SEMESTER – VII
PEDAGOGY OF PHYSICAL SCIENCE – P3

CODE: 16PIED71 **Credits: 1 (0L: 0.5T: 0.5P)**

Hours: 2/Week

Objective: On completion of the course, the student-teachers will be able to

Understand the subject matters at the School level in Physical Science deeply based on the orientation given.

Subject Content on Physical Science Subjects (Physics and Chemistry) at the School Level of Class VI to X will be taught by the Teacher Educators to strengthen the Subject Knowledge of the Student Teachers.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the subject matters at the school level in physical science.

CO2: Apply the teaching methods and techniques in school subject.

CO3: Gain the knowledge about the co-operative school climate.

CO4: Use the teaching practice experience while giving demo teaching in various school.

CO5: Relate the lesson plan format with the Bloom taxonomy of educational objectives

SEMESTER – VII
PEDAGOGY OF MATHEMATICS – P3

CODE: 16PIED72 **Credits: 1 (0L: 0.5T: 0.5P)**
Hours: 2/Week

Objective: On completion of the course, the student-teachers will be able to

Understand the subject matters at the School level in Mathematics deeply based on the orientation given.

Subject Content on Mathematics Subject at the School Level of Class VI to X will be taught by the Teacher Educators to strengthen the Subject Knowledge of the Student Teachers.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the subject matters at the school level in Mathematics.

CO2: Apply the teaching methods and techniques in school subject.

CO3: Gain the knowledge about the co-operative school climate.

CO4: Use the teaching practice experience while giving demo teaching in various school.

CO5: Relate the lesson plan format with the Bloom taxonomy of educational objectives

SEMESTER-VII
MATHEMATICS – PAPER - XI
MECHANICS

CODE: 16EIED72 **Credits: 3 (2L:1T:0P)**
Hours: 4/Week

Objectives: To enable students to

1. understand some real life problems
2. understand the basic concepts of forces, moments, friction
3. know the application of Mathematics.

UNIT – I : Forces: Linear momentum – friction – laws of friction- angle and cone of friction. Resultant of two, three and several forces acting on a particle Equilibrium of a particle: Triangle law of forces and its converse – Lami's theorem, equilibrium of a particle under several forces – Limiting equilibrium of a particle on an inclined plane **Chapter 2**: Section 2.1,2.2 **Chapter 3**: Sections 3.1, 3.2

UNIT – II: Forces on a rigid body: Moment of a force- General Motion of a rigid body – equation of motion of a rigid body (statement only)- equivalent systems of forces resultant of Like and Unlike parallel forces – Varignon's theorem **Chapter 4 :** Sections 4.1, 4.2, 4.3, 4.4

UNIT – III: Kinematics: Velocity-resultant Velocity- relative velocity-Acceleration-velocity and acceleration in a coplanar motion-Angular velocity-Relative angular velocity. **Chapter 1** – Sec 1.1,1.2,1.3,1.4**.**

UNIT – IV: Impact: Impulsive force-Laws of impact- Direct and oblique impact of smooth spheres-Impulse: Loss of kinetic energy due to impact. **Chapter 14** – Sec 14.1,14.2,14.3,14.5(Omit 14.4)

UNIT – V: Central Orbits: General Orbits- central force- Differential equation of a central orbit-Law of central force- Method to find the central orbit-Conic as a central orbit-Kepler's law of planetary motion. **Chapter 16** - Sec 16.1,16.2,16.3.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Relate linear momentum and triangle law of forces to real life problems

CO2: Explain the momentum of a force and general motion of rigid body

CO3: Understand the concept of velocity and acceleration

CO4: Examine loss of impact and loss of kinetic energy

CO5: Describe laws of central force and Kepler's law of planetary motion

Reference Books:

- Duraipandian, P. Laxmi Pandian, Muthamizh Jayapragasam. (2005).Mechanics (6th Revised Edition), New Delhi: S.Chand and Co.
- Dharmapadam, A.V. (1991), Mechanics, Chennai, S. Viswanathan and Co.,
- Viswanath Naik, K. (2000), Statics, Chennai, Emerald Publishers (Reprint).

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SEMESTER-VII

PHYSICS – PAPER - 8
RELATIVITY AND QUANTUM MECHANICS

CODE: 16EIED71 **Credits: 4 (3L:0T:1P)**
Hours: 5/Week

Objectives: To enable students to

- understand the concepts of wave mechanics, dualistic nature of Nature.
- understand the physical implications of wave functions, expectation value, linkage between classical and quantum physics.
- apply the Schrödinger equation to 1D and 3D physical systems
- learn the 4D space and changes from our common sense.

UNIT - I: Origin of Quantum Mechanics

Introduction - expression for group velocity - experimental study of matter waves - Properties of wave functions. Phase velocity - wave velocity – group velocity- relation between group velocity and phase velocity. Heisenberg's Uncertainty principle - Mathematical proof of uncertainty principle for one dimensional wave packet - wave particle duality.

UNIT - II: General Formalism

Basic postulates - derivation of time dependent Schrödinger's equation - Probability current density - Ehrenfest's theorem- Commutator algebra - form of wave function in terms of definite momentum - probability density - properties of energy eigen values.

