GOVERNMENT COLLEGE OF ENGINEERING & CERAMIC TECHNOLOGY

WEST BENGAL

An autonomous institute under

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY

Vide UGC letter number F.22-1/2017(AC) Dated 17th October, 2017

Information Brochure

Ph. D Program Admission 2022 -2023

Applications are invited for admission to the Doctor of Philosophy (Ph. D) program in Department of Information Technology and Department of Ceramic Technology with the following specialization area as listed below. The applicants who have cleared UGC-NET (including JRF)/ UGC-CSIR NET (including JRF)/SLET/GATE/teacher fellowship holders or passed M.E/M. Tech. or equivalent examinations from recognized institutes can apply directly. Selection of these candidates will be determined on the basis of their performance in the Interview and RET.

Table 1: Department of Information Technology

1.	Machine learning and its Applications
2.	Social Network Analysis
3.	Image Processing and its Applications
4.	Electronic Device analytics
5.	Mobile Computing and its Applications
6.	High performance Computing
7.	Theoretical Computer Science
8.	Data Science
9.	Network Security
10.	IOT and its applications

Table 2: Department of Ceramic technology

1.	Waste material utilization and characterization
2.	Tribomechanical characterization of materials
3,	Glass Technology
4.	Refractories
5.	Whiteware, Tiles, Insulators and Sanitaryware
6.	Metal Ceramic composites, Textile ceramic composites
7.	Nanoceramics
8.	Bioceramics and its applications
9	Advanced ceramics
10.	Cement and Concrete based material

1. Eligibility criteria for admission:

Candidates seeking admission to the Ph.D. program under the university must have minimum 55% marks or an equivalent CGPA in the qualifying Master's degree examination like M. E/M. Tech or equivalent examinations. Students with B.Tech degree in appropriate discipline may apply but have to appear in written examination.

Note:

❖ Candidates belonging to SC/ST/OBC (non-creamy layer)/Differently-abled categories shall have minimum 45% marks or an equivalent CGPA.

❖ A relaxation of 5% of marks, from 55% to 50%, may be allowed to the candidates, who obtained their Master's degree prior to 19th September, 1991.

❖ The eligibility marks of 55% (or an equivalent grade in a point scale wherever grading system is followed) and the relaxation of marks to the categories mentioned above are permissible based only on the qualifying marks without including the grace marks. 2. Selection of candidate:

The selection of a candidate shall be based on the performance in the interview conducted by the subject specific Ph.D Committees and Research Entrance Test (RET).

3. Fee structure:

a) Application fee- Rs 500/-

b) Enrolment interview fee- Rs 2,000/-

c) PhD Program admission fee- Rs 6,000/-

d) PhD thesis submission fee- Rs 19,500/-

4. Important dates:

 a) Last date for submission of online application: 18th June, 2023

 b) Research entrance test for IT department: 21st June, 2023.

   Research entrance test for CT department: To be announced

 c) Enrolment interview date- Shall be informed through email.

 5. Instructions for filling up the Application form

 (Those who are selected in the previous interview need not be required to apply but they have to appear for a research entrance test. Applicants who are qualified in GATE/NET/SLATE are not required to appear in RET as per rules of UGC.)

a) The payment receipt of application fee of Rs. 500/- so obtained after online payment is to be attached with the application.

 b) After payment of application fee, apply online at https://gcect.ac.in/ as per your eligibility for

 the Enrolment interview. Please read the instructions carefully to fill the correct application

 form.

 c) Discipline: Choose from the table1 or Table 2.

 d) If employed, upload the scanned copy of NOC(* Nobody will be allowed to appear in interview with original copy)

 e) Qualifications: Mention the highest degree first in a descending order.

 f) GATE/NET/SLET/Equivalent: Mention the details

 g) Fee details: Mention the reference number of online fee payment.

 h)The list of selected candidates in the interview shall be notified on the institute website.

6. Documents to be submitted:

 a) Print out of filled application form and payment receipt at the time of interview. b) Self-attested

 copy of all Mark sheets and degree certificates mentioned in the application form. c) Self-attested

 copy of GATE/NET/SLET or relevant certificate for exemption of Entrance Test. d) No objection

 certificate from employer in original along with Photo copy of the same, in case of employed

 applicant.

 e) Two photographs (Passport size), one to be affixed on this form and one without signature &

      seal to be attached (for use in the Ph.D. registration letter) with this form

PAYMENT DETAILS INSTRUCTION FOR PH.D. APPLICATION (ENROLLMENT INTERVIEW)

Please submit the Ph.D. Application fees (Enrollment Interview) through online banking (Gpay / Phonepay/ Paytm / Net Banking / others) of Rs. 500/- (Five Hundred only) to the Institute Bank account as –

Account Details: State Bank of India, Beliaghata branch

A/C No. 30089300316

IFSC code: SBIN0001798

After payment of application fee you have to apply online at https:// gcect.ac.in/ by creating login id then as per your eligibility for the Direct Enrollment Interview, , Rs 500/- fee payment receipt (FORMAT: Doc/ PDF / Image/ JPEG) and one combined file with Highest Qualification Mark Sheet , Certificate, NET or GATE Certificate (if any), Caste Certificate (if any) (FORMAT: Doc / PDF).

