

## Teaching Plan Year (2022–2023) Semester: I

**Department:** Physics **Duration of Teaching:** June 2022 to December 2022

**Class:** F.Y.B.Sc. **Subject:** Physics Practicals

**Course:** USPHP1

**Hours = 30**

| Sr. No.       | Topics                                                 | Number of Hours Planned | Lectures per Week (3) | Duration                                   |
|---------------|--------------------------------------------------------|-------------------------|-----------------------|--------------------------------------------|
| <b>Unit I</b> | <b>GROUP-A</b>                                         | <b>8</b>                |                       |                                            |
| 1             | Torsional Oscillation                                  | 2                       | 2                     | August to Second Week of September         |
| 2             | Bifilar Pendulum                                       | 2                       | 2                     |                                            |
| 3             | Flywheel Experiment                                    | 2                       | 2                     |                                            |
| 4             | Young's Modulus by Vibration Method                    | 2                       | 2                     |                                            |
|               | <b>GROUP-B</b>                                         | <b>8</b>                |                       |                                            |
| 1             | AC Mains Frequency using Sonometer                     | 2                       | 2                     | Second Week of September to October        |
| 2             | Thermistor Characteristics                             | 2                       | 2                     |                                            |
| 3             | Capacitance in AC Circuit                              | 2                       | 2                     |                                            |
| 4             | Inductance in AC Circuit                               | 2                       | 2                     |                                            |
|               | <b>GROUP-C (Skill Experiments)</b>                     | <b>14</b>               |                       |                                            |
| 1             | Vernier Callipers, Screw Gauge & Travelling Microscope | 3                       | 3                     | Last Week of July to Second Week of August |
| 2             | Graph Plotting                                         | 3                       | 3                     |                                            |
| 3             | Spectrometer – Schuster's Method                       | 3                       | 3                     |                                            |
| 4             | Resistance & Capacitance using Colour Code             | 3                       | 3                     |                                            |
| 5             | Digital Multimeter                                     | 2                       | 3                     |                                            |

  
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& Commerce & Science College  
Wada, Dist. Palghar

## DSDD Arts College and Commerce & Science College, Wada, Dist. Palghar

### Teaching Plan

**Name of Teacher:** Dr. Kailas Prabhakar Joshi

**Department:** Physics

**Academic Year:** 2022–2023

**Class and Semester:** F.Y.B.Sc. Semester II

**Subject & Paper:** Physics Practicals

**Course Code:** USPHP2

**Duration of Teaching:** December 2022 to March 2023

**Hours = 30**

| Sr. No. | Topics                                                                                                                | Number of Hours Planned | Lectures per Week (3) | Duration                                       |
|---------|-----------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------|------------------------------------------------|
|         | <b>Unit I</b>                                                                                                         | <b>30</b>               |                       |                                                |
|         | <b>GROUP-A</b>                                                                                                        | <b>8</b>                |                       |                                                |
| 1       | Study of LASER Beam Divergence                                                                                        | 3                       | 2                     | Second Week of December to January             |
| 2       | Spectrometer: To determine angle of Prism                                                                             | 3                       | 2                     |                                                |
| 3       | Spectrometer: To determine refractive index of prism material                                                         | 3                       | 2                     |                                                |
| 4       | Combination of Lenses: To determine equivalent focal length of a lens system                                          | 3                       | 2                     |                                                |
|         | <b>GROUP-B</b>                                                                                                        | <b>8</b>                |                       |                                                |
| 1       | Study of Logic Gates & Verification of De Morgan's Theorems                                                           | 3                       | 2                     | Month of February                              |
| 2       | To study EX-OR Gate and verify its truth table                                                                        | 2                       | 2                     |                                                |
| 3       | To study Half Adder and Full Adder and verify their truth tables                                                      | 4                       | 2                     |                                                |
| 4       | To study load regulation of a Bridge Rectifier                                                                        | 3                       | 2                     |                                                |
|         | <b>GROUP-C: Skill Experiments</b>                                                                                     | <b>14</b>               |                       |                                                |
| 1       | Radius of Ball Bearings (Single Pan Balance)                                                                          | 1                       | 3                     | Second Week of February to First Week of March |
| 2       | Use of Oscilloscope: Waveforms at output of Half-wave and Bridge Rectifiers with and without Capacitor Filter; Ripple | 2                       | 3                     |                                                |

|   |                                                                |   |   |  |
|---|----------------------------------------------------------------|---|---|--|
| 3 | Testing of Components (Resistor, Diode, Transistor, Capacitor) | 1 | 3 |  |
| 4 | Study of I-V Characteristics of Solar Cell                     | 2 | 3 |  |

  
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Dr. S.D. Devsey Arts College and Commerce & Science College Wada, Dist. Palghar

