

# Information Brochure

## Admission to Ph.D. Programs

January 2023



**Visvesvaraya National Institute of  
Technology, Nagpur**

## 1. Programs offered by the Institute.

Cat.	For	Departments
1.	Candidates (Non-sponsored) with Teaching Assistantship	<b>Engineering</b> : Civil, Mechanical, Electrical, Electronics and Communication, Computer Science, Chemical, Metallurgical & Materials, Mining , Applied Mechanics, VLSI & Nanotechnology <b>Architecture &amp; Planning</b> <b>Sciences:</b> Physics, Chemistry Mathematics, Social Sciences and Humanities. Inter disciplinary areas of research (Under Inter-Disciplinary BoS)
2.	VNIT's M.Tech. Students with Teaching Assistantship	
3.	SRF / JRF / research staff of R&D projects sponsored to VNIT	
4.	Sponsored candidates (place of research work VNIT only) DST Inspire/CSIR/UGC fellowship or equivalent	
5.	Sponsored Candidate from 100% centrally funded research laboratories including public sector and private industries	

**NOTE** :1. Institute will not provide any stipend or any other financial support to Ph.D. (Full Time) sponsored candidates of Cat. 4 and Cat. 5.

2. Cat. 1 and Cat. 2 Candidates desirous of seeking admission to Ph. D. (Full Time) programs with teaching assistantship should note that the candidate's admission and eligibility for emolument shall be subjected to his signing agreement with the institute.

3. Number of seats per department may change depending on the availability of Ph.D. vacancies under the Supervisors & suitability of the candidates.

## 2. Essential requirement. (for all categories Cat. 1 to Cat. 6) excluding cat. 3, 4.

Sr. No.	Departments	Qualifying Degree	Qualified Exam in the past
1	Engineering	Post Graduate degree in Engineering/ Technology (M.E./M.Tech. or equivalent)	GATE
2	Architecture and Planning	Post Graduate Degree in Architecture and Planning (ME, M. Tech. M. Arch, M. Plan. or equivalent)	GATE/ NET
3	Sciences	Post Graduate Degree (M. Sc./M.A. or equivalent) in Basic Sciences / Humanities	NET/ GATE /GPAT DST Inspire/ CSIR/UGC fellowship or equivalent

**For other details, please see the 'Guidelines, Rules and Regulations Governing Ph.D. (Full Time) programs Jan. 2023' on VNIT website.**

### 3. Eligibility criteria.

Sr. No.	Name of the Department	Eligibility for Ph.D
1.	Applied Mechanics  Discipline: (Structural Engineering)	I) B.E. / B. Tech./ AMIE in Civil Engineering. II) ME / M.Tech in Structural Engineering/Structural Dynamics and Earthquake Engineering/Structural Engineering related specialization/ Civil Engineering/Excavation Engineering, Mining Engineering, Rock Mechanics. III) <b>Minimum first class or 6.75 CPI / CGPA on a 10 point scale at Bachelor's or Master's level.</b> IV) <b>Qualified GATE score in Civil Engg. in the past.</b>
2.	Chemical Engineering	I) BE / B. Tech. in Chemical Engineering / Chemical Technology/ Biochemical Engineering / Biotechnology/ Nanotechnology/Civil Engineering/Environmental Engg. /Mechanical Engg./Material Engineering/Energy Engineering/Polymer Engg./Plastics Engg./Pharmacy (B. Pharm). II) ME / M. Tech in Chemical Engineering / Chemical Technology/ Biochemical Engineering / Biotechnology /Nanotechnology/ Civil Engineering/Environmental Engineering/Mechanical Engineering/Material Engineering/Energy Engineering / Industrial Pollution Abatement/ Bio Process Engineering/ Mineral Processing/Food Technology/Computer Aided Chemical Engineering/ Molecular Simulations/ Computational Nanotechnology/ Polymer Engg./Plastics Engg./Pharmacy M. Pharma and Chemical Engineering related disciplines/Rural Technology III) <b>Minimum first class or 6.75 CPI / CGPA on a 10 point scale at Bachelor's or Master's level.</b> IV) <b>Qualified GATE score in the related discipline in the past.</b>
3.	Civil Engineering	I) B.E. / B.Tech / AMIE in Civil Engg. II) M E / M.Tech in any branch of Civil Engineering/ Excavation Engineering/Mining Engineering/Applied Geology/ Urban Planning/ Urban Resource Planning/ Master's in Planning(M Plan). III) <b>Minimum first class or 6.75 CPI / CGPA on a 10 point scale at Bachelor's or Master's level.</b> IV) <b>Qualified GATE score in the past.</b>
4.	Computer Science and Engineering	I) B.E. / B. Tech. / AMIE or equivalent in any branch of Engg. II) M.E./M. Tech or equivalent in one of the following branches : Computer Science/ Computer Technology/Computer Engineering/ Information Technology/ Information Science. III) <b>Minimum first class or 6.75 CPI / CGPA on a 10 point scale at Bachelor's or Master's level.</b> IV) <b>Qualified GATE score in the past.</b>