UNIT-III: One Dimensional Schroedinger Problems

Particle in a box - Infinite square well potential - potential step. The free particle - rectangular potential well- Finite square potential well. Barrier penetration problem. Linear harmonic Oscillator - Comparison of classical and quantum ideas.

UNIT-IV: Spherically Symmetric Potential Problems

Wave mechanical atom model - The hydrogen atom - normalized wave function of the Hydrogen atom - Expression for energy of the electron of the Hydrogen atom in the ground state - Significance of various quantum numbers - electron probability density -Orbital angular momentum - expression for eigen values of L2 and L - Rigid rotator.

UNIT - V: Relativity

Introduction - Frame of reference - Newtonian relativity – Galilean Transformation equations - The Ether hypothesis - The Michelson –Morley experiment - Special theory of relativity - The Lorentz Transformation equations - Length contraction - Time Dilation - relativity of simultaneity - addition of velocities - variation of mass with velocity - Mass Energy equivalence - Minkowski's Four dimensional Space-Time continuum.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Gain the knowledge about the concepts of wave mechanics, dualistic nature.

CO2: Classify the implications of wave functions and expectation value.

CO3: Apply the Schrödinger equation to 1D and 3D physical systems.

CO4: Interpret the 4D space and changes from our common sense.

CO5: Differentiate the linkage between classical and quantum physics.

Reference Books

- R Murugesan & Kiruthiga Sivaprasath, Modern physics, S Chand & Co, New Delhi, Edition 2010.

Physics Practicals – VII
Paper – VII

Any Seven Practicals

1. Hartley oscillator.
2. B.G – absolute M.
3. B.G – absolute C.
4. B.G – resistance and figure of merit (condenser method).
5. B.G - high resistance by leakage.
6. Sonometer - AC frequency determination.
7. P.O box temperature co-efficient.
8. Surface tension - drop weight method.
9. Resonators.

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SEMSTER-VII
CHEMISTRY – PAPER-VII
CHEMISTRY OF NATURAL PRODUCTS

CODE: 16CIED71 **Credits: 4 (3L: 0T: 1P)**

Hours: 5/Week

Course objective: To understand what are carbohydrates proteins amino acid, alkaloids, terpenoide their classification structure, elucidation and to know about dyes

Unit – I: Carbohydrates

Classification – Constitution of glucose and fructose. Reactions of glucose and fructose-osazone formation. Mutarotation and its mechanism. Cyclic structure. Pyranose and furanose forms. Determination of ring size. Haworth projection: formula. D and L configuration of monosaccharides – epimerisation, chain lengthening and chain shortening of aldoses. Inter conversion of aldoses and ketoses.

Unit – II: Amino Acids and Proteins

Aminoacids and proteins - Classification of amino acids. Essential and nonessential amino acids, preparation of alpha aminoacids, properties and reactions. Zwitter ions, isoelectric points - Peptide synthesis - structure determination of polypeptides - end group analysis.

Unit – III: Vitamins and Alkaloids

Vitamins: - classification, biological importance of vitamins A, B_1, B_2, B_6, B_{12} and C. General methods of isolation and general methods of structure determination of conine, piperine and nicotine.

Unit – IV: Terpenoids

Isoprene rule, special isoprene rule, Structural elucidations of - Geraniol, menthol and alpha terpineol.

Unit – V: Dyes and Pigments

Theory of colour and constitution. Calssification - according to structure and method of application. Preparation and uses of 1) Azo dye-methyl orange and Bismark brown 2) Triphenyl methane dye Malachite green. 3) Phthalein dye - phenolphthalein and fluroescein 4) Vat dye - indigo 5) Anthraquinone dye - alizarin.

COURSE OUTCOME

At the end of this course the students will be able to,

CO1: Understand the Basic Structure and Reactions of Glucose and Fructose

CO2: Prove Haworth projection formula and D & L configuration of carbohydrates

CO3: Understand the classification, function and reactions of amino acids and proteins

CO4: Demonstrate the concept of synthesis and structural determination of polypeptides

CO5: Classify fat soluble and water-soluble vitamins with suitable examples.

Text Book:

- Ashutosh Kaur. "Chemistry of Natural Products" Vol. I & II. B. S. publishers. 2nd edition, **2012.**

Reference Books:

- Jagadamba Singh. "Natural Products Chemistry" Pragati Prakashan,2nd edition **2012.**
- O. P. Aggarwal. "Chemistry of Natural Products" Vol. I & II. Goel publishers. 41st edition. **2009.**

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CHEMISTRY
PRACTICAL-VII

Heterogeneous equilibria:

1. Phenol-water system – CST
2. Effect of Impurity- 2% NaCl or succinic acid solutions on phenol-determination of the concentration of the given solution.
3. Determination of transition temperature of the given salt hydrate. $Na_2S_2O_3$. $5H_2O$, CH_3COONa. $3H_2O$, $SrCl_2$ $6H_2O$, $MnCl_2$ $4H_2O$.
4. Molecular weight of a solute-Rast's method using naphthalene, m-dinitrobenzene and diphenyl as solvents.
5. Determination of strength of a strong acid by conduct metric titration (HCl *vs* NaOH).
6. Determination of the strength of Fe (II) by potentiometric redox titration.

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