PEDAGOGY OF PHYSICAL SCIENCE
FIRST YEAR / SEMESTER – I

OBJECTIVES

1. **t**o enable the student to understand the nature and scope of Physical Science.
2. to enable the student teachers to know the aims and objectives of teaching Physical Science.
3. to enable the student teachers to understand the skills in the teaching of Physical Science and to develop the skills in them through classroom teaching.
4. to enable the student – teacher to understand the principles of curriculum construction and examine critically the syllabi in Physical Science of the Secondary and Higher Secondary schools.
5. to enable the student teachers to develop a theoretical and practical understanding of the various methods and techniques of teaching Physical Science and the importance of self-learning devices.
6. to enable the student teachers to know the special qualities of a good science teachers.

UNIT: I - NATURE AND SCOPE OF PHYSICAL SCIENCE (15 hours)

Nature and Scope of Physical Science – Nature of Science – (Product and Process) – A body of knowledge – a way of investigation – a way of thinking – Areas of Knowledge related to Physics and Chemistry – Inter disciplinary approach. Aims and Objectives of Teaching Physical Science – Blooms Taxonomy of Educational Objectives – Aims and Objectives of teaching Physical Science at different levels – Primary, secondary and higher secondary. Organizing learning experiences for achieving specific behavioral outcomes.

Activity: Prepare objectives for any 5 lessons

UNIT: II MICRO TEACHING (14 hours)

Micro Teaching – Micro Teaching and relevant skills – Skill of set induction – Skill of explaining – Skill of stimulus variation – Skill of reinforcement – Skill of using blackboard – Skill of demonstration Skill of Achieving Closure – Need for link lessons in Micro Teaching Program.

Activity: Practicing 3 micro lessons with 3 different skills.

UNIT: III- METHODS OF TEACHING PHYSICAL SCIENCE (16 hours)

Methods of Teaching Physical Science – General Methods of teaching Physical Science – Lecture method – Lecture cum demonstration method – Individual practical work as a method – Assignment method – Project method – Historical and Biographical approaches. Modern methods of Teaching Physical Science – discussion, seminar, symposium, team teaching, supervised study, Computer Aided Instruction, Programmed Instruction.

Activity: Preparing Biographical Albums related to Scientific personalities.

UNIT: IV – CURRICULUM (15 hours)

Curriculum Construction in Physical Science – Principles of curriculum construction – Criteria of selection of content matter – Organization of content matter – Critical evaluation of Tamil Nadu Secondary School Science Curriculum.

Activities: Identification and cataloguing of three websites relating to the prescribed school curriculum

UNIT: V - SCIENCE TEACHER (14 hours)

Science Teacher – Academic and Professional qualification –Special qualities – In-service training. - Class Room Climate - and its Types - Flanders Interaction Analysis.

Activity: List the professional competencies required for a science teacher

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- Anderson, R.D. et al. (1992). Issues of Curriculum Reform in Science, Mathematics and Higher Order Thinking Across the Disciplines. The Curriculum Reform Project, University of Colorado, U.S.A.
- Carin & Robert Sund, (1989), Teaching Modern Science (Fifth Edition), Merill Publishing Co., U.S.A.Edgar Dale, Audio-Visual Methods in Teaching, Revised Edition, Thy Dryden Press, New York.
- Garrett,(1979) Statistics in Psychology and Education, Vakils, Feffer and Simons Ltd., Bombay.
- Gupta, S.K., (1985) Teaching of Physical Science in Secondary Schools, Sterling Publication (Pvt.) Limited,.
- Heiss, Obourn & Hoffman, (1985)Modern Science in Secondary Schools, Sterling Publication (Pvt.) Limited,

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1. Science Education International, ICASE.
2. Current Science, IISC, Bangalore.
3. School Science, NCERT, New Delhi.
4. Science Teacher – (Monthly), Editorial and Executive officers, 1201, Sixteenth St., N.W. Washington.
5. Science Today – (Monthly), 'Ganga Criha' 3rd Floor, 6-D, Nungambakkam High Road, Madras – 600 034.
6. Science Reporter – (Monthly), Publication and Information Directorate (CSIR), New Delhi.

