Indian Institute of Technology Guwahati, Guwahati-781 039, Assam, India.

DEPARTMENT OF CIVIL ENGINEERING

Phone : +91-361 2582450
Fax : +91-361- 2582440
Email : civiloff@iitg.ernet.in

Date : 18.05.2018

To,

Sub: Call letter for shortlisted candidates for **Written Test** and **Interview** for admission into the **Ph.D. Programme** in the Department of Civil Engineering, IIT Guwahati, starting **July 2018.**

Dear Applicant,

With reference to your application for admission into Ph.D. programme in the Department of Civil Engineering, you are hereby required to appear for a ***WRITTEN TEST*** *followed by* ***INTERVIEW*** for different specializations. The Written Test and Interview will be conducted as per the following schedule:

Document Verification, Written Test and Interview	**Date and time**	**Reporting Time**
Document Verification	9:00 AM onward 6th June 2018	8:00 AM
Written Test for All Specializations (in a sequence for different specializations)	6th June 2018 (11.00 AM onward)	
Interview for All Specializations (for candidates shortlisted after the written test)	7th June 2018 (9 AM onward)	

The venue for reporting and document verification to be held on 6th June 2018 is **4G3 and 4G4,** (class galleries located close to Civil Engineering Department).

Please note that, the **syllabus for written tests** are enclosed (**Annexure – A:** Environmental Engineering, **Annexure – B:** Earth System Science and Engineering, **Annexure – C:** Structural Engineering, **Annexure – D:** Geotechnical Engineering, **Annexure – E:** Transportation Systems Engineering, **Annexure – F:** Water Resources Engineering & Management and **Annexure – G:** Infrastructure Engineering and Management).

Please note the following:

Firstly, you will be required to bring your downloaded and signed copy of the Online Application Form (*If due to some reasons, you filled-up more than one online application forms, you have to bring the latest and updated one only*),

ALONG WITH:

1. Your colour photograph of size 4.5 cm. x 3.5 cm., affixed on it;

2. **Original Demand Draft** (from any nationalized bank) in favour of INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI, payable at Guwahati for the following amount:

- Rs.150/- for all female candidates
- Rs.150/- for all SC/ ST/ PwD candidates
- Rs.300/- for all other candidates

3. Self-Attested copy of your Date of Birth Certificate (if DoB is not mentioned in your Class X/XII Pass Certificate/Mark Sheet);
4. Self-Attested copy of your Caste Certificate, if applicable
5. Self-Attested copy of your 'PwD' Certificate, if applicable
6. The appropriate Form in original relating to candidate's Category [Sponsored (Full-Time)/Self-Financed/IITG's Project Staff/ Part-Time/External] - as per format prescribed in our Admission Notification for PhD programme, if applicable
7. Self-Attested copies of Pass Certificates and Mark Sheets [***Mark Sheets should be complete for all semesters/years*** of your educational qualifications (from Class X onwards)];
8. ***As may be applicable,*** copy of your qualifying degree Grade Point Average to Percentage conversion certificate (or proof thereof);
9. ***As may be applicable,*** attested copy of your valid GATE/CEED/NET (JRF)/INSPIRE Score Card.
10. ***As may be applicable***, attested copy of Certificates relating to your professional experience etc.

You are also required to bring all **ORIGINAL documents mentioned above** for verification on the day of your **Written Test and Interview.**

The candidates who have not completed qualifying degree may appear in the Written Test and Interview,

- if you have appeared in the qualifying degree examination and your results are awaited

OR

- if you are going to appear in all the subjects of your qualifying degree examination before **13-07-2018.**

Please note that, for such candidates, selections shall be provisional. All provisionally selected candidates shall have to produce their original pass certificates and Mark Sheets of the qualifying degree examination latest by **20-08-2018,** for regularization – failure to which their admissions shall stand automatically cancelled.

Please further note that:

For any other announcements, updates and results **as well as timely follow-up actions to be taken,** the candidates will have to constantly monitor the instructions available in the website with following URL:

http://www.iitg.ac.in/acad/admissions

and also see the webpage of concerned academic department/ center of IIT Guwahati.

