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**Shri Mata Vaishno Devi University**  
**श्री माता वैष्णो देवी विश्वविद्यालय**  
Kakryal, Katra-182320 (J&K), India  
**School of Physics**

SMVDU/SoP/22/352

Dated: 07/11/2022

**Minutes of the 9<sup>th</sup> meeting of Board of Studies (BoS) of School of Physics (SoP) held on 31/10/2022 at 2.30 pm in hybrid mode**

The 9<sup>th</sup> meeting of board of Studies (BoS) of School of Physics (SoP), SMVDU was held on 31/10/2022 at 2:30 pm in hybrid mode (External members attended the meeting through online mode). Agenda of this meeting (which was finalized after consultations held internally with all the faculty members of the school), and was then circulated to all the worthy members of the board as listed in the table below:

S. No.	Name of BoS Participants	Affiliation
1.	Dr. S.K. Wanchoo	Associate Professor & Head, SoP Chairman (Ex-Officio)
2.	Prof. D.K. Pandya	Visiting Professor, Department of Physics IIT Jammu (Former Professor of Physics, IIT Delhi) External Member Expert
3.	Prof. Saumitra Mukherjee	Professor School of Environmental Sciences, JNU, New Delhi External Member Expert
4.	Prof. Ashok K. Sharma	Professor, SoP
5.	Dr. Yugal Khajuria	Associate Professor, SoP
6.	Dr. Jitendra Sharma	Assistant Professor, SoP
7.	Dr. Kamni	Assistant Professor, SoP
8.	Dr. Ram Prakash	Assistant Professor, SoP
9.	Dr. Pankaj Biswas	Assistant Professor, SoP Member Secretary, BoS of SoP
10.	Dr. Mudasir A. Mir	Assistant Professor, (contract) SoP
11.	Dr. Deepa Singh	Assistant Professor, (contract) SoP

At the outset, the chairman BoS on behalf of School of Physics placed on record deep sense of appreciation and gratitude to Prof. D.K. Pandya and Prof. Saumitra Mukherjee for providing constant

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*(Signatures of participants)*

guidance to the school which has greatly helped the school in shaping its academic programmes particularly the integrated program. He further stated that tenure of the current composition of BoS shall expire in the month of December. Thereafter the board shall once again be reconstituted by the Competent Authority.

Accordingly, based on the deliberations held during the meeting, the resolutions on individual agenda items are as follows:

**Agenda Item No. 9.1:**

**To confirm the minutes of the 8<sup>th</sup> Meeting of BoS, SoP held in October, 2021 via circulation.**

**Resolution:** *The minutes of 8<sup>th</sup> meeting of BoS stand confirmed.*

**Agenda Item No. 9.2:**

**To consider and ratify the detailed course contents of the course on Elementary Statistical Mechanics Lab applicable to the batch admitted in 2020-21.**

**Resolution:** *The Board deliberated on the agenda item and approved the same. The approved contents are appended as Annexure-I.*

**Agenda Item No. 9.3:**

**To consider the proposal to replace the course titled Basic Nuclear Physics Lab (PHP 3092) having L-T-P of 0-0-4) with new multidisciplinary course titled Energy Sources (PHL 3093 having L-T-P of 3-0-0) applicable to the batch admitted in 2020-21.**

**Resolution:** *The BoS accorded approval to the proposed change. The approved contents are appended as Annexure-II.*

**Agenda Item No. 9.4:**

**To consider and approve the detailed course structure and detailed contents for semesters I and II for the Integrated B.Sc. - M.Sc. (Physics) programme with multiple entry and multiple exit options as per NEP-2020 to be applicable for the batch admitted in 2022-23 and onwards.**

**Resolution:** *The board deliberated on the agenda item and discussed the structure and contents of all the proposed courses and approved the same with some modifications. The finalized structure and contents are appended as Annexure-III. This is to be made applicable for Academic Year 2022-23. Prof Pandya suggested that it would be advisable that all the universities of the region should make efforts to arrive at a common structure of courses so as to allow easy mobility of students under multiple entry and exit scheme of NEP-2020. It was further resolved that School of Physics shall come up with complete five year structure and contents with learning objectives and outcomes listed for each course which shall then be placed before BoS at its next meeting.*

**Agenda Item No. 9.5:**



To consider and approve the modified course on Research Methodology for Pre-Ph.D. students at school level.

**Resolution:** The Board considered the proposed changes and noted that same have been proposed by the course coordinator based on his experience after teaching the said course and unanimously resolved to approve the same. The finalized contents are appended as *Annexure-IV*.

