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ANNEXURE - ~~1068~~ - 21



UNIVERSITY DEPARTMENT OF PHYSICS
PATNA UNIVERSITY, PATNA
105 Years of Excellence

Letter No. Physics 21/2024

Date: - 27/01/2024

To,
The Registrar
Patna University, Patna

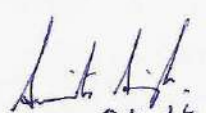
Subject: - Regarding Revised syllabus of Pre-Ph.D. Course Work of Physics 2024

Sir,

I am sending you the revised syllabus of Pre-Ph.D. Course Work 2024 Physics, Patna University, Patna duly approved by members of Departmental Council. This is for your kind information and necessary action.

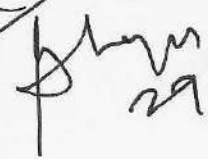
Thanking you

Yours Sincerely


27.01.24
Head

(Prof. Sumita Singh)
Department of Physics
Patna University, Patna

HEAD OF THE UNIVERSITY
DEPARTMENT OF PHYSICS
PATNA UNIVERSITY

S.O. (Head)

29/01/24

Sr. Asst

27/01/24

Physics
REVISED
SYLLABUS FOR PRE-Ph.D. COURSE WORK

SESSION:-2023-24

PART II (40 lectures)

II(a)(10 lectures-common to all groups):

Instrumentation: Measurement & Physics, principle, standards and calibration, instrumentation & system design, transducers & their characteristics, fluctuation & noise, signal to noise consideration.

II(b)(30 lectures):

General theory of relativity: still an evolving theory, various cosmological models, black hole & black energy, interrelation & interdependence of matter, space & time, theory of relativity & causality principle, theory of relativity & scientific materialism.

OR

Spontaneous symmetry breakdown & generation of mass, Lie groups with reference to $O(3)$, $Su(3)$ & Poincare group. Quark model & chromo dynamics, Standard model & Grandunified theories.

OR

Instrumentation for microwave, UV, NMR spectroscopy, crystal tonography, flame photometry, dispersion, dichroism, nephelometry, turbidometry, colourimetry, spectrophotometric titration, INDOR, ENDOR, NQR spectroscopes, mass spectrometer, Grotian diagram.

OR

Preparation of material & device fabrication (SSPD): Crystal growth, chemical & physical routes for nano-materials, polymers & composites, synthesis of thin films for research & technological applications, Ion-beam techniques. Device fabrication: oxidation, diffusion, ion implantation, metallization, lithography & etching, bipolar & MOSFET device fabrication.

OR

Instrumentation electronics: DMM, CRO, OP-AMP, analog signal processing, ADC & DAC, sampling & aliasing, IEEE 488 interface bus, USB, plug & play systems, basics of microcontrollers & data acquisition systems, digital interfacing, virtual instruments, labview.

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27.01.24
UNIVERSITY PROF & HEAD
DEPARTMENT OF PHYSICS
PATNA UNIVERSITY

OR

Application of MHD: Magnetostatic equilibrium, Magnetic topology, magnetic nulls, Plotting of magnetic nulls, Magnetic reconnection and its steady-state models, MHD Waves, Dynamo theory, application in astrophysical plasma. A brief introduction to the Sun, Role of MHD in explaining the solar phenomena.

OR

Amphiphiles assemblies and interactions

Introduction to amphiphile and their self-assemblies, thermodynamic principle of self-assembly, phase behaviour of amphiphile-water systems, Aggregation of amphiphilic molecules into micelles, bilayers, vesicles and biological membranes, the interactions between lipid bilayers and biological membranes: van der Waals, electrostatics, hydration, steric.

OR

(30 Lecture)

Electrostatic accelerators – Cockroft-Walton, Van-de-Graaff, Principle of tandem accelerator, Pelletron accelerator; Pulsed accelerators – cyclotron, synchrotron; Radio frequency linear accelerators; Superconducting linac, Radio frequency quadrupole, Ion Implanter, RBS – measurement of elemental ratios & concentrations, channeling RBS, ERDA – depth resolution & sensitivity, high resolution sub monolayer thickness studies, Nuclear Reaction Analysis (NRA), Particle Induced X-ray emission (PIXE) studies, Accelerator Mass Spectrometry (AMS), Medical applications of accelerators.

Ion stopping – Energy loss process Nuclear and Electronic energy loss, Ion range and range distribution, Radiation damage, Sputtering, Ion-Solid Simulations and diffusion, Ion beam driven surface Patterning and related theory.

- Book: 1) Ion-solid interactions: Fundamentals and applications by M Nastasi, J.W. Mayer, J.K. Hirvonem
 2) Materials Science with ion beams by Harry Bernas
 3) Accelerator Physics by S. Y. Lee
 4) Electrostatic Accelerators by R. Hellborg

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