VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY: BURLA

(Formerly University College of Engineering, Burla-Established by Govt. of Odisha in 1956 &
Upgraded in 2009 to A State Govt. University Covered under Section 2(f) & 12(B) of UGC Act.)
P.O.: Engineering College, Burla (Siddhi Vihar), Dist.: Sambalpur – 768018, Odisha, INDIA
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No. VSSUT/PGSR/ 356/2019   Date:10.07.2019

NOTICE

Sub: **List of candidates provisionally shortlisted for Written Test for admission into M.Phil. Programme 2019.**

This is for information of all concerned that the **Written Test of M.Phil. Programme 2019 shall be held on 24.07.2019 at VSSUT, Burla as per detailed given below.** Further, it is to inform that the following candidates have been shortlisted for the Written Test as applicable.

No separate intimation for appearing the Written Test as applicable shall be sent to the candidates. Candidates are required to bring their Photo Identity card issued by Government/Institution for verification at the Examination Hall. The Written Test will be of single paper consisting of 50 Multiple Choice Questions of 50 marks of one hour duration as per syllabus available (Given below) in our University website: www.vssut.ac.in. The Written Test will start at 12.00 PM. The candidates are required to report at least 30 minutes before commencement of examination. No candidate will be allowed to appear the test after commencement of Written Test.

PROGRAMME (FOR WITTEN TEST)

Date of Written Test/ Interview	Time of Written Test	Name of the Department
24.07.2019 (Wednsday)	12.00 Noon to 1 PM	Chemistry, Mathematics, and Physics

SHORTLISTED CANDIDATES FOR **WRITTEN TEST**
FOR ADMISSION INTO M.Phil. PROGRAMME – 2019

CHEMISTRY

Ref./Roll No.	Name of the Candidate	Remarks
CHE-01	Sibani Rath	…
CHE-02	Satabdi Panda	…
CHE-03	Jyotsna Bindhani	…
CHE-04	Sushree Suman Dash	…
CHE-05	Soma Pradhan	M.Sc. Certificate
CHE-06	Jaya Prakash Behera	…
CHE-07	Akash Kumar Naik	…
CHE-08	Deepika Dehury	…
CHE-09	Premalata Malla	…
CHE-10	Asish Dandapat	…
CHE-11	Ankita Sahu	…
CHE-12	Rutuparna Mahakud	M.Sc. Marksheet and Certificate
CHE-13	Sheersha Pradhan	M.Sc. Marksheet and Certificate
CHE-14	Priyanka Priyadarsini Samal	M.Sc. Marksheet and Certificate
CHE-15	Asutosh Mishra	…
CHE-16	Abinash Kar	…
CHE-17	Debajani Tripatghy	…
CHE-18	Aradhana Bhanja	…
CHE-19	Abdul Farib Khan	…
CHE-20	Jasmini Panigrahi	…
CHE-21	Purandar Mahanta	…
CHE-22	Adrija Ghosh	M.Sc. Marksheet and Certificate
CHE-23	Patitapaban Mohanty	…
CHE-24	Pallishree Sahoo	…
CHE-25	Hrudeswar Mohanty	…

SHORTLISTED CANDIDATES FOR **WRITTEN TEST** FOR ADMISSION INTO M.Phil. PROGRAMME – 2019

<u>MATHEMATICS</u>

Ref./Roll No.	Name of the Candidate	Remarks
MATH-01	Bandana Nayak	…
MATH-02	Priya Mahanta	…
MATH-03	Sushree Swagatika	…
MATH-04	Nirakara Padhan	…
MATH-05	Rudra Prasad Pal	…
MATH-06	Digvijay Mahanta	…
MATH-07	Anwesha Mishra	…
MATH-08	Bharat Padhi	…
MATH-09	Sibani Pattanaik	…
MATH-10	Snehalata Kalari	…
MATH-11	Jagadish Chandra Dehury	…
MATH-12	Sita Majhi	…
MATH-13	Taramani Padhan	…
MATH-14	Sarojinee Naik	…
MATH-15	Nirbhaya Singh	…
MATH-16	Abinash Choudhury	M.Sc. Marksheet and Certificate
MATH-17	Srinibas Sahoo	…

SHORTLISTED CANDIDATES FOR **WRITTEN TEST** FOR ADMISSION INTO M.Phil. PROGRAMME – 2019

PHYSICS

Ref./Roll No.	Name of the Candidate	Remarks
PHY-01	Karubaki Jena	…
PHY -02	Tanmayee Patra	…
PHY-03	Debasmita Sahoo	…
PHY-04	Jayanta Kumar Panda	…
PHY-05	Swetangada Jena	…
PHY-06	Akanksha Sahoo	…
PHY-07	Chandra Shekhar Samal	…
PHY-08	Sangram Mohanty	…

