described as the science and technology dealing with the structure and character of spatial information, its capture,

classification, quantification, storage, processing, portrayal, dissemination, and all the other aspects necessary to secure optimal use of this spatial information. Geoinformatics is essentially a multidisciplinary subject and different aspects of this subject are dealt by different branches of science and technology. For example, development of sensors / resolution / payload / energy consumption etc are dealt by experts in electronics, image processing algorithms and extraction of information etc are dealt by experts in computers and information technology, and various sustainable development applications are dealt by experts in the field of civil and agriculture engineering.

Multidisciplinary Centre for Geoinformatics (MCG) has been working with the objective to provide education, research and consultancy in the field of Geoinformatics and associated Geospatial Technologies. The Centre is currently working on various projects/ fellowships awarded by Department of Science and Technology (DST), New Delhi, Space Applications Centre (SAC), ISRO, Ahmedabad and National Mission on Himalayan Studies (NMHS), Almora etc. Besides, the Centre is also running an M.Tech. programme in Geoinformatics.

**Research Areas:** The Centre proposes to undertake research and consultancy projects in a wide ranging multidisciplinary subjects involving Geoinformatics/ Geospatial Technologies. Major areas of research, however are, Defense, Security and Intelligence, Water Resources and Glaciology, Urban Infrastructure Development, Planning and Urban Transportation Systems, Earth



Sciences, Oceanography, Soil and Geosciences (Geomorphology & Geology), Environment, Health, Forest, Atmosphere, Meteorology, Climate Change and Pollution, Geohazards and Disaster Management, Satellite Image Processing and Photogrammetry, GNSS and Geographical Information System. Imaging & Non-Imaging Sensor Development.

## 6. Department of Computer Science and Engineering

The Department of Computer Science and Engineering endeavors to provide the thrill of a corporate R&D environment with a planned focus on industrially relevant projects and technology incubation. The department has been offering three M.Tech. level programmes in Computer Science & Engineering, Software Engineering and Artificial Intelligence. Department has developed state-of-the-art laboratories in the various fields of Computer Engineering-Computer Architecture Lab, Network Lab, Web Designing Lab, Computation and programming Lab, Operating System Lab, Artificial Intelligence Lab and many others. The Department offers doctoral (Ph.D.) degree programmes in diverse areas and large numbers of problems have been taken up in close collaboration with industries.

**Research Areas:** Software Testing & Quality, Software Metrics, Machine Learning, Software Reliability, High Performance Computing, Soft Computing, Optimization Techniques, Parallel Computing, Web Technology, Image Processing, Soft Computing, Evolutionary Computing, Artificial Intelligence, Information Security.

## 7. Delhi School of Management

DSM aims at extending the seven-decade long legacy of

Delhi College of Engineering by incubating and developing techno-managers, who are adept at identifying pertinent and critical business problems and apply their technical skills and competencies in solving those issues. DSM offers dual specialization in MBA programme and offers post-doctoral degree programme. It focuses on developing a strong foundation and right attitude by teaching general subjects, Technical and Functional area of Management.

**Research Areas:** Managerial themes such as E-Governance, Information Technology Management & Strategy, Marketing Management, Distribution and Retail Management, Organizational Behaviour & Human Resource Management, Corporate Governance and Ethics, Public Policy and Governance, Accounting and Finance (including but not limited to CEO succession, Accounting Theory, Accounting Standards, Directors' Remuneration, Valuation of Human Resources and Intangibles), Portfolio Management, Mergers and Acquisition and Corporate Restructuring, Knowledge Management, International Business and Trade.

## 8. Department of Electronics and Communication Engineering

The vision of the department is to focus on the incubation of innovations in the areas of electronic design/ fabrication, and communication technologies, which are needed to address the growing challenges of tomorrow. The department offers UG and PG programmes with annual intake of 230 students in the B. Tech programme in Electronics and Communication Engineering and the PG Programmes include M. Tech. in VLSI Design and Embedded



Systems; Signal Processing and Digital Design; and Microwave and Optical Communication. The Department has focused attention on quality research and offers Ph. D. Programmes in the area of Electronics and Communication namely VLSI, DSP, Image Processing, Micro strip antenna design, Sensor Networks, Analog and digital system design.

**Research Areas:** VLSI Design, Computer Vision, Pattern Recognition, Object Tracking, Image Processing, Human Computer Interaction, Wireless Sensor Network, Microwave Engineering, Antenna Design, Digital Signal Processing, Wireless Communication, RF Devices, Nano-electronics, Network Security, and Cloud Computing, Optical Communication, R F Circuit Design.

## 9. Department of Electrical Engineering

The goal of the department is to provide quality education at undergraduate and postgraduate levels and undertake cutting edge research in various areas of Electrical Engineering. The department also aims to develop active collaboration with various industries in the power sector. The department has an annual intake of 150, 100 and 46 students in the B. Tech programmes in Electrical Engineering and Electrical and Electronics Engineering and B. Tech (Evening), respectively. At the post graduate level, the department is offering three M. Tech programmes in Control and Instrumentation, Power Systems and Power Electronics and Systems. The department is also running part time (evening) PG programme in Power Electronic Systems for DMRC (under MOU) since 2012-13. In addition to the above, the department offers

regular Ph. D. Programmes in various areas of specialization in Electrical Engineering. The department is involved in carrying out several sponsored R & D projects funded by national agencies like AICTE, DST, etc.

**Research Areas:** Power system Optimization, AI Techniques, Modeling & Analysis of Electrical machines, Power Electronics & Drives Intelligent control of nonlinear systems, FACTS, SSR, voltage stability, power Quality Improvement, Grid Integration, Micro grid, smart Grid, BPL Analog Signal processing (Linear & Non Linear), Power system & control, system Engineering, Power system Analysis, Intelligent control, Power electronics, renewable energy, HVDC, Power Quality, power system restructuring, AI in Electricity market forecasting, Wind Energy forecasting, Embedded system, Information security, design of power supply. Electric traction systems. Analog signal processing Energy conversion and micro grid.

