DELHI TECHNOLOGICAL UNIVERSITY

(Formerly Delhi College of Engineering)

ISO 9001:2015 Certified

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

ADMISSION
BROCHURE

Ph.D.

SESSION:
AUGUST, 2024

PH.D. ADMISSIONS: SESSION: AUGUST, 2024

TENTATIVE ADMISSION SCHEDULE AND IMPORTANT DATES

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

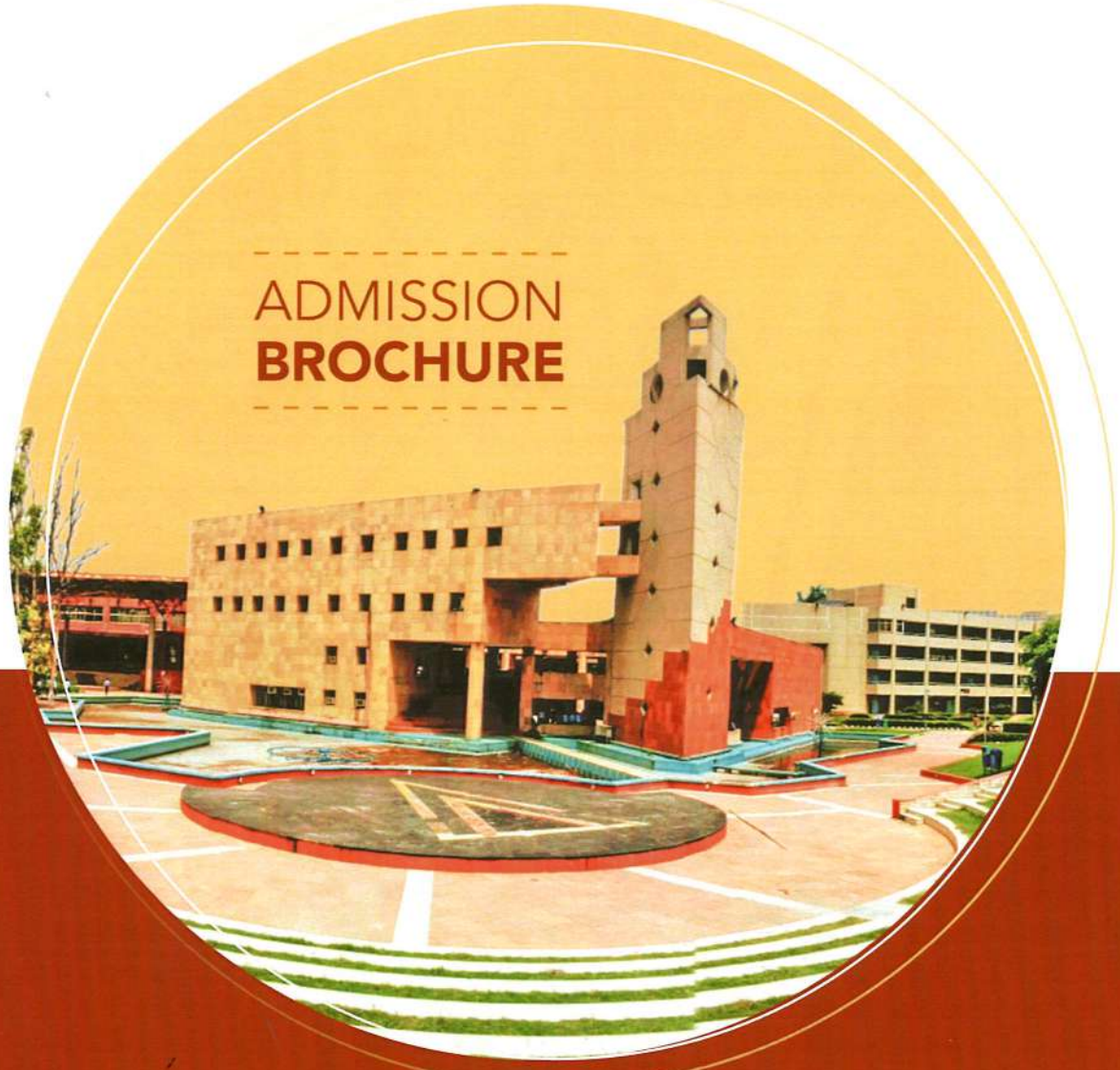
S. No.	Activity / Event	Date
1.	Advertisement in newspapers	17.05.2024 (Friday)
2.	Opening of website for Online Registration	20.05.2024 (Monday)
3.	Last date for Online Registration and Registration Fee Deposit	24.06.2024 (Monday) 12:00 Midnight
4.	Display of list of shortlisted candidates for written test on DTU website	28.06.2024 (Friday) 8:00 PM
5.	Date of Entrance Test	03.07.2024 (Wednesday) & 04.07.2024 (Thursday)
6.	Declaration of Result on DTU website	09.07.2024 (Tuesday)
7.	Dates for Interview	16.07.2024 (Tuesday) & 17.07.2024 (Wednesday)
8.	Declaration of final result on DTU website	26.07.2024 (Wednesday)
9.	Dates for Document verification and Admission (Candidates are required to report along with original documents and Demand Draft for admission fee)	30.07.2024 & 31.07.2024 (Tuesday & Wednesday)
10.	Display of vacant seats for waitlisted candidates on DTU website	05.08.2024 (Monday) 5:00 PM
11.	Last round of admissions, if required (Candidates are required to report along with original documents and Demand Draft for admission fee)	09.08.2024 (Friday) at 10:00 AM

DTU Website: **www.dtu.ac.in**

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

DELHI TECHNOLOGICAL UNIVERSITY

(Formerly Delhi College of Engineering)



Ph.D.

SESSION:
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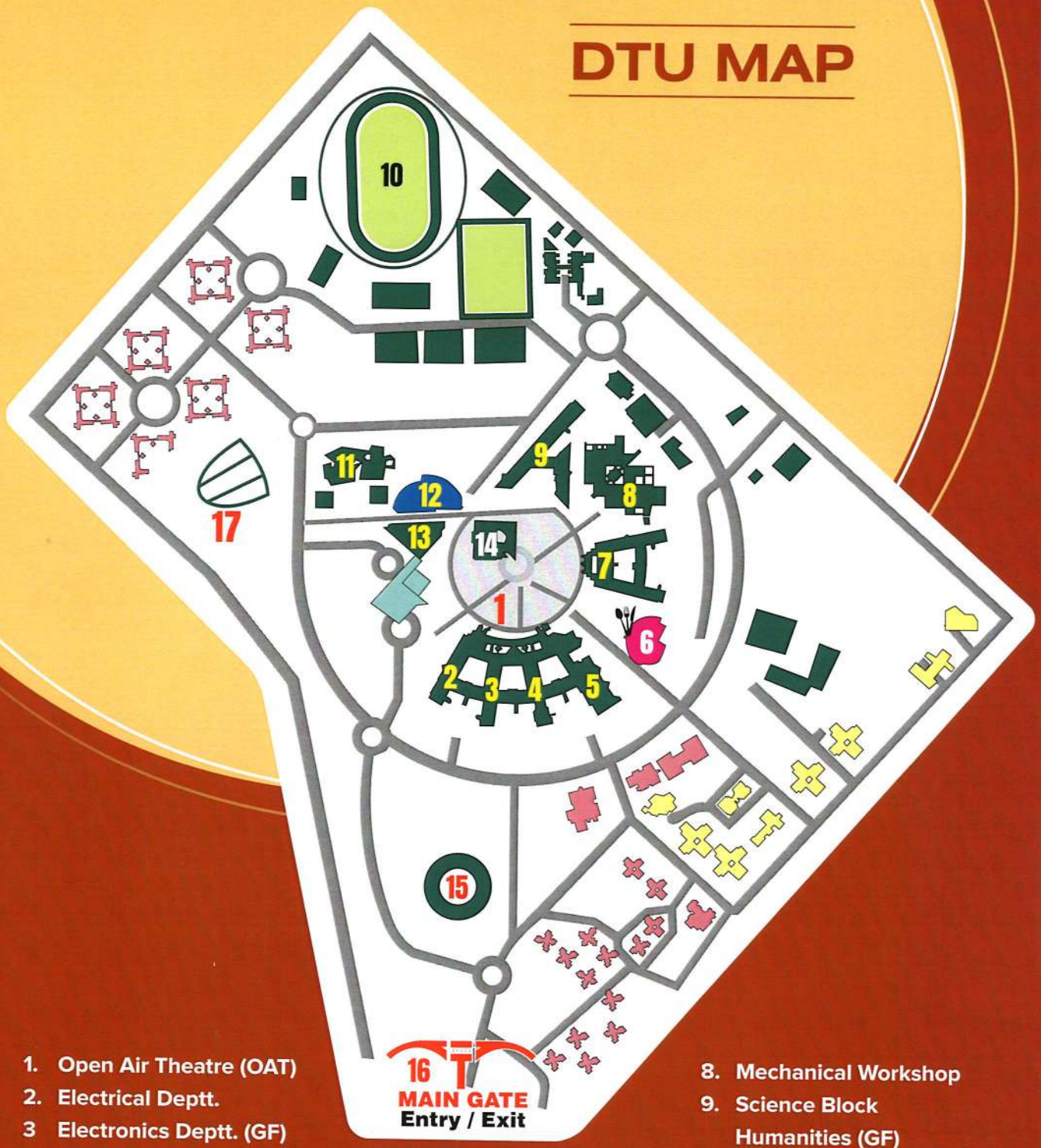
DTU MAP



1. Open Air Theatre (OAT)
2. Electrical Deptt.
3. Electronics Deptt. (GF)
   IT Deptt. (GF)
   Computer Deptt. (FF)
   Software Deptt. (SF)
4. Civil Deptt. (GF)
   Environment Deptt. (GF)
5. Civil Lab
6. Main Canteen
7. Mechanical, Production & Industrial and Automobile Deptt. (GF)
   Bio Technology (TF)
8. Mechanical Workshop
9. Science Block
   Humanities (GF)
   Applied Mathematics (FF)
   Applied Chemistry (SF)
   Applied Physics (TF)
10. Sports Complex
11. Department of Design
12. Library
13. Auditorium
14. Computer Centre and T&P
15. Delhi School of Management
16. Entry/Exit Main Gate
17. Raj Soin Hall

Prof. Prateek Sharma
Vice-Chancellor

Message

It gives me immense pleasure to announce that Delhi Technological University is commencing Ph.D. admissions for the Session: August, 2024.

