

**INDIAN INSTITUTE OF TECHNOLOGY (BANARAS HINDU UNIVERSITY)
VARANASI – 221 005**

**Information Brochure for Admission to Ph.D. Programmes for Even Semester of the
Academic Session 2019-20**

The Ph.D. programmes of the Indian Institute of Technology (Banaras Hindu University), Varanasi are aimed at training manpower with sound theoretical and experimental background in frontier areas of research in the engineering, sciences and interdisciplinary subjects. The emphasis is on understanding the scientific basis and engineering principles involved in solving problems of practical importance in the relevant field using multidisciplinary approach. An important component of these programmes is to inculcate the habit of independent thinking and initiative by the candidates in planning and execution of the research work. These programmes seek to train manpower of the highest quality to cater to the needs of industry, R & D organizations and educational institutions.

The Institute has ten Engineering three Science and a Humanistic Studies Departments and three Interdisciplinary Schools which offer Ph.D. programmes in the respective disciplines. Joint registrations for Ph.D. programme involving more than one department/ school are encouraged to promote multi-disciplinary research.

Duly filled-in on-line applications on the prescribed form on our website are invited for admission to Ph.D. programmes for registration in Even semester of session 2019-20 in various disciplines as given in **Annexure-I** and **II**. Candidates whose qualifying examination results are not declared at the time of written test / interview may also be considered. In case such candidates are selected, their admission will be provisional subject to the condition that they produce proof of completing all the examinations including the project/thesis examination and the viva voce before the date of registration. Such candidates are required to produce the evidence of their having passed the qualifying degree examination with the minimum marks/grades for eligibility by the last date for document submission as mentioned in the academic calendar (usually about 8 weeks from the date of registration), failing which their admission shall be cancelled.

All forms mentioned in this document are made available on the admission portal. Please use the links provided in the instructions given therein.

1. Ph.D. Programmes

A candidate may apply for any of the four categories of registration subject to the fulfillment of requirements, minimum qualification (1.A.1) and eligibility criteria (**Table 1A, Annexure-I**)

1.A.1 Minimum Qualification:

Ph.D. in Engineering

- a) Applicants with master's degree in engineering in the discipline concerned or in an allied discipline/ area must have a minimum of 60% marks or 6.0 CPI (on a 10.0 point scale) at the master's degree level.
- b) Applicants with bachelor's degree in engineering in the discipline concerned or in an allied discipline/area must have a minimum of 75% marks or 7.5 CPI (on a 10.0 point scale) at the bachelor's degree level. Applicant with more than two years of professional experience, the minimum requirement shall be 70% marks or 7.0 CPI (on 10 point scale) at bachelor degree provide the degree is from an Institution funded by the Central Government.
- c) Applicants with master's degree in science as an allied discipline/area (where science is an allied discipline/area), must satisfy each of the following criteria:
 - (i) A minimum of 65% marks or 6.5 CPI (on a 10.0 point scale) at the master's degree level,
 - (ii) A minimum of 60% marks or 6.0 CPI (on a 10.0 point scale) at the bachelor's degree level.

Ph.D. in Pharmacy

- a) Applicants with master's degree in pharmacy or in an allied discipline/area must have a minimum of 60% marks or 6.0 CPI (on a 10.0 point scale) at the master's degree level.
- b) Applicants with bachelor's degree in pharmacy must have a minimum of 75% marks or 7.5 CPI (on a 10.0 point scale) at the bachelor's degree level. Applicant with more than two years of professional experience, the minimum requirement shall be 70% marks or 7.0 CPI (on 10 point scale) at bachelor degree provide the degree is from an Institution funded by the Central Government.

Ph.D. in Sciences

- a) Applicants with master's degree in science in the discipline concerned or in an allied discipline/area must have a minimum of 60% marks or 6.0 CPI (on a 10.0 point scale) at the master's degree level.
- b) Applicants with four year bachelor's degree in Science in the discipline concerned or in an allied discipline/area must have a minimum of 75% marks or 7.5 CPI (on a 10.0 point scale) at the bachelor's degree level. Applicant with more than two years of professional experience, the minimum requirement shall be 70% marks or 7.0 CPI (on 10 point scale) at bachelor degree provide the degree is from an Institution funded by the Central Government.