## 10. Department of Environmental Engineering

The Department of Environmental Engineering have been offering M. Tech. in Environmental Engineering Degree and B. Tech in Environmental Engineering. The department conducts cutting-edge research, in developing the vital areas that address societal needs for environmentally sustainable life style and offer doctoral degree. In addition to this, the department also provides opportunity to working engineers for upgrading their qualification under Continuing Education Programme on part time basis for PG level. The departmental laboratories (Water Pollution, Air & Noise Pollution, Microbiology, GIS & Remote Sensing and Solid



Waste) for teaching and research are among the best in the nation, providing opportunities for hands-on experience for all students.

**Research Areas:** Water Pollution, Waste Water Treatment, Environment Modelling, Phytoremediation, Water Management, Air Pollution, Geo-environmental Engineering, Solid Waste Management and Noise Pollution.

### 11. Department of Humanities

The Department of Humanities offers courses in Communication Skill, English, Economics and Accountancy for engineering and management students in an effort to train them for the global economic environment of the 21<sup>st</sup> Century. Besides giving them in-depth understanding of the labour market in which they are expected to work as well as emerging employment trends among engineers, students are sensitized towards the specific technological needs of urban slums and rural areas and socio economic impact of engineering projects on the masses. The Department has competent faculty members with a high degree of excellence who keeps pace with the current developments in their fields of specialization for the fulfilment of its teaching and research goals.

**Research Areas:** Women Education and Inclusive Growth, Banking and finance, International Trade and other areas of economics.

### 12. Department of Information Technology

Department offers an undergraduate B. Tech. Course in Information Technology with an intake of 75 students every year. Also, to meet the growing demands of present day technologies, DTU has started M. Tech. in Information Systems.

Designed in a way so as to provide the students with fundamental concepts and tools related to the field, the courses emphasize on all basic subjects such as operating systems, computer architecture and design, software development, networking, multimedia and graphics, analog and digital communication and computer Communications. Specialized knowledge on analysis and design of Information system, information security, mobile communication, soft computing, artificial intelligence, digital signal processing, computer vision and expert systems, web engineering is also imparted. The department provides well-equipped and well-connected state of the art laboratories in the areas of RF engineering and Web Engineering, Computer Networking, Advance Signal Processing, Information Security, Biometric lab, etc.

**Research Areas:** Pattern Recognition, Soft computing, Biometric security system, Neural Networks/ Deep learning, Fuzzy-Neural Networks, Computer Vision, Big data Analytics Web Mining Internet Technologies, Data Mining Social Networks Machine Learning Human behaviour, Multimedia Systems Human Computer interaction, Image processing, Evolutionary Computing.

### 13. Department of Mechanical Engineering

The Department of Mechanical Engineering also offers undergraduate and Postgraduate courses with specialization in Thermal Engineering and Production Engineering. Ph. D Programmes in all fields of Mechanical Engineering are also offered. The department possesses modern laboratories equipped with latest experimental set-ups and research facilities for



instrumentation, experimental stress analysis, strength of materials, fluid mechanics, tic, engines, automotive engineering, robotics, heat transfer, solar energy, flexible manufacturing system, computational fluid dynamics supported by Software like view-flex, CAD-CAM and I.e. engine design. Cad lab has Softwares like NX-LAD, NXCAM, AUTOCAD Inventor, Catia, Techomatix, Abus, Iadino, NX-Narran, Hyper mesh, hyper works, MDADAMS, Dynaform etc. The department has many research projects which are sponsored by different government organizations.

**Research Areas:** Turbo Machinery, Fluid Mechanics, Power Plant b Engineering, Refrigeration and Air conditioning, Computational Fluid Dynamics, Solar Energy, Bio Fuels, Power Plant, Industrial Engineering & Supply Chain Management, Robotics, CAD/CAM, Welding, Production Engineering, System Dynamics, Structural Vibration, Modeling & Simulation, Automation, Advanced Manufacturing Process, Human Factor Engineering, Quality Engineering.

#### 14. Department of Design

DTU has started Department of Design from academic year 2018-19 with a vision of pursuing excellence in design thinking, design research and design practice for the betterment of society or the ecosystem we live in. The department of design would concentrate on developing a knowledge based design professionals who would become the problem solvers, and who can effectively use different design methodology. They would develop their innovative and aesthetic sensibilities into making a coherent and appropriate research. To develop centres of excellence in

design research and practice, the department aspires to initiate Ph.D. programme as per the expertise and strength of the department.

**Research Areas:** Product Design, Industrial Design, Visual Communication, Interaction Design.

#### 15. USME

USME (University School of Management and Entrepreneurship)

The Vision of the USME is to develop and nurture the spirit of management leadership and entrepreneurship for the good of society. The mission focuses on a portfolio of Programmes around entrepreneurship and cutting edge areas in management, and offers courses at the undergraduate and postgraduate levels: The MBA, the MBA-Business Analytics, BBA and BA(H) Economics.

The focus of the department is to create a practice school in the area of management which is based on research and leads back to Programmes with a strong focus on entrepreneurship, employability, skill development and holistic, experiential learning. Research Areas: The research focus of USME faculty covers diverse areas within management, economics and analytics. The management research focus is in the areas of work performance management, CRM and behavioural models. The research interests in the area of analytics are in optimization and multi-criterion decision models, quantitative models of innovation diffusion and analytics, social networks and collective intelligence. Faculty in economics stream have research focus in the area of international banking and market structures and health economics and capital markets.



## 10. Fee and Documents to be submitted

The selected candidates will be required to pay the admission fee as per the details given below:

S. No.	Particulars	Annual Fee			
		At the time of Admission		2 <sup>nd</sup> year onwards	
	Code	A	B	A	B
1.	Tuition Fee	Nil	12000	Nil	6000
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, Misc. Expenditure on Unspecified Items)	6000	6000	3500	3500
2.2	Facilities & Services Charges (Research initiatives, training programmes, Awards, automation, facilities, entrepreneurship activities and any misc. expenditure on unspecified items)	2500	2500	1000	1000
2.3	Economically weaker section fund	1000	1000	1000	1000
2.4	Examination fee (Examination Infrastructure strengthening, expenditure on examination activities, confidential printing etc.	7000	7000	-	-
2.5	Premium amount for mediclaim of student (per-annum)	500	500	500	500
	<b>GRAND TOTAL</b>	<b>17000</b>	<b>29000</b>	<b>6000</b>	<b>12000</b>

S. No.	Particulars	Code
1.	The teaching/non-teaching/academic staff of the Delhi Technological University (including the teaching/non-teaching/ academic staff of erstwhile Delhi College of Engineering) and officers of Department of Technical and Higher Education, Govt. of NCT of Delhi as in R.19 (i)	A
2.	Project staff pursuing Ph.D. as in R.19(ii)	
3.	Other Full Time / Part Time candidates	B

## 11. Withdrawal / Refund Policy

S. No.	Percentage of Refund of aggregate fee*	Point of Time when Notice of admission is served to HEI
1	100%	Application for withdrawal of admission received upto 19.01.2021
2	80%	Application for withdrawal of admission received from 20.01.2021 to 25.01.2021
3	50%	Application for withdrawal of admission received from 26.01.2021 to 31.01.2021
4	NIL	Application for withdrawal of admission received after 31.01.2021



### Original Documents to be submitted for verification at the time of Admission

- a. Printed copy of online registration application
- b. All the semesters Mark sheet/grade card / provisional / degree certificates beginning from first degree towards proof of qualification.
- c. All the candidates will be required to produce the proof of having passed the qualifying degree with the required percentage of marks or CGPA latest by **January 31, 2021**, failing which their admission shall be cancelled.
- d. Caste Certificate in the case of SC/ST/OBC-NCL candidates issued by the respective State Government as per format annexed at 2.
- e. Authorised Doctor's Certificate with disability descriptions in the case of Person with Disabled (PwD) candidates as per format annexed at 3.
- f. Copy of GATE score or Original UGC-JRF/NET/CSIR/ DAE-JEST or other fellowship award.
- g. Project Co-ordinator's certificate in the prescribed format
- h. Date of Birth Proof
- i. Two passport sized recent photographs
4. The last date for submission of online application shall not be extended. Accordingly, no request shall be entertained for accepting the application after the last date. Therefore, candidates are advised to submit their application well in advance and not to wait for the last moment.
5. The University has the right to cancel, at any stage, the admission for the candidate who is found admitted to a course to which he/she is not entitled, being unqualified or ineligible in accordance with the statutes and regulations in force.
6. The list of the shortlisted candidates for screening test, interview and finally selected for admissions to Ph.D. programme will be displayed on the DTU website: [www.dtu.ac.in](http://www.dtu.ac.in)
7. Candidates have to bring a valid photo-identity card for the purpose of written test along with the printed application form.
8. There is no need to send any part of application form to DTU by post.
9. Incomplete applications are likely to be rejected.
10. No separate call letter will be dispatched.
11. The candidates are advised to make their own arrangements for travelling and lodging accordingly. They must come prepared for admission (in case they are selected) as per the schedule.
12. Candidate should check the Institute website for results / important announcements.
13. Candidates called for the interview should bring with them (i) Photo ID Card, (ii) Printed copy of the application submitted online, (iii) Thesis / dissertation / report / publications (iv) copy of certificates and mark-sheets.
14. The candidates may contact faculty members/Head of the concerned academic departments for selecting

### IMPORTANT INSTRUCTIONS

1. The candidates are advised to read each and every instruction given in this Information Brochure very carefully before applying Online.
2. All entries should be carefully made while applying online. DTU will not be responsible for wrong entries. Candidates shall be sole responsible for the correctness and authenticity of the information / documents provided in the online application.
3. Online application found incomplete in any form will be summarily rejected. No correspondence / communication will be entertained in this regard.



## ANNEXURE-1

Seat Matrix for Full Time Ph.D. Admission with University Scholarship for the Session: January 2021								
Name of the Department	Disciplines Offered by the Departments	Code of the Department	General	OBC	SC	ST	Total Seats Available	
Applied Chemistry	1. Chemistry	AC	01	01	01	-	05	
	2. Chemical Engineering		01	-	01	-		
PwD								
Applied Physics	1. Physics	AP	01	-	-	01	04	
	2. Engineering Physics		01	01	-	-		
PwD								
Applied Mathematics	1. Mathematics	AM	02	02	01	01	08	
	2. Mathematics and Computing		01	-	-	01		
PwD								
Civil Engineering	1. Civil Engineering	CE	02	-	01	-	03	
PwD								
Computer Science & Engineering	1. Computer Science and Engineering	CSE	02	01	01	02	07	
PwD								
EWS				01				
Electronics & Communication Engineering	1. Electronics and Communication Engineering	ECE	02	-	-	01	04	
PwD					01			
EWS								
Electrical Engineering	1. Electrical Engineering	EE	02	-	-	01	04	
PwD						01		
Environmental Engineering	1. Environmental Engineering	ENE	01	-		01	03	
EWS				01				
PwD								
Mechanical Engineering	1. Mechanical Engineering	ME	02	-	-	01	04	
PwD					01			
EWS								
Delhi School of Management	1. Management	DSM	02	-	-	-	02	
PwD								
Information Technology	1. Information Technology	IT	01	04	-	-	05	
PwD								
EWS								
USME	1. Management	USME	03	01	03	01	16	
	2. Economics		03	-	-	01		
	3. Entrepreneurship Innovation & Venture Development		01	-	-	01		
EWS			02					
Total:			32	11	09	13	65	

**Note:** Number of DTU fellowships may increase depending upon the students selected for final Ph.D. admission.



## ANNEXURE-2

### AUTHORITIES WHO CAN ISSUE CASTE/TRIBE CERTIFICATE

**SC/ST/OBC candidates should submit certificate issued by any of the following authorities:**

District Magistrate/Additional District Magistrate/Collector/Deputy Commissioner/Additional Deputy Commissioner/Deputy Collector/1<sup>st</sup> Class Stipendiary Magistrate/City Magistrate/Sub-Divisional Magistrate/Taluka Magistrate/Executive Magistrate/Extra Assistant Commissioner/Chief Presidency Magistrate/Additional Chief Presidency Magistrate/Presidency Magistrate/Revenue Officer not below the rank of Tehsildar/Sub-Divisional Officer of the area where the candidate and/or his/her family normally resides/Administrator/Secretary to Administrator/Development Officer (Lakshadweep Island).

(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. / Kum. \_\_\_\_\_

\_\_\_\_\_ 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. | BCC dated 6/12/96 published in the Gazette of India Extraordinary Part I Section I No. 210 dated 11/12/96.                                  |
| 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.    | v. Resolution No. 12011/13/97-BCC dated 03/12/97.   |
| iii. Resolution No. 12011/7/95-BCC dated 24/05/95 published in the Gazette of India Extraordinary Part I Section I No. 88 dated 25/05/95.    | vi. Resolution No. 12011/99/94-BCC dated 11/12/97.  |
| iv. Resolution No. 12011/96/94-BCC dated 9/03/96. (v) Resolution No. 12011/44/96-  | 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 dated 04/04/2000.
- x. Resolution No. 12011/44/99-BCC dated 21/09/2000 published in the Gazette of India Extraordinary Part I Section I No. 210 dated 21/09/2000.
- 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: \_\_\_\_\_

District Magistrate / Deputy Commissioner / Competent Authority  
Seal

**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 / Deputy Collector / 1st Class Stipendiary Magistrate / Sub-Divisional magistrate / Taluka Magistrate / Executive Magistrate / Extra Assistant Commissioner (not below the rank of 1st 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.



**Declaration/undertaking - for OBC Candidates only**

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.

Signature of the Candidate

Place: \_\_\_\_\_

Date: \_\_\_\_\_



**ANNEXURE-3****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.



## ANNEXURE-4

Government of.....

(Name &amp; Address of the authority issuing the certificate)

**INCOME & ASSET CERTIFICATE TO BE PRODUCED BY ECONOMICALLY WEAKER SECTIONS**

Certificate No. \_\_\_\_\_

Date: \_\_\_\_\_

VALID FOR THE YEAR \_\_\_\_\_

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)

Name \_\_\_\_\_

Signature with seal of Office

Designation \_\_\_\_\_

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

as also his/her spouse and children below the age of 18 years.

\*\*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

\*\*\*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 AND 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/ 1st 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 or the area where the candidate and/or his family normally resides.



# Syllabus for Screening Test for **Ph.D. ADMISSIONS** Session January, 2021

## 1. Department of Civil Engineering

Engineering mechanics, Solid Mechanics, Structural Analysis, Construction Materials & Management, Concrete Structure, Steel Structure, Solid Mechanics, Foundation Engineering, Fluid Mechanics, Hydraulics, Hydrology, Irrigation, Transportation Engineering, Geomatics Engineering.

## 2. Department of Electrical Engineering

### Section 1 : Electric Circuits

Network graph, KCL, KVL, Node and Mesh analysis, Transient response of dc and ac networks, sinusoidal steady-state analysis, resonance, passive filters, Ideal current and voltage sources, Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum power transfer theorem, Two-port networks, Three phase circuits, Power and power factor in ac circuits.

### Section 2 : Electromagnetic Fields

Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss's Law, Divergence, Electric field and potential due to point, line plane and spherical charge distributions, Effect

of dielectric medium, Capacitance of simple configurations, Biot-Savart's law, Ampere's law, Curl, Faraday's law, Lorentz force, Inductance, Magnetomotive force, Reluctance, Magnetic circuits, Self and Mutual inductance of simple configurations.

### Section 3 : Signals and Systems

Representation of continuous and discrete-time signals, Shifting and scaling operations, Linear Time Invariant and Causal systems, Fourier series representation of continuous periodic signals, sampling theorem, Applications of Fourier Transform, Laplace Transform and z-Transform.

### Section 4 : Electrical Machines

Single phase transformer; equivalent circuit, phasor diagram, open circuit and short circuit tests, regulation and efficiency; Three phase transformer; connections, parallel operation; Auto-transformer, Electromechanical energy conversion principles, DC machines; separately excited, series and shunt, motoring and generating mode of operation and their characteristics, starting and speed control of dc motors; Three phase induction motors, Principle of operation, types, performance, torque-speed characteristics, no-load



and blocked rotor tests, equivalent circuit, starting and speed control; Operating principle of single phase induction motors; Synchronous machines: cylindrical and salient pole machines, performance, regulation and parallel operation of generators, starting of synchronous motor, characteristics; Types of losses and efficiency calculations of electric machines.

### Section 5 : Power systems

Power generation concepts, ac and dc transmission concepts, Models and performance of transmission lines and cables, Series and shunt compensation, Electric field distribution and insulators, Distribution systems, Per-unit quantities, Bus admittance matrix, Gauss-Seidel and Newton-Raphson load flow methods, Voltage and Frequency control, power factor correction, Symmetrical components, Symmetrical and unsymmetrical fault analysis, Principles of over-current, differential and distance protection; Circuit breakers, System stability concepts, Equal area criterion.

### Section 6 : Control Systems

Mathematical modeling and representation of systems, Feedback principle, transfer function, Block diagrams and Signals flow graphs, Transient and Steady-state analysis of linear time invariant systems, Routh-Hurwitz and Nyquist criteria, Bode plots Root loci, Stability analysis, Lag, Lead and Lead-Lag compensators; P, PL and PID controllers; State space model, State transition matrix.

### Section 7 : Electrical and Electronic Measurements

Bridges and potentiometers, Measurement of voltage, current, power, energy and power factor; Instrument transformers, Digital voltmeters and multimeters, Phase, Time and Frequency measurement; Oscilloscopes, Error analysis.

### Section 8 : Analog and Digital Electronics

Characteristics of diodes, BJT, MOSFET; simple diode circuits clipping, clamping, rectifiers; Amplifiers; Biasing, Equivalent circuit and Frequency response; Operational amplifiers; Characteristics and applications, Combinational and Sequential logic circuits, multiplexer, DE multiplexer, 8085 microprocessors; Architecture, programming and Interfacing.

### Section 9 : Power Electronics

Characteristics of semiconductor power devices; Diode, Thyristor, Triac, GTO, MOSFET, IGBT; DC to DC conversion; Buck, Boost and Buck-Boost converters; Single and three phase configuration of uncontrolled rectifiers, Line commutated thyristor based converters, Bidirectional ac to dc voltage source converters, Issues of line current harmonics, Power factor, Distortion factor of ac to dc converters, Single phase and three phase inverters, Sinusoidal pulse width modulation.

## 3. Department of Environmental Engineering

Characteristics of water and waste water, Water quality requirements, water & waste water treatment, Air quality, Air Pollution & control, Solid waste, Solid Waste management, Engineering system for resource and energy recovery, Industrial waste management, Environmental impact assessment.

## 4. Department of Delhi School of Management

Managerial themes such as E-Governance, Information Technology Management, Strategic Management, Marketing Management, Distribution and Retail Management, Organizational Behavior, Human Resources Management, Corporate Governance and Ethics, Public Policy and



Governance, Accounting and Finance, Portfolio Management, Mergers and Acquisition, Corporate Restructuring, Knowledge Management, General Management Principle and Practices, Supply Chain Management, Business Research Methods, Business Statistics.

## 5. USME

### Discipline: Management

Managerial themes such as Management Principles, Information Technology Management, Business policy and Strategic Management, Marketing Management, Distribution and Retail Management, Brand and product management, Organizational Behavior and Development, Human Resources Management, Performance and talent management, Corporate Governance and Ethics, Public Policy and Governance, Accounting and Finance, Portfolio Management, Mergers and Acquisition, Corporate Restructuring, Knowledge Management and Practices, Supply Chain Management, Business Research Methods, Business Statistics.

Operations management, vendor management, Services marketing and service operations, CRM, Business Analytics, predictive techniques, marketing financial and HR analytics, supply chain analytics, optimization techniques, big data analytics. Entrepreneurship, innovation management, managing technology. Managerial Economics, forecasting, inventory management, various types of costing approaches, total quality management.

### Discipline: Innovation Entrepreneurship and Venture Development

**Unit 1:** Comprehension Passages from success stories in Entrepreneurship and startup Leadership. Current affairs related to start-ups.

**Unit 2:** Entrepreneurship, Social entrepreneurship, Intrapreneurship, Entrepreneurial Characteristics, Entrepreneur v/s Manager, Entrepreneurial Motivation.

**Unit 3:** Innovation Management, Diffusion of Innovation, Innovation Cycle, New Product Development, Design Thinking.

**Unit 4:** Startup, Stages of Startup, Ideation, Pre-startup, Startup and Scaling up Stage, Start Up India Program, Start Up concept and its support to start Ups, Startup Financing, Seed Funding, Angel investors, venture capital funding, government financial support for startups, MSME-definition and its types.

**Unit 5:** Government Schemes & Policy for Startups and MSMEs, ATAL Innovation Mission (AIM), ATAL Tinkering Lab (ATL), Self Employment & Talent Utilization (SETU) scheme, SFURTI Scheme, Intellectual Property Rights (IPR), Start Up Intellectual Property Protection (SIPP), Trademark, Copyright, Patents, Type of Companies in India and their Characteristics, Formation Legalities of the Company.

### Discipline: Economics

#### Micro Economics

Consumer behaviour, Demand and Supply analysis, Concept of Elasticity. Theory of production and costs, Forms of Market, Pricing and Output Decision. Tax and Subsidy, Elements of General Equilibrium and Welfare Economics.

#### Macro Economics

Determination of output and Employment, National Income- Concept and Determinants: Concept of money, bank, Inflation- Causes and Remedies, Concept of multiplier, Business Cycle, IS and LM function. Concept of Growth and Development: Various models of Growth.



### International Trade

Theories of International Trade, Balance of Payment, Terms of Trade, Free trade and Protection.

### Indian Economy

Main features: Geographic Size, Natural Resources, Population, Poverty, Agriculture, Industry, Unemployment, Public finance, Meaning and Measurement of Growth Development-meaning and Characteristics of Underdevelopment.

### Statistics

Measures of Central tendency, Measurement of Dispersion, Correlation, Regression, Interpolation and Extrapolation Sampling Distributions Normal, t, Chi square, F distribution, Testing of hypothesis, Index numbers.

## 6. Department of Applied Physics

### For both the disciplines: Physics and Engineering Physics

#### Section 1: Mathematical Physics

Vector calculus; matrices; similarity transformations, diagonalization, eigenvalues and eigenvectors; linear differential equations: second order linear differential equations and solutions involving special functions; Partial differential equations, complex analysis: Cauchy-Riemann conditions, Cauchy's theorem, singularities, residue theorem and applications; Laplace transform, Fourier series & analysis; Tensors; Numerical methods.

#### Section 2: Classical Mechanics

Lagrangian formulation: D'Alembert's principle, Euler-Lagrange equation, Hamilton's principle, symmetry and conservation laws; central force motion: Kepler problem and Rutherford scattering; Periodic

motion: small oscillations; coupled oscillations and normal modes; rigid body dynamics; Liouville's theorem; canonical transformations, Poisson brackets, Hamilton-Jacobi equation. Special theory of relativity: Lorentz transformations, relativistic kinematics, mass-energy equivalence.

#### Section 3: Electromagnetism

Electrostatics and magnetostatics, boundary value problems, multipole expansion, Fields in conducting, dielectric, diamagnetic and paramagnetic media, Faraday's law and time varying fields; displacement current; Maxwell's equations; energy and momentum of electromagnetic fields; Propagation of plane electromagnetic waves, reflection, refraction; Electromagnetic waves in dispersive and conducting media.

