The Research Eligibilty Test (RET) for the Department of Physics will be held from 11-30 AM to 1-30 PM on 5th April, 2012 at the Departmental Lecture Hall. The following applicants are required to appear for this test.

1. Chandima Paul

Candiates, who would have cleared the written test successfully will be required to appear for an interview on 21st April, 2012 at 12 Noon

The Following candidates are exempted from the written test, however they need to appear for an interview on 21st April, 2012 Noon

Sl.	Name	Reason for Exemption
1	Swarup Paul	GATE
2	Ayanendu Bishaye	NET

Details of the Written Test (RET):

Duration of the examination will be 2 hours (12 Noon -2 pm).

30 multiple choice questions will be set and all are to be answered.

Syllabus of the examination :

Mathematical Physics: (4 Questions)

Linear vector space; matrices; surface and volume integrals, vector calculus; linear differential equations; elements of complex analysis; Laplace transforms, Fourier analysis, Fourier Transform, Tensors, Group Theory,

Classical Mechanics: (4 Questions)

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: (4 Questions)

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: (4 Questions)

Physical basis of quantum mechanics; uncertainty principle; Schrodinger equation; one, two and three dimensional potential problems; particle in a box, harmonic oscillator, hydrogen atom; Operators in Hilbert space; angular momentum and spin; addition of angular momenta; time independent and independent perturbation theory; Variational Principle, elementary scattering theory – Born Approximation and Partical Waves.

Thermodynamics and Statistical Physics: (3 Questions)

Laws of thermodynamics; probability; macrostates and microstates; phase space; different 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: (2 Questions)

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: (3 Questions):

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 (3 Questions):

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 (3 Questions) :

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, flip-flops, counters, registers, A/D and D/A conversion.