5.	Electrical Engineering	<p>I) B.E./B.Tech in Electrical Engineering / Allied branches such as Electrical &amp; Electronics, Power Engineering, Electrical &amp; Power, Energy Systems, Electronics &amp; Instrumentation, Control &amp; Instrumentation, Instrumentation.</p> <p>II) M.E/M.Tech in Electrical Engineering/ Allied Specializations Such as Power Electronics &amp; Drives, Power Electronics, Electronics, Signal Processing, Power Systems, Condition Monitoring, Energy systems, Instrumentation, Control systems, Power &amp; Control, Smart Grid, Bio-medical.</p> <p>III) <b>Minimum first class or 6.75 CPI / CGPA on a 10 point scale at Bachelor's or Master's level.</b></p> <p>IV) <b>Qualified GATE Score in Electrical Engineering (EE) OR Instrumentation (IN) in the past.</b></p>
6.	Electronics & Communication Engineering	<p>I) B.E. / B. Tech. / AMIE/AMIETE/B.Sc.(Engg.) of four years duration in one of the following branches : Electronics and Communication / Electronics and Telecommunication/ Electronics/ Electronics and Instrumentation and other allied branches of Electronics Engineering/Computer Science with minimum first class or CPI / CGPA 6.75 on a 10 point scale</p> <p>II) M.Tech/M.E./M.S.(at least two year program) in above branches.</p> <p>III) <b>Minimum first class or 6.75 CPI / CGPA on a 10 point scale at Bachelor's and Master's level.</b></p> <p>IV) <b>Qualified GATE score in the past.</b></p>
7.	VLSI & Nanotechnology	<p>I) M.E. / M. Tech in one of the following branches Microelectronics, Nanoelectronics, VLSI and embedded system, VLSI design, VLSI systems, digital Electronics, Microelectronics and VLSI design, VLSI and Embedded systems related branches, Microelectronics/Nanoelectronics related branches</p> <p>III) <b>Minimum first class or 6.75 CPI / CGPA on a 10 point scale at Bachelor's or Master's level.</b></p> <p>IV) <b>Qualified GATE score in the past.</b></p>
8.	Mechanical Engineering	<p>I) <b>B.E/B.Tech</b> in Mechanical Engg. or equivalent.</p> <p>II) <b>M.E/M.Tech</b> in Mechanical Engg. / Production Engg. / Machine Design / Automobile Engg. / Industrial Engg. / Power Plant Engg. / Chemical Engg. / Aerospace Engg. / Energy Systems &amp; Engg. / Renewable Energy / Production and Industrial System Engg./ Materials Engg./Technology/Thermal Engg. / Fluid and Thermal Engg., or Equivalent</p> <p>III) <b>Minimum first class or 6.75 CPI / CGPA on a 10 point scale at Bachelor's or Master's level.</b></p> <p>IV) <b>Qualified GATE score in the past.</b></p>
9.	Metallurgical and Materials Engineering	<p>I) M E / M. Tech in Metallurgical and Materials Engineering / Mechanical / Production / Industrial / Chemical and M.Sc (Physics or Chemistry or Materials Science)</p> <p>II) <b>Minimum first class or 6.75 CPI / CGPA on a 10 point scale</b></p>

		<p><b>at Bachelor's or Master's level.</b></p> <p><b>III) Qualified GATE score in the past in the discipline of UG/M.Sc.</b></p>
10.	Mining Engineering	<p>I) M E / M. Tech in Mining Engg or related to Mining Engg / Civil Engineering / Env. Engg. / Geo-Tech Engg/ Mine Planning / Rock Mechanics / Opencast Mining / Mineral Engg. OR M.Sc. / M.Sc. Tech in Geology / Applied Geology/ Environment.</p> <p><b>II) Minimum first class or 6.75 CPI / CGPA on a 10 point scale at Bachelor's or Master's level.</b></p> <p><b>III) Qualified GATE score in the past.</b></p>
11.	Architecture and Planning	<p>I) B.Arch. / BE (Civil) / B.Tech.(Civil) / B.Plan. / B.Tech. (Plan) or equivalent with M.C.P./M. Arch./M.Des. / M.Tech. (Urban Planning) / M. Plan./ M.U.R.P. / ME (T&amp;C.P) / other masters in relevant field.</p> <p><b>II) Minimum first class or 6.75 CPI / CGPA on a 10 point scale at Bachelor's or Master's level.</b></p> <p><b>III) Qualified GATE/NET score in the past.</b></p>
12.	Physics	<p>I) Master's Degree in the concerned or an allied subject.</p> <p><b>II) Minimum first class or 6.75 CPI / CGPA on a 10 point scale at Bachelor's or Master's level.</b></p> <p><b>III) Qualified GATE / NET score in the past.</b></p>
13.	Chemistry	<p>I) Master's or equivalent degree in Chemistry, Biochemistry, other allied disciplines like Microbiology and Pharmacy (M. Pharm-Pharmaceutical Chemistry/ Medicinal Chemistry).</p> <p><b>II) Minimum first class or 6.75 CPI / CGPA on a 10 point scale at Bachelor's or Master's level.</b></p> <p><b>III) Qualified GATE/NET/GPAT score in the past.</b></p>
14.	Mathematics	<p>I) M.Sc. in Mathematics / Applied Mathematics.</p> <p><b>II) Minimum first class or 6.75 CPI / CGPA on a 10 point scale at Bachelor's or Master's level.</b></p> <p><b>III) Qualified GATE / NET score in the past.</b></p>
15.	Humanities and Social Sciences	<p>I)M.A. in English / Sociology /Economics./Psychology/MBA-HR)</p> <p><b>II) Minimum first class or 6.75 CPI / CGPA on a 10 point scale at Bachelor's or Master's level.</b></p> <p><b>III) Qualified GATE / NET score in the past.</b></p>