#### Section 4: Quantum Mechanics

Wave-particle duality, uncertainty principle; Schrodinger equation; linear vectors and operators in Hilbert space; one dimensional potentials: step potential, finite rectangular well, tunnelling from a potential barrier, particle in a box, harmonic oscillator; two and three dimensional systems: concept of degeneracy; hydrogen atom; Stern-Gerlach experiment, angular momentum and spin; addition of angular momenta; variational method and WKB approximation, time independent perturbation theory; elementary scattering theory, Born approximation; symmetries in quantum mechanical systems; Identical particles; Pauli exclusion principle.

#### Section 5: Thermodynamics and Statistical Physics

Laws of thermodynamics and their consequences; macrostates and microstates; phase space; ensembles; partition function, free energy, calculation of thermodynamic quantities; classical



and quantum statistics; degenerate Fermi gas; black body radiation and Planck's distribution law; Bose-Einstein condensation; first and second order phase transitions, phase equilibria, critical point.

### **Section 6: Atomic and Molecular Physics**

Quantum states of an electron in an atom; Spectra of one-and many-electron atoms; spin-orbit interaction: LS and jj couplings; fine and hyperfine structures; Zeeman and Stark effects; Electronic, rotational and vibrational spectra of diatomic molecules; selection rules; electronic transitions in diatomic molecules, Franck-Condon principle; Raman effect; EPR, NMR, ESR, X-ray spectra; lasers: Einstein coefficients, population inversion, two, three and four level systems.

### **Section 7: Solid State Physics**

Bravais lattices; crystal structures, Miller indices, diffraction methods for structure determination; Reciprocal lattice, bonding in solids; Defects and dislocations; lattice vibrations and thermal properties of solids; free electron theory; band theory of solids; Optical properties of solids; dielectric properties of solid; dielectric function, polarizability, ferroelectricity; magnetic properties of solids; domains and magnetic anisotropy; superconductivity: Type-I and Type II superconductors, Meissner effect, London equation, BCS Theory, flux quantization, Josephson junctions.

### **Section 8: Electronics**

Semiconductors, electron and hole statistics in intrinsic and extrinsic semiconductors; Hall effect, metal-semiconductor junctions; Ohmic and rectifying contacts; PN diodes, bipolar junction transistors, field effect devices; negative and positive feedback circuits;

oscillators, operational amplifiers, active filters; basics of digital logic circuits, combinational and sequential circuits, flip-flops, timers, counters, registers, A/D and D/A conversion, Opto-electronic devices, Microprocessor and microcontroller basics.

### **Section 9: Nuclear and Particle Physics**

Basic nuclear properties; Nuclear radii and charge distributions, nuclear binding energy, electric and magnetic moments; semi-empirical mass formula; nuclear models; liquid drop model, nuclear shell model; nuclear force and two nucleon problem; alpha decay, beta-decay, electromagnetic transitions in nuclei; Rutherford scattering, nuclear reactions, conservation laws; fission and fusion; particle accelerators and detectors; elementary particles, Quark model.

### **Section 10: Optics and Fiber Optics**

Interference, diffraction, polarization, Guided wave Optics, Guided Wave Structures, Ray analysis, Modes of planar waveguide, Mode theory for optical fibers, Propagation characteristics of step index fibers, graded index fibers, Signal degradation in optical fiber due to dispersion and attenuation, Optical Sources and detectors for optical fiber communication.

## **7. Department of Applied Chemistry**

### **Discipline: Chemistry**

Chemical periodicity, structure and bonding, concepts of acids, bases and non-aqueous solvents, main, transition and inner-transition group elements and their compounds including properties, organometallic compounds, cages and metal clusters, bioinorganic chemistry.



Basic principles of quantum mechanics, chemical thermodynamics, electrochemistry, chemical kinetics, photochemical reactions, colloids and surfaces, solid state and polymer chemistry.

IUPAC nomenclature of organic molecules, configurational, conformational isomerism in acyclic and cyclic compounds. Organic reaction mechanism, determination of reaction pathways, common named reactions and rearrangements and applications in organic synthesis. Separation, electro- and thermo analytical methods. Molecular spectroscopy and characterization of chemical compounds by IR, Raman, NMR, EPR, UV-vis, MS, electron spectroscopy and microscopic techniques.

### **Discipline: Chemical Engineering**

Material and energy balance, Chemical Engineering Thermodynamics, Basic concepts of fluid mechanics, flow through pipe, pressure drop calculations, Transport Phenomena, Heat transfer by conduction, convection, radiation, Concepts and design of heat exchangers and evaporators, Basic concepts of mass transfer, Different mass transfer processes and unit operations, Mechanical operations, Chemical reaction engineering: Design of homogeneous and heterogeneous reactors, Chemical process technology, Petroleum refining and petrochemicals. Instrumentation control and optimization, Principles of process economics and cost estimation.

Polymer chemistry, Polymer properties and testing: Determination of molecular weight, thermal, morphological, structural, Mechanical, optical, electrical and environmental properties of polymers, properties and applications of commodity, engineering and speciality polymers, Natural and synthetic rubbers,

Polymer blends and composites, biopolymers, Polymer processing: Compression molding, injection molding, blow molding, extrusion, rotational molding, thermoforming, rubber processing.

## **8. Department of Applied Mathematics**

### **FOR DISCIPLINE : MATHEMATICS**

- i. Differential & Integral calculus  
Vector calculus
- ii. Algebra (Linear & Abstract)
- iii. Differential equations (ODE & PDE)
- iv. Laplace & Fourier transforms, Fourier series.
- v. Probability, statistics & operations research
- vi. Numerical methods
- vii. Special functions
- viii. Real and complex analysis

### **FOR DISCIPLINE : MATHEMATICS AND COMPUTING:**

Entrance exam will be 30% in Mathematics domain and 70% in Computing Domain

### **Mathematics Doman (30%)**

**Calculus:** Sequences and Series, differential calculus, integral calculus, vector calculus. Basics and ordinary differential equation (ODE) and partial differential equation (PDE), Fourier Series

**Linear Algebra:** Determinants and matrices, Cayley-Hamilton Theorem, Hermitian, skew Hermitian, unitary matrices, eigen values, eigen vectors.