Also, please note the following:

Accommodation for candidates has been arranged in IIT Guwahati Hostels. **However, you are required to bring your own bedroll**. Details about the hostel accommodation will be uploaded soon in the Civil Engineering Department website.

Yours sincerely,

18/5/18

Chandan Mahanta
Professor and Head, Department of Civil Engineering, IIT Guwahati

Annexure - A

Specialization: Environmental Engineering

Syllabus

Water and Wastewater:
Quality standards, basic unit processes and operations for water treatment. Drinking water standards, water requirements, basic unit operations and unit processes for surface water treatment, distribution of water. Sewage and sewerage treatment, quantity and characteristics of wastewater. Primary, Secondary and tertiary treatment of wastewater, effluent discharge standards. Domestic wastewater treatment, quantity of characteristics of domestic wastewater, primary and secondary treatment. Unit operations and unit processes of domestic wastewater, and sludge disposal.

Air and Noise pollution:
Types of air pollutants, sources effects on health, air pollution meteorology, air quality monitoring, law of mass conservation, air pollution control for gases as well as particulate matter, air quality standards, mathematics of dispersion of pollutants.
National ambient, Noise, sower, effects, measurement of noise, noise pollution control, mathematics of noise wave propagation.

Municipal Solid wastes:
Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal).

Annexure - B

Specialization: Earth System Science and Engineering

Syllabus

General Aptitude and graduate level engineering and science topics inclusive of Mechanics, Thermodynamics, Electromagnetic radiation, optics, Trigonometry, Probability and Statistics, Differential Equations, Integral and differential calculus, Coordinate geometry, Equilibrium, Alkali and Alkaline Earth Metals, Hydrocarbons, Environmental Chemistry, principles of remote sensing and solid earth.

Annexure - C

Specialization: Structural Engineering

Syllabus

Matrix algebra : Systems of linear equations; Eigen values and Eigen vectors.

Calculus: Functions of single variable; Limit, continuity and differentiability; local maxima and minima, Evaluation of definite and indefinite integrals, Partial derivatives; Total derivative; Gradient, Divergence and Curl.

Ordinary Differential Equation (ODE) : First order (linear and non-linear) equations; Second order linear equations with constant coefficients.

Solid Mechanics:
Stress and Strain at a point, Stress-strain relations, Theories of failures; Bending moment and shear force in statically determinate beams; Simple bending theory, flexural and shear stresses, shear centre; Uniform torsion, buckling of column.

Structural Analysis:
Statically determinate and indeterminate structures by force/ energy methods; Method of superposition; Analysis of trusses, arches, beams, cables and frames; Displacement methods: Slope deflection and moment distribution methods; Influence lines; Stiffness and flexibility methods of structural analysis.

Structural Materials: Structural steel - composition, material properties and behaviour; Concrete - constituents, mix design, short-term and long-term properties; Bricks and mortar.

Concrete Structures:
Working stress, Limit state design concepts; Design of beams, slabs, columns; Bond and development length; Prestressed concrete; Analysis of beam sections at transfer and service loads.

Steel Structures:
Working stress and Limit state design concepts; Design of tension and compression members, beams and beam- columns, column bases; Connections - simple and eccentric, beam-column connections, plate girders and trusses; Plastic analysis of beams and frames.

Annexure - D

Specialization: Geotechnical Engineering

Syllabus

Origin of soil, Phase relationships, Identification and classification ofsoils, Site investigation, and characterization of soils; Effective stress principle, Permeability of soils, Seepage, and flownets, Compressibility of soils, Terzaghi's one-dimensional consolidationtheory, Compaction of soils.Shear strength of soils, Effective stress and total stress strength parameters, Total and effective stress paths.

Earth retaining structures, Earth pressure theories, Design of retaining walls; Foundation types, selection, and design; Shallow foundations: Bearing capacity theories, Stress distribution, Immediate and consolidation settlement; Deep foundations: Load carrying capacity of piles, Stability of slopes and Embankments

Matrix algebra; Eigen values and Eigen vector; Limit, continuity and differentiability; Definite integral; Maxima and minima; Gradient, curl and divergence; Laplace transform; Mean, median, mode and standard deviation.