**Agenda Item No. 9.6:**

To report the budgetary proposal submitted to Higher Education Department, J&K Government for implementation of NEP-2020 by the school.

**Resolution:** The board ratified the action taken by the School in having submitted the said proposal to the J&K Government through University Administration.

**Agenda Item No. 9.7:**

To report the invited lectures/ talks delivered by eminent experts in the school

**Resolution:** The board noted the information and appreciated the efforts made by the School in having organized these activities since the previous BoS was held.

**Agenda Item No. 9.8:**

To report the celebration of National Science Day by holding a Webinar on "Science is Fun" held at School of Physics SMVDU

**Resolution:** The board noted the information and appreciated the efforts made by the School in having organized these activities under the banner of National Science Day-2022 jointly with IAPT-RC02.

**Agenda Item No. 9.9:**

To report the bagging of meritorious positions by two B.Sc. (Hons.) Physics Sem-V students in NAEST 2022


**Resolution:** The board noted the information and appreciated the efforts made by the School in general and students in particular for bringing laurels to the University.

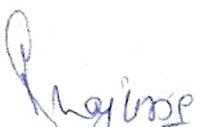
**Agenda Item No. 9.10:**


To report the successful defense of Ph.D. thesis by research students of the school since 6<sup>th</sup>, August -2021:


**Resolution:** The board noted the information and expressed satisfaction at the same.

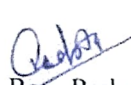
The decisions taken by the BoS of SoP as listed hereinabove were finally recommended for discussion and approval in the next scheduled Academic Council meeting of the University.

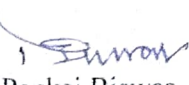
  
Prof. A.K. Sharma  
Professor  
Member


  
Dr. Yugal Khajuria  
Assoc. Professor  
Member

  
Dr. Jitendra Sharma  
Asstt. Professor  
Member

  
Dr. Kamini  
Asstt. Professor  
Member

  
Dr. Ram Prakash  
Asstt. Professor  
Member

  
Dr. Pankaj Biswas  
Asstt. Professor  
Member

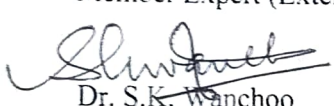
  
Dr. Deepa Singh  
Asstt. Professor (Contract)

(See Pg 19 of 19)


Dr. Soumitra Mukherjee  
Professor  
Member Expert (External)

(See Pg 19 of 19)

Prof. D.K. Pandaya  
Professor  
Member Expert (External)

  
Dr. S.K. Wanchoo  
Assoc. Professor & Head, SoP  
Chairman

Submitted for your kind consideration and necessary action for approval of the same in the forthcoming Academic Council meeting.

  
Dr. Pankaj Biswas  
Member Secretary BoS, SoP

To

All members for the information.

Copy to:

1. Registrar, SMVDU for kind information
2. Dean (AA) for information.
3. PS to VC for kind information of the Hon'ble Vice Chancellor.
4. Concerned file.

Annexure-I**Elementary Statistical Mechanics Lab  
(PHP-3062)****0-0-4**

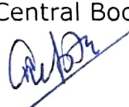

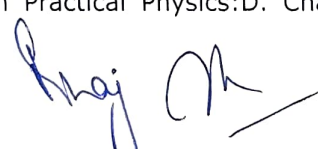



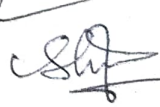
Choose & perform any 5 experiments from the list given below:

Sessions on the review of experimental data analysis, sources of error and their estimation in detail, writing of scientific laboratory reports including proper reporting of errors.

1. To determine Mechanical Equivalent of Heat,  $J$ , by Callender and Barne's constant flow method.
2. Measurement of Planck's constant using black body radiation.
3. To determine Stefan's Constant.
4. To determine the coefficient of thermal conductivity of Cu by Searle's Apparatus.
5. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton's disc method.
6. To determine the temperature co-efficient of resistance by Platinum resistance thermometer.
7. To study the variation of thermo emf across two junctions of a thermocouple with temperature.

**References:**

1. Advanced Practical Physics for students, B.L. Flint & H.T. Worsnop, 1971, Asia Publishing House.
2. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11<sup>th</sup> Edition, 2011, Kitab Mahal, New Delhi.
3. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal, 1985, Vani Publication.
4. Practical Physics, G.L. Squires, 2015, 4th Edition, Cambridge University Press
5. An Advanced Course in Practical Physics: D. Chattopadhyay & P.C. Rakshit (New Central Book Agency)

## Annexure-II

### Energy Sources (PHL 3093)

(3-0-0)

#### Unit-I

(12)

##### Types of sources

Introduction to Energy, conservation and various forms such as heat (thermal), light (radiant), mechanical, electrical, chemical, and nuclear energy. Conventional energy sources such as natural gas, oil, coal, or nuclear. Global scenario of energy sources. Renewable Energy Scenario. Energy resources and their utilization, national grid for the gas distribution, gas conservation, nuclear power programme, energy parameters, and rational use of energy, energy efficiency and conversion.