**Note:**

i)The candidate having secured Government Fellowship i.e, DST fellowship, CSIR fellowship, UGC fellowship can apply for Ph.D. program under Cat 4 at VNIT even if candidate does not have valid GATE scores/NET qualification or candidate has not appeared for GATE/NET.

ii) Candidates, whose M.E. / M.Tech/ M.Arch. / M.Plan. / M.Sc. result is awaited, can also apply for Ph.D. program. They will have to submit the result of M.E. / M.Tech/ M.Arch. / M.Plan./M.Sc. exam to Academic Section, till that time their registration will be provisional.

## 4. Admission Procedure.

**4.1 (a).**The application form is available on institute website <https://vnit.ac.in/admission>.

Candidate is required to pay application fee of Rs 500/- (per application form) online through online payment portal of VNIT. (Link : <https://pay.vnit.ac.in/home>). After payment, candidate shall mention this **VNIT Payment Ref. No** in the application form & also attach the printed copy of receipt.

The duly filled application form, along with photo copies of the certificates (self-attested) & photograph, and copy of payment receipt, should be sent by speed post or hand delivery.

To,  
**The Deputy Registrar (Academic),**  
**VNIT, South Ambazari Road,**  
**Nagpur – 440010 (M.S.)**

Candidates should mention on the Envelope: **PhD- Name of Department.**

Incomplete application and/or applications received after the last date are liable to be rejected.

**4.1(b)** In addition to the above process of physical form submission, candidate need to fill Google Form (Online), link for the same is displayed along with the Boucher. Candidate are requested to fill correct information in the Google Form as per the information given in the actual form submitted. Candidate take important Note that, if they are submitting PhD application for Multiple Branches then they need to fill different Google Form for different branches.

**4.2** All candidates will be required to appear for the written test, which will be conducted in the respective departments on the date specified in the information brochure. Further, the candidates shortlisted on the basis of performance in the written test shall be interviewed.

Top most scorer of the written test will be normalized to 100 and marks of other candidates will be scaled accordingly. Then depending on the number of candidates to be called for the interview, Department can set a cut-off normalized score. However, normalized cut-off below 40% is not allowed. Candidates will appear for written test / interview at their own cost.

**4.3.** The interview of the short-listed candidates will be conducted in the concerned departments as per the schedule given in this brochure. The constitution of the interview committee will be as follows:

1. HoD of the concerned department - Chairman
2. Dean(R&C) / Dean (Acad)/ Professor from other department - Director's Nominee
3. All faculty members from the concerned department/ discipline who are recognized Ph.D. supervisors– Members

#### 4.4

- (i) Candidate should have qualified GATE/NET score in the past. The GATE/NET score, percentile GATE score as well as qualified mark should be stated.
- (ii) Candidate should also score minimum 40% marks in Interview for selection.
- (iii) Final list will be prepared based on following weightage.

<b>Written Exam</b>	-	<b>40%</b>
<b>GATE/NET Score</b>	-	<b>40%</b>
<b>Interview</b>	-	<b>20%</b>

**4.5** The provisional list of selected candidates will be displayed on Institute's website and no separate intimation will be sent to the candidates. Selected candidates shall report to The Joint Registrar (Academic) for admission and payment of prescribed fees as per the schedule.

**4.6** Candidate shall report to the concerned department for getting the Supervisor allotted. Candidate in consultation with the supervisor shall identify the area of research and prepare a synopsis. The supervisor will propose a **Research Progress Committee, (RPC)** for Ph.D. program. The RPC shall monitor the progress of Ph.D. work of the candidate.

**4.7** RPC shall recommend the courses to be undertaken by a candidate as per norms.

#### 5. Duration of Program

Minimum duration: Full time cat. :Three years

Part time cat. :Four years

#### 6. Payment of Fees and Deposit (This is subject to the revision from time to time)

	<b>Head</b>	<b>Ph.D. Admission (One Time)</b>	<b>Ph.D. Full Time with teaching assistantship (Per Sem)</b>	<b>Ph.D. Full Time (Sponsored) (Per sem)</b>
1.	Registration fees	4000	--	--
2.	Library Deposit (refundable)	2400	--	--
3.	Library Fees	--	1600	3200
4.	Tuition Fees	--	7500	15000
5.	Retention Fees	--	1600	1600
6.	Internet Charges	--	1000	2000
7.	Infrastructure Usage Fee	--	1000	2000
8.	*Medical Aid Fund Premium (for first 3 years)	--	3000	3000
	<b># Grant Total Rs.</b>	<b>6400</b>	<b>15700</b>	<b>26800</b>

*# At the time of joining, candidate has to pay one time fees and per semester fees together (i.e Rs. 22100/- for Ph.D. full time with teaching assistantship and Rs. 33200/- for Ph.D. Full Time (Sponsored)).*

**\* For subsequent years, scholar will have to pay Rs. 1000/- per year till thesis submission.**

1. The Full Time Ph.D. Category fellows who have completed five years, ( excluding approved semester drop), but could not submit thesis under specified criteria (Two SCI/SCIE/AHCI/SSCI Journal publications) will be converted to Part Time Ph.D. Category automatically. The candidate will have to pay the fees as per the norms of the part time program.

If the candidates could not submit the thesis even after completion of 2 years after conversion to Part Time Ph.D. category, they have to apply for re-registration with consent from supervisor's and RPC committee through proper channel. Re-registration process is to be done every year.

2. The part time Ph.D. category fellows who have completed seven years, but could not submit thesis under specified criteria (Two SCI/SCIE/AHCI/SSCI Journal publications) have to apply for re-registration with consent from supervisor's and RPC committee through proper channel. Re-registration process is to be done every year.
3. Re-registration fees is Rs. 25000/- (per year after completion of 7 years from the date of registration).

**Examination Fee :** The examination fee of **Rs. 30,000/- for Ph.D. full time/ Sponsored** shall be paid by the candidate prior to the submission of the thesis.



## 7. Syllabus for written examination (Department-wise)

The syllabus for the written examination for admission to Ph.D. program is given below.

SN	Name of Department	Syllabus for Written Test
1.	Applied Mechanics	<ul style="list-style-type: none"> <li>a) Engineering Mechanics</li> <li>b) Strength of Materials</li> <li>c) Theory of Structures</li> <li>d) Design of Steel Structures</li> <li>e) Design of Concrete Structures</li> </ul>
2.	Chemical Engineering	<ul style="list-style-type: none"> <li>a) Mass Transfer,</li> <li>b) Heat Transfer,</li> <li>c) Chemical Reaction Engineering,</li> <li>d) Fluid Mechanics,</li> <li>e) Process Calculations,</li> <li>f) Process Control,</li> <li>g) Mechanical Operation,</li> <li>h) Chemical Engineering Thermodynamics</li> <li>i) Basic Mathematics</li> <li>j) Numerical Methods</li> </ul>
3.	Civil Engineering	<p>Part A : 30% Weightage Objective type question paper for B.Tech level syllabus.</p> <p>Part B : 70% Weightage</p> <p>A. Environmental Engg</p> <ul style="list-style-type: none"> <li>a) Water Supply &amp; Treatment</li> <li>b) Sewerage and Sewage Treatment</li> <li>c) Air pollution &amp; Solid waste</li> </ul> <p>B. Water Resources Engg.</p> <ul style="list-style-type: none"> <li>a) Irrigation Engineering</li> <li>b) Hydrology &amp; Water Resources Engg.</li> <li>c) Fluid Mechanics</li> </ul> <p>C. Transportation Engg.</p> <ul style="list-style-type: none"> <li>a) Pavement Design</li> <li>b) Highway Construction Materials</li> </ul> <p>D. Construction Management &amp; Concrete Engg.</p> <ul style="list-style-type: none"> <li>a) Concrete Structure &amp; Concrete Technology</li> <li>b) Construction Management</li> <li>c) Building Technology</li> </ul> <p>E. Geotechnical Engineering</p> <ul style="list-style-type: none"> <li>a) Soil Mechanics</li> </ul> <p>Foundation Engineering</p>
4.	Computer Science Engineering	<ul style="list-style-type: none"> <li>a) Programming &amp; Data Structures</li> <li>b) System Programming/OS</li> <li>c) Compiler</li> <li>d) Theory of Computation</li> <li>e) Analysis of Algorithm</li> <li>f) Discrete Mathematics</li> <li>g) Computer Organization</li> <li>h) Database Management Systems</li> <li>i) Computer Networks</li> </ul>