Government College of Engineering & Ceramic Technology
Department of Information Technology

Research Eligibility Test (RET) Syllabus as per Ph.D. regulation 2022-23

RET Syllabus on Research Methodology Component (50 Marks)

Research Formulation: Objectives and motivation of Research – Research Methodology *vs* methods. Types of research – Descriptive, Analytical, Applied, Fundamental, Quantitative, Qualitative, Conceptual, Empirical etc; Approaches to Research: Preparation of Schedule, Case study approach, Comparison approach, Definition approach, Descriptive approach, Evaluative approach, Exploratory approach, Interpretive approach, Narrative approach, Persuasive approach, Policy memorandum approach. Definition and formulation of the research problem – Selection of the problem - Necessity of defining the problem - Importance of literature review in defining a problem – Literature review – Primary and secondary sources – reviews, treatise, monographs-patents – web as a source – searching the web - Critical literature review – Development of working hypothesis.

Data Collection and analysis: Execution of the research - Observation and Collection of data - Methods of data collection – Sampling Methods- Data Processing and Analysis strategies - Generalization and Interpretation- Data visualization tools.

Reporting and thesis writing: Structure and components of reports - Types of report – Technical reports and thesis – Significance – Different steps in the preparation – Layout, structure and Language of typical reports – Illustrations and tables – Bibliography, referencing and footnotes- Text editing software basic (Latex).

Intellectual Property Rights: Intellectual property rights (IPR): kinds of property, nature of IP, basic principle, major IP, moral rights & economic rights; Copyright, Patent, Industrial Design, Trademark, Geographical Indication, Farmers' Right, IPR licensing & Technology Transfer; Reproducibility of IP and Accountability.

Philosophy and Ethics: Introduction to Philosophy: definition, nature and scope, concept, branches – Ethics: definition, moral philosophy, nature of moral judgments and reactions- plagiarism and self plagiarism-well known plagiarism software (e.g. Ithenticate)

Scientific Conduct: Ethics with respect to science and research – Intellectual honesty and research integrity – Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP) – Redundant Publications: Duplicate and overlapping publications, salami slicing – Selective reporting and misinterpretation of data.

Publication Ethics: definition, introduction and importance – Best practices / standards setting initiatives and guidelines: COPE, WAME, etc. - Conflicts of interest – Publication misconduct: definition, concept, problems that lead to unethical behavior and vice-versa, types – Violation of publication ethics, authorship and Contributorship – Identification of publication misconduct, complaints and appeals – Predatory publishers and journals.

Open access publishing: Open access publications and initiatives – SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies – Software tool to identify predatory publications developed by SPPU – Journal finder / journal suggestion tools viz., JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

Publication Misconduct: A) Group Discussions: Subject specific ethical issues, FFP, authorship – conflicts of interest – Complaints and appeals: examples and fraud from India and abroad. **- B) Software tools:** Use of plagiarism software like Turnitin, Urkund and other open source software tools, Smart referencing (open source reference management (RM) software, RM as SEO (Search Optimization Tool), Retraction (Databases & services, Inclusion in RM).

Databases, Research Metrics and Review: A) Databases: Indexing databases – Citation databases: Web of Science, Scopus, etc. **- B) Research Metrics:** Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score – Metrics: h-index, g index, i10 index, altmetrics- **C) Review process-** peer review, blind peer review

RET Syllabus for Subject-Specific Component (50 marks)

Same as GATE syllabus for Computer Science and Information Technology (CS)

Section1: Engineering Mathematics
Discrete Mathematics: Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Groups. Graphs: connectivity, matching, coloring. Combinatorics: counting, recurrence relations, generating functions.
Linear Algebra: Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition.
Calculus: Limits, continuity and differentiability. Maxima and minima. Mean value theorem. Integration.
Probability: Random variables. Uniform, normal, exponential, poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem.

Section 2: Digital Logic Boolean algebra
Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

Section 3: Computer Organization and Architecture
Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

Section 4: Programming and Data Structures
Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

Section 5: Algorithms
Searching, sorting, hashing. Asymptotic worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph search, minimum spanning trees, shortest paths.

Section 6: Theory of Computation
Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and context free languages, pumping lemma. Turing machines and undecidability.

Section 7: Compiler Design
Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation.

Section 8: Operating System
Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems.

Section 9: Databases
ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

Section 10: Computer Networks
Concept of layering. LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms (distance vector, link state). TCP/UDP and sockets, congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi-Fi. Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls