

DeitY

Information Brochure January 2016

Ph.D. Admission
Under Visvesvaraya Ph.D. Scheme of
Department of Electronics & Information Technology
(DeitY)
Govt. of India

for

- A. Ph.D. (Full Time) with financial assistance.**
*(Benefits in addition to Stipend → HRA per month +
Contingency Rs. 30000/- per year + Support upto Rs.
50000/- for attending International Conference)*
- B. Ph.D. (Full Time) Industry Sponsored.**



Visvesvaraya National Institute of Technology,
South Ambazari Road,
Nagpur – 440 010

1. PREAMBLE

VISVESVARAYA PhD SCHEME FOR ELECTRONICS AND IT

Department of Electronics and Information Technology, Government of India has conceived a scheme” to enhance the number of PhDs in the Electronic Design and Manufacturing (ESDM) and IT/IT enabled Services (ITES) sector”. Cabinet Committee on Economic Affairs (CCEA) has approved the scheme with a total estimated cost of Rs 401 crore (Rupees Four Hundred One Crore only) over a period of nine years. Media Lab Asia (a Section-25 not-for-profit organization of Department of Electronics and Information Technology, Ministry of Communications and Information technology, would be responsible for providing implementation support to the scheme.

Salient Features of this PhD Scheme are as follows:

- ❖ Thrust to R&D, create innovative ecosystem and enhance India’s competitiveness in these knowledge intensive sectors.
- ❖ To fulfill the commitments made in National Policy on Electronics (NPE) 2012 and National Policy on Information Technology (NPIT) 2012.

1.1 DURATION

The duration of scheme would be for a period of maximum five years (i.e. till January 2020 or earlier).

1.2 PROGRAMMES OFFERED BY THE INSTITUTE

Type	Programme	Departments
A	Ph.D. (Full Time) with Stipend	1. Electronics and Communication Engineering
B	Ph.D. (Full Time) Industry Sponsored *	2. Computer Science and Engineering 3. Electrical & Electronics Engineering 4. Centre for VLSI & Nano Technology

***:Sponsored candidates will be required to submit a separate sponsorship certificate given in Annexure- I**

1.3 IMPORTANT DATES TO REMEMBER –

- Date of notification - **05.10.2015**
- Last date of submission of application - **10.11.2015**
- Display of list of eligible candidates - **20.11.2015**
- Written test for eligible candidates - **27.11.2015**
- Interview for short listed candidates - **27.11.2015 & 28.11.2015**

1.4 SCHEDULE FOR WRITTEN TEST & INTERVIEW**

Department	Written Test (Date & Time)	Interview (Date & Time)
Electronics & Communication Engineering	27.11.2015 10.00 am to 11.00 am	27.11.2015 2.30 pm to 5.00 pm
Computer Science & Engineering	27.11.2015 10.00 am to 11.00 am	28.11.2015 2.30 pm to 5.00 pm
Electrical & Electronics Engineering		
Centre for VLSI & Nano Technology		

**** Written Test and Interview will be held in the respective Departments/Centre.**

2. TYPE A) FULL TIME PH.D PROGRAMME

2.1 Eligibility Criteria for Type A) Full Time Ph.D.

Qualification and Experience

Qualifications – Rules as applicable to regular Ph.D. students of VNIT with the degree in following areas.