Teaching Plan (2022-23) Semester: IV Department of Physics

Duration: Nov 2022 to May 2023

Class: S.Y.B. Sc Subject: Optical and Digital Electronics Course: USPH401

| Sr.no | Topics                                                                                                                                     | Number of hours planned | Lectures per week-4         | Learning Inputs                                                                             |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------|---------------------------------------------------------------------------------------------|
| 1     | <b>Diffraction</b>                                                                                                                         | 15                      | <b>Nov 2022 to Dec 2022</b> |                                                                                             |
|       | <b>1.Fresnel Diffraction</b>                                                                                                               |                         |                             |                                                                                             |
|       | Fresnel assumption, Rectilinear propagation of light, Diffraction pattern due to Straight Edge, position of maxima and minima of intensity | 2                       |                             | Fundamentals of light, interference, Diffraction, polarisation, Huygens and Newton's Theory |
|       | Intensity at a point inside the geometrical shadow                                                                                         | 3                       |                             |                                                                                             |
|       | Diffraction due to narrow slit                                                                                                             | 2                       |                             |                                                                                             |
|       | Diffraction due to Narrow wire                                                                                                             | 2                       |                             |                                                                                             |
|       | <b>2.Fraunhofer Diffraction</b>                                                                                                            |                         |                             | Single and Double slit Experiment                                                           |
|       | Introduction, Fraunhofer Diffraction at a single slit                                                                                      | 3                       |                             |                                                                                             |
|       | Intensity distribution in diffraction pattern due to a single slit                                                                         | 1                       |                             |                                                                                             |
|       | Fraunhofer Diffraction at a double slit                                                                                                    | 1                       |                             |                                                                                             |
|       | Distinction between single slit and double slit Diffraction pattern and missing orders                                                     | 2                       |                             |                                                                                             |
|       | Plane Diffraction Grating, Theory of plane Diffraction Grating                                                                             | 2                       |                             |                                                                                             |
|       | Width of principal maxima                                                                                                                  | 1                       |                             |                                                                                             |
| 2     | <b>Unit II: Polarisation</b>                                                                                                               | 15                      |                             | Concept of Lens, types of                                                                   |

|   |                                                                                                                                                                          |    |                          |                                                                                                                                                           |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | Types of polarisations, plane polarised light                                                                                                                            | 1  | 4                        | polaroid's, practical examples.<br>Types of crystal, crystal Growth, Refractive index, Braggs law, law of Malus, bending of light waves, shaping of waves |
|   | Circularly polarised light, Elliptical polarised light, partially polarised light                                                                                        | 1  | Dec 2022 to Jan2023      |                                                                                                                                                           |
|   | Production of plane polarised light, polarisation by reflection from dielectric surface                                                                                  | 2  |                          |                                                                                                                                                           |
|   | Polarisation by refraction pile of plates, polarisation by scattering                                                                                                    | 2  |                          |                                                                                                                                                           |
|   | Polarisation by Selective Absorption<br><br>Polarisation by double refraction<br><br>Polariser and analyser, malus law, Anisotropic crystal, calcite crystal, optic axis | 2  |                          |                                                                                                                                                           |
|   | Double refraction in calcite crystal, Huygens explanation of double refraction, ordinary and Extraordinary rays, positive and negative crystal                           | 2  | Dec 2022 to Jan2023      | Practical input of Refraction                                                                                                                             |
|   | Superposition of waves linearly polarised right angles, superposition of E-ray and O-ray, Retarders, Quarter wave plates                                                 | 2  |                          | Production of various polarised light                                                                                                                     |
|   | Half wave plate, production of linearly polarised light, production of epiphytically polarised light                                                                     | 2  |                          |                                                                                                                                                           |
|   | Production of circularly polarised light, Analysis of polarised light, Application of polarised light                                                                    | 1  |                          | Applications in commercialism                                                                                                                             |
| 3 | Unit III                                                                                                                                                                 |    |                          |                                                                                                                                                           |
|   | Digital Electronics                                                                                                                                                      | 15 | Jan to 2023 last week of | Types oF Gates ,NAND ,NOR ,OR,NOT,etc                                                                                                                     |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                            |   |               |                                                                                                   |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---------------|---------------------------------------------------------------------------------------------------|
|  |                                                                                                                                                                                                                                                                                                                                                                                                                            |   | march<br>2023 |                                                                                                   |
|  | Fundamental revision                                                                                                                                                                                                                                                                                                                                                                                                       | 1 |               |                                                                                                   |
|  | Binary number system, Arithmetic Building blocks, Types of registers, Digital IC signal levels, Binary to Decimal, decimal to binary, Hexadecimal number, Hexadecimal to Binary conversion, Binary to Hexadecimal conversion, Binary addition, Unsigned binary numbers, sign magnitude numbers, 1 and 2 complements, converting to and from 2's complement representation, 2's complement arithmetic, the Adder-subtractor | 5 |               | Microprocessor its types, adder and contents. Practical inputs and fundamentals of binary numbers |
|  | R-S flip-flop, Gated flip-flop, Edge triggered RS flip-FLOP, Edge triggered D flip-flop, Edge triggered JK flip-flop, JK Master slave Flip-flop, Bounce Elimination switch                                                                                                                                                                                                                                                 | 3 |               | Types of flipflop, registers, counters, synchronisation, modification of flipflops                |
|  | Types of registers: SISO, SIPO, PISO, PIPO                                                                                                                                                                                                                                                                                                                                                                                 | 2 |               |                                                                                                   |
|  | Asynchronous counter-3bit, synchronous counter only mod8,                                                                                                                                                                                                                                                                                                                                                                  | 3 |               |                                                                                                   |
|  | Decode counters Mod5 and Mod10                                                                                                                                                                                                                                                                                                                                                                                             | 2 |               |                                                                                                   |