Ph.D. in Humanistic Studies

- a) Applicants with Master's degree in relevant subject or allied subjects with a minimum CPI of 6.00 on a 10.0 point scale (or 60% marks) in the qualifying degree.
- b) Applicants with Master's degree in Science or allied subjects with a minimum CPI of 6.00 on a 10.0 point scale (or 60% marks) in the qualifying degree.
- c) Applicants with Bachelor's degree in Engineering or Sciences (4-Year program) with a minimum CPI of 7.50 on a 10.0 point scale (or 75% marks) in the bachelor degree. Applicant with more than two years of professional experience, the minimum requirement shall be 70% marks or 7.0 CPI (on 10 point scale) at bachelor degree provide the degree is from an Institution funded by the Central Government.

Interdisciplinary Programmes

a) Ph.D. in Systems Engineering

Applicants with a bachelor's and master's degree in any branch of Engineering must have a minimum of 60% marks or 6.0 CPI (on a 10.0 point scale) at the master's degree level.

Applicants with bachelor's degree in any branch of engineering must have a minimum of 75% marks or 7.5 CPI (on a 10.0 point scale) at the bachelor's degree level. Applicant with more than two years of professional experience, the minimum requirement shall be 70% marks or 7.0 CPI (on 10 point scale) at bachelor degree provide the degree is from an Institution funded by the Central Government.

b) Ph.D. in Industrial Management

Applicants with bachelor's degree in any branch of engineering and master's degree in any branch of engineering/ management must have a minimum of 60% or 6.0 CPI (on a 10.0 point scale) at the master's degree level.

Applicants with bachelor's degree in any branch of engineering must have a minimum of 75% marks or 7.5 CPI (on a 10.0 point scale) at the bachelor's degree level. Applicant with more than two years of professional experience, the minimum requirement shall be 70% marks or 7.0 CPI (on 10 point scale) at bachelor degree provide the degree is from an Institution funded by the Central Government.

c) Ph.D. in Bio-chemical Engineering/Bio-medical Engineering/Materials Science and Technology

Applicants with master's degree in the discipline concerned or in an allied discipline must have a minimum of 60% or 6.0 CPI (on a 10.0 point scale) at the master's degree level.

Applicants with bachelor's degree in the discipline concerned or in an allied discipline must have a minimum of 75% marks or 7.5 CPI (on a 10.0 point scale) at the bachelor's degree level. Applicant with more than two years of professional experience, the minimum requirement shall be 70% marks or 7.0 CPI (on 10 point scale) at bachelor degree provide the degree is from an Institution funded by the Central Government.

A. Admission of Candidates having National-level Scholarships

There is a provision for admission to Ph.D. programmes for candidates who fulfill the eligibility criteria for the respective programmes and also have qualified in any of the national level JRF/SRF tests conducted by UGC, CSIR, Department of Biotechnology, Indian Council of Medical Research or DST-INSPIRE fellowship or Dr. K.S. Krishnan Fellowship of DAE, etc.

Applicants must have requisite qualification with minimum marks/CPI (see **Sec. 1.A.1 and Table 1A Annexure-I**). Such candidates may be offered admission after an interview as and when they apply in Departments/Schools where they are eligible. They will be recommended by DPGC to register for the programme at the next available semester. Such candidates who are applying for admission in response to this advertisement for the current session will go through similar process of selection as above.

B. Full Time External Registration category

A candidate working in an external R&D organization or in an industry recognized by the Institute (the list of recognized external R&D organizations and industries is given in **Annexure – II**), which is equipped with necessary research and library facilities can also apply for admission to Ph.D. programmes, provided he/she satisfies the eligibility criteria laid down for the programme concerned (see **Sec. 1.A.1 and Table 1A Annexure-I**). Such a candidate must show satisfactory performance in the interview, must be sponsored by his/her employer and must have been in employment with the sponsoring organization for at least two years at the time of admission.

