NOTIFICATION

Written test and/or interview for Ph.D. admission in the Department of Civil Engineering (Specialization: Environmental Engineering)

The schedule for written test and interview is as under:

Venue, Date & Time of Written test	Venue, Date & Time of Interview **(only for written test qualified candidates)**
Department of Civil Engineering. **14th October, 2019** **08:30 AM to 09:30 AM**	**Department of Civil Engineering.** **15th October 2019,** **09:00 AM onward**

You are required to report in person for Written Test and Interview at least 30 minutes before the above schedule at **Conference Room, Civil Engineering Department.**

Important Instructions:

1. If you are having your own valid fellowship i.e. CSIR/UGC JRF/INSPIRE/DBT/ICMR etc, please bring the self-attested copy of the same.
2. Copy of your project/dissertation/research articles published maybe brought at the time of interview, if available.
3. You are required to bring with you a hard copy of a 500 word STATEMENT OF PURPOSE related to the research proposal you intend to pursue.
4. **Other original documents/testimonials are not required at the time of written/interview.**
5. Please note that TA will be provided to attend the interview and/or written test (as mentioned in https://www.iitr.ac.in/admissions/pages/Phd.html). Kindly check this website and download the TA form. Submit the filled TA form along with relevant documents in the department office.
6. Accommodation will be provided in hostels subject to availability. Candidates may directly contact the individual hostels for accommodation.
7. Further, no request for change of date(s) and/or time for Interview/Written Test will be entertained under any circumstances.

Chairman, DRC **Head of Deptt.**

Syllabus for the written test for Ph.D. admission (Spring Semester 2019-20) to be held on 14th October, 2019

SYLLABUS FOR ENVIRONMENTAL ENGINEERING

Design of experiments, Reactor Modeling, kinetics, parameter estimation, RTD studies and flow regimes. Mixing in lakes, river self-purification, dynamics of DO, BOD and nutrients.
Chemistry of Natural Waters – Reaction stoichiometry, Basic concepts from equilibrium chemistry, Acid base reactions, Solubility of salts (soil chemistry) and related water quality parameters. Oxidation – Reduction reactions, Reaction kinetics. Heavy metals in water, Complex formation, metal speciation. Air Chemistry – General concepts of air chemistry, Stratospheric and Tropospheric chemistry

Introduction to Unit Operations and Processes Involved in Water Treatment, Course Material Removal Operations: Coarse Screens, Fine Bar Screens, Disc and Drum Screens, Pre-Settling Tank, Aeration-Iron and Manganese Removal. Coagulation and Flocculation: Rapid mixing, Floccultaion, Different Types of Flocculators like Baffled Channels, Mechanical Mixes. Sedimentation: Theoretical Concepts, Class-1 Clarification, Class-2 Clarification, Zone Settling, Compression. Filtration: General Features of Slow Sand and Rapid Sand Filter, Filter Media, Characteristics and Preparation, Different Operating Parameters Affecting the Filtration Performance, Hydraulics of Filtration and Backwashing Cycles, Removal Particles. Chemical Precipitation, Hardness Removal- Lime Soda Softening. Adsorption: Different Types of Adsorption, Adsorption Isotherms, Adsorption Kinetics in Batch Reactors, Breakthrough Curve and Design of Fixed Absorber. Principles of different membrane processes: Reverse Osmosis, Electrodialysis, Nanofiltration, Ultrafiltration, Microfiltration. Effect of Operational Parameters, Membrane antifouling techniques. Removal of nitrate, fluoride, iron, manganese, arsenic etc. from water. Disinfection-Chlorination, UV &Ozonation, Advanced Oxidation Processes.Sludge Treatment- Sludge generation & various methods of sludge treatment and disposal from water and wastewater treatment plants.

Biological Systems: Fundamentals of Microbiology and Biochemistry, Bioenergetics and Metabolism, Kinetics of Biological Growth. Design of municipal sewers, hydraulic profiles, hydraulic elements of sewers. Domestic wastewater characteristics, Flow equalization, population equivalent, Treatment flow chart. Screening & Grit removal, Activated Sludge Process: Substrate Utilization and Biomass Growth, Monod's Kinetics, Estimation of Kinetic Parameters, Process Description and its Modification, (F/M), mean cell residence time, oxygen requirement, Process Design,. Nitrogen Removal- Biological nitrification and Denitrification. Biological and Chemical phosphorus removal, Sedimentation of Activated Sludge. Advanced Activated Sludge Process- Sequencing Batch Reactor, Oxidation Ditch and membrane bioreactors. Biofilm Process: Trickling Filter, Biotower, Rotational Biological Contactor, Integrated Activated Sludge and Biofilm processes. Stabilization Ponds& Aerated Lagoons: Types and their description, Design, Operation and Maintenance.
Integrated solid waste management, legislations and regulations. Sources and Types of Solid Waste: Residential, commercial and industrial wastes, waste generation, sampling and analysis. Transformation of Solid Waste: Biological Processes: Composting and anaerobic Digestion Waste to Energy Process: Emission control and ash management. Disposal of Solid Waste: Siting, Design and construction, gas, leachete, stromwater movement and control, natural attenuation andcontainment landfills, closure of landfills, environmental monitoring.