LIST OF DOCUMENTS TO BE PRODUCED AT THE TIME OF ADMISSION

Sl. No.	Documents for Verification
1	Proof of Identity (Voter ID/PAN/Aadhaar Card/Passport/Driving License/Govt. ID Card)
2	HSC or equivalent Examination certificate showing Date of Birth
3	Pass Certificate of the +2 Science/Diploma Examination
4	Pass Certificate of the +3 Science/Arts
5	Pass Certificate of M.Sc. Examination
6	Memorandum of Marks of HSC Examination or equivalent Examination
7	Memorandum of Marks of +2 Science/Diploma Examination
8	Memorandum of Marks of +3 Science/Arts
9	Memorandum of Marks of M.Sc. Examination
10	Certificate in support of SC/ST category (as the case may be)
11	Original GATE/NET/Inspired Fellowship/Letter of any other Fellowship from Government Agencies
12	Synopsis of the Proposed Research Work (One Page)
13	Hard Copy of Publications (if any)

Sd/-
Dean, PGS&R

Memo No. VSSUT/PGSR/357(17) /2019   Date: 10.07.2019

Copy to :
1. All HODs for information and necessary action.
2. Dean, Faculty & Planning with a request to display in the notice of University website.
3. PA to V.C. for kind information of Hon'ble Vice Chancellor

Sd/-
Dean, PGS&R

SYLLABUS FOR WRITTEN TEST
PHYSICS

Mathematical Physics: Linear vector space; matrices; vector calculus; linear differential equations; elements of complex analysis; Laplace transforms, Fourier analysis, elementary ideas about tensors.

Classical Mechanics: Conservation laws; central forces, Kepler problem and planetary motion; collisions and scattering in laboratory and centre of mass frames; mechanics of system of particles; rigid body dynamics; moment of inertia tensor; noninertial frames and pseudo forces; variational principle; Lagrange's and Hamilton's formalisms; equation of motion, cyclic coordinates, Poisson bracket; periodic motion, small oscillations, normal modes; special theory of relativity – Lorentz transformations, relativistic kinematics, mass-energy equivalence.

Electromagnetic Theory: Solution of electrostatic and magnetostatic problems including boundary value problems; dielectrics and conductors; Biot-Savart's and Ampere's laws; Faraday's law; Maxwell's equations; scalar and vector potentials; Coulomb and Lorentz gauges; Electromagnetic waves and their reflection, refraction, interference, diffraction and polarization. Poynting vector, Poynting theorem, energy and momentum of electromagnetic waves; radiation from a moving charge.

Quantum Mechanics: Physical basis of quantum mechanics; uncertainty principle; Schrodinger equation; one, two and three dimensional potential problems; particle in a box, harmonic oscillator, hydrogen atom; linear vectors and operators in Hilbert space; angular momentum and spin; addition of angular momenta; time independent perturbation theory; elementary scattering theory.

Thermodynamics and Statistical Physics: Laws of thermodynamics; macrostates and microstates; phase space; probability ensembles; partition function, free energy, calculation of thermodynamic quantities; classical and quantum statistics; degenerate Fermi gas; black body radiation and Planck's distribution law; Bose-Einstein condensation; first and second order phase transitions, critical point.

Atomic and Molecular Physics: Spectra of one- and many-electron atoms; LS and jj coupling; hyperfine structure; Zeeman and Stark effects; electric dipole transitions and selection rules; X-ray spectra; rotational and vibrational spectra of diatomic molecules; electronic transition in diatomic molecules, Franck-Condon principle; Raman effect; NMR and ESR; lasers.

Solid State Physics: Elements of crystallography; diffraction methods for structure determination; bonding in solids; elastic properties of solids; defects in crystals; lattice vibrations and thermal properties of solids; free electron theory; band theory of solids; metals, semiconductors and insulators; transport properties; optical, dielectric and magnetic properties of solids; elements of superconductivity.

Nuclear and Particle Physics: Nuclear radii and charge distributions, nuclear binding energy, Electric and magnetic moments; nuclear models, liquid drop model – semi-empirical mass formula, Fermi gas model of nucleus, nuclear shell model; nuclear force and two nucleon problem; Alpha decay, Beta-decay, electromagnetic transitions in nuclei; Rutherford scattering, nuclear reactions, conservation laws; fission and fusion; particle accelerators and detectors; elementary particles, photons, baryons, mesons and leptons; quark model.

Electronics: Network analysis; semiconductor devices; Bipolar Junction Transistors, Field Effect Transistors, amplifier and oscillator circuits; operational amplifier, negative feedback circuits ,active filters and oscillators; rectifier circuits, regulated power supplies; basic digital logic circuits, sequential circuits.

SYLLABUS FOR WRITTEN TEST
CHEMISTRY

PHYSICAL CHEMISTRY

Structure: Quantum theory: principles and techniques; applications to a particle in a box, harmonic oscillator, rigid rotor and hydrogen atom; valence bond and molecular orbital theories, Hückel approximation; approximate techniques: variation and perturbation; symmetry, point groups; rotational, vibrational, electronic, NMR, and ESR spectroscopy

Equilibrium: Kinetic theory of gases; First law of thermodynamics, heat, energy, and work; second law of thermodynamics and entropy; third law and absolute entropy; free energy; partial molar quantities; ideal and non-ideal solutions; phase transformation: phase rule and phase diagrams – one, two, and three component systems; activity, activity coefficient, fugacity, and fugacity coefficient; chemical equilibrium, response of chemical equilibrium to temperature and pressure; colligative properties;

Kinetics: Rates of chemical reactions, temperature dependence of chemical reactions; elementary, consecutive, and parallel reactions; steady state approximation; theories of reaction rates – collision and transition state theory, relaxation kinetics, kinetics of photochemical reactions and free radical polymerization, homogeneous catalysis, adsorption isotherms and heterogeneous catalysis.

INORGANIC CHEMISTRY

Main Group Elements: General characteristics, allotropes, structure and reactions of simple and industrially important compounds: boranes, carboranes, silicones, silicates, boron nitride, borazines and phosphazenes. Hydrides, oxides and oxoacids of pnictogens (N, P), chalcogens (S, Se & Te) and halogens, xenon compounds, pseudo halogens and interhalogen compounds. Shapes of molecules and hard- soft acid base concept.

Transition Elements: General characteristics of d and f block elements; coordination chemistry: structure and isomerism, stability, theories of metal- ligand bonding (CFT and LFT), mechanisms of substitution and electron transfer reactions of coordination complexes. Electronic spectra and magnetic properties of transition metal complexes, lanthanides and actinides.

Instrumental Methods of Analysis: Atomic absorption and emission spectroscopy including ICP-AES, UV- visible spectrophotometry, NMR, mass, Mossbauer spectroscopy (Fe and Sn), ESR spectroscopy, chromatography including GC and HPLC and electro-analytical methods (Coulometry, cyclic voltammetry, polarography–amperometry, and ion selective electrodes).

ORGANIC CHEMISTRY

Stereochemistry: Chirality of organic molecules with or without chiral centres. Specification of configuration in compounds having one or more stereogeniccentres. Enantiotopic and diastereotopic atoms, groups and faces. Stereoselective and stereospecific synthesis. Conformational analysis of acyclic and cyclic compounds. Geometrical isomerism. Configurational and conformational effects on reactivity and selectivity/specificity.

Reaction Mechanism: Methods of determining reaction mechanisms. Nucleophilic and electrophilic substitutions and additions to multiple bonds. Elimination reactions. Reactive intermediates- carbocations, carbanions, carbenes, nitrenes, arynes, free radicals. Molecular rearrangements involving electron deficient atoms.

Organic Synthesis: Synthesis, reactions, mechanisms and selectivity involving the following alkenes, alkynes, arenes, alcohols, phenols, aldehydes, ketones, carboxylic acids and their derivatives, halides, nitro compounds and amines. Use of compounds of Mg, Li, Cu, B and Si in organic synthesis. Concepts in multistep synthesis- retrosynthetic analysis, disconnections, synthons, synthetic equivalents, reactivity umpolung, selectivity, protection and deprotection of functional groups.

Pericyclic Reactions: Electrocyclic, cycloaddition and sigmatropic reactions. Orbital correlation, FMO and PMO treatments.

Photochemistry: Basic principles. Photochemistry of alkenes, carbonyl compounds, and arenes. Photooxidation and photoreduction. Di-π- methane rearrangement, Barton reaction.

Heterocyclic Compounds: Structure, preparation, properties and reactions of furan, pyrrole, thiophene, pyridine, indole and their derivatives.

Biomolecules: Structure, properties and reactions of mono- and di-saccharides, physicochemical properties of amino acids, chemical synthesis of peptides, structural features of proteins, nucleic acids, steroids, terpenoids, carotenoids, and alkaloids.