  
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**Dr.S.D.Devsey Arts College and Commerce &Science College Wada,Dist:Palghar**

**Teaching Plan (2022-23) Semester: III Department of Physics**

**Duration: Jun 2022 to Nov 2022**

**Class: S.Y.B.Sc Subject: Physics paper -III Course:USPH-303**

| Sr.no | Topics                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Number of hours planned | Lectures per week-4 | Learning Inputs                                                                                          |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------|----------------------------------------------------------------------------------------------------------|
|       | 1. Acoustics of Buildings: Reverberation, Explanation of Sabine's formula, & Importance of Sabine's Formula, Absorption Coefficient, Acoustics of Buildings, Factors Affecting Acoustics of Buildings, Sound Distribution in an Auditorium.                                                                                                                                                                                                                                        | 15                      | 4                   | Fundamental of Acoustics, factors of acoustics discussed with different examples.                        |
|       | 2. Laser: Introduction, transition between Atomic energy states, Principle of Laser, Properties of Laser: Coherence Properties of LASER, Spatial Coherence Length, Directionality, Intensity, Helium–Neon Laser, Application of Laser, Holography                                                                                                                                                                                                                                  | 15                      | 4                   | Concept of light its importance, Application and its engineering and medical applications were discussed |
|       | Unit II: Crystal Physics<br>1) Lattice points and space lattice, The basis and crystal structure, Unit Cells and lattice parameters, Primitive Cells, Crystal Systems, Crystal Symmetry, Bravais space lattices<br>2) Metallic crystal structures, relation between the density of crystal material and lattice constant in a cubic lattice, Directions, Planes, Miller Indices, Important planes in simple cubic structure, separation between lattice planes in a cubic crystal. | 15                      | 4                   | Types of crystals, solid state bonds, miller indices, structures were highlighted                        |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |   |                                                                                                               |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---|---------------------------------------------------------------------------------------------------------------|
|  | <b>Unit III: Properties of Material 15 Lectures</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  | 4 | Band gap, Brewster's law, reflection, magnetic materials, susceptibility's, periodic elements were discussed  |
|  | 1) Electrical properties: Review of energy band diagram for materials – conductors, semiconductors and insulators, Electrical conductivity in metals, semiconductors and insulators (dielectrics), effect of temperature on conductivity.<br>2) Optical properties: Reflection, refraction, absorption and transmission of electromagnetic radiation in solids.<br>3) Magnetic properties: Origin of magnetism in solids (basic idea), Types of magnetic order (Paramagnetism, Diamagnetism, antiferromagnetic, ferromagnetism, ferrimagnetism), magnetic hysteresis.<br>4) Applications: Dielectric materials: Piezoelectric, ferroelectric |  |   | ,properties of materials, various types of characterizations like X ray, TGA, DSC, DTA, BAND GAP, V.B. THEORY |

  
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**Dr.S.D.Devsey Arts College and Commerce &Science College Wada, Dist: Palghar**