5.	Electrical Engineering	<p>Evaluation test will be on the basis of:</p> <ol style="list-style-type: none"> <li>1. Objective type question <ol style="list-style-type: none"> <li>a) Electrical Machines</li> <li>b) Control Systems and Instrumentation</li> <li>c) Power Systems and Protections</li> <li>d) Power Electronics and Drives</li> <li>e) Circuit and Electromagnetic Field Theory</li> <li>f) Signals and Systems</li> <li>g) Microprocessor and Microcontrollers</li> </ol> </li> <li>2. Subjective type question (any two to be attempt) <ol style="list-style-type: none"> <li>a) Electrical Machines</li> <li>b) Control Systems and Instrumentation</li> <li>c) Power Systems and Protections</li> <li>d) Power Electronics and Drives</li> </ol> </li> </ol>
6.	Electronics & Communication Engineering	<ol style="list-style-type: none"> <li>a) Electronic Devices &amp; Circuits, Analog Circuits</li> <li>b) Digital Circuits &amp; Microprocessors</li> <li>c) Electromagnetic field</li> <li>d) Electronic measurements</li> <li>f) Analog &amp; Digital Communication</li> <li>g) Digital Signal Processing</li> <li>h) Computer Organization</li> <li>i) Electronics Control Systems</li> <li>j) Signal and Systems</li> <li>k) Linear Algebra</li> <li>l) Image Processing</li> </ol>
7.	VLSI & Nanotechnology	<ol style="list-style-type: none"> <li>a) Electronics Devices &amp; Circuits, Analog Circuits</li> <li>b) Digital Circuits &amp; Microprocessors</li> <li>c) Electromagnetic</li> <li>d) Electronic measurements</li> <li>f) Analog &amp; Digital Communication</li> <li>g) Digital Signal Processing</li> <li>h) Computer Organization</li> <li>i) UHF &amp; Microwave</li> <li>j) Linear Networks</li> </ol>
8.	Mechanical Engineering	<p><b>Part A – 30% weightage</b>  Common to all students (1. Design, 2. Thermal and, 3. Manufacturing &amp; Industrial Engineering Groups)</p> <ul style="list-style-type: none"> <li>• Engineering Mathematics</li> <li>• Numerical methods and computer programming</li> <li>• Measurement and Control</li> <li>• Engineering materials and basic metallurgy</li> </ul> <p><b>Part B – 70% weightage</b>  Any one group from the following</p> <ol style="list-style-type: none"> <li><b>1. Design Group</b> <ul style="list-style-type: none"> <li>• Solid mechanics and Machine Design</li> <li>• Mechanism and Theory of Machine</li> <li>• Vibration, CAD, FEM and Robotics</li> </ul> </li> <li><b>2. Thermal Group</b></li> </ol>

		<ul style="list-style-type: none"> <li>• Fluid Mechanics and Fluid Machines</li> <li>• Thermodynamics and Heat Transfer</li> <li>• IC engines, Refrigeration and Air conditioning</li> <li>• Hydraulics and Pneumatics</li> </ul> <p><b>3. Manufacturing and Industrial Engineering Group</b></p> <ul style="list-style-type: none"> <li>• Casting, Welding and Metal Forming</li> <li>• Metal cutting Processes, Machines and cutting tool geometry</li> <li>• Metrology and Quality control</li> <li>• Automation in Production</li> <li>• Reliability and maintenance engineering</li> <li>• Operations Research</li> </ul> <p><b>Note:</b> In case, any student attempts part B for more than one group, he/she will be considered for the group (if found eligible) in which he/she scores maximum marks.</p>
9.	Metallurgical and Materials Engineering	<ul style="list-style-type: none"> <li>a) Physical Metallurgy</li> <li>b) Extractive Metallurgy</li> <li>c) Foundry Technology</li> <li>d) Mechanical Processing</li> <li>e) Testing of Materials</li> <li>f) Polymeric and Ceramic Materials</li> <li>g) Composites</li> <li>h) Advanced Materials</li> <li>i) Characterization of Materials</li> </ul>
10.	Mining Engineering	<ul style="list-style-type: none"> <li>a) Rock Mechanics and Rock Engineering</li> <li>b) Surface and Mine Environment Engineering</li> <li>c) Rock excavation engineering and blasting</li> <li>d) Drilling, Exploration and Mineralogy</li> <li>e) Mining Methods : Surface and underground</li> <li>f) Mining Machinery</li> </ul>
11.	Architecture & Planning	<ul style="list-style-type: none"> <li>a) Architecture, Art &amp; Design</li> <li>b) Building Sciences &amp; Technology</li> <li>c) Issues in relation to built environment like sustainable development, behavioral aspects, cultural issues etc.</li> <li>d) Historical aspects of built environment</li> <li>e) Issues related to urban areas like Housing, Urban Design, Conservation, Planning, Infrastructure, Transportation etc.</li> <li>f) Types of Research and Research process.</li> <li>g) Landscape Design</li> <li>h) Environment and Disaster risk reduction</li> </ul>
12.	Physics	Syllabus as that for NET in Physics
13.	Chemistry	Syllabus as that for NET in Chemistry
14.	Mathematics	<ul style="list-style-type: none"> <li>a) Linear Algebra,</li> <li>b) Real Analysis,</li> <li>c) Complex Analysis,</li> <li>d) Ordinary Differential Equations,</li> </ul>