Spectroscopy: Principles and applications of UV-visible, IR, NMR and Mass spectrometry in the determination of structures of organic molecules

SYLLABUS FOR WRITTEN TEST
MATHEMATICS

Real Analysis: Axioms of Choice, Countability, Bolzano-Weiestrass theorem, Heine-Borel theorem, Convergence of sequences and series of real numbers, Tests of Convergence, Cauchy Test, Uniform continuity, Sequences and series of functions, Uniform convergence. Power series, Weiestrass approximation theorem, Differentiation, Reimann-Stieltjes Integration, Function of several variables, Differentiability, Inverse function theorem, Implicit function theorem, Constrained maxima and minima.

Complex Analysis: Analytic functions, Power Series, Exponential and trigonometric functions, Conformal mapping, Riemann-Stieltjes integral, Power Series representation of Analytic functions, The index of a closed curve, Cauchy's theorem for rectangle, Cauchy theorem for disc, Cauchy's integral formula, Liouville's theorem, Fundamental theorem of Algebra, Morera's theorem, Open mapping theorem, Zeros, Poles, Classification of Singularities, Laurent Series, Residues, The Maximum Modulus theorem.

Functional Analysis: L^p – spaces, Inequalities in L^p – spaces, Completeness of L^p, Normed linear spaces, inner product spaces examples, properties of Normed linear spaces and inner product spaces, Hilbert spaces, Examples, orthonormal sets, Gram-Schmidt orthonormalizations, Orthonormal polynomials, Orthonormal basis, Fourier Expansion, Hahn Banach Theorem, Baire's category theorem, Open mapping Theorem, Closed graph theorem, Uniform boundedness Principle.

Numerical Analysis: Root finding for non-linear equations, Lagrange and Newton interpolations, Interpolating polynomials using finite differences, Hermite interpolation, Piecewise and Spline interpolation, Numerical differentiation, Numerical integration, Numerical Solution of system of linear equations, Numerical solution of ordinary differential equation.

Linear Algebra: Vector spaces over fields, subspaces, bases and dimension, Systems of linear equations, matrices, rank, rank-nullity theorem, duality and transpose, Eigenvalues and eigenvectors, characteristic polynomials, minimal polynomials, Cayley-Hamilton Theorem, triangulation, diagonal-lization, rational canonical form, Jordan canonical form.

Modern Algebra: Groups, Subgroups, Normal Subgroups, Quotient groups, Homomorphism, Isomorphism, Cyclic groups, Permutation groups, Symmetric groups, Cayley's Theorem, Sylow theorem, Application of Sylow Theorem, Free Abelian groups, Free Groups, Vector Spaces, Subspaces, Quotient spaces, Linear independence, bases, Dimension, Projection, Algebra of matrices, Rank of a matrix, Characteristic roots and Vectors, Matrix representation of a linear transformation.

Ordinary Differential Equation: System of first order equations, Existence and Uniqueness theorems, Successive approximation Picard's Theorem, Non Uniqueness of solutions, Existence and uniqueness of solution of systems, Strum Liouville's Problem green's functions, Picard's theorem.

Partial Differential Equation: Classification of first order Partial differential equations, Pfaffian differential equations, Lagrange's method, Compatible systems, Charpit's method, Jacobi's method, Integral surfaces passing through a given curve, Monge cone, characteristic strip, Classification of Second order Partial Differential Equations., One dimensional Wave equation, Vibration of an infinite string, origin of the equation, D'Alembert's solution,

Vibrations of a semi finite string, Vibrations of a string of finite length, Laplace equation , Boundary value problems, Maximum and minimum principles.

Measure Theory: Sigma Algebra of Sets, Borel sets of R, Lebesgue outer measure and its properties, Sigma Algebra of Measurable sets in R, Non-measurable sets, Lebesgue measure and its properties, Cantor set and its properties, Measurable functions, Simple functions, Integration of Nonnegative functions, Riemann and Lebesgue Integration, Monotone convergence theorem, Fatou's Lemma, and Dominated convergence theorem.

Topology: Bases, Subbases, Countability, closed sets, Limit Points, Continuous functions, Subspace topology, Product topology, and Quotient topology, Connectedness, Local connectedness, Path-connectedness, compact Spaces, compactness in metric spaces, locally compacts spaces, Regular and completely regular space, normal spaces.

Discrete Mathematical Structures: Permutation, Combination, Graphs: Basic terminology, Multi graph and Weighted graphs, Paths and circuits, Eulerian Paths and circuits, Hamiltonion Paths and circuits, Trees: Rooted trees, binary search trees, Spanning trees, Cut sets, Recurrence relations and recursive Algorithms, Boolean Algebras.

Linear Programming: Simplex Method, Primal and Dual Problem, Duality & Simplex method, Dual Simplex Method, Transportation Problem, Properties of transportation matrix, N-W corner rule, Vogel's approximation method, and Transportation algorithm, Assignment Problem, Two person zero sum games, Maxmin and Minmax principle.