**Teaching Plan (2020-22) Semester: IV Department of Physics**

**Duration: Nov 2022 to May 2023**

**Class: S.Y.B.Sc Subject: Applied Physics paper -III Course:USPH-403**

| Sr.no | Topics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Number of hours planned | Lectures per week-4 | Learning Inputs                                                                                                                                            |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | <b>CHAPTER 1: GEOLOGY</b><br>1 Introduction to Geology its branches and relationship with other sciences.<br>2 Earth and solar system: Meteorites and other extra-terrestrial materials.<br>3 Age of Earth and various methods of determination. Planetary evolution of the Earth and its internal structure: Elastic waves and variation of physical and chemical properties in the interior of Earth.<br>4 Major tectonic features of the ocean oceanic and continental crust.<br>5 Continental drift – geological and geophysical evidence: mechanisms, objections and present status.<br>6 Geodynamics of the Indian plate.                    | 8                       | 4                   | Introduction to Geology its branches and relationship with other sciences. Age of Earth, Geodynamics of the Indian plate. Planetary evolution of the Earth |
| 2     | <b>CHAPTER 2: GEOPHYSICS</b><br>1 Introduction to Geophysics<br>2 Gravity and magnetic anomalies at Mid-ocean ridges: deep sea trenches, continental shield areas and mountain chains.<br>3 Geomagnetism, elements of Earth's magnetism: Internal, external fields and their causes, Palaeomagnetism, Polar wandering paths and reversals, Seafloor spreading and Plate tectonics.<br>4 Seismic belts of the Earth: Seismicity and plate movements.<br>5 Utility of the different geophysical techniques (discussed above) in exploration for academic as well as for harnessing resources.<br>Geophysical potential fields: Principles of Gravity | 7                       | 4                   | Introduction to Geophysics, Geomagnetism, Seismic belts, Seismicity and plate movements. Magnetic methods.                                                 |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |    |   |                                                                                                                                     |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|-------------------------------------------------------------------------------------------------------------------------------------|
|   | and Magnetic methods.<br>6 Instrumentation, field procedures used in geophysical studies.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |    |   |                                                                                                                                     |
| 3 | <p>Unit: II - Microprocessors</p> <p>1) Building Concept of microprocessor<br/>Introduction, Study of Memory, Input Device , Output Device , Input/output Device<br/>Central Processing Unit.</p> <p>2) 8085 Microprocessor<br/>Introduction, Features of Inter 8085 , Pin Diagram of 8085 , 8085 CPU Architecture ,Arithmetic and Logical Group (ALU , Accumulator , Temporary Register , Flag Register (PSW)) , Register Group (Temporary Registers (W and Z) , General purpose registers , Special Purpose registers) , Interrupt Control , Serial I/O Control Group ,Instruction Register , Decoder and Control Group (Instruction Register , Instruction Decoder , Timing and Control)</p> <p><b>3) Classification of Instruction Set</b><br/>(Data Transfer Group ,Arithmetic Group , Logical Group , Branching Group , Stack and Machine Control Group) , Notations used in Instructions and Opcode , Data Transfer Group ,Program Examples for Data Transfer Group , Arithmetic Operation Group , Branch Group , Logical Group , Addressing Modes , 8085 Programmers Model.</p> | 15 | 4 | Building Concept of Microprocessor, 8085 Microprocessor, Instruction Register, 8085 Instruction Set. Introduction, Flowchart        |
|   | <p><b>Unit: III-Radio communication</b></p> <p><b>1) Basics of Communication:</b> Block diagram of communication system, types of communication system: simplex, duplex, analog and digital communication, Electromagnetic spectrum, base band and broad band communication. Noise concept and types, signal to noise ratio, noise figure, noise temperature.</p> <p><b>2) Amplitude Modulation:</b> Need of modulation, concept of modulation, AM,waveform, mathematical expression of AM, concept of</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 15 |   | Basics of Communication: Block diagram of communication system, Amplitude Modulation: Need of modulation, concept of modulation, AM |

|  |                                                                                                                                                                                                                                                                                 |  |  |  |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
|  | <p>sideband, demodulation principles. AM Receiver: TRF and super heterodyne receiver.</p> <p>3) Frequency Modulation: Definition, mathematical representation, frequency, spectrum, bandwidth and modulation index.</p> <p>4) Concept of ASK, PSK, FSK, PAM, PWM, PPM, PCM.</p> |  |  |  |
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**Dr.S.D.Devsey Arts College and Commerce &Science College Wada,Dist:Palghar**

**Teaching Plan (2022-22) Semester: IV Department of Physics**

**Duration: Jun 2022 to Nov 2022**

**Class: S.Y.B.Sc Subject: Mechanics and Thermodynamics Course:USPH-301**

| Sr.no | Topics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Number of hours planned | Lectures per week-4 | Learning Inputs                                                                                                                                                             |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| .     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                         |                     |                                                                                                                                                                             |
|       | <p>UNIT –</p> <p>I Compound pendulum :<br/>Expression for period, maximum and minimum time period, centres of suspension and oscillations , reversible compound pendulum. Kater's reversible pendulum , compound pendulum and simple pendulum- a relative study.</p> <p>II Center of Mass , .Motion of the Center of Mass , Linear momentum of a Particle<br/>Linear momentum of a System of Particles ,<br/>Linear momentum wrt CM<br/>coordinate (i.e shift of origin from Lab to CM),<br/>Conservation of Linear<br/>Momentum , Some Applications of the<br/>Momentum Principle , System of<br/>Variable Mass<br/>Torque Acting on a Particle ,Angular<br/>Momentum of a Particle , Angular<br/>Momentum of System of Particles , Total<br/>angular momentum wrt CM<br/>coordinate. Conservation of Angular<br/>Momentum</p> <p>iiiOscillations , The Simple Harmonic Oscillator<br/>, Relation between Simple<br/>Harmonic Motion and Uniform Circular<br/>Motion , Two Body Oscillations,<br/>Damped Harmonic Motion ,Forced Oscillations<br/>and Resonance.</p> | 15                      | 4                   | Fundamentals of XII physics,<br>revision of syllabus of<br>moment of inertia, rotational<br>motion, practical's<br>knowledge-based questions<br>revised, topics of syllabus |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |    |   |                                                                                                                                                                                                                                                                            |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>UNIT –II<br/>(Review of zeroth and first law of thermodynamics)<br/>I Conversion of heat into work, heat engine, Carnot's cycle: its efficiency.<br/>II Second law of thermodynamics, Statements, Equivalence of Kelvin and Plank statement, Carnot's theorem, Reversible and irreversible process, Absolute scale of temperature.<br/>iii Clausius theorem, Entropy, Entropy of a cyclic process, Reversible process, Entropy change, Reversible heat transfer, Principle of increase in entropy, generalized form of first and second law, entropy change of an ideal gas, entropy of steam, entropy and unavailable energy, entropy and disorder, absolute entropy.</p> | 15 | 4 | <p>Fundamentals with laws of thermodynamics, effect of Heat, engines cycles.<br/>Conversion of heat into work, heat engine, Carnot's cycle: its efficiency.<br/>Second law of thermodynamics, Statements, Equivalence of Kelvin and Plank statement, Carnot's theorem,</p> |
|  | <p>UNIT –III<br/>i Third law of thermodynamics, Nernst heat theorem, Consequences of the third law, Maxwell's thermodynamic relations, Clausius – Clapeyron equation, Thermal Expansion.<br/>ii Steam engine, Rankine cycle, Otto engine, Efficiency of Otto cycle, Diesel cycle, Efficiency of Diesel cycle, Otto and diesel comparison<br/>iii Low temp Physics: Different methods of liquefaction of gases, methods of freezing, Cooling by evaporation, cooling by adiabatic expansion<br/>Joule - Thompson effect, JT effect of Vander Waal's gas, Liquefaction of helium, properties and uses of liquid Helium</p>                                                      | 15 | 4 | <p>Third law of thermodynamics, Joule - Thompson effect, JT effect of Vander Waal's gas, Liquefaction of helium, properties and uses of liquid Helium, Maxwell's thermodynamic</p>                                                                                         |