The employer must undertake to pay full salary to the candidate and relieve him/her from the duty to enable the candidate to stay on the campus and to complete the course work requirements. This is not a requirement for candidates who are working in organizations located within a distance of 50 km from the Institute. Further, the requirement of earning credits through course work shall be waived off by SPGC on the recommendation of DPGC provided the candidate has M.Tech./M.Pharm. as qualifying degree from an IIT.

The candidate should submit a certificate (See Form IV of the Application Form) obtained from his/her organization that the research facilities of his/her organization would be made available to him/her for carrying out research. He/she should also provide the bio-data of the prospective supervisor along with his/her consent, who would be supervising the candidate's work at his/her organization.

[N.B. Letter of appointment and Form – 16 for two years of service is required from the employer at the time of interview.]

In addition, an R&D organization/industry or a research area in the specific organization may be recognised by the Institute as per the following procedure. On the recommendation of the DPGC, the SPGC will constitute a committee to assess and approve an R & D organization/ industry for admission of sponsored candidates to carry out Ph.D. research in a specified area. The committee may, upon inspection, also approve all the areas in which R & D activities are going on in that organization.

An application for admission from a candidate working in the approved organization will be considered only if he/she wishes to work in the approved area.

C. Full Time Sponsored Registration Category

A candidate who is sponsored by a teaching institution or by an R&D organization or by an industry can also apply for admission to Ph.D. programmes, provided he/she satisfies the eligibility criteria laid down

for the programme concerned (see **Sec. 1.A.1 and Table 1A Annexure-I**). He/she must have been in service of the sponsoring institution/organization for at least two years at the time of admission. The sponsoring organization must specifically undertake to provide full salary to the candidate and to relieve him/her to pursue the programme for its full duration (**See Form I of the Application Form**). Such candidates have to complete the requirements of the programme by staying on-campus for the full duration of the programme.

[N.B. Letter of appointment and Form – 16 issued by the employer for two years of service is required at the time of written test / interview. In addition, the candidate must submit an undertaking that he/she will continue to submit Form – 16 for the subsequent years till he/she completes the programme.]

D. Part-time Registration Category

The Institute offers part-time Ph.D. programmes for permanent staff and faculty members of the Institute as well as research assistants/JRFs/SRFs working in an externally funded research project running in the Institute, provided they satisfy the eligibility criteria laid down for the programme concerned (see **Sec. 1.A.1 and Table 1A Annexure-I**). Such a candidate should submit a no-objection certificate from the Head of the Department/Coordinator of School/Principal Investigator as the case may be (See Form I & II of the Application Form) as applicable. They will be required to attend to normal duties assigned to them by the Department/School/ the Principal Investigator of the research project.

The Institute offers part time Ph.D. Programme also to a professionally employed person, who pursues the programme while continuing the duties of his/her service provided the sponsoring institution/organization is located within a distance of 50 km from the Institute and engaged in broad areas of Ph.D. Programme applied. He/she must be a regular employee of the sponsoring organization/institution for at least two year. No objection certificate from the Head of the Institution /organization must be enclosed with the application. The candidate must satisfy the eligibility criteria laid down for the programme concerned (see **Sec. 1.A.1 and Table 1A Annexure-I**).

[N.B.: Letter of appointment and Form 16 issued by the employer for two years of service is required at the time of written test/interview. In addition, the candidate must submit an undertaking that he/she shall continue to submit Form 16 for the subsequent years till he/she completes the programme]

2. SELECTION CRITERIA

Admission to Ph.D. Programme

1. Admission will be based on interview of the candidates shortlisted by the Department/School concerned.
2. The following category of applicants shall be exempted from appearing in the written test:
 - a) Full Time External Registration Category
 - b) Sponsored Registration Category
 - c) Part-time Registration Category
 - d) Candidates having National Level Scholarships
3. Upon approval of Chairman, Senate, the Head of the Department/Coordinator of the School concerned will issue admission letters to the candidates who will be required to accept the offer of admission by depositing the prescribed fee before a specified date.
4. In case a candidate does not accept the offer by paying the prescribed fee by the specified date, the offer of admission will stand withdrawn, and the admission will be offered to the candidates in the waiting list, if any, in order of merit.
5. Number of seat for Ph.D. admission will be decided by concern Department/School.

