

RAJIV GANDHI INSTITUTE OF PETROLEUM TECHNOLOGY, JAIS, AMETHI

(An Institution of National Importance Established under the Act of Parliament)

Department of Chemical Engineering and Biochemical Engineering

List of Shortlisted Candidates for
Written Test and Interview towards admission in PhD programme in CEBE

Following candidates were shortlisted for follow-up written examination and interview under the category mentioned for possible admission into the PhD programme in Odd Semester, 2021-22

1. Supernumerary Category

Sr. No.	Reg. No.	Name of Candidate
1	2117060	Aakash Rajpoot
2	2115721	CHAHAT KASHYAP
3	2117396	Deepali Sharma
4	2117934	YOGENDRA Kumar
5	2116748	ABHISHEK SINGH BHADOURIA

2. Full Time Regular Registration Category

Sr. No.	Reg. No.	Name of Candidate
1	2115866	ALOK YADAV
2	2117357	Amarendra Uttam
3	2117297	ANAMIKA MAURYA
4	2115906	Bhupendra Kumar
5	2117715	HEMANT KUMAR NAYAK
6	2115679	JAGANNATH PRASAD PATTANAYAK
7	2116310	Mousumi Das
8	2117762	Sachidananda Mohapatra
9	2116355	VIKASH KUMAR
10	2116699	VISHAL SINGH PAWAK

3. Part Time Registration Category

Sr. No.	Reg. No.	Name of Candidate
1	2116562	ACHAL SRIVASTAVA
2	2116659	ATUL VERMA
3	2116586	Mahendra Kumar
4	2116859	Pravesh Narain Singh
5	2116770	VIVEK KUMAR

The above short listing has been done on the basis of information provided by the applicant. If at any stage the information provided by the applicant is found incorrect, the application is liable to rejection.

Applicants who have qualifying degree from CFI/CFTI with CPI of 8.00 or above (on a 10.0 point scale) (supernumerary candidates), possessing external fellowship such as CSIR JRF, UGC JRF, DST INSPIRE etc., in part time and full time external category will be interviewed on 22nd July, 2021, 2 PM onwards for possible selection into the PhD programme.

The candidates in supernumerary category if fail to get selected in the interview will be evaluated under regular procedure by appearing for written test on 23rd July, 2021, 10-11 AM onwards

Other regular shortlisted candidates will appear for written test on 23rd July, 2021, 10-11 AM onwards. The Candidates those will qualify the written test will appear in the interview on 23rd July, 2021, 2 PM onwards for possible selection to PhD programme.

The final selection will be subjected to performances in GATE Score, written test & interview.

Syllabus for Written Test and Interview

Chemical Engineering

Mathematics:

Matrix algebra, Systems of linear equations, Eigen values and eigenvectors. Functions of single variable, Limit, continuity and differentiability, Taylor series, Mean value theorems, Evaluation of definite and improper integrals, Partial derivatives, Total derivative, Maxima and minima, Gradient, Divergence and Curl, Vector identities, Directional derivatives, Line, Surface and Volume integrals, Stokes, Gauss and Green's theorems. First order equations (linear and nonlinear), Higher order linear differential equations with constant coefficients, Cauchy's and Euler's equations, Initial and boundary value problems, Laplace transforms, Solutions of one dimensional heat and wave equations and Laplace equation. Definitions of probability and sampling theorems, Conditional probability, Mean, median, mode and standard deviation, Random variables, Poisson, Normal and Binomial distributions, Linear regression analysis. Numerical solutions of linear and non-linear algebraic equations. Integration by trapezoidal and Simpson's rule. Single and multi-step methods for numerical solution of differential equations.

Process Calculations and Thermodynamics

Steady and unsteady state mass and energy balances including multiphase, multi-component, reacting and non-reacting systems. Use of tie components; recycle, bypass and purge calculations; Gibb's phase rule and degree of freedom analysis.

First and Second laws of thermodynamics. Applications of first law to close and open systems. Second law and Entropy. Thermodynamic properties of pure substances: Equation of State and residual properties, properties of mixtures: partial molar properties, fugacity, excess properties and activity coefficients; phase equilibria: predicting VLE of systems; chemical reaction equilibrium.

Fluid Mechanics and Mechanical Operations

Fluid statics, surface tension, Newtonian and non-Newtonian fluids, transport properties, shell-balances including differential form of Bernoulli equation and energy balance, equation of continuity, equation of motion, equation of mechanical energy, Macroscopic friction factors,

dimensional analysis and similitude, flow through pipeline systems, velocity profiles, flow meters, pumps and compressors, elementary boundary layer theory, flow past immersed bodies including packed and fluidized beds, Turbulent flow: fluctuating velocity, universal velocity profile and pressure drop.

Particle size and shape, particle size distribution, size reduction and classification of solid particles; free and hindered settling; centrifuge and cyclones; thickening and classification, filtration, agitation and mixing; conveying of solids.

Heat Transfer

Equation of energy, steady and unsteady heat conduction, convection and radiation, thermal boundary layer and heat transfer coefficients, boiling, condensation and evaporation; types of heat exchangers and evaporators and their process calculations; design of double pipe, shell and tube heat exchangers, and single and multiple effect evaporators.

Mass Transfer

Fick's laws, molecular diffusion in fluids, mass transfer coefficients, film, penetration and surface renewal theories; momentum, heat and mass transfer analogies; stage-wise and continuous contacting and stage efficiencies; HTU & NTU concepts; design and operation of equipment for distillation, absorption, leaching, liquid-liquid extraction, drying, humidification, dehumidification and adsorption, membrane separations(micro-filtration, ultra-filtration, nano-filtration and reverse osmosis).

Chemical Reaction Engineering

Theories of reaction rates; kinetics of homogeneous reactions, interpretation of kinetic data, single and multiple reactions in ideal reactors, kinetics of enzyme reactions (Michaelis-Menten and Monod models), non-ideal reactors; residence time distribution, single parameter model; non-isothermal reactors; kinetics of heterogeneous catalytic reactions; diffusion effects in catalysis; rate and performance equations for catalyst deactivation.

Instrumentation and Process Control

Measurement of process variables; sensors and transducers; P&ID equipment symbols; process modeling and linearization, transfer functions and dynamic responses of various systems, systems with inverse response, process reaction curve, controller modes (P, PI, and PID); control valves; transducer dynamics; analysis of closed loop systems including stability, frequency response, controller tuning, cascade and feed forward control.

Materials Science and Engineering

Structure and Imperfections

Crystal symmetry, Point groups, Space groups, Indices of planes, Close packing in solids, Bonding in materials, Coordination and radius ratio concepts, Point defects, Dislocations, Grain boundaries, Surface energy, Equilibrium shapes of crystals

Characterisation Techniques

X-ray diffraction, spectroscopic techniques like UV-vis, IR, Raman, Optical and Electron microscopy.

Thermodynamics and Kinetics

Phase rule, phase diagrams, Solid solutions, Invariant reactions, Lever rule, Basic heat treatment of metals, Solidification and phase transformations, Fick's laws of diffusion, Mechanisms of diffusion, Temperature dependence of diffusivity

Properties of Materials

Stress-strain response of metallic, Ceramic and polymer materials, Yield strength, Tensile strength and modulus of elasticity, Toughness, Plastic deformation, Fatigue, creep and fracture
Electronic Properties: Free electron theory, Fermi energy, Density of states, Elements of band theory, Semiconductors, Hall effect, Dielectric behaviour, Piezo, Ferro, Pyroelectric materials