  
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**1. Dr.S.D. Devsey Arts College and Commerce & Science College Wada, Dist. Palghar**

**i. Teaching Plan Year (2022-2023) Semester: VI**

**a. Department of Physics**

**ii. Semester Duration: Nov 2022 to May 2023**

**iii. Duration of Teaching: Nov 2022 to April 23**

**Class: T.Y.B.Sc Subject: Electronics Course: USPH602**

| Sr. no.  | Topics                                                                                                                                                                                                                | Number of hours planned | Lectures per week 4                         | Learning Inputs                                                                          |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------------------------|------------------------------------------------------------------------------------------|
| <b>1</b> | <b>Unit I</b>                                                                                                                                                                                                         | 15                      |                                             |                                                                                          |
|          | Field effect transistors: JFET: Basic ideas, Drain curve, The transconductance Curve, Biasing in the ohmic region and the active region                                                                               | 3                       | <b>Nov 2022 to Jan 2023</b>                 | Fundamentals of Electronics, conduction of electric current in P-N junction diode stages |
|          | Transconductance, JFET common source amplifier, JFET analogue switch,                                                                                                                                                 | 2                       |                                             | Types of transistors its working, Biasing.                                               |
|          | Multiplexer, voltage-controlled resistor, current sourcing.                                                                                                                                                           | 3                       |                                             | Rectifier its Types                                                                      |
|          | MOSFET: Depletion and enhancement mode, MOSFET operation and characteristics, digital switching.                                                                                                                      | 2                       |                                             |                                                                                          |
|          | SCR- construction, static characteristics, Analysis of the operation of SCR,                                                                                                                                          | 2                       |                                             |                                                                                          |
|          | Gate triggering characteristics, Variable half wave rectifier and Variable full wave rectifier, Current ratings of SCR.                                                                                               | 1                       |                                             |                                                                                          |
|          | UJT: construction, Operation characteristics and application as a relaxation oscillator.                                                                                                                              | 2                       |                                             |                                                                                          |
|          | <b>Unit-II</b>                                                                                                                                                                                                        | 15                      | <b>30 Jan to Feb 2023</b>                   | Operational amplifier 741 comparison with Transistor.                                    |
|          | Differential Amplifier using transistor: The Differential Amplifier, DC and AC analysis of a differential amplifier,                                                                                                  | 4                       |                                             |                                                                                          |
|          | Input characteristics -effect of input bias, offset current and input offset voltage on output, common mode gain, CMRR.                                                                                               | 3                       |                                             |                                                                                          |
|          | Op Amp Applications: Log amplifier, Instrumentation amplifiers, Voltage controlled current sources (grounded load), First order Active filters, Astable using OP AMP, Comparators with Hysteresis, Window Comparator. | 15                      |                                             |                                                                                          |
|          | <b>Unit-III</b>                                                                                                                                                                                                       |                         | <b>First week of Mar to end of Mar 2023</b> | As per content, pulse modulation, power supply, controller,                              |
|          | Transistor Multivibrators: Astable, Monostable and bistable Multivibrators, Schmitt trigger.                                                                                                                          | 6                       |                                             |                                                                                          |
|          | 555 Timer: Review Block diagram, Monostable                                                                                                                                                                           | 4                       |                                             |                                                                                          |

|  |                                                                                                                                                                                                                                                                           |    |                                            |                                                                 |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--------------------------------------------|-----------------------------------------------------------------|
|  | and Astable operation Voltage Controlled Oscillators, Pulse Width modulator, Pulse position Modulator, Triggered linear ramp generator.                                                                                                                                   |    |                                            | oscillator                                                      |
|  | Regulated DC power supply: characteristics, series voltage regulator, short circuit protection (Current limit and fold back) Monolithic linear IC voltage Regulators. (LM 78XX, LM 79XX, LM317, LM337).                                                                   | 5  |                                            |                                                                 |
|  | <b>Unit-IV</b>                                                                                                                                                                                                                                                            | 15 | <b>1 April to first week of April 2023</b> | Types of Gates, and AND,OR,NOT,N AND,EXOR,its truth Tables etc. |
|  | Logic families: Standard TTL NOR, Open collector gates, Three states TTL devices, MOS inverters, CMOS NAND and NOR gates, CMOS characteristics.                                                                                                                           | 8  |                                            |                                                                 |
|  | Digital Communication Techniques: Digital Transmission of Data, Benefits of Digital Communication, Disadvantage of Digital Communication, Parallel and serial transmission, pulse Modulation, Comparing pulse - modulation Methods (PAM, PWM,PPM), pulse-Code Modulation. | 7  |                                            |                                                                 |

  
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**Dr.S.D.Devsey Arts College and Commerce & Science College Wada, Dist: Palghar**

**Teaching Plan 2022-2023 Semester: VI**

**Department of Physics**

**Semester Duration: Nov 2022 to May 2023**

**Duration of Teaching: Nov 2022 to April 2023**

**Class: T.Y.B.Sc Subject: Classical Mechanics Course: USPH601**

| Sr.no. | Topics                                                                                                                                                         | Number of hours planned | Lectures per week-4                     | Learning inputs                                                                                      |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------|
| 1      | <b>Central force</b>                                                                                                                                           | 15                      |                                         |                                                                                                      |
|        | 1.Motion under a central force, central force inversely proportional to the square distance                                                                    | 2                       | Last week of Nov 2022 to Jan 2023       | Newtons laws, Gravitation Kepler's-laws, moment-of-Inertia, Rotational motion                        |
|        | Elliptic Orbits, The Kepler problem                                                                                                                            | 2                       |                                         |                                                                                                      |
|        | 2.movin origin of coordinates, Numerical                                                                                                                       | 3                       |                                         |                                                                                                      |
|        | Rotating coordinate systems, Numerical                                                                                                                         | 2                       |                                         |                                                                                                      |
|        | Law of motion on the rotating earth                                                                                                                            | 2                       |                                         |                                                                                                      |
|        | The Foucault problems, armours theorems                                                                                                                        | 2                       |                                         |                                                                                                      |
| 2      | <b>Unit II: Lagrange s equation</b>                                                                                                                            | 15                      |                                         |                                                                                                      |
|        | 1.D"Alambert principle, constraints, Examples of holonomic constraints, examples of non holonomic constraints, degrees of freedom and generalized coordinates, | 4                       | Jan to Last week of Feb 2023            | Constraints, inertial frame-of-Reference, non-inertial frame of reference, general coordinate system |
|        | Virtual displacement, virtual work, D'Alembert's principle, illustrative problems.                                                                             | 3                       |                                         |                                                                                                      |
|        | 2. Lagrange's equation(using D'Alembert's principle), properties of Lagrange's equations,                                                                      | 4                       |                                         |                                                                                                      |
|        | Illustrative problem, canonical momentum, cyclic or ignorable coordinates                                                                                      | 2                       |                                         |                                                                                                      |
|        | Number of numerical                                                                                                                                            | 2                       |                                         |                                                                                                      |
| 3      | <b>Unit III : Fluid Motion and Rigid body rotation</b>                                                                                                         | 15                      |                                         |                                                                                                      |
|        | 1. Kinematics of moving fluids, Equation of motion for an ideal fluid, conservation laws for fluid motion, steady flow.                                        | 4                       | First week of 1Mar to end of March 2023 | Viscosity, Bernoulli's theorem, Degree of freedom, rotation of rigid bodies, spinning top.           |

|   |                                                                                                                    |    |                                    |                                                      |
|---|--------------------------------------------------------------------------------------------------------------------|----|------------------------------------|------------------------------------------------------|
|   | 2. Rigid dynamics: introduction, degrees of freedom, rotation about an axis: orthogonal matrix,                    | 4  |                                    |                                                      |
|   | Euler's theorem, Eulerian angles, inertia tensor, angular momentum of rigid body, symmetric top (without notation) | 4  |                                    |                                                      |
|   | Euler's equation of motion of rigid body, free motion of rigid body, motion of                                     | 2  |                                    |                                                      |
|   | Symmetric top (without notation)                                                                                   | 1  |                                    |                                                      |
| 4 | <b>Unit IV : Non Linear Mechanics</b>                                                                              | 15 | 1 April to last week of April 2023 |                                                      |
|   | 1. Non linear mechanics: Qualitative approach to chaos,                                                            | 5  |                                    | Undamped and damped harmonic and forced oscillations |
|   | The anharmonic oscillator, Numerical solution of Duffing's equation.                                               | 5  |                                    | Third stage of matter                                |
|   | 2. Transition to chaos: Bifurcations and strange attractors, Aspects of chaotic behaviour (logistic map).          | 5  |                                    |                                                      |

  
HEAD  
DEPARTMENT OF PHYSICS



  
I/C Principal  
Shikshak Sanchalit Shikshan Sanstha's  
Dr. Shantilal Dhanji Devsey Arts College &  
Commerce & Science College, Wada, Dist. Palghar

**Dr.S.D.Devsey Arts College and Commerce & Science College ,Wada,  
Dist.:Palghar**

**Teaching Plan 2022-2023**

**Department of Physics**

**Class: T.Y.B.Sc**

**Subject: Solid State Physics**

**Course: USPH502**

**Duration of Semester: Jun 2022 to Nov 2022**

**Teaching Duration: Jun 2022 to Oct 2023**

| Sr.no. | Topics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Number of hours planned | Lectures per week                                   | Inputs and Learning outcomes                                                                                                                                                                                                                                                                                                                                   |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | <b>Unit 1: Crystal Physics</b><br>General introduction of reflection, refraction, Dispersion, interference, polarisation, Types of prisms, overall revision of theories.<br>Lattice point and space lattice, The basis and crystal structure, Unit cells and lattice parameters, primitive cells<br>Crystal systems, crystal symmetry, Bravais space lattices, metallic crystal structures<br>Relation between density of crystal material and lattice constant in a cubic lattice<br>Directions, planes miller indices, important planes in scc structure<br>Separation between lattice planes in a cubic structure, reciprocal lattice<br>X-ray diffraction, classical free electron theory of metals, collision time, relaxation time and mean free path | 15                      | Second week of Jun 2022 to second week of July 2022 | General fundamentals of light is discussed with student. Student are able to understand the concepts which were strike.                                                                                                                                                                                                                                        |
| 2      | <b>Unit II: Electrical properties of metal</b><br>Quantum theory of free electrons, Fermi Dirac statistics and electronic distribution in solids<br>Density of energy states and Fermi energy, Fermi Distribution Function, Heat capacity of electron gas<br>Mean energy of electron gas at 0 kelvin, electrical conductivity from Quantum mechanical consideration                                                                                                                                                                                                                                                                                                                                                                                         | 15                      | July 2022 to second week of Aug 2022                | Inter relation between conduction convection, effect Transition in temperatures Heat capacities were discussed. Students recalled from concept of resistance, density. Ionic gas its role in conductivity understood.<br>Students are able to understand Application of electrical conductivity, specific -resistance, conductance their applications in units |
| 2      | <b>Unit II: Band theory of solids,</b><br>The Kronig penny model, Brillouin zones,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                         |                                                     | Energy, wavefunctions, conduction and Valence band theories were discussed, good outcomes obtained with                                                                                                                                                                                                                                                        |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                                                               |                                                                                                                                                                                                                                            |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                                                               | concept of wave function<br>Schrödinger equations and<br>Einstein energy relations.                                                                                                                                                        |
|   | Number of Wave function in band, Motion of<br>electron in one dimensional periodic potential,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    | Last week<br>of Aug2022<br>to sept<br>2022                    |                                                                                                                                                                                                                                            |
|   | Distinction between metals, insulator and<br>intrinsic semiconductor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |                                                               |                                                                                                                                                                                                                                            |
| 3 | <b>Unit III: Conduction in semiconductors</b><br><br>Electrons in holes in intrinsic semiconductor,<br>conductivity, carrier concentrations<br><br>Fermi levels in intrinsic semiconductors,<br>Diffusion, carrier life time<br>The continuity equation, Hall effect<br>Semiconductor diode characteristics:<br>Qualitative theory of p-n junction,<br><br>P-n junction as a diode, Band structure of open<br>circuit p-n junction                                                                                                                                                                                   | 15 |                                                               | Basics of conductor's<br>insulator and semiconductors<br>were revised and formation<br>of PN junction Diode<br>rectifier its application are<br>discussed<br><br>Verified with Experimental<br>outcomes of V-I<br>characteristic           |
| 4 | Unit IV:<br><b>Diode, Magnetism and super conductivity</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 15 |                                                               |                                                                                                                                                                                                                                            |
|   | The current component in a p-n junction diode,<br>Quantitative theory of p-n junction diode<br>current<br><br>The V-I Characteristics, The temperature<br>dependence of p-n characteristic, Diode<br>resistance<br><b>2.Magnetic properties of matter;</b> The<br>diamagnetism and Para magnetism, The origin<br>of permanent magnetic dipole Diamagnetism<br>and Lamour precession, The static<br>paramagnetic susceptibility.<br>Superconductivity: Mechanism of<br>superconductors, Effect of magnetic field<br>Critical currents, The Meissner effect, The<br>penetration Depth<br>Type I and II superconductors |    | Last week<br>of Sep<br>2022 to-<br>first -week<br>of Oct 2022 | Polarisation of magnetic<br>lines, Atomic Theory of,<br>coulombs law, orientation of<br>magnetic lines, flux its<br>Alignments are discussed.<br><br>Penetration of magnetic lines<br>under the action of magnetic<br>field are discussed. |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |                                                               |                                                                                                                                                                                                                                            |