1.	Computer Science & Engineering	B.E. / B. Tech. / AMIE or equivalent in any branch of Engineering and M.E./M. Tech or equivalent in one of the following branches Computer Science/ Computer Technology/Computer Engineering/ Information Technology/ Information Science with a minimum of First Class (C.P.I. or C.G.P.A. greater than 6.75 on a 10 point scale) at Bachelor's or Master's level. Qualified GATE score or equivalent national level exam in past.
2.	Electronics & Communication Engineering	B.E. / B. Tech. and M.E. / M. Tech in one of the following branches Electronics and Communication /Electronics/Industrial Electronics/ Instrumentation/ Electrical and Electronics/ Embedded Systems with a minimum of First Class (C.P.I. or C.G.P.A. greater than 6.75 on a 10 point scale) at Bachelor's or Master's level. Qualified GATE score or equivalent national level exam in past.
3	Electrical & Electronics Engineering	M E / M. Tech in Electrical & Electronics / Power Systems/ Energy Systems / Control System/ Instrumentation & Control / Power Electronics / Electric Drives with a minimum of First Class (C.P.I. or C.G.P.A. greater than 6.75 on a 10 point scale) at Bachelor's or Master's level. Qualified GATE score or equivalent national level exam in past.
	Centre for VLSI & Nano Technology	M.E. / M. Tech in one of the following branches Electronics and Communication /Electronics/Industrial Electronics/ Bio-medical/ Instrumentation/Power Electronics/Electrical and Electronics/ Embedded Systems with a minimum of First Class (C.P.I. or C.G.P.A. greater than 6.75 on a 10 point scale) at Bachelor's or Master's level. Qualified GATE score or equivalent national level exam in past.

Candidates, whose M.E./ M.Tech. Result is awaited, can also apply for Ph.D. program. They will have to submit the result of M.E./M.Tech. exam before January 31, 2015, till that time their registration will be provisional; or else cancelled.

2.2 Financial Assistance for Candidates Seeking Admission as Type A

Ph.D. Fellowship for Full-time Candidates: (Type A)

- i. Fellowship of Rs 22,500 p.m. (I&II Yr); Rs 25,000 p.m. (III - V Yr)
- ii. Annual Contingency grant/support: @Rs 30,000 per year for consumables, etc.
- iii. Reimbursement of Rent (ROR): These Ph.D candidates shall not be provided accommodation on VNIT Campus. ROR would be on reimbursement basis, based on actual and subject to current ceiling of 20% fellowship amount which may change as per the Government of India norms where the research is carried out.

Support for attending International conferences: Support for attending up to two renowned international conferences for full time candidate: @ up to maximum support of Rs.50,000/- for each international conference would be provided subject to approved from DeitY. No support from institute would be provided for contingency, conferences (National / International) etc., in any form (e.g. TEQIP-II) for these candidates from the institute.

2.3 Selection Criterion for TYPE A

- i. He/ She should have qualified GATE/NET score. The GATE/NET examination, percentile GATE score as well as qualified marks should be stated.
- ii. Candidate having M.E. / M. Tech. degree should have **qualified GATE or equivalent national level exam in past.**
- iii. Candidate should also score minimum 40% marks in Interview for selection.
- iv. Final list will be prepared based on following points

Written Exam (As per 5.2)	-	40%
Percentile GATE Score	-	40%
Interview	-	20%

Calculation of GATE/NET SCORE:

40% mark weightage for GATE = $(0.40) \times (\text{percentile GATE score of the candidate})$

Percentile GATE score = $100 \times ((\text{Number of candidate appeared in the exam} - \text{candidate's rank}) / (\text{Number of candidate appeared in the exam}))$

3. TYPE B : PH.D. (FULL TIME) INDUSTRY SPONSORED *

3.1 Eligibility Criteria for Type B

1.	Electronics & Communication Engineering	B.E. / B. Tech. and M.E. / M. Tech in one of the following branches Electronics and Communication /Electronics/Industrial Electronics/ Instrumentation/ Electrical and Electronics/ Embedded Systems with a minimum of First Class (C.P.I. or C.G.P.A. greater than 6.75 on a 10 point scale) at Bachelor's or Master's level.
2.	Computer Science & Engineering	B.E. / B. Tech. / AMIE or equivalent in any branch of Engineering and M.E./M. Tech or equivalent in one of the following branches Computer Science/ Computer Technology/Computer Engineering/ Information Technology/ Information Science with a minimum of First Class (C.P.I. or C.G.P.A. greater than 6.75 on a 10 point scale) at Bachelor's or Master's level.
3.	Electrical & Electronics Engineering	B.E. / B. Tech. and M E / M. Tech in Electrical & Electronics / Power Systems/ Energy Systems / Control System/ Instrumentation & Control / Power Electronics / Electric Drives with a minimum of First Class (C.P.I. or C.G.P.A. greater than 6.75 on a 10 point scale) at Bachelor's or Master's level.
4.	Centre for VLSI & Nano Technology	M.E. / M. Tech in one of the following branches Electronics and Communication /Electronics/Industrial Electronics/ Bio-medical/ Instrumentation/Power Electronics/Electrical and Electronics/ Embedded Systems with a minimum of First Class (C.P.I. or C.G.P.A. greater than 6.75 on a 10 point scale) at Bachelor's or Master's level.