#### Unit-II

(8)

##### Energy and Environment

Introduction to environmental aspects of electric energy generation- atmospheric pollution, hydrocarbons, particulates, thermal pollution, hydroelectric projects, nuclear power generation and environment, operational safety in nuclear plants and disposal of waste, impact of renewable energy generation on environment, cost of electricity production from various sources

#### Unit-III

(8)

##### Solar Energy harvesting

Solar radiation and its measurement, solar thermal energy collectors, solar thermal energy conversion systems, solar photovoltaic system

#### Unit-IV

(12)

##### Energy resources technology

Different types of energy source technologies- Wind energy, small hydropower energy, geothermal energy, ocean energy, biomass energy, fuel cells.

*Note:- As a part of this course students shall be encouraged to do self studies on various topics of their interest based on but not limited to various energy models, field visits to various plants etc*

##### Text book:

1. Renewable energy sources and technologies, Kothari, Singal & Ranjan, PHI, 2011.

##### Reference books:

1. Godfrey Boyle, "Renewable Energy, Power for a sustainable future", Oxford University Press, in association with The Open University, 2004.

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Annexure-IIISchool of Physics, Shri Mata Vaishno Devi University

School of Physics [Credit breakup scheme as per NEP-2020 & draft NHEQF for Bachelors Degree Programme] Applicable for batch admitted in AY 2022-23 [First Year]

First Year			[10 credit exit bridge course of 2 months]#
Semester/ Type of course	I	II	Certificate [Level-5]
Major Course (Physics) (4 Credits)	Mechanics 3hrs (3credits) [PHL1023] Mechanics Lab 2hrs (1 credits) [PHP1022]	Electrodynamics & EM Waves 3hrs (3credits) [PHL1026] Electrodynamics & EM Waves Lab 2hrs (1 credit) [PHP1026]	
Minor Course (Physics) (4 Credits)	Thermal Physics 3hrs (3 credits) [PHL1024] Thermal Physics Lab 2hrs (1 credits) [PHP1024]	Physical Optics 3+1 (4 credits) [PHL1027] Physical Optics Lab 2 hrs (1 credits) [PHP1027]	-
Multidisciplinary (MD I & II) (3 Credits)	Basic Instrumentation Skills 3hrs (3 credits) [PHE1025] Choose one course from MD-I offered by other schools or MD I offered by School of Physics	Energy Sources 3hrs (3 credits) [PHE1028] Choose one course from MD-II offered by other schools or MD II offered by School of Physics	
Ability Enhancement course (AEC) (3 Credits)	Choose one course from the pool of courses from AEC – I : English Language (General), Communication Skills, Mathematical Ability [Inhouse / Swyam platform] (3 credits)	Choose one course from the pool of courses from AEC – II : English Language (General), Communication Skills, Mathematical Ability [Inhouse / Swyam platform] (3 credits)	-
Skill Enhancement course (SEC) (2 Credits)	Choose one from the pool of courses SEC – I. [Inhouse / Swyam platform] (2 Credits)	Choose one from the pool of courses SEC – II. [Inhouse / Swyam platform] (2 Credits)	
Value addition courses (VAC) (2+2 Credits)	Choose two from the pool of courses VAC-I & VAC-II [Inhouse / Swyam platform] (4 credits (2 courses of 2 credits each))	Choose two from the pool of courses VAC-III & VAC-IV [Inhouse / Swyam platform] (4 credits (2 courses of 2 credits each))	
Total credits	20	20	10
Exit options			Certificate [50]

#Undergraduate Certificate (Field of study/ discipline). (Programme duration: First year (first two semesters) of the undergraduate programme, followed by an exit 10-credit bridge course(s) lasting two months, including at least 6-credit job-specific internship/apprenticeship that would help the graduates acquire job-ready competencies required to enter the workforce. (10 credits)

## Detailed Syllabi for Integrated B.Sc. Physics Semester I

### Major (Part –A)

#### **Mechanics (PHL-1023)**

**(3-0-0)**

##### **Unit-I**

##### **Non-Inertial Systems and Fictitious Forces**

12

Unit vectors, Displacement, Velocity, Acceleration, Area and Volume elements in Cartesian and Plane Polar coordinates, Dynamics Using Polar Coordinates; Galilean Transformation; Uniformly Accelerating Systems; The Principle of Equivalence; Physics in a Rotating Coordinate System–Rate of Change of a Rotating Vector, Time Derivative of a Vector, Velocity and Acceleration, Fictitious Forces in a Rotating Coordinate System.

##### **Unit-II**

##### **Collisions and Conservation Laws**

10

Concept Centre of Mass; Elastic Collision in Laboratory and Centre of Mass Coordinates; Relationship between Displacement, Velocities, Kinetic energies and Angles in Laboratory and Centre of Mass Coordinates.

##### **Unit-III**

##### **Central Force Motion**

10

Central Force Motion as a One-body Problem; Universal Features of Central Force Motion –Consequences of the Conservations of Angular Momentum and Energy, The Effective Potential, The Formal Solution for Central Force Motion; The Energy Equation and Energy Diagrams; Planetary Motion – Hyperbolic Orbits, Elliptic Orbits and Planetary Motion.

##### **Unit-IV**

##### **Rigid Body Motion**

9

The Vector Nature of Angular Velocity and Angular Momentum; The Gyroscope; Examples of Rigid Body Motion; Conservation of Angular Momentum; Rigid Body Rotation – Angular Momentum and the Tensor of Inertia, Principal Axes, Rotational Kinetic Energy of a Rigid Body, Rotation about a Fixed Point.

##### **Text Book:**

1. An Introduction to Mechanics, 2nd Ed., D. Kleppner, R. Kolenkow, McGraw-Hill, 2014.

##### **Reference Books:**

1. Mechanics, Berkeley Physics, vol. I, C. Kittel, W. Knight, et al., Tata McGraw-Hill, 2007.
2. Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000.



Major (Part-B)**Mechanics lab  
(PHP-1022)****(0-0-2)**

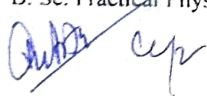
Choose a minimum of 5 experiments from the list given below:

1. To determine the Young's modulus of material of a metallic bar by bending of beam method.
2. To determine the coefficient of viscosity of highly viscous liquid by Stoke's method.
3. To find the surface tension of water by Jaeger's Method.
4. To determine the value of 'g' using bar pendulum.
5. To determine the Moment of Inertia of a Flywheel.
6. To determine the Elastic constants of a wire by Searle's method.
7. To find modulus of rigidity by Maxwell's needle.
8. To determine the moment of inertia of objects of regular shapes (rod, sheet, cylinder, sphere, spherical shell) and verify the parallel and perpendicular axes theorems.
9. To study oscillations of a bifilar pendulum.

*Note: - Emphasis shall be laid on the technological application of the concept and it's planning & methodology should be of the nature of study rather than obtaining the value of physical constant. A section on discussion of the results of study shall be included by the students in their report/ practical file. Objective learning goals and concept understood shall be defined for each experiment.*

**Reference Books:**

1. Advanced Practical Physics for Students, Worsnop and Flint, Methuen & Co. Ltd., 1957.
2. B. Sc. Practical Physics, C. L. Arora, S. Chand., 2001








Minor (Part -A)**Thermal Physics  
(PHL 1024)****(3-0-0)****Unit-I****Thermodynamics-I****10**

Thermodynamic system, Zeroth law of thermodynamics, concept of heat, thermodynamic equilibrium, work and their path-dependence, internal energy, First law of thermodynamics, specific heat of a gas, applications of first law of thermodynamics, work done during the isothermal and adiabatic process, reversible and irreversible process, heat engine, definition of efficiency, carnot's ideal heat engine.

**Unit-II****Thermodynamics-II****10**

Second Law of thermodynamics, carnot's theorem, steam engine, internal combustion engine, diesel engine, multi-cylinder engine, concept and physical significance of entropy, change in entropy, principle of increase of entropy, T-S diagram, thermodynamical scale of temperature. Third law of thermodynamics, zero point energy.

**Unit-III****Thermodynamical relations****10**

Thermodynamic variables, extensive and intensive variables, Maxwell thermodynamical relations and their applications, clausius-clapeyron's equations, thermodynamical potentials and significance, relation of thermodynamical potentials with their variables, relation between  $C_p$ ,  $C_u$  and  $\mu$ , adiabatic stretching of a wire, Joule-Kelvin coefficient, Phase transitions.

**Unit-IV****Liquefaction of gases****10**

Methods of Liquefaction of gases, method of freezing mixture, cooling by evaporation under reduced pressure, cooling by adiabatic expansion, Joule-Thomson expansion, regenerative cooling, liquefaction of air, principle of cascade cooling, liquefaction of various gases including helium I and II, production of low temperature, conversion of magnetic temperature into Kelvin temperature, measurement of very low temperature, superconductivity and Meissner effect.

**Text Book:**

1. Heat, thermodynamics & statistical physics, Lal and Subrahmanyam, S Chand, 2018.

**Reference Books:**

1. Thermal physics, Robert F. Sekerka, Elsevier, 2015.

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Minor (Part -B)**Thermal Physics Lab  
(PHP 1024)****(0-0-2)**

Choose a minimum of 5 experiments from the list given below:

1. To determine the thermal conductivity of a bad conductor by the Lee's disc method.
2. To determine the ratio of the specific heats of air by Kundt's tube method.
3. To determine the thermal conductivity of a good conductor by Searle's method.
4. To determine the value of Stefan's constant.
5. To determine the specific heat of a liquid by the method of Newton's law of cooling correction.
6. To find the latent heat of fusion of ice by the method of mixture.
7. To determine specific heat of bad conductor by method of mixture.
8. To find the thermal conductivity of rubber.
9. To study the heating efficiency of electrical kettle with varying voltages.
10. To measure the thermo emf of a given thermo couple.
11. To study the thermal behavior of an electric bulb (filament/torch light bulb).
12. To study of variation of resistance with temperature - thermistor.
13. To verify Stefan's law using a torch bulb.
14. To determine the coefficient of thermal expansion of a metallic rod using an optical lever, mutual inductance between a pair of coils using a ballistic galvanometer.

*Note: - Emphasis shall be laid on the technological application of the concept and it's planning & methodology should be of the nature of study rather than obtaining the value of physical constant. A section on discussion of the results of study shall be included by the students in their report/ practical file. Objective learning goals and concept understood shall be defined for each experiment.*

**Reference Books:**

1. Practical Physics by G L Squires Cambridge University Press, 2001.
2. An Advanced Course in Practical Physics by D. Chattopadhyay, P.C. Rakshit, New Central Book Agency, 1990.
3. B. Sc Practical Physics by C. L. Arora, S. Chand, 2001.

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Multidisciplinary (MD-I)**Basic Instrumentation Skills  
(PHL 1025)****(3-0-0)****Unit-I****Basics of Measurement****(4)**

Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance.

**Unit – II****Electronic multimeter****(4)**

Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance.

**Unit-III****Oscilloscope:****(6)**

Block diagram of basic CRO. CRT, electrostatic focusing and acceleration (Explanation only– no mathematical treatment), brief discussion on screen phosphor, visual persistence. Time base operation, synchronization. Front panel controls. Applications of CRO. Introduction to DSO.

**Unit- IV****Signal and pulse Generators:**

Block diagram, explanation and specifications of low frequency signal generator and pulse generator. Brief idea for testing, specifications. Distortion factor meter, wave analysis.

**Basic Instrumentation Skills (Hands-on component)**

*Sessions on use of various measuring instruments for measurement of current, voltage, frequency, resistance, capacitance using instruments such as Voltmeter, Ammeter, Multimeter, CRO etc. Sessions on experimental data analysis and its application to specific experiments shall also be done in the lab.*

**Text Book:**

1. Electronic Instrumentation, H.S. Kalsi, 3rd Ed. Tata McGraw Hill.

**Reference Books:**

2. Electronic Devices and circuits, S. Salivahanan & N. S.Kumar, 3rd Ed., 2012, Tata Mc-Graw Hill

*(Signatures)*

## Detailed Syllabi for Integrated B.Sc. Physics Semester II

### Major (Part –A)

## Electrodynamics & EM Waves (PHL-1026)

(3-0-0)

### Unit I Vector Analysis

4

Scalar and Vector Fields; Del Operator; Gradient, Divergence and Curl and their Physical Significance; Solenoidal Fields; Irrotational Fields; Line, Surface and Volume Integrals; The Fundamental Theorem for Gradients, Divergences and Curls; Spherical and Cylindrical Coordinates.

### Unit II Electrostatics

8

Gauss's Law in integral and differential forms and its applications; Line Integral of Electric Field, Conservative Nature of Electric field; Electric Field as the Negative Gradient of Potential; Poisson's and Laplace's equations; Boundary conditions satisfied by  $\vec{E}$  at the interface between two media.

### Unit III Magnetostatics

9

Line, Surface and Volume Current Densities; Ampere's circuit law in Integral and Differential forms, Modified Ampere's Circuit Law, Displacement Current, Divergence and Curl of Magnetic Field, Magnetic Vector Potential, Boundary conditions satisfied by  $\vec{B}$  at the interface between two media.

### Unit IV Time Varying Fields

8

The Continuity Equation; Poynting Theorem and its Differential Form; Newton's Third Law in Electrodynamics; Maxwell's Stress Tensor; Conservation of Momentum; Angular Momentum.

### Unit IV Electromagnetic Waves

12

The Wave Equation; Sinusoidal Waves; Boundary Conditions – Reflection and Transmission; Polarization; The Wave Equations for  $\vec{E}$  and  $\vec{B}$ ; Monochromatic Plane Waves; Energy and Momentum in Electromagnetic Waves; Propagation in Linear Media, Reflection and Transmission at Normal and Oblique Incidence, Derivation of Laws of Reflection and Refraction. Electromagnetic Waves in Conductors: Modified Wave Equations, Skin Depth and Characteristic Impedance.

#### Text Book:

1. Introduction to Electrodynamics, D. J. Griffiths, 3<sup>rd</sup> Ed. Pearson.

#### Reference Books:

1. Schaum's Outline of Electromagnetics, J. A. Edminister, 4<sup>th</sup> Ed. Tata McGraw Hill
2. Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education.

Major (Part -B)**Electrodynamics & EM Waves  
(PHP-1026)****(0-0-2)**

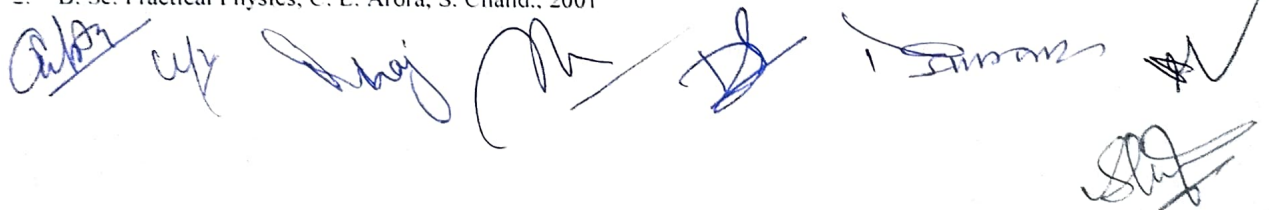
Choose & perform any 5 experiments from the list given below:

1. To measure field strength  $B$  and its variation in a Solenoid (determined  $B/dx$ ).
2. To find Capacity of a Capacitor by Electrical vibrator.
3. To find the Impedance of series LCR circuit.
4. To find low resistance by Carey Foster Bridge (Calibrating Bridgewire).
5. To determine the temperature coefficient of the material of a coil using a Carey-Foster's bridge.
6. Find Horizontal component of Earth's magnetic field by using vibration and deflection magnetometer.
7. To find Self-inductance by Anderson's bridge.
8. To measure the self-inductance of two coils, mutual inductance between these coils and the coefficient of coupling by Anderson's bridge method.
9. To calibrate a ballistic galvanometer.
10. To determine the mutual inductance between a pair of coils using a ballistic galvanometer.

*Note: - Emphasis shall be laid on the technological application of the concept and it's planning & methodology should be of the nature of study rather than obtaining the value of physical constant. A section on discussion of the results of study shall be included by the students in their report practical file. Objective learning goals and concept understood shall be defined for each experiment.*

**Reference Books:**

1. Advanced Practical Physics for Students, Worsnop and Flint. Methuen & Co. Ltd., 1957.
2. B. Sc. Practical Physics, C. L. Arora, S. Chand., 2001





Minor (Part –A)**Physical Optics  
(PHL-1027)****(3-0-0)****Unit –I****Interference****(10)**

Interference of light, conditions for interference, Young's double slit experiment, division of wavefront - Fresnel's biprism & mirror and Lloyd's Mirror. Interference by division of amplitude – plane parallel film, wedge shaped film. Newton's Ring. Interferometer - Michelson and Fabry-Perot.

**Unit –II****Diffraction****(10)**

Introduction to diffraction. Fresnel's and Fraunhofer's class of diffraction. diffraction by a rectangular aperture, circular aperture, single slit, n slits, diffracting grating and single edge. Resolving Power of Optical Instruments - Rayleigh's criterion and resolving power of telescope, microscope & grating.

**Unit –III****Polarization****(10)**

Introduction to polarization of light, circular and elliptical polarized light, production of plane polarized light, production and detection of circular and elliptically polarized light, applications of polarization. Optical Rotation - Fresnel's explanation of optical rotation and Half Shade & Biquartz polarimeters.

**Unit –IV****Lasers****(10)**

Introduction and evaluation of lasers, laser principles, process absorption & emission, Characteristics and uses of Lasers. Laser operation- population inversion & derivation of threshold, gain medium (active medium),. Conditions for Laser action and Einstein's coefficients. Three and four level laser systems (qualitative discussion). Types of laser including their working

**Text Book:**

1. Introduction to optics, Nkoma & Jain, "Mkuki Na Nyota, 2019.

**Reference Book:**

1. A text book of optics, N Subrahmanyam et. al. S. Chand, 2004
2. Lasers & optical instrumentation, Nagabhushana & Sathyanarayana, I K International, 2010.

*[Handwritten signatures and marks]*

Minor (Part-B)**Physical Optics Lab  
(PHP-1027)****(0-0-2)**

Choose a minimum of 5 experiments from the list given below:

1. To determine refractive index of a transparent liquid using a travelling microscope.
2. To determine the refractive index of the material of a convex lens by measuring its focal length and radii of curvature.
3. To determine refractive index of a liquid with the help of a convex lens and a plane mirror.
4. To determine of the focal length and power of a convex lens by u-v method.
5. To find refractive index of water by using hollow prism.
6. To find wave length of Sodium light using Newton's Rings.
7. To find the radius of curvature of plano-convex lens using Newton's rings experiment, given  $\lambda=5893\text{\AA}$ .
8. To determine the refractive index of a liquid by using Newton's rings apparatus.
9. To find wave length by using Diffraction Grating.
10. To determine the wavelength of monochromatic light by Fresnel's biprism.

*Note: - Emphasis shall be laid on the technological application of the concept and it's planning & methodology should be of the nature of study rather than obtaining the value of physical constant. A section on discussion of the results of study shall be included by the students in their report/ practical file. Objective learning goals and concept understood shall be defined for each experiment.*

**Reference Books:**

1. Practical Physics by G L Squires Cambridge University Press, 2001.
2. Practical Physics by R K Shukla, New Age International (P) Limited, Publishers, 2007.
3. B.Sc Practical Physics by Harnam Singh, S. Chand, 2000.
4. An Advanced Course in Practical Physics by D. Chattopadhyay, P.C. Rakshit, New Central Book Agency, 1990.
5. A Text Book of Practical Physics, S.K. Ghosh, New Central Book Agency, 2015.
6. B. Sc Practical Physics by C. L. Arora, S. Chand, 2001.

A series of handwritten signatures in blue ink, including several student initials and a larger signature that appears to be 'Simran'.

Multidisciplinary (MD-II)**Energy Sources  
(PHL 1028)****(3-0-0)****Unit-I  
Types of sources****(12)**

Introduction to Energy, conservation and various forms such as heat (thermal), light (radiant), mechanical, electrical, chemical, and nuclear energy. Conventional energy sources such as natural gas, oil, coal, or nuclear. Global scenario of energy sources. Renewable Energy Scenario. Energy resources and their utilization, national grid for the gas distribution, gas conservation, nuclear power programme, energy parameters, and rational use of energy, energy efficiency and conversion.

**Unit-II  
Energy and Environment****(8)**

Introduction to environmental aspects of electric energy generation- atmospheric pollution, hydrocarbons, particulates, thermal pollution, hydroelectric projects, nuclear power generation and environment, operational safety in nuclear plants and disposal of waste, impact of renewable energy generation on environment, cost of electricity production from various sources

**Unit-III  
Solar Energy harvesting****(8)**

Solar radiation and its measurement, solar thermal energy collectors, solar thermal energy conversion systems, solar photovoltaic system

**Unit-IV  
Energy resources technology****(12)**

Different types of energy source technologies- Wind energy, small hydropower energy, geothermal energy, ocean energy, biomass energy, fuel cells.

*Note:- As a part of this course students shall be encouraged to do self studies on various topics of their interest based on but not limited to various energy models, field visits to various plants etc*

**Text book:**

1. Renewable energy sources and technologies, Kothari, Singal & Ranjan, PHI, 2011

**Reference book:**

1. Godfrey Boyle, "Renewable Energy, Power for a sustainable future", Oxford University Press, in association with The Open University, 2004.



Annexure-IV

**Course Title: RESEARCH METHODOLOGY**  
**Course Code: PHL 9142**

**4-0-0**  
**Credits: 4**

**UNIT 1: Foundations of Research**

Philosophy of Science - Subjective thinking versus Objective thinking, Materialism versus idealism, causality, etc.; Logical Reasoning - Inductive logic, Deductive logic, Syllogistic logic; Historical perspective - Mechanical and Scientific materialism, Empiricism and Evolution, Positivism **12**

**UNIT 2: Techniques of Scientific Measurement**

What scientists actually do; Falsifiability and Reproducibility; Proposing a hypothesis; Elements of scientific measurement; The central limit theorem and its applications; **8**

**UNIT 3: Hypothesis Testing**

Issues in hypothesis testing; Null hypothesis; Statistical methods in hypothesis testing: Z-test and T-test; The Chi-square test **10**

**UNIT 4: Graphing and Error Analysis**

Curve fitting, Least Square Fit to a straight line and a polynomial, Simple Scientific graphing and data analysis using Origin, Error bars and confidence interval; Measurement of a proportion; Box and Whisker plot; Propagation of Errors **12**

**UNIT 5: Communicating Research Results:**

Search engines and database; Research proposal, Report, Thesis; Presentation in Seminar and conference; Journal abbreviations, Bibliography standards, Indices of quality assessment of publications. **8**

**References:**

1. Research Methodology for Natural Sciences, Soumitro Banerjee, IISc Press, 2022.
2. Research Methodology: The Aims, Practices and Ethics of Science, P. Pruzan, Springer, 2016.
3. Data Reduction and Error Analysis for the Physical Sciences 3<sup>rd</sup> Ed. by Philip R Bevington & D Keith Robinson, McGraw - Hill (2003)
4. OriginLab Tutorials, Access link: <https://www.originlab.com/doc/Tutorials>

*[Handwritten signatures and initials]*



## Draft minutes of 9th BoS of School of Physics

3 messages

HoD Physics <hod.physics@smvdu.ac.in>

Fri, Nov 4, 2022 at 3:14 PM

Cc: pankaj biswas <pankaj.biswas@smvdu.ac.in>, "Office SoP (Physics)" <office.sop@smvdu.ac.in>

Bcc: Department of Physics <dop@smvdu.ac.in>, Dinesh Pandya <dinesh.pandya@iitjammu.ac.in>, saumitra mukherjee <saumitramukherjee3@gmail.com>






Sir/ Madam,

Kindly find attached draft minutes of the 9th meeting of BoS held in hybrid mode on 31/10/2022 at 2.30 pm in the conference room of the School. External expert members joined through online mode. You are requested to go through the same and favour us with your valuable comments latest by 7/11/2022 (11:00 am) so as to enable us to finalize and issue the same as the session shall be commencing from 07.11.2022.

Regards

Head, SoP

### 5 attachments

-  **2 Annexure-I - Statistical Mechanics Lab Syllabus.docx**  
16K
-  **1 Draft Minutes of 9th meeting BoS\_SoP.docx**  
77K
-  **3 Annexure-II Energy Sources.docx**  
14K
-  **5 Annexure-IV - Research Methodology course modified contents.docx**  
17K
-  **4 Annexure-III First Structure and Contents as per NEP.docx**  
48K

saumitra mukherjee <saumitramukherjee3@gmail.com>

Fri, Nov 4, 2022 at 6:47 PM

To: HoD Physics <hod.physics@smvdu.ac.in>

Dear Head SOP

I agree with the draft minutes of the meeting.

Regards

Saumitra Mukherjee

Professor Saumitra Mukherjee PhD (B.H.U.), PGDEE Commonwealth Fellow(UK), Earth Sciences Fellow(India), Excellence in Groundwater Science Award of INC-IAH-2016 New Code of Education Award 2022

Former Dean, School of Environmental Sciences

Professor of Geology Remote sensing and Space Sciences

Jawaharlal Nehru University

New Delhi-110067

India

Website: <http://www.jnu.ac.in/Faculty/smukherjee/cv.pdf>

Phone: 9313908512

[Quoted text hidden]

Dinesh Pandya <dinesh.pandya@iitjammu.ac.in>

Mon, Nov 7, 2022 at 11:37 AM

To: HoD Physics <hod.physics@smvdu.ac.in>

In general I agree with the draft minutes. I have following submission for incorporation in MoM.

1. Text book ( preferably one) should be written separately. Others could be under "Reference books".
2. Name of the E&M course should be Electrodynamics and EM Waves.
3. For the experiments planned, the emphasis should be on the technological application of the concept and it's planning & methodology should be of the nature of study rather than obtaining the value of physical constant. A section on discussion of the results of study should be included by the students in their report. Objectives, learning goals and concepts understood should be defined for each experiment.

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