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

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

Over the years, DTU has established itself as the University of unshakable repute. Hence, getting admission to DTU has reached great heights on the national and international stages and continues 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.

We aim to nurture the students holistically and endeavour to foster a culture in which virtues and skills are instilled in them, along with a concern for society and its well-being.

I send my best wishes to the candidates applying for admission to the Delhi Technological University.

(Prof. Prateek Sharma)

About DELHI TECHNOLOGICAL UNIVERSITY

Delhi Technological University (DTU), a leading World Class Technological University, plays a vital role in National and Global Knowledge Network. It is empowering India with the Wings of Knowledge and Power of Innovations. With more than 82 years of tradition of excellence in "Engineering & Technological Education" and "Research & Innovations". DTU came into being after the reconstitution of the Delhi College of Engineering by the Government of NCT of Delhi in 2009, by Act 6 of 2009, passed by the assembly of the NCT of Delhi. It is a non-affiliating, teaching and research University, committed to achieve excellence in Engineering, Science, Technology, Management and allied areas and matters connected therewith or incidental thereto. The university, in its various avatars, namely, the 'Delhi Polytechnic' and 'Delhi College of Engineering' (DCE), has been serving the nation and the global community since its inception in 1941, by providing trained manpower of highest quality in the field of engineering and technology, and, is globally well known for its outstanding education, research and innovations.

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 the 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.

The University currently offers various inter-disciplinary and industry relevant programs in Science, Technology, Management, and allied areas at the Undergraduate, Postgraduate and Doctoral level. The University has established a strong academia-industry interface and has collaborations with reputed research organizations, industries, and premier institutions. A great many alumni of the institute have excelled at home and abroad and through their contributions to the profession of engineering they have brought high honour and enhanced the dignity of engineering fraternity being rolled out from institutions in India. The University lays great emphasis on assisting students in the development of national character, self-confidence, leadership and fostering an ecosystem for creativity and imagination. 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

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.

LOCATION

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

PROGRAMMES OFFERED

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

RANKING AND REWARDS

The university is having ISO 9001:2015 certification since 27.11.2018, accredited with 'A' grade by NAAC (National Assessment and Accreditation Council) and has been accorded 2(f) and 12-B status by the University Grants Commission (UGC). Many of its UG & PG engineering programmes are also accredited by the National Board of Accreditation (NBA). The University is consistently ranked among best 10 engineering institutions as per the various independent surveys on best engineering institutions of the country. The university has been ranked 8th by India Today's best government engineering colleges ranking 2023. The 2023 NIRF rankings placed DTU at the 29th position among the engineering institutions and at 40th in the categories of universities. DTU has been placed at 801-1000 bracket in the Times Higher Education World University Ranking 2024.

CAMPUS AND INFRASTRUCTURE

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

in the emerging areas of management, relevant to industry and society.

COMPUTER CENTRE

DTU has a well-equipped centralized computer centre to cater to the needs of students and faculty in the university. It is housed, in a magnificent state-of-the-art building having specialized laboratories to provide variety of platforms and computing environment for UG, PG and research students. The centre possesses a number of servers and over 275 Dell intel core i5 computer systems. In addition, the centre has more than 15 servers hosting different applications such as websites & portals, SPSS, Mathematica, MatLab, DNS, LDAP, proxy, Email services, Network Monitoring System (NMS) etc. and 4 SUN CAD workstations meant for use by UG/PG/PhD students for their projects and research work. The centre is fully networked through high-end intelligent Juniper/Avaya/CISCO/ Brocade/ Ruckus manageable switches, and possesses round the clock two leased lines of 10 Gbps link of NKN and 1Gbps link of Reliance Jio with shared bandwidth in different pipes for the Wi-Fi connectivity in the Library, Academic Departments, Administrative Blocks, Sports Complex, Faculty Residence and Hostel blocks of the campus, with internet facilities on all the nodes. It also has the latest versions of compilers, scientific, technical and engineering software, training kits etc. for the students of different branches of engineering.

CENTRAL LIBRARY

Delhi Technological University library, with a collection of more than 2,00,000 text and reference books and a large number of e-journals, e-books, manuscripts in digital format, is one of the highly rich engineering libraries in the country. Library provides remote access facility to all its readers by using cloud based remote access software. The library also helps researchers to maintain proper integrity and ethics and provides the facility of similarity check to avoid instances of plagiarism. It has a very active presence on Facebook. Various current awareness services and user information literacy programs are continually organized throughout the year. The library building is a four storied, aesthetically designed, centrally air-conditioned structure with a seating capacity of 400.

Library is updated regularly by way of adding new literature in the form of text books, reference books, reports, proceedings, abstracts & indexes, encyclopedias, data books, standards (National & International), Journals & database on CD-ROM.

HOSTEL

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

CENTRE FOR EXTENSION & FIELD OUTREACH

Centre for Extension and Field Outreach was established in DTU in the year 2018. The various activities/ program performed by the Centre is to sensitize the students

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

INNOVATION AND INCUBATION FOUNDATION (DTU-IIF)

DTU-IIF is a Technology Business Incubator (TBI) established in 2016 as a non-profit section 8 company. Currently, this TBI is supported by the Government of Delhi and Delhi Technological University. DTU-IIF helps start-up companies and individual entrepreneurs to develop their business ideas, by providing a range of services including co-working office space, mentoring support, funding support with venture capital financing, and other supports & resources they need, all under one roof. During last five years, IIF provided 70 lakhs of funds to 56 start-up companies. Also, DTU-IIF promotes the culture of innovation and Entrepreneurship by organizing various webinars/workshops/Hackathons, etc. The Business Review Committee screens the new ideas and recommends incubation at DTU-IIF. The Finance Review Committee recommends the investment of Rs. 7.5 lakh per start-up. Also, DTU-IIF provides pre-seed support of Rs. 50,000/- to develop ideas.

SPORTS AND OTHER OUTDOOR ACTIVITIES

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

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

DCE-DTU ALUMNI NETWORK

DCE-DTU Alumni are serving leadership positions in many of the best-known companies in India and abroad, in marketing, finance, human resources, information technology, research & analytics, innovation & entrepreneurship. And the worldwide network of illustrious alumni includes world-known personalities like Prof. Vinod Dham

(Father of the Pentium Chip), Dr. Raj Soin (Founder, CEO of Soin, and LLC), Prof. D. Yogi. Goswami (Inventor, Author, Entrepreneur and Educator), Dr. Durga Das Aggarwal (President, CEO Piping Technology & Products, Inc). Mr. Vijay Shekhar Sharma, (Founder of Paytm), Sh. Karnal Singh (Former Chief of Enforcement Directorate), Sh. Arun Goyal (Member-CERC & Former Secretary, Cabinet Secretariat).

Alumni have been traditionally contributing generously towards placement, opportunities, sponsorships/ Fellowship programs and infrastructural developments of their alma mater. Donations for Raj Soin Hall by Dr. Soin, Clean Energy Research Centre establishment by Prof. Yogi Goswami, and several scholarships for the students of DTU have shown the dedication of the alumni for the betterment of their alma mater. Vinod Dham has sponsored "Centre of Excellence for Semi-conductors and Micro-electronics" to establish centralized state of art infrastructure facility for device design / material research / fabrication for cutting edge R&D in Semi- conductors and Micro-electronics.

EVENTS AND FESTIVALS

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

MEDICAL FACILITIES

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

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

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 2,00,000 books, a large collection of back volumes of periodicals, standard specifications and other literature. It subscribes more than 39,924 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 which offers excellent opportunities to interact and plan research programmes and projects in collaboration.

2. FACULTY AND RESEARCH

The university has a very talented pool of experienced, as well as young faculty members who are well qualified in their area of specialization and have very good national and international exposure. To engage the students and faculty in research and innovation the university offers provisions like funding for students' innovative projects, financial assistance to students for attending internship overseas, research project grants to all faculty members, etc.

To celebrate the individual's excellence in research, the university gives Research Excellence Awards to researchers in three categories of awards annually, namely, Outstanding Research Awards, Premier Research Awards, and Commendable Research Awards. The awards are open to all the researchers of DTU. The University provides funds to faculty and students to organize and attend various faculty development programs, seminars, and conferences.

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 21st 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, Management 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 the 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, Software Engineering, Centre of Excellence for the Science of Happiness, Multidisciplinary centre for Geoinformatics (MCG) & Vinod Dham Centre of Excellence for Semiconductors and Microelectronics.

DTU also offers Ph.D. Admissions under the AICTE QIP (Quality Improvement Program) and AICTE Doctoral Fellowship (ADF) scheme.

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.

4.1 Full-time Research student/ Candidate

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

i. Full-Time students with DTU Fellowship admitted within the DTU Fellowship seat matrix.

   Further, if a candidate who is admitted as Full Time research scholar with DTU Fellowship chooses to withdraw from the Ph.D. programme, due to ANY reason, the candidate shall be liable to refund the full amount of fellowship disbursed to him/her.

ii. 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.

iii. 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 Organization, 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.

iv. 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.

v. Direct admission to Ph.D. program for the DTU full-time B.Tech. (or) M.Tech. students is subject to fulfilling the guidelines laid down by the BOM in its 40th (agenda 40.5) (or) 37th meeting (agenda 37.7), respectively.

4.2 Part - Time Research student/ candidate

i. Research student / Candidate working in other organizations having MoU with Delhi Technological University.

ii. Candidate employed in Educational Institutions, R&D organizations and Government Department, Public Sector Undertaking and Candidates from industry/companies of high repute and a medium sized enterprise along with standing commitment to the exemplary standards namely ISO/ CMM 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 projects at DTU

Project staff under project sponsored by DST/UGC/ any government agency, industry or centres established from

grant in aid from government or international agency 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).

4.5 Industry/ Working Professionals

DTU's Ph.D. Program for "Industry/ Working Professionals" is another step in the direction of encouraging innovation driven doctoral research for professionals of high standing and competence in their disciplines. Committed professionals drawn from Industries, R&D organizations and Government Departments will be able to utilise this opportunity to fulfil their aspirations of pursuing Ph.D. in their preferred areas of excellence. This Ph.D. program will play an integral role in establishing long lasting and fruitful ties between DTU and Industry professionals for pursuing high-value projects in the knowledge driven economy.

The Professional joining Ph.D. Programs at DTU will be able to update their knowledge and skills to grow and succeed in business environments. Exposure to relevant academic experiences and relationships will enhance the employability skills of the researchers. Further, Companies will be able to develop skilled human resources by training and supporting the next generation of researchers. Thus, their chances of thriving in the modern competitive market through innovation and knowledge exchange with university and research institutions will increase manifolds.

Guidelines for Ph.D. Program for Industry/ Working Professionals

Essential Qualifications:

Broad Discipline	Eligibility criteria
Engineering/ Technology	1. Bachelor's / Master's in Engineering/Technology in relevant discipline or equivalent** degree with: a) More than 05 years and less than 10 years work experience* CGPA of 7.0 on a 10-point scale or 70% marks 'OR' b) More than 10 years and less than 15 years work experience* CGPA of 6.5 on a 10-point scale or 65% marks 'OR' c) More than 15 years work experience* CGPA of 6.0 on a 10-point scale or 60 % marks
	2. Credentials of the company/ organization of the working professional applying for the program shall be assessed on the basis of following mandatory criteria: a) The reputation of the companies (private or government or PSU's), Research Organizations, Ministries of Central and State Governments or Union Territories or Recognized Research Institutes or Public Sector Undertaking or Semi-Govt. or Autonomous or Statutory organisations/ institutions or Registered Companies or industrial research and development organisations excluding academic institutions. b) With standing commitment to the exemplary standard namely, ISO/CMM or similar standard of respective areas mandatory for any enterprise/ company/ industry/firm. c) The candidate must have the working experience at least continuous 02 years in the respective organization/institution at the time of application along with the work experience indicated in Point (1) above. d) A research proposal approved by the prospective supervisor must be submitted by the candidate at the time of the application

**Work experience may include position in multiple organization(s), such candidate shall be working on industry oriented research problems.*

*** Equivalence of degree will be decided by the University.*

**** For candidate applying with higher degree under this category of IWP, the eligibility as per point no. 5 Admission Eligibility.*

i. **For all the broad disciplines:**

a) The candidate must meet the minimum eligibility criteria to be shortlisted for interview. In the absence of conversion of CGPA to percentage of marks (or vice versa) mentioned in the transcripts then the conversion formula of DTU will be applicable.

b) Candidates need to provide a 'NO OBJECTION' certificate issued from their company, stating it has no issues with the candidate pursuing Ph.D. under the proposed scheme "Ph.D. Program for Industry/Working Professionals".

ii. **Desirable Qualifications:**

Candidates having proven research capability and active participation record in devising/ designing, product development, planning, executing, analysing, quality control, innovating, training, technical books/research paper publications/ IPR/patents etc.

5. ADMISSION ELIGIBILITY

Academic Department	Disciplines Offered	Discipline Specific Eligibility Criteria
Applied Chemistry	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.
	Chemical Engineering	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. OR 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.

Academic Department	Disciplines Offered	Discipline Specific Eligibility Criteria
Applied Physics	Physics	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. 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.
	Engineering Physics	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. OR Bachelor's degree in Engineering/Technology/Sciences in relevant discipline or equivalent with a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.
Applied Mathematics	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.
	Mathematics and Computing	**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** OR 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 NOTE: Entrance Exam will be 30% in Mathematics Domain and 70% in Computing Domain
Biotechnology	Biotechnology	Master's degree in Engineering/Technology/Sciences 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 relevant to Life Sciences with a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.
Civil Engineering	Civil 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.
Computer Science & Engineering	Computer Science and Engineering	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 OR 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

Academic Department	Disciplines Offered	Discipline Specific Eligibility Criteria
		OR 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
Delhi School of Management	Management	Master's degree in Engineering / Technology / Sciences / Management/ Humanities/Commerce and Social Sciences 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.
Electrical Engineering	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.
	COE-EVRT	
Electronics & Communication Engineering	Electronics and Communication Engineering	Bachelor's degree in Engineering/Technology and Master's degree in Engineering/Technology in in ECE/ Electrical and Electronics Engineering/ EE/ CSE/ SE/ IT /M & C or equivalent with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU OR Bachelor's degree in Engineering/Technology in ECE/ Electrical and Electronics Engineering/ EE/ CSE/ SE/ IT /M & C or equivalent with a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.
Environmental Engineering	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
Humanities	English	Master's degree in English or relevant branch or equivalent with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU.
	Economics	Master's degree in Economics or relevant branch 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	Information Technology	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 OR 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 OR 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.
Mechanical Engineering	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.
Software Engineering	Software Engineering Computer Science	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 OR 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 OR 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

Academic Department	Disciplines Offered	Discipline Specific Eligibility Criteria
USME	Management	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. 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.
	Economics	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 CGPAas determined by the 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.
	Innovation, Entrepreneurship & Venture Development	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 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.
Design	Design	Master's degree in Design or equivalent with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU.
Centre of Excellence for the Science of Happiness	Science for Happiness	Master's degree in Engineering/Technology/ Science/Management/ Social Science /Arts/Humanities/ Psychology /Medicine and other behavioral Sciences and allied relevant disciplines or equivalent, with minimum 55% marks in aggregate or equivalent CGPA as determined by DTU OR Bachelor's degree in Engineering/Technology or equivalent with a minimum 75% marks in aggregate or equivalent CGPA and having proven research capability.
Multidisciplinary Centre for Geoinformatics (MCG)	Geoinformatics	Master's Degree in Engineering/ Technology or equivalent in any branch/discipline with a minimum 55% marks in aggregate or equivalent CGPA as determined by DTU OR Master's degree in Computer Applications/Sciences or equivalent in any branch/discipline 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
Vinod Dham Centre of Excellence for Semiconductors and Microelectronics (VDCoE4SM)	Semiconductors and Microelectronics	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 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.

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 PwD/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 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 entrance 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 entrance 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 entrance 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. It will be given a weightage of 70% in result preparation.

   The mode of examination shall be Computer Based Test at DTU Campus. The entrance test syllabus shall consist of 50% of research methodology, and, 50% shall be the subject specific. This is with reference to the UGC regulations, 2022 issued through Gazette notification dated 7th November, 2022.

   The Departmental Research Committee (DRC) of the respective department shall conduct the Interview and presentation which will be given weightage of 30%. The final selection will be recommended by University level committee after combining the 70% weightage to the Entrance test and 30% weightage to the performance in the interview/viva voce for all department.

2. (i) Entrance Test shall be waived only for UGC/CSIR/DST/DBT/ICMR/ IARI-JRF full time fellowship holders, GATE/CEED/NET qualified students, 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/ Industry working professional.

   (ii) Entrance Test shall be waived for the UGC-NET candidates (having valid NET Score released by NTA) for the following three categories:

Category-1	Admission to Ph.D. with JRF and appointment as Assistant Professor
Category-2	Admission to Ph.D. without JRF and appointment as Assistant Professor
Category-3	Admission to Ph.D. programme only and not for the award of JRF or appointment as Assistant Professor

   NET score shall be used for admission of Ph.D. programme. For students who qualify in categories 2 and 3, 70% weightage will be given for test scores and 30% weightage for the interview. The Ph.D. admission will be based on the combined merit of NET marks and the marks obtained in the interview/viva voce.

3. Moreover, Vice Chancellor may accord exemption from entrance 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.
4. Students with JRF will also be exempted from the entrance test for admission in Part Time Ph.D. programme without fellowship.
5. All the shortlisted candidates on the basis of entrance test are required to come along with 7 to 8 slides of 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 2024-25 is tabulated below.

S. No.	Category	Seats reserved	Relaxation in Essential Qualification
1	Schduled 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.

2. 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

3. 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. programme August 2024, all candidates need to register and fill the application ONLINE only by accessing www.dtu.ac.in from May 20, 2024 to June 24, 2024. 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 interview.

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. 1500/- for all categories 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 Chemistry, Chemical Engineering and Polymer Technology. The department runs four year course of B. Tech Chemical Engineering and post graduate course in Chemistry and Polymer Technology. 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 and M.Sc. Physics. 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. Theoretical Condensed Matter Physics, Density Functional Theory, Heusler alloys based materials for Spintronics and energy application, Topological insulators and Low dimensional Systems. 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, CNTFET and Graphene FET Devices, CNTFET based Biosensors and Solar energy materials.

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 an undergraduate programme with an intake of about

120. The post graduate Programmes are offered in Hydraulics and Water Resource and Engineering, 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.

6. Department of Computer Science and Engineering

The Department of Computer Science and Engineering endeavours to provide the thrill of a corporate and R&D environment with a planned focus on industrially relevant projects and technology incubation. The department has been offering two M.Tech level programs in Computer Science and Engineering and Artificial Intelligence. The department has elite faculties from premier Institutes. 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, Machine Learning Research Lab, Internet of Things Lab and many others. The department offers Doctoral (Ph.D) degree programs in diverse recent areas and a large number of problems have been taken up in those collaborations (like Samsung Research Lab etc.) with industries. The department has successfully fetched projects for National and International organizations.

Research Areas: Machine Learning, Artificial Intelligence, High Performance Computing, Mobile Computing, Soft Computing, Optimisation techniques, Parallel Computing, Cloud Computing, Internet of Things, Wireless Sensor Networks, Quantum Computing, BlockChain, Nature Inspired Optimisation, Virtual and Augmented Reality, Web Technology, Image Processing, Evolutionary Computing, Big Data, Computer Vision, Steganography, Network Security, Information Security, Software Defined Networks, Software Engineering.

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 MBA, MBA (Executive) and post- doctoral programs. It focuses on developing a strong research foundation to support the right attitude knowledge dissemination and training young minds to have a meaningful impact. It also includes outcome-based teaching, eloquent learning and exploring the contemporary areas 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, Corporate Restructuring, Knowledge Management, International Business and Trade, Supply Chain Management and Operations Management.

8. 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.

9. Department of Electrical Engineering

The goal of the department is to provide quality education at undergraduate and post graduate 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 300 and 60 students in the B.Tech programmes in Electrical 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. 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. The department is establishing a new Centre of Excellence for Electrical Vehicle and Related Technologies (COE for EVRT) which is funded jointly by Govt. of NCT of Delhi and Delhi Technological University.

Research Areas: Power system optimization, AI Techniques, Modelling & 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, Analog Signal processing (Linear and Non linear), Power system & control, System Engineering, Power System Analysis, Power electronics, Renewable energy, HVDC, Power systems restructuring, AI in Electricity market forecasting, Wind energy forecasting, Embedded system, Information security, Design of power supply, Electric traction systems, Energy conversion, IOT enabled electrical system, Charging infrastructure for EVs, Battery management system (BMS), Electric drives & control, EV retrofitting.

10. Department of Electronics and Communication Engineering

The vision of the department is to foster education, innovation and research in the frontline areas of Electronics and Communication Engineering for the sustainable growth of nation and service to the mankind. The department offers UG and PG programmes with annual intake of 240 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. The Department also has active MoUs with academic institutions, research labs and the industrial sector to ensure that the students and faculty can get ample opportunities to work on real-world problems in collaboration through these MoUs.

Research Areas: VLSI Design, Semiconductor Devices Computer Vision, Pattern Recognition, Object Tracking, Image Processing, Machine learning, Artificial Intelligence 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.

11. 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.

12. 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 21st Century. Besides giving them in-depth understanding of the labour market in which they are expected to work as well as of 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. More than 20 research students are registered in the Department for Ph.D. programme.

Research Areas:

a) Economics: Women Education and Inclusive Growth, Banking and finance, International Trade and other areas of economics.

b) English: Contemporary Fiction, Cultural Studies, Diaspora Studies, Post-modern literature.

13. Department of Information Technology

The Department of Information Technology (IT) endeavors to provide the thrill of a corporate R&D environment with a planned focus on industrially relevant subjects, projects and technology incubation. The department offers an undergraduate (B. Tech.) course in Information Technology with an intake of 180 students every year. To meet the growing demands of present day technologies, the department has

started M.Tech. degree in Information Systems in 2009-10 with an intake of 25. The curriculum of the department is designed in a way so as to provide the students with fundamental concepts and learning tools related to outcome based studies. The designed courses mainly emphasize on all basic core subjects such as data structure, operating systems, computer architecture and design, software development, networking, multimedia and graphics, analog and digital communications and computer communications, compiler design, theory of computation, etc. The department is also imparted a specialized subject knowledge on analysis and design of Information system, Information security systems, mobile computing, Internet of Things, cloud computing & security, soft computing, artificial intelligence, digital signal processing, computer vision and expert systems and web engineering. The department has developed the various state-of-the-art laboratories in the fields of Information Technology such as Computer Networks Lab, Web Engineering Lab, Programming Lab, Information and Security Lab, Biometric Research Lab, and many others.

Research Areas: Pattern Recognition, Computer Vision, Soft computing, Biometric security system, Neural Networks/ Deep learning, Fuzzy-Neural Networks, Natural Language Processing, Optimizations Techniques, Computer Vision, Big data Analytics Web Mining Internet Technologies, Data Mining Social Networks, Social Media Mining, Social Computing, Human behaviour, Multimedia Systems Human Computer Interaction (HCI), Image processing, Human Action and Activity Recognition, Sentiment Analysis, Spam Analysis, Fake News Analysis, Rumour Detection, Evolutionary Computing, Wireless Ad-hoc & Sensor Networks, Internet of Things (IoT), Software Defined Networking (SDN), Network Security, Information Security, Mobile Security, Internet of Robotics Things (IoRT), Cyber Physical System Security, Flying Ad-hoc Network (FANET) Security, Distributed Computing, Pattern Mining and Digital Forensics, Blockchain Technology, Recommendation Systems, Affective Computing, Autonomous Vehicles, etc.

14. Department of Mechanical Engineering

The Department of Mechanical Engineering alsooffers undergraduate and Postgraduate courses with specialization in

a) Thermal Engineering
b) Production Engineering.
c) Industrial Engineering and Management
d) Computer Aided Analysis and Design
e) Energy Systems and Management

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, ladino, 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 Me chanics, 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.

15. Department of Software Engineering

The Department of Software Engineering is dedicated to produce high quality graduates and skilled software engineers/professionals who can develop high quality and cost-effective software systems.

The Discipline of Software Engineering was introduced in the year 2009. The Department is currently running a B.Tech program in Software Engineering with an intake of 180, two M.Tech programs in Software Engineering and Data Science and offers Ph.D. in the Discipline of Computer Science and Software Engineering. All the software engineering programs are well designed keeping in view the industry demands. The programs are designed to build the analytical and practical capabilities of students in the design and development of the software and lays emphasis on following well defined and systematic approach for meeting the growing demands and requirements of the software industry. The department has state of art labs consistent with industrial standards which provide a hands-on experience to the students.

Research Areas: Empirical software engineering, machine learning, software quality and testing, search based software engineering, web engineering, opinion mining, social web, predictive modeling, machine learning and Deep learning for mobile healthcare, telemedicine, internet of things, cryptography.

16. USME

USME (University School of Management and Entrepreneurship) The Vision of the USME is to develop and nurture the spirit of management leadership andentrepreneurship 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: MBA, MBA- Business Analytics, MBA-Family Businessand Entrepreneurship, MBA- Innovation Entrepreneurship and Venture Development, BA(H) Economics and BBA.

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.

17. Centre of Excellence for the Science of Happiness

The basic aim of this centre of excellence is to develop high standard of research in the area of happiness, mediation and value education with the main objective of stimulating the existing ecosystem of body, mind and energy with more general social objectives, corporate strategy-culture seamless integration or regional development to enhance happiness with scientific touch and ancient wisdom. This centre offers various Foundation elective and value added courses. This Centre also conducts various student and staff

development programs. This centre is aligned with the new educational policy 2020 with the objective of holistic development of individuals.

Research Areas: Ethics and Human values, Neuro Psychology, Science of Happiness, Positive Psychology, Sustainable Development, Emotional Intelligence, Yoga and wellbeing, Meditation and stress management, Traditional Practices and consciousness, Leadership Mastery.

18. Multidisciplinary Centre for Geoinformatics

Delhi Technological University has established a "Multidisciplinary Centre for Geoinformatics" with a view to promote different location-based technologies falling under the umbrella of Geospatial Science and Technologies/ Geoinformatics. The Centre currently offers a PhD and a M.Tech program in Geoinformatics. Besides, it conducts several short-term courses/workshops and undertakes research projects awarded by DST, NMHS, ISRO etc and consultancies in the field of Geospatial sciences and Technologies.

The MCG has been established with the vision to be a world class multidisciplinary center for education, research and consultancy in the field of Geospatial Science and Technologies/ Geoinformatics. The Centre aims to work in close coordination with Central / State Government Agencies and Industries in fulfilment of Government objectives, capacity building, research and consultancy.

Research Area: Glaciology, Water Resources, EO satellite-based water quality estimation, Meteorology & Climate Change, Environment, GNSS (GPS and Navic) based Water Vapour Estimation, Urban Planning Studies, Urban Biodiversity, Urban UHI and Green Spaces, Earth Sciences, Agriculture, Forest, Geohazards& Disaster Management, Geosciences, Defense, Security and Intelligence Satellite Image Analysis, Photogrammetry, Geographic Information System, AI and Machine Learning, Big data analytics 19.

Vinod Dham Centre of Excellence for Semiconductors and Microelectronics

The Vision of the Centre is to stimulate and create a robust R & D ecosystem that drives innovation, IP and start-ups in Semiconductor Technology and Microelectronics to cater to the Nation's scientific demands; and serve as a Centre of National and Strategic importance. DTU has received a research donation from its alumnus, Vinod Dham, an Indian-American engineer, entrepreneur, venture capitalist and popularly known as the "Father of Pentium Chip" with a vision to enhance the research capabilities at DTU and foster the development of human resources in the field of semiconductors in line with the India Semiconductor Mission. VDCoE4SM will focus on imparting training & research in thrust areas of Semiconductor Technology and IC Manufacturing; and will provide a platform to boost productivity, address emerging skill gaps and align training & research with industry needs in order to support Government of India's vision to build a vibrant Semiconductor and Display Ecosystem enabling India's emergence as a global hub for electronics manufacturing and design.

Research Area: The centre focuses on Semiconductor Device Modeling & Simulation- Analysis of Novel Device Structures- FinFETs, Nanowires, Tunnel FETs, HEMTs etc. for Biomedical, Wireless, Sensor and Power Applications; Novel Material based Devices (III-V Compound Semiconductor, Spintronics, Opto-electronics); Memory Devices; Quantum and AI assisted novel materials; Development of Nanoparticles (Quantum Dots) for QLEDs, Solar Cell and Sensors; 2D nanostructures; Analog/Mixed Signal and Digital VLSI Design; System Design using FPGAs.

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		2nd 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)	6500	6500	5000	5000
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	-	-
2.4	Premium amount for mediclaim of student (per-annum)	700	700	700	700
	GRAND TOTAL	**17700**	**29700**	**7700**	**13700**

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 Application for Withdrawal of admission is received
1	100%	Application for withdrawal of admission received up to 05.08.2024
2	80%	Application for withdrawal of admission received from 06.08.2024 to 12.08.2024
3	50%	Application for withdrawal of admission received from 13.08.2024 to 19.08.2024
4	NIL	Application for withdrawal of admission received after 19.08.2024

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 August 31, 2024, failing which their admission shall be cancelled.
d. Caste Certificate in the case of SC/ ST/OBC-NCL candidates issued by respective State Government as per format annexed at 2. OBC (NCL) Candidates are required to produces Caste Certificate issued after 31st March, 2024. However, if the certificate is issued prior to March 31, 2024, it must be accompanied with an additional certificate regarding the present non-creamy layer status of the candidate, issued by the same competent authority. This additional certificate must have reference of his/her already issued original caste certificate.
e. Authorised Doctor's Certificate with disability descriptions in the case of Person with Disabled (PwD) candidates as per format annexed at 3.
f. EWS Income and Asset Certificate issued by compliant authority as per Annexure-4 issued after 31st March, 2024.
g. NOC for part time candidates as per format annexed at 5.
h. Original UGC- JRF/NET/CSIR/ DAE-JEST or other fellowship award letter.
i. Project Co-ordinator's certificate in the prescribed format
j. Date of Birth Proof
k. Two passport sized recent photographs
l. Copy of Cancelled Cheque
m. Copy of Adhaar Card

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.
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 statues and regulations in force.
6. The list of the shortlisted candidates for entrance test, interview and finally selected for admissions to Ph.D. programme will be displayed on the DTU website: 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 University 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 their area of research work.

ANNEXURE-1

Vacant Seats for full time Ph.D. programme with University Scholarship for the Session: August 2024					
S. No.	Name of the Department	Discipline Offered by the Departments	Code of the Department	Tentative total available Seats with DTU Fellowship	UGC/CSIR-NET JRF/Part Time/ Without DTU Fellowship
1	Applied Chemistry	1. Chemistry	AC	3	Seats are available subject to the availability of slots with prospective supervisors
		2. Chemical Engineering		1	
2	Applied Physics	1. Physics	AP	11	
		2. Engineering Physics		2	
3	Applied Mathematics	1. Mathematics	AM	2	
		2. Mathematics and Computing		1	
4	Biotechnology	1. Biotechnology	BT	2	
5	Design	1. Design	DS	1	
6	Delhi School of Management	1. Management	DSM	2	
7	Civil Engineering	1. Civil Engineering	CE	9	
8	Computer Science and Engineering	1. Computer Science and Engineering	CSE	12	
9	Electronics & Communication Engineering	1. Electronics and Communication Engineering	ECE	21	
10	Electrical Engineering	1. Electrical Engineering	EE	18	
		2. COE-EVRT		2	
11	Environmental Engineering	1. Environmental Engineering	ENE	2	
12	Mechanical Engineering	1. Mechanical Engineering	ME	23	
13	Information Technology	1. Information Technology	IT	10	
14	Software Engineering	1. Software Engineering	SWE	5	
		2. Computer Science		2	
15	Humanities	1. Economics	HUM	0	
16	USME	1. Management	USME	1	
		2. Economics		1	
		3. Entrepreneurship Innovation & Venture Development		1	
17	MCG	Geoinformatics	MCG	2	
18	CESH	Science of Happiness		0	
19	VDCOE4SM	Semiconductor and Microelectronics		3	
	Total:			137	

* Non availability of suitable candidate in the discipline of the Department(s), the seat may be converted in other discipline of the Department.

Note:

1. Reservation Policy: OBC-27%, SC- 15%, ST-7.5%, EWS-10%, PWD: 5% Horizontal
2. This is tentative seat allocation. It may vary as per availability of seats in various departments. University reserves the right to allot a supervisor to the selected candidate in respective Departments.

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/1st 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.)

Government of.....

(Name & Address of the authority issuing the certificate)

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.

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

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

iv. Resolution No. 12011/96/94-BCC dated 9/03/96.

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

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

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

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

ix. 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.

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

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

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

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

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

xv. 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 / Ist Class Stipendiary Magistrate / Sub-Divisional magistrate / Taluka Magistrate / Executive Magistrate / Extra Assistant Commissioner (not below the rank of Ist Class Stipendiary Magistrate).

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

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

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

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: _____

Contact No.: _____

Email ID _____

ANNEXURE-3

Person with Disability Sub-Category

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

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

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

Certificate for Person with Disability

To be issued by Medical Board from Government Hospital

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

Father's Name:_____

Permanent Address:_____

Percentage loss of earning capacity (in words): _____

_____

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

Name of the disease-causing handicap: _____

Whether handicap is temporary or permanent: _____

Whether handicap is progressive or non-progressive: _____

The candidate is FIT / UNFIT to pursue further studies.

(*Strike out whichever is not applicable)

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

Date: _____

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 & 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.

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

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

INCOME 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.

ANNEXURE-5

NO OBJECTION CERTIFICATE

(Required from candidates seeking admission in Ph.D. on Part-Time Basis)
(On the Organization Letter Head)

The undersigned is pleased to permit Mr./Ms._____ who is working in this organization for the last_____years and is presently holding the rank/position of_____ for pursuing the Ph.D. programme at Delhi Technological University, Delhi with specialization in the following areas:

1._____ 2._____

To the best of my knowledge and belief Mr./Ms._____bears a good moral character.

If selected for admission, the candidate will be permitted and be granted leave of absence to be present at the Delhi Technological University as required by the academic schedule to attend classes/ research work. He/She will continue to remain in service of this organization for the entire duration of the course.

This organization has standing commitment to the exemplary standards namely ISO/CMM or similar standard of respective area (required for candidates from industry).

Signature of Head of the
Institution/Organization with seal

Place:_____

Date:_____

Name_____

Designation _____

Email ID: _____

ANNEXURE-6

DELHI TECHNOLOGICAL UNIVERSITY

(Formerly Delhi College of Engineering)

Shahbad Daulatpur, Main Bawana Road, Delhi – 110042

UNDERTAKING

Ph.D. Admission (August 2024)

I, Mr./Ms. _____ S/D/O or W/o_____

hereby undertake that on being selected in Ph.D. Full Time/Part Time/Sponsored course by Department of_____ at Delhi Technological University. I will produce following document on or before 31/08/2024: -

S. No.	Type of Document	Date of issue
1.		
2.		
3.		
4.		
5.		

In case of non-submission of the above said documents/certificate my admission will be treated as cancelled and I will not claim for re-admission.

(Signature of Candidate)

Name: _____

Registration No.: _____

Address: _____

Contact No.: _____

Verified by: _____

(Ph.D. Coordinator/Dy. Coordinator)

ANNEXURE-7

DELHI TECHNOLOGICAL UNIVERSITY

(Formerly Delhi College of Engineering)

Shahbad Daulatpur, Main Bawana Road, Delhi – 110042

UNDERTAKING

Name of the Department : _____

Year of Admission : _____

Type of Fellowship : _____

I _____ hereby undertake that in the event of leaving Ph.D/not completing Ph.D due to any exigency/medical reason/personal reason, I shall be liable to return full amount of fellowship & contingency to be disbursed to me from the date of admission to the date of withdrawal.

Name : _____

Roll No.: _____

Contact No.: _____

Email ID: _____

Signature of Candidate

Parents/Guardian Signature

Name: _____

Phone No.: _____

Syllabus for
Screening Test
for

Ph.D.
ADMISSIONS

Session
August, 2024

Research Methodology (Common for All)

UNIT 1 - Introduction to Research: The concept of research, characteristics of good research, Application of Research, Meaning and sources of Research problem, characteristics of good Research problem, Research process, outcomes, application of Research, Meaning and types of Research hypothesis, Importance of Review of Literature, Organizing the Review of Literature. Types of Research: Types of research, pure (basic, fundamental) and applied research, qualitative and quantitative.

UNIT 2 - Research Design: Meaning, need, types of research design – Exploratory, Descriptive, Casual research Design, Components of research design, and Features of good Research design. Experiments, surveys and case study Research design. Sampling, Data Collection and analysis: Types and sources of data – Primary and secondary, Methods of collecting data, Concept of sampling and sampling methods – sampling frame, sample, characteristics of good sample, simple random sampling, purposive sampling, convenience sampling, snowball sampling, classification and tabulation of data, graphical representation of data, graphs and charts – Histograms, frequency polygon and frequency curves, bell shaped curve and its properties.

UNIT 3 - Statistical Methods for Data Analysis: Applications of Statistics in Research, measures of central tendency and dispersion, Descriptive statistics, Probability functions, Correlation & regression analysis, Statistical inference.

UNIT 4 - Research Report: Research report and its structure, journal articles – Components of journal article. Explanation of various components. Structure of an abstract and keywords. Thesis and dissertations: components of thesis and dissertations. Referencing styles and bibliography. Ethics in Research - Plagiarism - Definition, different forms, consequences, unintentional plagiarism, copyright infringement, collaborative work. Qualities of good Researcher.

UNIT 5 - ICT Tools for Research: Role of computers in research, maintenance of data using software such as Mendeley, Endnote, Tabulation and graphical presentation of research data and software tools. Web search: Introduction to Internet, use of Internet and WWW, using search engines and advanced search tools.

1. Department of Applied Chemistry

Discipline: Chemistry

Chemical periodicity, structure and bonding, concepts of acids, bases and non-aqueous solvents, main, transition and inner-transition groupelements andtheir 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 energybalance,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.

2. Department of Applied Physics

Discipline: 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 ADMISSION BROCHURE Ph.D. (Session August, 2024) 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, 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.

Discipline: Engineering Physics

Section 1: Engineering Mathematics

Linear Algebra: Vector space, basis, linear dependence and independence, matrix algebra, eigenvalues and eigenvectors, rank, solution of linear equations- existence and uniqueness.

Calculus: Mean value theorems, theorems of integral calculus, evaluation of definite and improper integrals, partial derivatives, maxima and minima, multiple integrals, line, surface and volume integrals, Taylor series.

Differential Equations: First order equations (linear and nonlinear), higher order linear differential equations, Cauchy's and Euler's equations, methods of solution using variation of parameters, complementary function and particular integral, partial differential equations, variable separable method, initial and boundary value problems.

Vector Analysis: Vectors in plane and space, vector operations, gradient, divergence and curl, Gauss's, Green's and Stokes' theorems.

Complex Variables: Analytic functions, Cauchy's integral theorem, Cauchy's integral formula, sequences, series, convergence tests, Taylor and Laurent series, residue theorem.

Section 2: Computational Physics

Roots of Non-linear Equation: Roots of equations, Bisection method, Regula Falsi Method or Method of False position, Secant, Newton-Raphson method, Convergence of these methods.

Interpolation: Finite differences and difference operators, Interpolation with equally spaced data points: Newton's forward and backward formulae for interpolation, Central difference: Gauss forward, Gauss Backward, Stirling, Bessels, Everett's formula for interpolation, Interpolation with unequally data points: Divided differences and their property, Newton Divided differences formula.

Integration: Newton-cotes integration formulae, trapezoidal method, Simpson's 1/3-rule, Simpson's 3/8-rule, Boole's and Weddle's Rule.

Numerical solution of ordinary differential equations: Taylor's series method, Picard's method of successive approximation methods, Euler's method, modified Euler's method, Runge-Kutta method, solution of second order and simultaneous differential equations, Application of optimization and variational methods to problem of interest in applied physics.

Section 3: 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 Quantum states of an electron in an atom; Spectra of one-and many-electron atoms; spin-orbit interactions; fine and hyperfine structures; Zeeman and Stark effects; Electronic, rotational and vibrational spectra of diatomic molecules.

Section 4: Engineering Materials

Classification of Materials, Nature of bonding in Materials, Defects in Crystalline Materials, Mechanical, Structural, Electronic, Thermal, Optical Properties and various Applications of Materials.

Section 5: Synthesis and Characterization of Materials

Top down and bottom-up synthesis approach, physical and chemical techniques for material synthesis (sol-gel, hydrothermal etc.), X-Ray Diffraction, Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy, Photoluminescence Spectroscopy and other spectroscopic techniques.

Section 6: Electronic Devices and Circuits

Semiconductors, 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 7: Communication systems

Random processes: autocorrelation and power spectral density, properties of white noise, filtering of random signals through LTI systems.

Analog communications: amplitude modulation and demodulation, angle modulation and demodulation, spectra of AM and FM, superheterodyne receivers.

Information theory: entropy, mutual information and channel capacity theorem.

Digital communications: PCM, DPCM, digital modulation schemes (ASK, PSK, FSK, QAM), bandwidth, inter-symbol interference, MAP, ML detection, matched filter receiver, SNR and BER.

Section 8: 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, Rectangular and circular waveguides, light propagation in optical fibers, dipole and monopole antennas, linear antenna arrays.

3. Department of Applied Mathematics

DISCIPLINE : MATHEMATICS

Differential & Integral calculus Vector calculus Algebra (Linear & Abstract) Differential equations (ODE & PDE) Laplace & Fourier transforms, Fourier series. Probability, statistics & operations research Numerical methods, Special functions Real and complex analysis

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.

4. Department of Civil Engineering

DISCIPLINE : CIVIL ENGINEERING

Section - 1: Civil Engineering (General)

Engineering Surveying, Basic principles of surveying, types and classification of survey, surveying equipment, levelling, Maps and Map making, Indian Map series. Engineering Mechanics, Basic terminology, Units and dimensions, Force, Torque, Friction, Laws of mechanics Free body diagram, solid mechanics. Construction Materials, Types and characteristics of different types of construction materials to include Steel, Concrete, Wood, Stone, Brick/Masonry etc, requirements of good construction materials. Transportation and Highway Engineering – Types and classification of roads, IRC, road construction and materials, road construction equipment. Project Management, Basic terms in project management, , CPM/PERT, critical path, float/slack, quality control, risk management, resource scheduling and management, project management software.

Section - 2 : Mathematics

Linear Algebra - Vector calculus; matrices; similarity transformations, diagonalization, Cayley-Hamilton Theorem, Hermitian, skew Hermitian, unitary matrices, eigenvalues and eigenvectors; linear differential equations: second order linear differential equations; Partial differential equations, Laplace transform, Fourier series & analysis; Tensors. Numerical Analysis – Numerical Analysis - Numerical solution of algebraic equations using Gauss elimination and Gauss-Siedel methods, numerical solution of ordinary differential equations using Picard, Euler method. Interpolation. Statistics and Probability - mean, mode, median and standard deviation, Probability space, conditional probability, Baye's theorem, various types of distributions, uniform, binomial, poisson, normal and exponential distribution.

Section - 3 : Hydraulics and Water Resource Engineering

Fluid Mechanics: Properties of fluids, fluid statics; Continuity, momentum, and energy equations and their applications; Potential flow, Laminar, and turbulent flow; Flow in pipes, pipe networks; Concept of boundary layer and its growth; Concept of lift and drag. Open Channel Flow and Hydraulic Machines: Introduction of open channel flow, energy depth relationship, uniform flow, gradually varied flow, water surface profiles, and its computations, rapidly varied flow and its computations, spatially varied flow, unsteady flows, hydraulics of mobile bed channels, Fluid machinery; Turbines, pumps and hydro-electric power systems. Water Resources Engineering: Hydrologic cycle and its components, hydrograph analysis, flood estimation, and routing, surface runoff models, hydrological modelling, groundwater hydrology - steady state well hydraulics and aquifers; Application of Darcy's Law, Crop water requirements - Duty, delta, Diversion headworks, canal falls, Regulators modules, Design and construction of gravity dams, Theories of seepage and design of weirs, barrages and dams, spillways, energy dissipators.

Section - 4 : Structural Engineering

Mechanics of Material: Bending moment and shear force in statically determinate beams; Simple stress and strain relationships; Theories of failures; Simple bending theory, flexural and shear stresses, shear centre; Uniform torsion, buckling of column, combined and direct bending stresses. Structural Analysis: Statically determinate and indeterminate structures by force/ energy methods; Method of superposition; Analysis of trusses, arches, beams, cables and frames; Displacement methods: Slope deflection and moment distribution methods; Influence lines;

Stiffness and flexibility methods of structural analysis. Concrete Structures: Working stress, Limit state and ultimate load design concepts; Design of beams, slabs, columns, footing, staircase; Pre-stressed concrete.

Steel Structures: Working stress and Limit state design concepts; Design of tension and compression members, beams and beam-columns, column bases; Connections – simple and eccentric, beam-column connections, plate girders and trusses; Plastic analysis of beams and frames. Prestressed Concrete: Pre-stressing systems and end anchorages, losses of pre-stress. Analysis and design of members for flexure, shear, bond and bearings, Cable layouts, Design of Pre-stressed Bridges. Structural Dynamics: Free and Forced vibration analysis of Single and Multi degree of freedom systems. Orthogonality relationships of principal modes, Earthquake forces, nature and magnitude, pseudo-static method of approximate evaluation of earthquake forces, seismicity, Earthquake Motion and Response, Response Spectra, Philosophy of Capacity Design. Concepts of seismic design: Earthquake resistant design, construction & detailing for RCC and Masonry structures and relevant codes such as IS 1893:2002, IS 13920, IS:4326 etc.

Section - 5 : Geotechnical Engineering

Soil Mechanics and Geotechnical Engineering- Nature of soil, soil formation and soil type, soil properties, basic definitions, phase relations, index properties, basic concepts of clay minerals and soil structure, soil classification and identification, hydraulic conductivity, seepage, compaction, stress distribution, shear strength, Mohr's circle of stress, Mohr-Coulomb failure theory, shear strength parameters, compressibility and consolidation, soil exploration, shallow foundations, settlements of footings and rafts, pile foundations.Geotechnical Earthquake Engineering - Engineering seismology, seismic risks and hazards, social and economic consequences, nature and attenuation of earthquake magnitude, ground motion, site characteristics, dynamic behavior of soils, liquefaction and cyclic mobility, seismic response of soil structure system, mitigation techniques. Rock Mechanics - Problems of rock mechanics, rock exploration, Griffith's theory, Coulomb's theory, in-situ tests on rock mass, mechanical, thermal and electrical properties of rock mass, pressure tunnels, lined and unlined tunnels, foundation on rocks, slope stability, rock bolt anchors and grouting, problems associated with tunnels, tunnelling in various subsoil conditions and rocks. Uncertainties, Risk and Reliability in Geotechnical Engineering - Risk, randomness, uncertainty, measures of reliability, modeling of uncertainty, probability, tests of goodness-of-fit (chi-square test, Kolmogorov-Smirnov test), reliability methods, deterministic and probabilistic approaches, Monte Carlo simulation and applications, risk assessment. Ground Improvement Techniques - Mechanical modification, precompression, sand drains, soil stabilisation, chemical modifications and grouting, hydraulic modification, ground modification by soil reinforcement, difficult soils.

5. Department of Computer Science and Engineering/ Department of Information Technology / Department of Software 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 prepositional 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.

6. 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.

7. Department of Design

1. Visualization and Spatial ability
2. Environmental and Social Awareness
3. Analytical and Logical Reasoning
4. Language and Creativity
5. Observation and Design Sensitivity

8. 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 and 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, Magneto motive 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, Electron mechanical 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.

9. Department of Electronics and Communication Engineering

Networks, Signals and Systems

Network Analysis: Node and mesh Analysis, superposition, Thevenin's theorem and Norton's theorem, maximum power transfer, Steady state sinusoidal analysis: phasors; Time and frequency domain analysis of linear circuits; Solution of network equations using Laplace transform; Frequency domain analysis of RLC circuits.

Continuous-Time Signals: Fourier series and Fourier transform, sampling theorem and applications.

Discrete-Time Signals: 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.

Image Processing

Image Transforms: Unitary transorms, Sine, Cosine, Hadamard transform, KL transform, Short term Fourier transform, Wavelet transform, DWT.

Image Enhancement Techniques- Histogram Modelling, Spatial operations, transforms operations.

Segmentation Techniques- Thresholding based, cluster analysis, region growing.

Morphological Operation- Dilation, Erosion. Histogram and Histogram equalization.

Electronic Devices

Energy bands in intrinsic and extrinsic semi-conductors, equilibrium carrier concentration, direct and indirect band gap semi-conductors.

Carier 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.

Analog Circuits

Small signal equivalent circuits of diodes, BJTs and MOSFETs: Simple diode circuits; clipping, clamping and rectifiers.

BJT and MOSFET amplifiers: biasing, bias stability, mid frequency small signal analysis and frequency response; of BJT and MOSFET amplifiers; multi-stage, differential, feedback, power and operational; Simple op-amp circuits.

Digital Circuits:

Logic gates and their static CMOS implementations, arithmetic circuits, code converters, multiplexes, decoders, encoders.

Sequential circuits; latches and flip-flops, counters, shift-registers.

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; Bade and root-locus plots; Lag, lead and lag-lead compensation; State variable model and solution of state equation of LTI systems.

Communications

Probability and Statistics: Mean, mode, median and standard deviation, distribution function, density function, conditional probability, Baye's theorem, uniform, bionomial, Poisson, normal and exponential distribution, Gaussian distribution function, movements, centralized moments, characteristic functions.

Random Process: 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.

Digital Communications: PCM, DPCM, digital modulation schemes ASK, PSK, FSK, QAM) intersymbol interference, MAP and ML detection, matched filter receiver, SNR and BER.

Fundamentals of error detection and correction, information, mutual, entropy, channel capacity theorem.

Electromagnetics

Maxwell's Equations: differential and integral forms and their interpretation, boundary conditions, wave equation

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, Rectangular and circular wave guides, dipole and monopole antennas. Enhancement techniques- Spatial domain-relationship between pixels- basic grey level transformations, Histogram processing, smoothing spatial filters, sharpening spatial filters.

Frequency Domain- smoothing frequency domain filters-sharping frequency domain filters, homographic filtering.

Segmentation Techniques- Thresholding based, cluster analysis, region growing.

Morphological Operation- Dilation, Erosion. Histogram and Histogram equalization. Feature Extraction Techniques. Image restoration-Weiner filter, Image reconstruction-radon transform and inverse radon transform.

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, encoders, PALs 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; Bade and root-locus plots; Lag, lead and lag-lead compensation; State variable model and solution of state equation of LTI systems.

Communications

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, Gram Schmidt orthogonalization procedure, 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 detection and correction, Single parity code, 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, Modal Analysis of a step index fiber, Attenuation and dispersion in optical fibers, Optical sources and detectors, Optical Amplifiers, Optical link design.

10. 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.

11. Department of Humanities

The Following Syllabus is common for :

DISCIPLINE : Humanities (Economics)

DISCIPLINE : USME (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.

12. Department of Mechanical Engineering (25% from each section)

Section 1: Applied Mechanics and Design

Engineering Mechanics: Free-body diagrams and equilibrium; friction and its applications including rolling friction, belt-pulley, brakes, clutches, screw jack, wedge, vehicles, etc.; trusses and frames; virtual work; kinematics and dynamics of rigid bodies in plane motion; impulse and momentum (linear and angular) and energy formulations; Lagrange's equation.

Mechanics of Materials: Stress and strain, elastic constants, Poisson's ratio; Mohr's circle for plane stress and plane strain; thin cylinders; shear force and bending moment diagrams; bending and shear stresses; concept of shear centre; deflection of beams; torsion of circular shafts; Euler's theory of columns; energy methods; thermal stresses; strain gauges and rosettes; testing of materials with universal testing machine; testing of hardness and impact strength.

Theory of Machines: Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of linkages; cams; gears and gear trains; flywheels and governors; balancing of reciprocating and rotating masses; gyroscope.

Vibrations: Free and forced vibration of single degree of freedom systems, effect of damping; vibration isolation; resonance; critical speeds of shafts.

Machine Design: Design for static and dynamic loading; failure theories; fatigue strength and the SN diagram; principles of the design of machine elements such as bolted, riveted and welded joints; shafts, gears, rolling and sliding contact bearings, brakes and clutches, springs.

Section 2: Fluid Mechanics and Thermal Sciences

Fluid Mechanics: Fluid properties; fluid statics, forces on submerged bodies, stability of floating bodies; control-volume analysis of mass, momentum and energy; fluid acceleration; differential equations of continuity and momentum; Bernoulli's equation; dimensional analysis; viscous flow of incompressible fluids, boundary layer, elementary turbulent flow, flow through pipes, head losses in pipes, bends and fittings; basics of compressible fluid flow.

Heat-Transfer: Modes of heat transfer; one dimensional heat conduction, resistance concept and electrical analogy, heat transfer through fins; unsteady heat conduction, lumped parameter system, Heisler's charts; thermal boundary layer, dimensionless parameters in free and forced convective heat transfer, heat transfer correlations for flow over flat plates and through pipes, effect of turbulence; heat exchanger performance, LMTD and NTU methods; radiative heat transfer, Stefan-Boltzmann law, Wien's displacement law, black and grey surfaces, view factors, radiation network analysis

Thermodynamics: Thermodynamic systems and processes; properties of pure substances, behavior of ideal and real gases; zeroth and first laws of thermodynamics, calculation of work and heat in various processes; second law of thermodynamics; thermodynamic property charts and tables, availability and irreversibility; thermodynamic relations.

Applications: Power Engineering: Air and gas compressors; vapour and gas power cycles, concepts of regeneration and reheat. I.C. Engines: Air-standard Otto, Diesel and dual cycles. Refrigeration and air-conditioning: Vapour and gas refrigeration and heat pump

cycles; properties of moist air, psychrometric chart, basic psychrometric processes. Turbomachinery: Impulse and reaction principles, velocity diagrams, Pelton-wheel, Francis and Kaplan turbines; steam and gas turbines.

Section 3: Materials and Manufacturing

Engineering Materials: Structure and properties of engineering materials, phase diagrams, heat treatment, stress-strain diagrams for engineering materials.

Casting, Forming and Joining Processes: Different types of castings, design of patterns, moulds and cores; solidification and cooling; riser and gating design. Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk (forging, rolling, extrusion, drawing) and sheet (shearing, deep drawing, bending) metal forming processes; principles of powder metallurgy. Principles of welding, brazing, soldering and adhesive bonding.

Machining and Machine Tool Operations: Mechanics of machining; basic machine tools; single and multi-point cutting tools, tool geometry and materials, tool life and wear; economics of machining; principles of non-traditional machining processes; principles of work holding, jigs and fixtures; abrasive machining processes; NC/CNC machines and CNC programming.

Section 4: Industrial Engineering

Metrology and Inspection: Limits, fits and tolerances; linear and angular measurements; comparators; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly; concepts of coordinate-measuring machine (CMM).

Computer Integrated Manufacturing: Basic concepts of CAD/CAM and their integration tools; additive manufacturing. Robotics and Mechatronics.

