



[Estd: 1917]

UNIVERSITY DEPARTMENT OF PHYSICS
PATNA UNIVERSITY, PATNA
103 years of Excellence

165
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Memo No. *Physics/308/2021*

Dated: 18.02.2021

To,
Examination Controller,
Patna University,
Patna

With reference to the letter number 2171/Examination, this is to inform you that following five students are doing Pre PhD coursework – 2021 in the department of Physics, Patna University, Patna

1. Sumit Kumar
2. Kumari Neha
3. Dharmendra Rai
4. Ravi Bhushan Singh
5. Kumari Sammy

The syllabus of Coursework for the subject of Physics is also attached with this letter.

S. Sheery
19.2.2021

Surabhi Prasad
Dr. Surabhi Prasad *18/2/2021*
HEAD OF THE UNIVERSITY
DEPARTMENT OF PHYSICS
PATNA UNIVERSITY

2. The marks, duration and structure of Question paper-

- i. Paper I, Total marks :100, Duration of examination: 3 Hrs
- ii. Paper II, Total marks : 100, Duration of examination: 3 Hrs
- iii. Having the distribution of marks in the Faculty of Education shall be 80 marks in written examination and 20 marks in practicum examination.

Both theory and practicum examination will be conducted at the end of the course work at the University level. There shall not be any CIA component in the PhD course work 2018 as it was not indicated in the Ph. D Ordinance and Regulations, 2016.

iv. The committee decided that the Structure of Question Paper to be set for the Written Test in Paper I as well as Paper II will have three sections namely Group A, Group B and Group C. Group A will have questions of objective type in nature, Group B have questions to be answered in short answer [Answer to be given in not more than 200 words] and Group C will have questions to be answered in details i.e. long. The details will be as mentioned in the following table :

Group	Type of Questions	Number of questions to be set	Number of questions to be answered	Marks on each question	Total marks
Group A	Multiple Choice (Objective)	10	10	01	10
Group B	Short Answer questions (Answer in not more than 200 words)	05	04	7.5	30
Group C	Long Answer questions	05	03	20	60
Total Marks					100

The Qualifying marks is 55% in each paper separately

25/15

18/12/21

PHYSICS SYLLABUS FOR PRE-Ph.D. COURSE

Part I (40 lectures)

21/12/21

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

Analytical & Numerical techniques for solving ODE & PDE, Runge-Kutta method & application, Numerical integration & Simpson's method, Monte Carlo integration, Tensor analysis, Fortran 90 or higher, Numerical recipes, Matlab & Mathematica.

~~21/12/21~~

1(b) (30 lectures)

Non-linear methods & chaos, period doubling and bifurcation, Lyapunov spectra, limit cycle-stability aspects, forced oscillations- Duffing's equation, Rossler attractor & Lorenz attractor, Logistic maps.

~~21/12/21~~

OR

Theory of relativity: a bit of history- pre-1905 scene, Galilean relativity, postulates of special relativity, Lorentz transformation- Einstein's approach and those of others, signal velocity, meaning of relativity of space & time and of time & quantum particles.

X

OR

Analysis of compounds by microwave, infrared & Raman spectroscopy, near I.R.F.T. Raman spectroscopy, photo-electron, atomic fluorescence spectroscopy, spin resonance & Mossbauer spectroscopy, solid state & surface spectroscopy, laser system involving high density gain media, plasma diagnostics technique & arc plasma.

~~21/12/21~~

OR

Vacuum techniques: production & measurement of rough to ultra high vacuum, design of vacuum systems, leak detection methods, vacuum materials.

~~21/12/21~~

Overviews of analytical instrumentation-X-ray measurements, TEM, SEM, AFM, electrical & magnetic measurements, UV-visible, FTIR, Raman, PL spectrometers, thermodynamic measurements(DTA & TGA), ellipsometry, mechanical properties & their measurements.

Prof. (Dr.) K.A. Witee — K.A. Witee 11.5.13

Dr. A. Narayan — A.N. 11.5.13

Dr. S. Singh — S.S. 11.5.13

Dr. S. Kumar — S.K. 11.5.13

Dr. R. Ramen — R.R. 11.5.13

21/12/21

Head Of The University Department of Physics Patna

21/12/21

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 considerations.

~~11/11/10~~

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.

~~11/11/10~~

OR

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

~~11/11/10~~

OR

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

~~11/11/10~~

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.

~~11/11/10~~

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

~~11/11/10~~

Y) K A. Mitra - ~~11/11/10~~
Narayan - ~~11/11/10~~
E. Singh - ~~11/11/10~~
S. Kumar - ~~11/11/10~~

~~11/11/10~~