		<ul style="list-style-type: none"> <li>e) Partial Differential Equations,</li> <li>f) Integral Transforms,</li> <li>g) Numerical Analysis,</li> <li>h) Probability &amp; Statistics</li> </ul>
15.	Humanities	<ul style="list-style-type: none"> <li>a) English - Syllabus as that for NET in English</li> <li>b) Sociology- Syllabus as that for NET in Sociology</li> <li>c) Economics -Syllabus as that for NET in Economics</li> <li>d) Psychology- Syllabus as that for NET in Psychology</li> <li>c) MBA (HR) - Syllabus as that for NET in MBA(HR)</li> </ul>

## 8. Areas of Research (Department-wise)

S N	Department	Area of Research
1.	Applied Mechanics	<ol style="list-style-type: none"> <li>1) Earthquake Engineering</li> <li>2) Nonlinear Analysis of structures</li> <li>3) Structural Engineering</li> </ol>
2.	Chemical Engineering	Biochemical Engineering, Bio energy, Environmental engineering, waste Water Treatment, Membrane bio reactor, Physical separation, Bio pesticide and fertilizer, Process modeling and simulation, Green Engineering and Technology, Process Intensification, Advanced Separation, Adsorption, Nanotechnology. Molecular dynamics simulations .
3.	Civil Engineering	<ol style="list-style-type: none"> <li>1) Water Distribution Systems</li> <li>2) Environmental Management</li> <li>3) Water and Waste Water Treatment</li> <li>4) Solid and Hazardous Waste</li> <li>5) Traffic Engg.</li> <li>6) Pavement Design</li> <li>7) Highway Construction Materials</li> <li>8) Durability of concrete</li> <li>9) High Performance Concrete</li> <li>10) Self-Compacting Concrete</li> <li>11) Bond Strength of Concrete with Reinforcement</li> <li>12) Building Construction &amp; Technology</li> <li>13) Water Resources Engineering</li> <li>14) Green Building</li> <li>15) Construction Management</li> <li>16) Remote Sensing &amp; GIS Applications</li> <li>17) Geotechnical Engineering</li> <li>18) Characterization of geo-materials &amp; Ground Improvement</li> <li>19) Rock Engineering &amp; Underground structures</li> <li>20) Soil Dynamics &amp; Geotechnical Earthquake Engineering</li> <li>21) Application of Geosynthetics</li> <li>22) Physical &amp; Numerical modelling of Geotechnical systems</li> <li>23) Mining Geotechnics &amp; Pavement Geotechnics</li> </ol>
4.	Computer Science	<ol style="list-style-type: none"> <li>1) Parallel &amp; Distributed Computing</li> <li>2) Data Mining &amp; Warehousing</li> <li>3) Pattern Recognition</li> <li>4) Security</li> <li>5) Artificial Intelligence</li> <li>6) Soft Computing</li> <li>7) Mobile Computing</li> <li>8) Knowledge Management</li> <li>9) IT and IT enables services</li> <li>10) Real Time systems</li> <li>11) Image and Video processing</li> <li>12) Data Science</li> </ol>

		<ul style="list-style-type: none"> <li>13) Machine learning</li> <li>14) Internet of Things</li> <li>15) Cloud Computing</li> <li>16) Information retrieval</li> <li>17) Natural language processing</li> <li>18) Spatial information extraction</li> <li>19) Data analytics and Data Science</li> <li>20) Wireless sensor networks</li> <li>21) Biological systems modeling</li> </ul>
5.	Electrical Engineering	<ul style="list-style-type: none"> <li>1) Power Electronics and Drives</li> <li>2) Power Electronics applications in Power System</li> <li>3) Electrical Machines, design and condition monitoring</li> <li>4) Power system and related areas</li> <li>5) Control systems and its applications</li> <li>6) Electric Vehicles and Charging Infrastructure</li> <li>7) Renewable Energy Sources and Utilisation</li> <li>8) Micro-grid stability and analysis</li> <li>9) Power Quality</li> <li>10) Smart Grid</li> <li>11) Energy Vectors and Management</li> <li>12) Control system interface with system and Signal Processing</li> <li>13) Artificial Intelligence &amp; Machine Learning Application</li> <li>14) Non-linear Dynamics and Chaos Theory</li> <li>15) Switchgear and protection</li> <li>16) IOT and Industry automation</li> <li>17) Measurement and Instrumentation</li> <li>18) Circuit and Electromagnetic Field Theory</li> </ul>
6.	Electronics & Communication Engineering	<ul style="list-style-type: none"> <li>1) Embedded Systems and Sensor networks</li> <li>2) Communication Engineering</li> <li>3) Signal Processing</li> <li>4) IoT Electronics &amp; Instrumentation.</li> <li>5) Image Processing</li> <li>6) Antennas</li> <li>7) Microwave Engineering</li> <li>8) Artificial Intelligence and its applications</li> </ul>
7.	VLSI & Nanotechnology	<ul style="list-style-type: none"> <li>1) Embedded Systems</li> <li>2) VLSI/ Nanoelectronics /MEMS</li> <li>3) Communication</li> <li>4) Signal Processing</li> <li>5) Optoelectronics / Photonics</li> </ul>
8.	Mechanical Engineering	<ul style="list-style-type: none"> <li>1) Collaborative robots and nonlinear control</li> <li>2) Machine vision, deep learning and artificial intelligence.</li> <li>3) Nonlinear dynamics, Fatigue and Fracture Mechanics</li> <li>4) Vibration and Machine condition monitoring</li> <li>5) Composite laminates and damage identification</li> <li>6) Biomedical Engineering</li> <li>7) Product design, Mechanism and parallel manipulators</li> <li>8) Surface engineering, Friction and Tribology</li> <li>9) Crashworthiness, ballistic and cellular structure</li> </ul>

		<ul style="list-style-type: none"> <li>10) Nanomaterials, CNT reinforced composites and ceramics</li> <li>11) Bio Tribology, Adhesion and rupture of soft solids</li> <li>12) Renewable energy (Solar/Wind/Biomass)</li> <li>13) CFD, Compressible flow and Fluid dynamics</li> <li>14) Combustion engineering, Supersonic and hypersonic engines</li> <li>15) Multi phase flows, Fluid structure interaction.</li> <li>16) I.C Engines and Alternative fuels</li> <li>17) Fuel Cell, Heat and Mass transfer</li> <li>18) Nuclear power engineering and safety</li> <li>19) CAD/CAM and additive manufacturing</li> <li>20) Industrial engineering and industry 4.0</li> <li>21) Manufacturing system simulation</li> <li>22) Maintenance and reliability engineering</li> <li>23) Smart manufacturing and automation</li> </ul>
<b>9.</b>	Metallurgical and Materials Engineering	<ul style="list-style-type: none"> <li>1) Wear of Composite and Metallic Materials</li> <li>2) Welding Metallurgy</li> <li>3) Development of Polymer Blends and Composite Materials</li> <li>4) Fatigue, Creep and Fracture Behavior of Materials</li> <li>5) Corrosion Science and Engineering</li> <li>6) Alloy Development</li> <li>7) Nano – Bio Materials/ SMART Materials</li> <li>8) Polymers Polymeric/Ceramics and Composite Materials</li> <li>9) Processing of Materials</li> <li>10) Waste Materials Utilization</li> <li>11) Modelling and Simulations in Materials Engineering</li> <li>12) Texture and Micro-texture development in metals/alloys/ceramics</li> <li>13) Recrystallization in metals/alloys</li> <li>14) Crystal plasticity deformation simulations</li> <li>15) Nanomaterials for functional applications</li> </ul>
<b>10.</b>	Mining	<ul style="list-style-type: none"> <li>1) Blasting and Rock Fragmentation</li> <li>2) Dust and Other Environmental Pollution in Mines</li> <li>3) Slope Stability and Geo-Mechanics</li> <li>4) Applicability of System Engineering and Safety Engineering</li> <li>5) Reliability and Productivity Analysis of HEMM</li> <li>6) Numerical Modeling for Rock Mechanics Applications</li> <li>7) Mine Design</li> </ul>
<b>11.</b>	Architecture & Planning	<ul style="list-style-type: none"> <li>1) Urban Planning</li> <li>2) Environmental Planning</li> <li>3) Disaster Risk Management</li> <li>4) Urban Design</li> <li>5) Urban Infrastructure</li> <li>6) Architecture and Urban Conservation</li> <li>7) Housing</li> <li>8) Energy Efficient Architecture</li> <li>9) Vernacular Architecture</li> <li>10) Sustainable Architecture</li> <li>11) Building Acoustics</li> <li>12) Building Illumination</li> <li>13) Built Environment And Human Behavior</li> </ul>

		<ul style="list-style-type: none"> <li>14) Pedagogy in Architecture</li> <li>15) Urban Heat Island Studies</li> <li>16) Urban Sustainability</li> <li>17) Urban Form and Climate Studies</li> <li>18) Universal Design</li> <li>19) Urban Transportation</li> <li>20) Real Estate and Development</li> <li>21) Remote Sensing and GIS Applications</li> <li>22) Building Materials</li> <li>23) Complex Systems approach for Urban Studies</li> <li>24) Soundscape</li> <li>25) Project Management</li> <li>26) Regional Planning</li> </ul>
12.	Physics	<ul style="list-style-type: none"> <li>1) Solid Electrolytes</li> <li>2) Functional Ceramics</li> <li>3) Nanomaterials / Biomaterials</li> <li>4) Polymers Polymeric/Ceramics &amp; Composite Materials</li> <li>5) Solar Cells</li> <li>6) Sensors</li> <li>7) Supercapacitors</li> <li>8) Quantum dots</li> <li>9) Magnetic Nanoparticles</li> <li>10) Solid Oxide Fuel Cells</li> <li>11) Thin films</li> <li>12) Heterojunctions</li> <li>13) Advanced Materials/SMART Materials</li> <li>14) Physics of Materials</li> <li>15) Advanced Processing</li> <li>16) Simulation and Modeling, computational condensed matter</li> <li>17) Theoretical and mathematical Physics</li> <li>18) Quantum Mechanics and Quantum Information Theory</li> <li>19) Photocatalysis</li> <li>20) Photoluminescence</li> <li>21) Ferroelectric &amp; Dielectric materials</li> </ul>
13.	Chemistry	<ul style="list-style-type: none"> <li>1) Polymer Composite / Nano Composites</li> <li>2) Conducting Polymers / Nonmaterial, Photocatalysis</li> <li>3) Microwave / Ultrasound / Assisted Organic Synthesis</li> <li>4) Thermocatalytic depolymerization of Biomass -Industrial Waste-Lignin for its valorization through deoxygenative, hydrogenative processes / various important organic conversions using metal oxide loaded heterogeneous catalysts like HZSM-5 etc for the exploring cheaper fuel additives, polymer precursors and various important organic conversions with high selectivity.</li> <li>5) Chromatographic Analysis (GC/HPLC).Biopolymer based Smart materials for selective separation/Environmental Remediation/Valorisation or value addition of Biomass waste.</li> <li>6) Supramolecular polymers for industrial applications</li> <li>7) Electrochemical sensors, Biosensors, polymer and nano-material synthesis for electrochemical and Bio-sensing</li> </ul>



		8) Photochemistry and Photobiology 9) Biochemistry and Biophysical Chemistry 10) Thermodynamics Chemistry/Green Chemistry/Heterogeneous Catalysis 11) Elastometric composites 12) Porous Materials, Hybrid System for Environmental Application, Desulfurization of Fuels. 13) Crystal Engineering & Supera-molecular Chemistry, Organic Soft Materials and Liquid Crystals 14) Advanced Materials/SMART Materials 15) Biomaterials 16) Ceramics Materials/ Composite Materials 17) Advanced Processing 18) Simulation and Modeling 19) Organic Synthesis ,Heterocyclic Chemistry 20) Biocatalysis
14.	Mathematics	1) Relativity & Cosmology 2) Numerical Analysis 3) Singular Perturbation Problems 4) Fluid Mechanics 5) Operator Theory 6) Functional Analysis 7) Spectral Element Methods for Partial Differential Equations 8) Fixed Point Theory : Nonlinear Analysis 9) Singular Boundary Value Problems 10) Approximation Theory 11) Commutative Algebra 12) Fractal Approximation. 13) Lie Groups, Lie Alegbra and Partial Equations. 14) Query Theory: Stochastic Modeling 15) Operation Research, Optimization under uncertainty
15.	Humanities	1) Sociology 2) English Language & Literature 3) Open-Economy Macroeconomics 4) Trade and Development 5) Public Finance and Policy 6) Psychology 7) Human Resource Management

**For other details, please see the 'Guidelines, Rules and Regulations Governing Ph.D. (Full Time) programs Jan 2023' on VNIT website.**

## ANNEXURE – I

**Cat. 4: Ph.D. (full time) sponsored category candidates (place of research work VNIT only) should note that:**

1. No teaching assistantship will be paid to sponsored candidates under this category.
2. Since it is a full-time program, the candidate is required to be available for full time in the respective department for the entire duration of the program (i.e. minimum THREE YEARS from the date of registration).

### ***CERTIFICATE FROM THE HEAD OF THE ORGANISATION***

**(On the letter-head of Industry / Organization / Institute)**

Shri / Ms. \_\_\_\_\_ who is serving in our Industry/Organization/Institute from \_\_\_\_\_ as (designation) \_\_\_\_\_ is hereby sponsored for Ph.D. (Full time) program in \_\_\_\_\_ Department of VNIT Nagpur.

In case of his/her selection, he/she will be relieved for the complete duration of the Ph.D. program (Minimum 3 years from the date of registration).

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

Signature : \_\_\_\_\_

Name : \_\_\_\_\_

Designation : \_\_\_\_\_

Office Seal : \_\_\_\_\_

## ANNEXURE – II

**Cat. 5: Ph.D. (full time) sponsored candidate category from 100% centrally funded research laboratories including public sector and private industries.**

1. Candidates should note that no teaching assistantship will be paid to candidates admitted under this category.

***CERTIFICATE FROM THE HEAD OF THE ORGANISATION***  
**(On the letter-head of Industry / Organization / Institute)**

Shri / Ms. \_\_\_\_\_ who is serving in our Industry/Organization/Institute from \_\_\_\_\_ as (designation) \_\_\_\_\_ is hereby sponsored for Ph.D. (Full time) program in \_\_\_\_\_ Department of VNIT Nagpur.

In case of his/her selection, he/she will be relieved for minimum 6-12 months to stay at VNIT, Nagpur for the completion of course work as per the condition given in Guidelines, Rules and Regulations governing PhD Full time programs.

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

Signature : \_\_\_\_\_

Name : \_\_\_\_\_

Designation : \_\_\_\_\_

Office Seal : \_\_\_\_\_