Annexure - E

Specialization: Transportation Systems Engineering

Syllabus

Transportation Engineering: Design of horizontal and vertical Curves; Pavement materials and Characterisation–Soil, aggregate, Bitumen, Emulsion; Design of bituminous mixes (MarshallMethod); Analysis and Design of flexibleand rigid pavements.

Traffic Engineering: Traffic studies on flow, speed, travel time - delay and O-D study, PCU, peak hour factor, parking study, accident study and analysis, statistical analysis of traffic data; Microscopic and macroscopic parameters of traffic flow, fundamental relationships; Control devices, signal design by Webster's method; Types of intersections and channelization; Highway capacity and level of service of rural highways and urban roads.

Transportation Planning:

Introduction to transportation planning; concept of travel demand and supply; four-stage sequential modeling approach; trip generation; trip distribution; modal split; trip assignment; travel demand management measures.

Annexure - F

Specialization: Water Resources Engineering & Management

Syllabus

Fluid Mechanics: Properties of fluids, fluid statics; Continuity, momentum, energy and corresponding equations; Potential flow, applications of momentum and energy equations; Laminar and turbulent flow; Flow in pipes, pipe networks; Concept of boundary layer and its growth.

Hydraulics: Forces on immersed bodies; Flow measurement in channels and pipes; Dimensional analysis and hydraulic similitude; Kinematics of flow, velocity triangles; Basics of hydraulic machines, specific speed of pumps and turbines; Channel Hydraulics - Energy-depth relationships, specific energy, critical flow, slope profile, hydraulic jump, uniform flow and gradually varied flow.

Hydrology: Hydrologic cycle, precipitation, evaporation, evapo-transpiration, watershed, infiltration, unit hydrographs, hydrograph analysis, flood estimation and routing, reservoir capacity, reservoir and channel routing, surface run-off models, ground water hydrology - steady state well hydraulics and aquifers; Application of Darcy's law.

Irrigation: Duty, delta, estimation of evapo-transpiration; Crop water requirements; Design of lined and unlined canals, head works, gravity dams and spillways; Design of weirs on permeable foundation; Types of irrigation systems, irrigation methods; Water logging and drainage; Canal regulatory works, cross-drainage structures, outlets and escapes.

Annexure - G

Specialization: Infrastructure Engineering and Management

Syllabus

Civil Engineering Materials: Introduction to building materials, Cement: Chemical composition, manufacturing, physical characteristics, hydration, properties of cement compounds, different types of cements, Aggregate: Coarse and fine aggregates, Influence of aggregate on the properties of concrete, aggregate selection. Fresh Concrete: Batching, Mixing, workability, effect of admixture, Hardened Concrete: mechanical properties of hardened concrete, Water-cement ratio, Porosity, Curing of concrete, Design of concrete mix: IS code recommendation, Brick: Raw materials, drying and burning, Strength and durability, mortar for masonry and strength of masonry, Timber, Seasoning and conversions, properties, tests, defects in timbers, Steel for reinforced concrete.

Tests on Civil Engineering Materials: Tests on materials: Physical tests on cement, fine and coarse aggregate, tests for workability, tests on hardened concrete, compression tests on cubes and cylinders, testing of bricks, water absorption and compressive strength, testing of reinforcement bar in tension.

Construction Management: Methods of construction management, Life cycle of construction projects, Stages of awarding contract, types of contract, contract documents, Principles of estimation, Principles of general and detailed specifications, Introduction to network based project management techniques: Defining activities and their interdependence, drawing of network, time and resource estimations, use of network as scheduling techniques, use of network as control techniques i.e. project monitoring.

Construction Technology: Construction of superstructure and substructures, Various construction methods: Excavation, Earth-moving, Drilling, Blasting, Dewatering, foundation, Finishing items, painting, flooring, brick works, Quality Management and Construction safety.