Note: 1. Mere fulfillment of eligibility criteria does not guarantee admission in a programme. The candidates' performance in the interview should be at the levels expected for the respective programmes.

2. Further details on Ph.D. programme is available on the official website www.iitbhu.ac.in.
 3. The hostel facility may not be provided to the students registered in even semester of the academic session 2019-20.
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Annexure-I

Table 1A : Departments/Schools/Disciplines and Allied Disciplines for Ph.D. Programmes.

Most of the Bachelor's and Master's degrees that are being awarded in the disciplines in the country and abroad are listed in the following. However, a candidate possessing degree(s) that do not exactly conform to the degree(s) listed below may be considered for admission, based on the performance in interview and provided that the interview / admission committee (DPGC), upon scrutiny of the list of courses done and credits earned by the candidate, finds that the degree concerned is at par with those listed below.

Departments/ Schools offering the Programme	Discipline	Allied Disciplines
Department of Ceramic Engineering	Ceramic Engineering	Bachelor's / Master's degree in any branch of Engineering. Master's degree in Chemistry/Applied Chemistry/Physics/ Applied Physics/Geology or Geophysics (with Mathematics as a subject at Bachelor's Degree level). Master's degree in Modern Medicine / Indian Medicine (for the areas related to Bioceramics). Preference would be given to candidates with B.Tech./M.Tech. in Ceramic Engineering/with some background of ceramics.
Department of Chemical Engineering & Technology	Chemical Engineering	Bachelor's/Master's degree in any branch of Engineering/Technology with Mathematics at Senior Secondary (Plus 2)/Intermediate level. Master's degree in Chemistry/Biochemistry/Environmental Science/ Biotechnology/Industrial Chemistry with Mathematics at Senior Secondary (Plus 2)/Intermediate level.

Departments/ Schools offering the Programme	Discipline	Allied Disciplines
Department of Civil Engineering	Civil Engineering	<p>M.Sc.(Engg.)/M.E./M.Tech. degree in Applied Mechanics, Mining Engineering, Chemical Engineering, Chemical Engineering and Technology, Chemical Technology, Mechanical Engineering, Aerospace Engineering, Naval Engineering, Industrial Engineering, Agricultural Engineering.</p> <p>M.Sc.(Engg.)/M.E./M.Tech. in Geoinformatics, Geomatics, Remote Sensing, Remote Sensing and GIS.</p> <p>M.E./M.Tech. in Computer Science and Engineering, Computer Engineering.</p> <p>B.Sc.(Engg.)/B.E./B.Tech./M.Sc.(Engg.)/M.E./M.Tech. or equivalent degree in Environmental Engineering, Environmental Science and Engineering, Environmental Science and Technology.</p> <p>M.Sc./M.Tech. in Geophysics, Geology.</p>
Department of Computer Science & Engineering	Computer Science & Engineering	B.Tech./B.E./M.Tech./M.E. degree in Computer Technology/ Information Technology/ Electronics Engineering/ Electronics and Communication Engineering/All related subjects of Computer Engineering at M.Tech. level/ M.Tech. in Mathematics & Computing.
Department of Electrical Engineering	Electrical Engineering	B.Tech. & M.Tech. in Electronics Engineering.
Department of Electrical Engineering	Systems Engineering	Bachelor's and Master's Degree in any Branch of Engineering or Bachelor's Degree in any Branch of Engineering.
Department of Electronics Engineering	Electronics Engineering	<p>Master's degree in any of the following areas:</p> <p>Digital Communication Systems, Information and Coding Theory, Telecom Networks, Mobile and Wireless Communication Systems, Digital Systems and Microprocessors, Digital Signal and Image Processing, Computer Vision and Robotics, Signal and Systems Theory, Control Systems, Fuzzy Logic, Neural Networks and their applications, Power Electronics, Microelectronics and VLSI Systems, Semiconductor Device Modelling and Simulation, Solid State Devices, Organic Electronics, Transparent Semiconductors and Photovoltaics, Sensors and Pattern Recognition, Electronic Instrumentation and Virtual Instrumentation, Electromagnetics, RF Engineering and Microwaves, Antennas, Optoelectronics and Optical Communication, Photonic Networks and Systems, Information Technology.</p>
Department of Humanistic	Humanities and Social Sciences	Master's/Bachelor's degree in any Engineering discipline;

Departments/ Schools offering the Programme	Discipline	Allied Disciplines
Studies		Master's degree in any Science discipline; 4-year – Bachelor's Science degree.
Department of Mechanical Engineering	Mechanical Engineering	Bachelor's degree in Production Engineering and Master's degree in any discipline/ area relevant to Mechanical Engineering.
Department of Mechanical Engineering	Industrial Management	Bachelor's degree in any branch of Engineering and Master's degree in any branch of Engineering/Management.
Department of Metallurgical Engineering	Metallurgical Engineering	Bachelor's / Master's degree in Mechanical / Chemical / Production Engg./Manufacturing Engg./Mineral Engg./ Ceramic Engg. Master's degree in Materials Science / Engg./ Technology Master's degree in Physical Sciences (Solid State Physics)/Chemical Sciences (Inorganic / Physical Chemistry/Industrial Chemistry)/ Biological Sciences/Geology with Mathematics as a subject at Bachelor's level.
Department of Mining Engineering	Mining Engineering	Master's degree in Geology/Geophysics/Geohydrology Mathematics/ Petroleum Geosciences /Chemistry/ Environmental Science/Materials Science/Botany/ Zoology/Polymer Science/Computer Science Master's degree in Chemical Engg. / Environmental Engg. /Civil Engg./Industrial Engg./Mechanical Engg./Electrical Engg./Computer Engg./Electronics Engg./Polymer Engg. or Technology/ Ceramic Engg./Materials Engg./Information Technology
Department of Pharmaceutical Engineering and Technology	Pharmacy	MS/M.Pharm./M.Tech. in Pharmacy/Pharmaceutical Sciences/ Pharmaceutical Engineering/Pharmaceutical Technology/ Pharmaceutical Biotechnology/ Bioinformatics/ Biochemical Engineering/ Biomedical Engineering with graduation in Pharmacy (B.Pharm./B.Tech.).
Department of Physics	Physics	M.Sc./M.Tech. in Applied Physics, Engineering Physics, Bio-Physics, Electronics Engg., Materials Science, Ceramic Engg., Metallurgical Engg., Electrical Engg., Bio-Informatics, Geomatics and Geoinformatics, Computer Science, Computer Engg., Mechanical Engg., Mathematics, Chemistry, Remote Sensing, Astrophysics, Space Physics, Applied Optics, Atmospheric Physics, Fibre Optics & Photonics.
Department of Chemistry	Chemistry	M.Sc./M.Tech. in Chemistry/ Industrial Chemistry/ Applied Chemistry/ Biochemistry/ Biotechnology/Medicinal Chemistry/

Departments/ Schools offering the Programme	Discipline	Allied Disciplines
		Materials Science & Technology/Environmental Science and Nano Technology with chemistry as a subject at Bachelor Level.
Department of Mathematical Sciences	Mathematical Sciences	Master's degree in Statistics/ Computer Science/ Computer Engineering, with Mathematics as a subject at Bachelor's level. Bachelor's degree (B.Tech./B.E.) in Mathematics and Computing/ Computer Engineering/Computer Science.
School of Biochemical Engineering	Biochemical Engineering	Master's degree in Biochemistry / Biotechnology/Microbiology/ Environmental Science. Bachelor's/Master's Degree in Biochemical Engg./ Food Technology/Pharmacy/Chemical Engineering/Biotechnology
School of Biomedical Engineering	Biomedical Engineering	B.Tech./M.Tech. degree in Bioengineering/Electrical Engg./ Electronics Engg./Instrumentation Engg./Mechanical Engg./ Computer Engg./Materials Science & Technology/ Chemical Engg./ Bio-technology/ Nanotechnology. M.Sc./M.Tech./Engineering in Pharmacy. M.Sc./M.Tech. in Statistics, Mathematics. M.Sc. degree in Physics/Chemistry/Polymer Sciences/ Biochemistry/ Life Sciences.
School of Materials Science & Technology	Materials Science & Technology	Master's degree in Chemical Sciences, Materials Science and Physical Sciences. Bachelor's / Master's degree in Ceramic/ Chemical/ Civil/ Electrical/ Electronics/ Mechanical / Metallurgical/ Polymer Engineering/ Plastic Technology/ Materials Technology/ Nanotechnology. Master's degree in Dentistry/ Orthopedics/ E.N.T./ Rasa Shastra.

Table 1B : Discipline-wise Research Areas for Ph.D. Programmes.

The discipline-wise the Research Areas in the Ph.D. programmes for the session 2019-20 are listed below.

Disciplines	Research Areas
Ceramic Engineering	Bio-Ceramics, Ceramic/Metal/Polymer matrix composites, Electro Ceramics, Glass and Glass Ceramics, Refractories, Advanced Ceramics, Nano Technology, Cement & Concrete Technology, Energy Materials.
Chemical Engineering	To be announced at the time of Interview
Civil Engineering	Structural Engineering; Hydraulics and Water Resources Engineering; Environmental Engineering; Geotechnical Engineering; Transportation Engineering; Geo-informatics; Gology.
Computer Science & Engineering	Social Network Analysis, HPC, Machine Vision, Natural Language Processing, Information Extraction, Data Mining, Image Processing, Pattern Recognition.
Electrical Engineering	Electrical machines & Drives; Power Electronics; Control Systems; Power Systems
Systems Engineering	Systems Engineering
Electronics Engineering	Microwave Engineering; Digital Techniques and Instrumentation; Microelectronics, Communication System Engineering
Humanities and Social Sciences	<ul style="list-style-type: none"> a) English b) Philosophy (Indian and Western Logic, Peace and Ahimsa Studies, Gandhian Philosophy, Value Education, Humanistic Philosophy) c) Computational Linguistics (MT, CALL, Computational Semantics, Grammar Formalism, Sanskrit Computation Linguistics) d) Psychology (Intelligence, Indigenous Research, Macro Organizational Behaviour) e) Sociology (Environmental Sociology, Sustainable Urbanization, Smart Cities)
Mechanical Engineering	<ul style="list-style-type: none"> a) Machine Design: Fracture behavior of fibre composite through thickness, Mechanical behavior of biocomposites; Composites, Impact and failure mechanisms, Computational Fracture Mechanics, Transient Dynamics; Nuclear graphite and Fracture Characterization; Biomechanics, Cardiovascular stent design; Tiobology; Fracture Mechanics; Composite Materials such metal matrix composite, hybrid composite and nano composite for the mechanical and tribological applications; Fatigue wear modeling, contact modeling and its relevance to wear, Reliability of MEMS Devices. b) Production Engg.: Additive manufacturing, unconventional manufacturing, Incremental Forming & Manufacturing, Metal firming, Manufacturing automation using: CAD/CAM/CAE/CE/Reverse Engg.; Tool wear condition monitoring; Materials aspect of Triobology, Composite Materials and Laser Surface Texturing; Weld metal

