KUVEMPU UNIVERSITY

Department of Studies in Physics
Jnanasahyadri, Shankarghatta-577451

KU/PHY; 315 ;2018-19 **Date : 03-12-2018**

Ph.D Entrance Exam-2018

We have received your application for Ph.D Programme-2018. The Department will be Conducting the entrance examination as a part of admission process. Details are given below.

Date of Exam. **:15-12-2018**
Examination Time **: 11.00 am – 2.00 pm**
Duration **:03 hrs**
Reporting Time **:10:00 am**
Venue **: Department of Studies in Physics, Kuvempu University.**

Question Paper Pattern

S. No	Type Questions	Research Methodology	Cognate Subjects	Marks per question	Total Marks
1	Objective-multiple choice	10	10	1	**20**
2	Short Notes (Answer any five)	4	4	6	**30**
3	Essays (Answer any four)	3	3	10	**40**
Maximum Marks for written entrance exam is. 90, Minimum pass marks is 45 (50%); for GM. and for SC/ST 40 (45%) except those fall under section 8.3.					
4	Viva Voce				**10**
Total Marks					**100**

Note:

1. Candidate should come with any personal ID card, and recent two passport size photos.
2. The Admission ticket will be issued before the commencement of examination on the same day.,
3. Candidates who have not enclosed the P.G Degree Marks cards/ recent Caste certificates (SC, ST, Cat-I, IIA, IIB, IIIA, IIIB,) should bring a copy of the same while appearing for the entrance examination.
4. **Ph.D entrance examination syllabus is enclosed**.
5. Only Foreign applicants are exempted from Entrance Examination**.**

--Sd—
Chairman

Copy to ; All Ph.D applicants

Syllabus for Ph.D., Qualifying Examination (Physics)

Research Methodology:

Research and its importance; Research method and research methodology; Types of research; Identification of the problem; Literature survey; Reference collection; Internet Browsing; Assessing the current status; Mode and design of approach; Actual investigation; Results and discussion; Conclusion; Presentation of a scientific paper; Multimedia techniques in paper presentation; Art of writing a research paper and a thesis;

Classical Mechanics:

Constraints and their classification; Degrees of freedom, Generalized coordinates and velocities. Principle of virtual work, D'Alembert's principle, Generalized forces, Lagrange's equation of motion. Properties of Lagrangian. Cyclic coordinates, Lagrangian of a simple harmonic oscillator. Simple problems using Lagragian formalism. Motion of a particle in a central force field, Conservation of energy and angular momentum, Kepler's laws of planetary motion. Hamiltionian Mechanics: Hamilton's equations of motion. Canonical coordinates, Cyclic coordinates, conservation laws. Canonical transformations, Generating functions. Poisson bracket and its properties. Hamilton's principle of least action.

Classical Electrodynamics:

Basic concepts of electrostatics and magneto statics, Coulomb's Law, Gauss' Law, Biot-Savart Law: Time-dependent fields; Faraday's Law, Ampere's Law: Maxwell's equations; Wave equation for electromagnetic field, Poynting theorem; Scalar and Vector potentials of EM field; Gauge invariance; Coulomb Gauge, Lorentz gauge; Wave propagation in dielectrics and conductors.

Quantum Mechanics:

The classical description and the inadequacy of Classical mechanics. Dual nature of matter and waves, Double-slit experiment for photons and electrons as an illustration. Waves, wave packets, phase velocity and group velocity. Canonically conjugate variables, General uncertainty principle. Position and momentum representations. Wavefunctions. Superposition principle. Schrödinger's equation. probability densities, probability current. Expectation values and Ehrenfest's Theorem. Continuity equation, Fundamental Postulates of Quantum Mechanics. Commutators. Eigenvalues and eigenvectors of a complete set of mutually commuting operators.

Angular Momentum: Concept of Spin: Stern Gerlach experiment: Addition of angular momenta: Clebsch Gordan coefficients; Singlet and Triplet states;

Simple Harmonic oscillator: Ground, excited state wave functions and energy levels;

Hydrogen atom; Ground and excited state wave functions and energy levels;

Statistical Mechanics:

Basic concepts of probability theory; Joint and conditional probabilities;

Concept of an ensemble; Types of ensembles; Micro and macrostates; Postulate of equal a priori probability, Ergodic hypothesis; Liouville theorem;

Partition function and its significance; Rotational, vibrational and electronic partition functions. Meaning of distribution function: Maxwell, Bose-Einstein and Fermi-Dirac distribution functions: Classical limit; Bose-Einstein condensation.