3.2 Special Instructions for Type B

The candidates desirous of seeking admissions for Ph.D. program under “DeitY Industry sponsored candidate” scheme should meet the following requirements:

1. Candidate possessing M.E. / M.Tech. degree having qualified GATE exam in past or any equivalent national level examination and he/she should have minimum 5 years experience in industry.

OR

Candidate possessing M.E. / M.Tech. degree should have minimum 8 years experience in industry.

2. VNIT committee shall examine the research facilities in research laboratory in which the candidate is employed where the candidate wishes to carry out part of his Ph.D. research. In case the committee report is favorable and suitable co-supervision (as certified by the committee) is available in the candidate's parent organization where the candidate proposes to carry out research, VNIT may exempt the stay requirement on campus on case to case basis. In case wherever co-supervisor is not available, candidate would interact with supervisor regularly.
3. In any case minimum stay at VNIT is **Six** months for completion of course work and other related research work. If he/she fails to do so, he/she has to stay another six months at VNIT Nagpur to complete the course work. It is candidate's responsibility to obtain deputation / leave from parent organization.
4. Candidate admitted under this program will be treated as a sponsored candidate at VNIT (degree will be awarded by VNIT).
5. He/she should appear for written test & interview as per Institute's norms.
6. Main Supervisor will be from VNIT and optional qualified Co-supervisor approved by VNIT will be from the candidate's parent organization.
7. All six monthly seminars should be delivered at VNIT only. Attendance record of the candidate will be maintained at VNIT. In this respect, it may be noted that the attendance in parent organization of candidate where he carries research, duly certified stating that the candidate has substantially (deemed to be full time) carried out research in the parent organization by Co-supervisor / immediate superior of the candidate, shall be submitted to VNIT before conducting six monthly seminar.
8. As far as possible, co-guide shall also attend the six monthly progress seminar. However, co-guide shall be present for pre submission seminar and thesis defense viva-voce. No financial assistance will be permissible from VNIT for travel of co-guide.
- 9. Institute will not provide any stipend or any other financial support (for conferences etc.) to these candidates.**
10. Fees to be paid at VNIT as per the norms & policy of the institute as applicable to full time sponsored candidate(s).
11. Candidates should satisfy all degree requirements (including publications) as specified by VNIT for the award of Ph.D. degree.
12. It is clarified that candidates from academic institutes are not considered under this scheme, since such candidates have the opportunity for doing full time Ph.D. program through schemes like Quality Improvement Program (QIP) and Full Time Ph.D. with teaching assistantship and Ph.D. full time sponsored (place of research will be VNIT only)

In case candidate fails to complete the course work within one year from the date of registration, his/her admission stands cancelled automatically and no further extension will be granted.

3.3 Selection Criterion for Type B

1. Candidate should score minimum 40% marks in Interview for selection.
2. Candidate should also score minimum 40% normalized marks as mentioned in (5.2).

3.4 Essentials Requirements for Type B

1. The supporting Industry must give No Objection cum financial support certificate for the candidate citing his availability for the minimum contact period for completion of course work.
2. The supporting industry must certify the available research facility with specifications.
3. The desirous candidate must submit a SoP justifying his/her worthiness by giving the details of research contributions and achievements so far, Research Interests and other professional competencies.