PEDAGOGY OF PHYSICAL SCIENCE

FIRST YEAR / SEMESTER II

OBJECTIVES

- to guide the student teachers in acquiring skills relating to planning their lessons and presenting them effectively.
- to enable the student teachers to understand the techniques of evaluating science teaching and to construct achievement test to evaluate the progress of pupils.
- to understand the basic principles of statistical tools.
- to understand the basic principles of using of audio visual aids.
- to enable the students to understand the criteria in selecting a good textbook and to evaluate a science textbook.
- to enable the student to know the facilities required for the organization and maintenance of science laboratory.

UNIT: I TEACHER'S PLAN OF ACTION (15 hours)

Lesson Planning – Planning for teaching – developing year plans, unit plans, lesson plans – Principles of lesson planning – Lesson plans – their importance – Herbartian steps – their merits and limitations.

Activity: Preparing 20 lesson plans.

UNIT: II- EVALUATION (15 hours)

Tests and its types – Achievement tests – Qualities of a good test – Evaluating outcome of Science teaching – Principles of test construction – Blue Print and Question Paper – Item Analysis – Diagnostic testing and Remedial teaching.

Activites: Constructing and conducting an achievement test and interpreting the scores

UNIT: III-STATISTICAL TOOLS (15 hours)

Measures of Central tendency – Mean, Median & Mode – Measures of Variability – Means, Standard and Quartile Deviation; Correlation co-efficient, Rank order – Graphical representation of Data – Bar Diagram, Histogram, and Frequency Polygon – Cumulative Frequency Curve, Ogive.

Activity : Preparation of Transparencies sheets to represent data(graphical)

UNIT: IV – TEACHING AND LEARNING MATERIALS (16 hours)

Classification of Audio Visual Aids (Projected and Non-projected) – their importance – Principles and use of Hardware: Film strip cum Slide Projector, Overhead Projector, Motion Picture Projector, Radio, TV, CCTV, Tape Recorder, principles and use of Software: Objects, specimens, slides, transparencies, CD, Audio and Video Tapes-Educational Broadcasts: Radio and T.V. lessons – Programmed Learning – Power Point – use of Internet in teaching Physical Science – e-learning.

Activities: Making 15 charts and improvised apparatus.

UNIT: V – TEXT BOOK AND LABORATORY (15 hours)

Physical Science Qualities of good Science text book use of text books inside and outside the class room. Text books – Physics, Chemistry – Evaluation of different types of textbooks – CBSE, SSLC etc. Equipping the Physics and Chemistry libraries. Laboratory – Organization and maintenance of Science Laboratory – Maintenance of Registers – Storage of Chemicals – Organization of Practical work. Improvisation of Apparatus Accidents and First Aids**.**

Activities: Preparation of 2 laboratory instructional cards.

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- Carin & Robert Sund, 1989, Teaching Modern Science (Fifth Edition), Merrill Publishing Co., U.S.A.
- Edgar Dale, Audio-Visual Methods in Teaching, Revised Edition, Thy Dryden Press, New York.
- Garrett, Statistics in Psychology and Education, Vakils, Feffer and Simons `Ltd., Bombay, 1979.
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- Jenkins, E.W. (Ed.) 1997, Innovations in Science and Technology Education, Vol. VI, UNESCO, Paris.
- Newbury N.F., Teaching of Chemistry in Tropical Secondary Schools, Oxford University Press.
- Nair, C.P.S., Teaching of Science in our Schools, Sulthan Chand & Co. (Pvt.) Limited,1971.

- Panner Selvam, A., Teaching of Physcial Science (Tamil), Government of Tamil Nadu, 1976.
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5. Science Today – (Monthly), 'Ganga Criha' 3rd Floor, 6-D, Nungambakkam High Road, Madras – 600 034.
6. Science Reporter – (Monthly), Publication and Information Directorate (CSIR), New Delhi.

WEB-SITES:

HYPERLINK "http: //www.sciedu/nsrc.com" www.sciedu/nsrc.com
HYPERLINK "http: //www.nerdword.com" www.nerdword.com
HYPERLINK "http: //www.2112systems.com" www.2112systems.com
HYPERLINK "http: //www.ncert.nic.in" www.ncert.nic.in
HYPERLINK "http: //www.unesco.org" www.unesco.org

PEDAGOGY OF PHYSICAL SCIENCE
SECOND YEAR / SEMESTER III

OBJECTIVES

- to enable the student teachers to understand the place of Physics and Chemistry in the modern world and to understand the contribution of mankind in the development of science.
- to enable the student teachers to understand the psychological basis of modern trends in teaching science and the new techniques of teaching science.
- to enable the student teachers to understand the correlation of Physical Science with other subjects.
- to enable the student-teachers will be able to acquire classroom management
- to enable the students to have knowledge of all the basic concepts in Physics and Chemistry.