Disciplines	Research Areas
	<p>characteristics, Thermal effects on weld metal properties, stress removal in casting.</p> <p>c) Thermal and Fluid: Thermal behavior of Fibre Composite Materials; Solar Thermal, Alternate Fuel, Hybrid System; Engine Simulation; Multi-phase flows related to Molten Metal-Gas interaction, Hydro and Gas cyclones, Droplet/Bubble dynamics; Atomization – Pressure assisted, Electrohydrodynamic; Aerosol generation and measurement; Particle Image Velocimetry; Heat and Mass Transfer Analysis of Grains during fluidized bed drying for achieving energy economy and higher quality; Influence of Climate Change for the Specification of Design Wind Speed of Engineering Structure, Gasification based Polygeneration Cycle of Biomass for Hydrogen Production; Numerical and Experimental analysis of pulverized coal and biomass combustion.</p>
Industrial Management	Operations Management, SCM, Production System
Metallurgical Engineering	Microstructural, Structural and Chemical Characterization; Mechanical Behavior, Deformation Processing and Failure Analysis; Phase Equilibria and Phase Transformation; Non-Equilibrium Processing of Advanced Materials; Ultra-Fine Grained and Nano-Structured Material; Metallurgical and E-Waste Utilization; Design and Development of Advanced Steels; Tribology and Surface Engineering; Thermodynamics and Kinetics of Metallurgical Processes; Advanced Structural and Functional Materials.
Mining Engineering	To be announced at the time of Interview
Pharmacy	Pharmaceutics, Pharmaceutical Chemistry, Pharmacology , Pharmacognosy.
Physics	Solar & Space Plasma Physics, Condensed Matter Physics (Theory), Quantum Information, Condensed Matter Physics (Experiment) & Materials Science (Experiment), Biophysics, Photonics (Theory and Experiment), Remote Sensing.
Chemistry	Synthetic Chemistry, Environmental Chemistry, Surface Chemistry, Computational Chemistry.
Mathematical Sciences	Harmonic Analysis, Differential Geometry, Numerical Wavelet methods for partial differential equations, Numerical Analysis of PDEs, Mathematical Image Processing, Stochastic Modeling (Queuing Theory), Integral Equations, Numerical Analysis, Optimization, Fluid Dynamics, Biomechanics, Non-Linear Waves, Graph Theory and Network Science, Rings and Modules, Mathematical Modeling and Porous Media, Soft Computing, Fuzzy Sets, Algebraic Numerical Techniques, Mathematical Modeling on heat Transfer Problem.
Biochemical Engineering	To be announced at the time of Interview
Biomedical Engineering	Physiology; Electrophysiology & Neuro Biology; Polymer in Medicine; Bioinstrumentation, Biomedical Signal & Image Processing; Modeling of Biological System, Biological Control System Analysis; Biomechanics;

Disciplines	Research Areas
	Tissue Engineering & Micro fluidics; Molecular Biology, Biochemistry, Biotechnology & Nano Medicine; Optical Nanomaterial, Biosensing, Image Theuranostics.
Materials Science & Technology	M.Sc./B.Tech./M.Tech. Degree in Materials Science/Physics/Chemistry/ Polymer Science/ Materials Science & Technology/ Polymer Engineering & Technology/Nanoscience and Nanotechnology/Biotechnology.

**LIST OF R & D ORGANIZATIONS RECOGNIZED BY THE INSTITUTE
FOR EXTERNAL REGISTRATION**

1. All R & D Laboratories/Institutions of CSIR, DAE, DOS, DRDO, DST and Ministry of Telecommunication & Information Technology.
2. Bharat Heavy Electricals Limited (BHEL), Research and Development Laboratories.
3. Central Indian Pharmacopoeia Laboratory, Ghaziabad.
4. Central Mine Planning and Design Institute Limited, Ranchi.
5. Central Power Research Institute, Bangalore.
6. Central Pulp and Paper Research Institute, Saharanpur.
7. Diesel Locomotive Works (DLW), Varanasi
8. Hindustan Aeronautics Limited, Lucknow & Korwa.
9. Hindustan Machine Tools (R & D Division), Bangalore.
10. Indian Bureau of Mines, Nagpur.
11. Jyoti Limited, Baroda.
12. Kirloskar Electric Limited, Bangalore.
13. Mechanical Engineering Research and Development Organization, Pune.
14. National Institute of Rock Mechanics, Kolar.
15. National Council for Cement and Building Materials (NCCBM), New Delhi.
16. Raman Research Institute, Bangalore.
17. Tata Steel, Jamshedpur.
18. National Metallurgical Laboratory Extension Centre, Chennai.