  
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**Dr.S.D.Devsey Arts College and Commerce & Science College Wada, Dist: Palghar**

**Teaching Plan 2022-2023**

**Semester: Department of Physics**

**Class: T.Y.B.Sc      Subject: ELECTRODYNAMICS      Course: USPH504**

**Duration of Semester: Jun 2022 to Nov 2022**

**Teaching Duration: Jun 2022 to Oct 2022**

| Sr.no. | Topics                                                                                                                                                             | Number of hours planned | Lectures per week<br>4                          | Inputs and Learning outcomes                                                   |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------------------------------|--------------------------------------------------------------------------------|
| 1      | <b>Unit 1: Electrostatics:</b><br>Introduction, revision from coulombs law, fundamentals, revision of formulae, general idea about syllabus and topics in syllabus | 2                       | End of second week<br>Jun2022 to 11Jully 2022   | Fundamentals from coulombs law, concept of Flux, Revision of Divergence, curl. |
|        | Field lines, Flux and Gauss law, The divergence of E                                                                                                               | 2                       |                                                 |                                                                                |
|        | Application of gauss law                                                                                                                                           | 2                       |                                                 | Properties of lines of force and tubes of force                                |
|        | Curl of E, Introduction to potential, comments on potential                                                                                                        | 3                       |                                                 |                                                                                |
|        | Poisson's equation and Laplace Equation                                                                                                                            | 2                       |                                                 |                                                                                |
|        | The potential of a localized charge distribution, Review of conductors                                                                                             | 2                       |                                                 |                                                                                |
|        | First Uniqueness theorem, the classic image problem-infinite conducting plane                                                                                      | 2                       |                                                 |                                                                                |
| 2      | <b>Unit II: polarisation and Magneto statics</b>                                                                                                                   | 15                      | Second of July2022 to 14 Aug 2022               | Fundamentals of magnetic materials, Bohr's theory, its postulates              |
|        | Dielectrics, induced Dipoles, Alignment of polar molecules, polarisation                                                                                           | 3                       |                                                 |                                                                                |
|        | Bound charges, and their physical interpretation                                                                                                                   | 2                       |                                                 |                                                                                |
|        | Gauss law in presence of Dielectrics,, A Deceptive parallel,succeptibility, permitivity,Dielectricconstant, Energy in Dielectric systems                           | 4                       |                                                 |                                                                                |
|        | Straight line currents of B and curl of Application of Ampere law in case of long straight wire and long solenoid,                                                 | 3                       |                                                 |                                                                                |
|        | Comparison of Magneto statics and electrostatics                                                                                                                   | 3                       |                                                 |                                                                                |
| 3      | <b>Unit III: Magnetism and Varying Field</b>                                                                                                                       | 15                      | Third week of Aug2022 to first week of Sep 2022 | Distinguish between Para magnetism, magnetic susceptibility, charge            |
|        | 1.Diamagnets para magnets, ferro-magnets, Magnetisation                                                                                                            | 2                       |                                                 |                                                                                |

|   |                                                                                                      |    |                                                    |                                                            |
|---|------------------------------------------------------------------------------------------------------|----|----------------------------------------------------|------------------------------------------------------------|
|   | Bound currents and their physical interpretation                                                     | 2  |                                                    | distribution, electrodynamic s before Maxwell.             |
|   | Ampere's law in magnetised materials, A deceptive parallel, magnetic susceptibility and permeability | 3  |                                                    |                                                            |
|   | 2. Energy in Magnetic fields, Electrodynamics Before Maxwell, Maxwell correction to Ampere's law,    | 3  |                                                    |                                                            |
|   | Maxwell's Equations, Magnetic charge, Maxwell's Equation in matter, Boundary conditions              | 5  |                                                    |                                                            |
| 4 | <b>Unit IV :Electromagnetic waves</b>                                                                | 15 |                                                    | Types of waves, momentum of waves, concept of transmission |
|   | 1. The continuity equation,                                                                          | 2  | Second week of sept 2022 to first week of Oct 2022 |                                                            |
|   | Poynting theorem<br>Newton's third law in Electrodynamics.                                           | 3  |                                                    |                                                            |
|   | 2. The wave equation for E and B                                                                     | 2  |                                                    |                                                            |
|   | Monochromatic plane waves, Energy and momentum in electromagnetic waves                              | 3  |                                                    |                                                            |
|   | Propagation in linear media                                                                          | 2  |                                                    |                                                            |
|   | Reflection and transmission of EM waves At normal incidence                                          | 3  |                                                    |                                                            |
|   |                                                                                                      |    |                                                    |                                                            |

  
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