4. SPECIALIZATION FOR PH.D. STUDENTS UNDER DEITY SCHEMES

(i) 5G Mobile Networks:

- a) 10-100 x typical user rate through improved spectral efficiency, Massive MIMO, Carrier Aggregation, millimeter wave
- b) Energy efficiency at UE (10 x longer battery life) and BS
- c) 100x scaling of connected devices per BS using low data rate low power communication
- d) Low latency mobile communication (5x reduction in end-to-end latency) to provide real time applications
- e) 1000x scaling of mobile data volume per sq km to handle high density areas like stadium, city centers
- f) HetNet consisting of licensed and unlicensed band technologies and involving enhanced Inter-Cell Interference Coordination (eICIC)
- g) Cognitive radios and Self-organizing networks (SON)
- h) Device-to-Device (D2D) communication

(ii) Software-defined networks (SDN) and Network Function Virtualization (NFV)

- a) Network orchestration and abstraction
- b) Scalable network hypervisor architecture
- c) Design high throughput P routers with MPLS-TP and OTN/ROADM data plane with SDN based control plane
- d) Efficient NFV based firewall, BRAS, EPC design architecture to improve physical server resource utilization
- e) Algorithms to map SLA requirements to resource allocation

(iii) Smart Grid

- a) Smart water/gas metering and communication to detect leakages and rectify it through rerouting.
- b) Smart electricity grid measuring and control mechanism to auto manage the load and dispatch situation
- c) Smart electricity metering technique to improve billing
- d) Securing the smart grid networks against sabotage

(iv) Internet of Things

- a) New sensor technologies

- b) SoC (System-on-chip) with integrated communication module, sensors and battery/chargers for various verticals like eHealth (Monitor SP, Heart rate etc) , eTransportation (tracking vehicles and goods), and others (monitoring calorie consumption and burn rate, tracking of balls in games like cricket football etc with integrated sensors)
- c) Self-organizing and low power consuming sensor networks
- d) Energy harvesting and energy efficiency
- e) remote operations of excavators, crane, warehouse, logistics etc through robotics and reliable communication
- f) Multi-hop networks: protocols and networking issues
- g) Optical communication
- h) WSN Architectures
- i) Encryption Technologies
- j) Signal Processing on IOT

(v) Chip Design and Related Areas

(vi) Nano Electronics, MEMS

5. ADMISSION PROCEDURE

5.1 The application form is available on Institute website www.vnit.ac.in. The form, duly filled in by the candidate, along with xerox copies of the certificates and photograph duly attested and crossed DD/ Bankers Check of amount Rs. 500/- (non-refundable) towards processing fee drawn in favour of **The Director, VNIT, Nagpur**, payable at Nagpur, should be send it to **Dy. Registrar (Academic), VNIT, South Ambazari Road, Nagpur-440 010** and must reach on or before the last date of submission of application form (clearly mention admission category and department on the envelop in bold letters). **Incomplete applications and applications received after the last date are liable to be rejected.**

5.2 All Candidates will be required to appear for written test to be conducted in the Electronics & Communication Engineering Department 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 be required to appear for written test / interview at their own cost.

5.3. The interviews for the short listed candidates will be conducted in the Departments/Centre as per the schedule given in this brochure. Final list of the Selected candidates will be displayed on the Institute's website. The constitution of the interview committee will be as follows:

1. Nodal Officer - Chairman
2. Dean(R&C) / Dean (Acd) - Director's Nominee
3. Concerned faculty member who are recognized Ph.D. supervisors– Members

5.4 The provisional list of selected candidates will be displayed on Institute's website and no separate intimation will be sent to the candidates. Registration will be w.e.f. **January 1, 2016**. Candidates shall report to Dy. Registrar (Academic) for admission alongwith DD of prescribed fees.

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

Following shall be the composition of RPC.

Head of the Concerned Department – (Chairman)

Supervisor(s)

Expert from Department (nominated by supervisor & approved by HoD)

Expert from allied Department/ Discipline (nominated by supervisor & approved by HoD)

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

6. REQUIREMENT OF COURSE WORK and OTHER REQUIREMENTS

Requirement of course work for Ph.D.