**Transforms:** Laplace Transform, Fourier Transform.

**Numerical Analysis:** Numerical solution of algebraic equations using Gauss elimination and Gauss-Siedel methods,



Gauss Jordan, numerical solution of ordinary differential equations using Picard, Euler method. Interpolation.

**Probability and Statistics:** mean, mode, median and standard deviation, Probability space, conditional probability, Baye's theorem, uniform, binomial, poisson, normal and exponential distribution.

### **Computing Domain (70%)**

**Programming:** Programming fundamentals & C/C++ programming, object-oriented programming concepts using C++/JAVA.

**Data Structures and Algorithms:** Arrays, stack, queue, linked list, trees, binary search trees, graph, sorting and searching. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Asymptotic space and time complexity.

**Digital Logic Design:** Boolean Algebra, Logic Functions, combinational and sequential circuit design, registers and counters, logic families.

**Computer organization and architecture:** Machine instructions and addressing modes, Instruction pipelining, memory hierarchy, I/O devices.

**Computer network:** OSI, TCP/IP, Brief overview of OSI layers, IPv4, IPv6, routers and routing algorithms (distance vector, link state), congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP)

**Database Management System:** ER model, relational model, normalization, integrity constraints, SQL, indexing transaction processing, concurrency control.

**Theory of Computation:** Regular expression, Finite automata, context free grammar, pushdown automata, regular and context free languages, pumping

lemma, Turing machine.

**Compiler Design:** Lexical Analysis, parsing, syntax-directed translation, runtime environments, intermediate code generation.

**Operating System:** Types of OS, process management, concurrency and synchronization, CPU scheduling, deadlocks, memory management and virtual memory, disk scheduling, file systems.

**Discrete Structures:** Classical logic theory, Boolean algebra and relations and graph, tree, spanning tree, planar graph and coloring.

**Software Engineering:** Requirement and Feasibility Analysis, Data flow Diagrams, Process life cycle, design, coding, testing, implementation and maintenance.

## **9. Department of Electronics and Communication Engineering**

### **Networks, Signals and Systems**

Network solution methods; nodal and mesh analysis; Network theorems; superposition, Thevenin and Norton's, maximum power transfer; Wye-Delta transformation; Steady state sinusoidal analysis using phasors; Time domain analysis of simple linear circuits; Solution of network equations using Laplace transform; Frequency domain analysis of RLC circuits; Linear 2-port network parameters; driving point and transfer functions; State equations for networks.

Continuous-time signals; Fourier series and Fourier transform representations, sampling theorem and applications; Discrete-time signals; discrete-time Fourier transform (DTFT), DFT, FFT, Z-transform, interpolation of discrete-time signals; LTI systems; definition and properties causality, stability, impulse response, convolution, poles and



zeros, parallel and cascade structure, frequency response, group delay, phase delay, digital filter design techniques.

### Electronic Devices

Energy bands in intrinsic and extrinsic silicon; Carrier transport; diffusion current, drift current, mobility and resistivity; Generation and recombination of carriers; Poisson and continuity equations; P-N junction, Zener diode, BJT, MOS capacitor, MOSFET, LED, photo diode and solar cell; Integrated circuit fabrication process; oxidation, diffusion, ion implantation, photolithography and twin-tub CMOS process.

### Analog electronics

Small signal equivalent circuits of diodes, BJTs and MOSFETs; Simple diode circuits; clipping, clamping and rectifiers; Single-stage BJT and MOSFET amplifiers; biasing, bias stability, mid-frequency small signal analysis and frequency response; BJT and MOSFET amplifiers; multi-stage, differential, feedback, power and operational; Simple op-amp circuits; Active filters; Sinusoidal oscillators; criterion for oscillation, single-transistor and op-amp configurations; Function generators, wave-shaping circuits and 555 timers; Voltage reference circuits; Power supplies; ripple removal and regulation

### Digital Circuits

Number systems; Combinatorial circuits; Boolean algebra, minimization of functions using Boolean identities and Karnaugh map, logic gates and their static CMOS implementations, arithmetic circuits, code converters, multiplexes, decoders and PLAs; Sequential circuits; latches and flip-flops, counters, shift-registers and finite state machines; Data converters; sample and hold circuits, ADCs and DACs; Semiconductor memories; ROM, SRAM,

DRAM; 8-bit microprocessor (8085); architecture, programming, memory and I/O interfacing.

### Control Systems

Basic control system components; Feedback principle; Transfer function; Block diagram representation; Signal flow graph; Transient and steady-state analysis of LTI systems; Frequency response; Routh-Hurwitz and Nyquist stability criteria; Bode and root-locus plots; Lag, lead and lag-lead compensation; State variable model and solution of state equation of LTI systems.

### Communications

Random processes: autocorrelation and power spectral density, properties of white noise, filtering of random signals through LTI system; Analog communications: amplitude modulation and demodulation, angle modulation and demodulation, spectra of AM and FM, superheterodyne receivers, circuits for analog communication; Information theory: entropy, mutual information and channel capacity theorem; Digital communications: PCM, DPCM, digital modulation schemes, amplitude, phase and frequency shift keying (ASK, PSK, FSK), QAM, MAP and ML decoding, matched filter receiver, calculation of bandwidth, SNR and BER for digital modulation; Fundamentals of error correction, Hamming codes; Timing and frequency synchronization, inter-symbol interference and its mitigation; Basics of TDMA, FDMA and CDMA.

### Electromagnetics

Electromagnetics; Maxwell's equations: differential and integral forms and their interpretation, boundary conditions, wave equation, Poynting vector; Plane waves and properties: reflection and refraction, polarization, phase and group velocity, propagation through various media, skin depth; Transmission lines: equations, characteristic impedance,



impedance matching, impedance transformation, S-parameters, Smith chart; Waveguides: modes, boundary conditions, cut-off frequencies, dispersion relations; Antennas: antenna types, radiation pattern, gain and directivity, return loss, antenna arrays; Basics of radar; Light propagation in optical fibers.

## 10. Department of Computer Science and Engineering

### **Computing related mathematics:**

Propositional and first-order logic, sets, relations, functions, partial order and lattice groups. Groups. Vectors, matrices, determinants, System of linear equations, eigenvalues and eigenvectors, LU decomposition. Vector space, differential equation gradients, maxima minima random variables. Uniform Gaussian exponential, Poisson and binomial distributions. Mean Median Mode and standard deviation. Conditional Probability and Bayes Theorem.

### **Programming and Data structures:**

Programming in C, recursion, arrays, stacks, queues, linked list, trees, binary heaps, graphs

Algorithms: Searching sorting hashing asymptotic worst-case time and space complexity algorithm design techniques: Greedy, dynamic programming and divide and conquer. Graph search, minimum spanning trees, shortest path

**Theory of computation:** Regular expression and finite automata context-free grammar and pushdown automata, regular and context-free languages, pumping Lemma, Turing machines and undecidability.

**Compiler Design:** Lexical analysis parsing syntax-directed translation runtime environments intermediate code generation

**Operating system:** Processes inter-process communication concurrency

and synchronisation, deadlock CPU scheduling, memory management and virtual memory file systems.

**Database management systems:** ER model, relational algebra, tuple calculus, SQL integrity constraints, normal forms, file organisation, indexing (B and B plus trees) transactions and concurrency control.

**Computer networks:** Concept of layering. LAN Technologies (Ethernet) flow and error control techniques, switching ipv4/ ipv5 routers and routing algorithms (distance vector, link state). TCP/UDP and socket congestion control, Application layer protocols (DNS, SMTP POP3 HTTP), Basics of Wi-Fi, network security: Authentication, basics of Public key and Private key cryptography digital signatures and certificates, firewalls.

CIDR notation, Basics of IP support protocols (ARP, DHCP, ICMP), Network Address Translation (NAT), and Email.

**Software engineering:** Software development life cycle, requirement and feasibility analysis, data flow diagrams, process specifications, input/ output planning and managing the project, design, coding, software testing, implementation, maintenance, software metrics.

**Web technologies:** Web IR retrieval ,Web mining , Bigdata, NOSQL, Basics of cloud (SaaS, PaaS, IaaS, Public and Private Cloud)

**Artificial intelligence:** Artificial intelligence approach for problem-solving, Automated reasoning for propositional logic, state-space representation of problems, bounding functions, breadth-first search, depth-first search, A, A\*, Ao\*, etc. Frames scripts semantic nets, production system, procedural representation.

Basics of Artificial Neural Networks (ANN): Supervised, Unsupervised and Reinforcement Learning



## 11. Department of Information Technology:

### Fundamentals of Mathematics

Linear Algebra: Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition.

Calculus: Limits, continuity and differentiability. Maxima and minima. Mean value theorem. Integration.

Probability: Random variables. Uniform, normal, exponential, Poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem.

Discrete Mathematics: Propositional and first-order logic. Sets, relations, functions, partial orders and lattices. Groups. Graphs: connectivity, matching, colouring. Combinatorics: counting, recurrence relations, generating functions.

### Digital Logic

Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

### Computer Organization and Architecture

Machine instructions and addressing modes. ALU, data path and control unit. Instruction pipelining. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

### Programming and Data Structures

Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

### Algorithms

Searching, sorting, hashing. Asymptotic worst-case time and space complexity.

Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph search, minimum spanning trees, shortest paths.

### Theory of Computation

Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and context-free languages, pumping lemma. Turing machines and undecidability.

### Compiler Design

Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation.

### Operating System

Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems.

### Databases and Management Systems

ER model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

### Computer Networks

Concept of layering. LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms (distance vector, link state). TCP/UDP and sockets, congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi-Fi. Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.

### Machine Learning

Concept of Artificial Intelligence and Machine Learning, Task of Machine



Learning, classification, regression, clustering, information theory and decision system, data representation, diversity of data, data table, form of learning, Learning algorithms: nearest neighbours, linear and kernel classifiers, neural networks, linear regression, logistic regression, Support Vector Machines, Clustering, Expectation Maximization, K-Mean clustering, Dimensionality Reduction, Feature Selection, manifold learning.

## 12. Department of Mechanical Engineering

### Thermodynamics & Heat Power Engineering

Thermodynamics Cycles and IC Engines, Laws of thermodynamics and applications. Steam Power Plants, Boilers, Turbines, Compressors, Fans and Blowers.

### Refrigeration and Air Conditioning

Different modes of heat transfer. Heat Exchangers, Refrigeration and Heat Pump Systems, Vapour absorption Refrigeration Systems, Refrigerants and Air Conditioning Systems.

### Fluid Mechanics

Viscosity and Its Measurement, Present measurement Devices, Flow kinematics, Flow Dynamics, Navier- Stokes equation,

Bernoulli's theorem, Flow measurement, Laminar and turbulent flows. Boundary Layer Theory, Fluid power machines.

### Theory of Machines

Mechanisms, Governors, cams, gears, gear-trains, Mechanical vibrations, flywheel, balancing.

### Machine Design

Stress at a point, principal stresses, bending, torsion, buckling. Design of joints, shafts, Key and Coupling, Brakes, Gears and Box, Piston, Crank Shaft, Connecting Rod.

### Engineering Materials

Structure and properties of common engineering materials, Heat treatment of steels.

### Production Engineering

Metal Forming, Metal casting, Welding, Metal cutting, Machine Tool Design,

Machinability & Economics of Metal Machining Automation and Robotics.

### Industrial Engineering

Production Planning and Control: Forecasting, scheduling, assembly line balancing, PERT and CPM Control Operations: Inventory control, Work measurement, Quality Management.

**Dean (Acad-PG)/ Associate Dean (Acad-PG)/  
Ph. D Admission Coordinator**

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# DELHI TECHNOLOGICAL UNIVERSITY

*(Formerly Delhi College of Engineering)*

Govt. of NCT of Delhi

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