The Environmental Impact Assessment Process, Basic Steps in EIA Process, EIA Notifications of MoEF, Project Screening and scoping for EIA, Initial Environmental Examination, public participation in environmental decision making. Industrial waste surveys, sampling and characterization. Green technologies, zero waste discharge units, environmentally balanced industrial complex (EBIC). ISO 9000 and ISO 14000 series of standards for environmental management. Waste treatment technologies, CEPTs, co-disposal with municipal waste.

Air Pollution: Introduction and scope, emission sources, stationary and mobile sources, types of air pollutants (criteria air pollutants, air toxics, greenhouse gases and noise), effects of pollutants on man, material and plants. Meteorology, transport, dispersion and transformation of pollutants in air, plume rise, effect of buildings and topography on the fate of air pollutants. Monitoring of indoor and ambient air quality, emission inventory, air pollution dispersion models, point, line and area source models, receptor modeling, stochastic models, compartment/box model. Carrying capacity of air sheds, local, regional and global issues of air pollution, summer and winter smog, acid rain and climate change. Air pollution control techniques, equipment's and their design, design of stacks, control of particulate matter and gaseous pollutants. Air pollution emission standards, air quality standards, control laws, regulations and legislations - national and international, technology and policy options for controlling air pollution, economics of air pollution control, case studies.

Shortlisted Candidates for PhD Interviews: Environmental Engineering
(Spring 2019-2020)

Sl . No	Application ID	Applicant Name
1.	RPHD19001015	PATIL ASHISH PRAVINSING
2.	RPHD19002883	JAYA YADAV
3.	RPHD19001964	BHARAT KUMAR MAHAJAN
4.	RPHD19002110	AKSHAY KUMAR SAGAR
5.	RPHD19001639	YUVRAJ SIDDHARTH
6.	RPHD19004663	IMRAN AHMAD
7.	RPHD19001654	SHUBHAM GUPTA
8.	RPHD19000628	SARIPALLI SIDDHARTHA
9.	RPHD19001207	SUBHASH KUMAR
10.	RPHD19000312	PUNDARIKAKSHA NATH
11.	RPHD19000681	BHANU PRATAP SINGH
12.	RPHD19001264	PANKAJ MEENA
13.	RPHD19000334	DIPAYAN LODH
14.	RPHD19001743	NAVEEN JEET PAL
15.	RPHD19000661	LEENA DHRUWA
16.	RPHD19003261	MINAKSHI PATEL
17.	RPHD19002078	VIKAS RAMESH MALL
18.	RPHD19000066	RAHUL KUMAR
19.	RPHD19001533	JASWANT SINGH
20.	RPHD19005189	SUBHANKAR DAS
21.	RPHD19002641	RASHI SINGH
22.	RPHD19003163	SAIMATUN NISA
23.	RPHD19002596	NEERAJ SAHU
24.	RPHD19005237	MRIDULA SHARMA
25.	RPHD19001719	DIVYA KUMAR
26.	RPHD19003230	TEKKALI SATYA DURGA VENKATESH
27.	RPHD19002871	ANUJ KUMAR
28.	RPHD19000372	CHANDER KANT
29.	RPHD19001473	SUMIT KUMAR
30.	RPHD19002343	RAHUL KUMAR
31.	RPHD19002977	SHOBHA RAWAT
32.	RPHD19002235	RAJESH KUMAR V
33.	RPHD19002216	ARUN KASHYAP
34.	RPHD19003246	ANKUR RAWAT
35.	RPHD19001424	MIR USMAAN KHALID
36.	RPHD19002363	GUNTAKALA VENKATANAGA CHANDRA
37.	RPHD19004749	ASHISH KUMAR MISHRA
38.	RPHD19005225	ANKIT NAINWAL
39.	RPHD19002395	MOHD WASI
40.	RPHD19002782	DINESH KUMAR
41.	RPHD19004267	GHULAM SARWAR
42.	RPHD19004969	SHUBHM DWIVEDI
43.	RPHD19001332	ANAND KUMAR
44.	RPHD19001632	ASHMITA DAS
45.	RPHD19002769	BHAWANA VERMA
46.	RPHD19003695	VINAY KUMAR
47.	RPHD19001504	SANDEEP KUMAR

48.	RPHD19001368	K RAGHU NAICK
49.	RPHD19003464	VARUN SINGH
50.	RPHD19005315	PRAVEEN KUMAR S
51.	RPHD19000567	MANISH KUMAR
52.	RPHD19001945	ANURAG SINGH
53.	RPHD19003009	NEHA G PASWAN
54.	RPHD19003480	GODI SUBODH
55.	RPHD19000763	SAROJ RANA
56.	RPHD19000147	BALKRISHNA CHOUBEY
57.	RPHD19001558	SWAYAM VID
58.	RPHD19002804	RISHI SHANDILYA
59.	RPHD19000931	DIXIT SHUBHAM RAJESH KUMAR
60.	RPHD19000597	ABBHISHEK ADHIKARI
61.	RPHD19000505	PALLAVI VERMA
62.	RPHD19001213	JASBIR SINGH
63.	RPHD19005278	SAI SHANKAR SAHU
64.	RPHD19001514	ABHINAV SINGH
65.	RPHD19002319	DHANANJAY SINGH SHYAMAL
66.	RPHD19005336	KAMALPREET SINGH
67.	RPHD19003129	ANJALI
68.	RPHD19000802	SWATI GAUTAM