Program	Qualification	Courses to be completed
Ph.D.	M.E. / M. Tech. / M. Arch./ M.Plan	12 credits (Two Courses)

RPC may recommend more course work if feel necessary. In addition to above, candidate will be required to undergo course in **Research Methodology** (Audit Course). Ph.D. candidate will be required to complete the course work within **one year** of joining the program.

Essentials:

1. The supporting Industry must give No Objection cum financial support certificate for the candidate citing his availability for the minimum contact period for completion of course work.
2. The supporting industry must certify the available research facility with specifications.
3. The desirous candidate must submit a SoP justifying his/her worthiness by giving the details of research contributions and achievements so far, Research Interests and other professional competencies.

7. MINIMUM DURATION OF PROGRAM

The minimum duration for TYPE A and B is **THREE** Years.

8. VALIDITY OF REGISTRATION

- 8.1** The registration will be valid for a period of 6 years from the date of registration and no further extension will be granted under normal circumstances.
- 8.2.** After 6 years, if a candidate wishes to continue research, he / she will be required to register again. A candidate should apply for re-registration before completion of 6 years of registration period. In case the candidate fails to do so, he will be required to register again following the procedure for fresh candidates.

9. PAYMENT OF FEES AND DEPOSITS

- a) Application fee for Ph.D. registration : **Rs. 500/-** Nonrefundable (Through DD drawn in favor of **Director, VNIT Nagpur**)
- b) The following table gives the existing fee structure for Ph.D. students. It may be noted that, this is subject to the revision from time to time.

	Head	Ph.D. Admission (One Time)	Ph.D. Full Time (Per Sem)	Ph.D. Full Time (Sponsored) (Per sem)
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
	Grant Total RS.	6400	12700	23800

At the time of joining candidate has to pay one time fees and per semester fees together (i.e Rs. 19100/- for Ph.D. full time and Rs. 30200/- for Ph.D. Full Time (Sponsored)).

Note:

1. The delay in payment of annual fees may invite cancellation of registration. Payment of fees is annual. Six-monthly seminar will not be conducted without payment of fees.
2. Students who will be staying in quarters will be required to pay license fees, water & electricity charges, etc. as applicable for occupation of these quarters as per the Estate Office Rule.
3. If the thesis submission is done after 30th June, candidate will be required to pay the fees for next academic session.

10. SYLLABUS FOR WRITTEN TEST

The syllabus for written test to be conducted) / Areas of Research for Admission to Ph.D. degree under DeitY.

SN	Name of Department	Syllabus for Written Test
1.	Electronics & Communication Engineering	a) Electronics Devices & Circuits, Analog Circuits b) Digital Circuits & Microprocessors c) Electromagnetics d) Electronic measurements f) Analog & Digital Communication g) Digital Signal Processing h) Computer Organization i) UHF & Microwave j) Linear Networks
2.	Computer Science Engineering	a) Programming & Data Structures b) System Programming/OS c) Compiler d) Theory of Computation e) Analysis of Algorithm f) Discrete Mathematics g) Computer Organization h) Database Management Systems i) Computer Networks
3.	Electrical & Electronics Engineering	a) Control Systems b) Electrical machines c) Power Systems d) Switchgear and Protection e) Power Electronics
4.	Centre for VLSI & Nano Technology	VLSI Implementation of Following Topics a) Electronics Devices & Circuits, Analog Circuits b) Digital Circuits & Microprocessors c) Electromagnetics d) Electronic measurements e) Analog & Digital Communication f) Digital Signal Processing g) Computer Organization h) UHF & Microwave i) Linear Networks

Annexure – I

1. No teaching assistantship will be paid to candidates admitted **industries sponsored scheme under DeitY** category.

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

Shri / Ms. _____ who is serving in this Industry/Organization/Institute from _____ as (designation) _____ is hereby sponsored for Ph.D. program in _____ Department of VNIT Nagpur. In case of his/her selection he/she will be relieved for the completion of course work and minimum stay at VNIT, Nagpur for 6-12 months as per the condition given on page 3 section 3.1.

Date : _____

Signature : _____

Name : _____

Designation : _____

Office Seal : _____