Production Planning and Control: Forecasting models, aggregate production planning, scheduling, materials requirement planning; lean manufacturing.

Inventory Control: Deterministic models; safety stock inventory control systems.

Operations Research: Linear programming, simplex method, transportation, assignment, network flow models, simple queuing models, PERT and CPM.

13. 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.

14. Centre of Excellence for the Science of Happiness

Science and practice of happiness, Measurement of Happiness and well being, Happiness at work and daily living, consumer happiness, building resilience, Gross National Happiness, Traditional knowledge and Values, Theories of emotions, Happiness and prosperity, Harmony in family and society, Human values, Science and art behind meditation, Power of Self discipline, Peaceful conversation, Brain and heart connection, Healing from the heart, Managing with heart.

15. Multidisciplinary Centre for Geoinformatics (MCG)

Geomatics Engineering, Remote Sensing, Advance Surveying/GPS/GNSS, GIS, Web GIS, Linear Algebra, Numerical Analysis, Statistics & Probability, Geography, Geology, Earth Sciences, Cartography & Maps, Land Surveying, Engineering Surveying, Aerial Photogrammetry, Digital Image & Signal Processing, Radiometric and Geometric Correction, Image Enhancement & Transformation, Optics, Electromagnetics, Programming, Digital Logic Design, Computer Network, Web Technologies, DBMS, Basics of Artificial Neural Networks. Detailed syllabus can be viewed on the website.

16. Vinod Dham Centre of Excellence for Semiconductors and Microelectronics (VDCoE4SM)

Discipline: Semiconductors and Microelectronics

Section 1: Computational Physics

Roots of equations, Bisection method, Regula Falsi Method, Secant, Newton-Raphson method, Convergence, Interpolation: Finite differences and difference operators, Interpolation with equally spaced data points: Newton's forward and backward formulae for interpolation, Central difference: Gauss forward, Gauss Backward, Stirling, Bessels, Everett's formula for interpolation, Numerical solution of ordinary differential equations: Taylor's series method, Picard's method of successive approximation methods, Euler's method, modified Euler's method, Runge-Kutta method, solution of second order and simultaneous differential equations, binomial, poisson, normal and exponential distribution, Application of optimization and variational methods to problem of interest in semiconductors and microelectronics.

Section 2: Semiconductor Device Physics

Fermi energy, density of states function, quantum tunneling, potential inside a semiconductor, semiconductor in Equilibrium, Carrier transport phenomena and models, PN junction, metal semiconductor and hetero junctions, Shallow and deep levels, Carrier statistics, Carrier transport, Carrier mobility, Scattering mechanisms, Hall effect measurements, High field property, Non-equilibrium conditions, Quasi Fermi levels, Recombination processes, Current density and continuity equations, Surface recombination, Surface states, Excitons in semiconductors, Diffusion capacitance, Generation-recombination currents, Junction breakdown mechanisms. Heterojunctions: Band alignments, energy band diagrams of heterojunctions, formation of two dimensional electron gas; Metal-semiconductor contacts: Schottky barrier diode, Fermi level pinning, C-V characteristics of a Schottky diode, Current transport processes and I-V characteristics, Ohmic contacts.

Section 3: 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.

Section 4: Electronic Devices

Energy bands in intrinsic and extrinsic silicon; Carrier transport; diffusion current, drift current, mobility and resistivity; Poisson and continuity equations; device structure and

characteristics: P-N junction, Zener diode, BJT, MOSFET, LEDs, LASERs, Semiconductor Photodetectors, Solar Cells, PIN photodiode, APDs; Integrated circuit fabrication process: epitaxy, clean room, oxidation, diffusion, ion implantation, photolithography, assembly techniques, packaging and twin-tub CMOS process.

Section 5: Analog System Design

Diode Applications: Clipping, clamping, rectifiers and regulators; transistor biasing, bias stability; BJT and MOSFET amplifiers: mid frequency small signal analysis and frequency response, cascode, multi-stage, differential, feedback, power and operational amplifiers; Simple op-amp circuits; Active filters; Sinusoidal oscillators; criterion for oscillation, op-amp configurations; Current Mirror, Voltage and Current references, Comparators, Sample and Hold circuits, Nyquist rate ADCs and DACs; Function generators, wave-shaping circuits and 555 timers; Power supplies.

Section 6: Digital System Design

Number systems; Combinatorial circuits; Boolean algebra, minimization of functions using Boolean identities and Karnaugh map, logic gates, arithmetic circuits, code converters, multiplexes, decoders, encoders, PALs and PLAs; Sequential circuits; latches and flip-flops, counters, shift-registers and finite state machines; Semiconductor memories; ROM, SRAM, DRAM, Introduction to RTL, DTL, TTL, Schottky TTL, IIL and ECL logic family, concept of Noise margin, fan out and propagation delay, 16-bit microprocessor (8086); architecture, programming, memory and I/O interfacing.

Section 7: VLSI System Design

Static and dynamic characteristics of CMOS inverters, delay estimation, logical efforts and transistor sizing, power dissipation, interconnect, combinational CMOS logic circuits, complex logic circuits, behavior of MOS logic elements, SR latch circuit, clocked latch and flip-flop circuits, CMOS D-latch and edge-triggered flip-flop, pass transistor and Transmission gate logic, Stick diagram and Layout, VLSI Design Flow: Full custom and Semi Custom, Verilog/VHDL, FPGA architecture, Verification, and Testing, AC Model of MOS, MOS resistors, CMOS Fabrication process flow, layout design rules, full custom mask layout design.

17. Department of Biotechnology

Molecules and their Interaction Relevant to Biology: Structure and functions of biomolecules; Carbohydrates; Fatty acids; Lipids; Amino acids; Proteins; Nucleic acids – DNA, mRNA, tRNA, rRNA; Hormones; Vitamins; Enzymes; Bioenergetics; Cell metabolism; Protein-protein and protein- DNA interactions

Cellular Organization: Cell theory; Cell as basic unit of life; Hierarchy of cell organization; Structure and organization of prokaryotic and eukaryotic cells; Structure and function of cell organelles; cell cycle; Bio-membranes; Cytoskeletal elements; Chromosome structure; Karyotype; Chromatin organization

Fundamental Processes: Photosynthesis; Cellular respiration; Movement through cell membrane; Nutrition; Blood clotting; Human physiological systems; Replication; Transcription; Translation; DNA repair mechanisms; Plant physiology; Bacterial growth; Microbial genetics, Secondary metabolites

Cell Communication and Cell Signaling: Tight adherents and communicating cell junctions; Cell adhesion molecules; Cadherins and Integrins; Extracellular matrix; Cell cycle; Basics of cancer; Basics of cell signaling; Major signaling pathways.

Developmental Biology: Stages of development; Mechanism of differentiation; Germ layers; Potency; Morphogenetic movements; Early and late development in model organisms; Cell division; Gametogenesis and fertilization in animals and flowering plants; Embryology; Seed germination; Dormancy; Evolution and natural selection; Mendel's law of heredity; Evidence of DNA as genetic information carrier; Hardy-Weinberg law; Extra-chromosomal inheritance; Sex- linked inheritance in humans; Mutations

Plant and Animal Biotechnology: Plant tissue culture techniques; Totipotency; Organogenesis and Somatic embryogenesis; Suspension culture; Protoplast isolation and somatic hybridization; Production of secondary metabolites; Basic techniques in animal cell and organ culture; Bioreactors for large scale culture of animal cells; Stem cells; Transgenic plants and animals

Immunology and Immunotechnology: Immunity; Antigen; Structure of antibody; Hapten; Antigen-antibody interaction, Introduction to antigen presentation; Role of

MHC; Complement system; Bacterial diseases of humans; Types of vaccines; Immunization; Recombinant vaccines.

Inheritance Biology: Mendelian's principles, Extensions of Mendelian principles, Gene mapping methods, Extra chromosomal inheritance, Human genetics, Mutations, Structural and numerical alterations of chromosomes.

Diversity of Life Forms: General characteristics of life forms; General characteristics of bacteria, fungi, algae, Microbial growth curve; plant and animal viruses; Classification of plant and animal kingdom

Ecological Principles and Environmental Biology: Ecosystem; Ecological relationships; Habitat and niche; Ecology of ecosystems; Air, water, and soil pollution; Greenhouse effect and global warming; Noise pollution; Pollution abatement; Wastewater treatment; Disposal of solid wastes; Biogeochemical cycles of elements; Bioremediation; Bioleaching; Biopesticides; Biofertilizers

Evolution and Behaviour: Evolution and natural selection; Mendel's law of heredity; Evidences of DNA as genetic information carrier; Hardy-Weinberg law; Extra-chromosomal inheritance; Sex-linked inheritance in humans; Mutations.

Applied Biology: Basics of fermentation technology; Microbes in industry; Biosensors; Biofuels; Principles of gene cloning; Methods of gene transfer; Application of biology in agriculture, health, industry, and environment sectors.

Assay techniques in Biology: Basics of Centrifugation; Electrophoresis; Chromatography; Microscopy; UV- Visible spectrophotometry; Radiotracer technique; PCR; DNA sequencing; Southern blotting; Tests of significance; Analysis of variation; Correlation and regression; Hybridoma technology; Basic techniques in bioinformatics

Bioinformatics and Computational Biology: Sequence and Structural Databases (NCBI, GenBank, EMBL, DDBJ, PDB); SNP databases; Visualization tools- Pymol, VMD; Functional Annotation; Local and Global Alignment; Phylogenetics; Pharmacogenomics; Machine learning

Diagnostic techniques: X-Rays, CT scan, MRI, Pathology test, ECG, EEG

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