UNIT I - THE MEANING OF SCIENCE (14 hours)

The meaning of Science – Different branches of Science – Globalization and Science History of Science with special reference to India – Physics and Chemistry as process and Product.

Activity: Preparing a Science album with scientific issues.

UNIT II - MODERN TRENDS IN TEACHING OF SCIENCE (15 hours)

Justification for including Physics and Chemistry separately at the higher secondary level. Modern trends in teaching of science, Psychological basis of methods in science teaching-Gagne, Bruner, Piaget

Activity: Preparing a Science show with 10 slides in Power Point.

UNIT III - CORRELATION OF SCIENCE WITH OTHER SUBJECTS (16 hours)

Correlation of Science with other subjects – Values of teaching Physical Science – Intellectual, Utilitarian, Vocational, Leisure time, Cultural, Moral, Aesthetic and Psychological Values. Development of Scientific attitude.

Activity: Prepare a comparative chart showing the difference in teaching science with any other subject

UNIT IV - CLASSROOM MANAGEMENT (16 hours)

Concept of class Room Management – Class Room Organisation – Components of Class Room Management – Class Room Learning atmosphere – Positive Classroom climate –Factor supporting an Effective Learning atmosphere – Advantages of Positive Learning climate – Creative Ideal classroom atmospheres – Technical teaching skills – Prevention and Control of Students – classroom Activities – Classroom Records and Rules.

Activity: Observe the class of your colleague and give a report on the classroom management skill.

UNIT V- SENSITISING THE SCHOOL CURRICULUM (14 hours)

Analysis of the Content course of Standard VI to VIII (Tamil, English, Mathematics and Science) Text Books prescribed by Government of Tamil Nadu, and content course of standard IX - X (for UG), XI – XII (for PG) Physics / Chemistry Text Books Prescribed by Government of Tamil Nadu.

ACTIVITIES

1. Preparation of a program of 10 frames on Physics or Chemistry topic.
2. Collecting 3 materials on selected topics in Physics or Chemistry that could be used in Classroom.

REFERENCES

- Chauhan, S.S., Innovation in Teaching and Learning Process, Vikas Publishing House, 1985.
- Natrajan, C., (Ed.), 1997, Activity Based Foundation Course on Science Technology and Society, Homi Bhaba Centre for Science Education, Mumbai.
- Panneer Selvam, A., Teaching of Physical Science (Tamil), Government of Tamil Nadu, 1976.
- Passi, B.K., becoming a Better Teacher, Micro Teaching Approach.
- Sharma, R.C., Modern Science Teaching, Thanpat Raj and Sons, 1985.

PEDAGOGY OF PHYSICAL SCIENCE

SECOND YEAR / SEMESTER IV

OBJECTIVES

- to enable the student teachers to identity gifted and backward students**.**
- to enable the student teachers to be aware of the trends in co-curricular activities in science education.
- to enable the student teachers to be aware of the types of research with special reference to action research.
- to enable the student teachers to know how to evaluate teachers.
- to enable the student teachers to understand the problems of science teaching in urban and rural schools and to develop scientific perspective of the problems confronting the world and the role of science in solving them.

UNIT I - ENRICHMENT AND REMEDIAL SCIENCE PROGRAMMES

(16 hours)

Grouping – Ability Grouping – Gifted Children – Meaning – Definition - Identification – Educating the Gifted – Enrichment Programme – Acceleration – Special Grouping; Types of Enrichment Programme – Lateral –Intensive Programme – Science Talent Search Programme; Slow Learners – Identification - (Remedial Programme for Slow Learners) - Role of Teachers in Educating the Slow Learners – Special Curriculum – Special Teaching Methods.

Activity: Preparation of branched programme material consisting of 10 frames, in science.

UNIT II - STRENGTHENING SCIENCE EDUCATION (14 hours)

Co-curricular activities – Organization of Science clubs – Science exhibitions and fairs – fieldtrips and excursions.

Activity: Preparation of about 10 slides in advance level in Power Point.

UNIT III- RESEARCH IN SCIENCE EDUCATION (15 hours)

Research in Science Education – Status of Research in Science Education in India – Educational Research – Types – Action research.

Activity: Evaluating reports of 3 websites in science.

UNIT IV - EVALUATION OF TEACHERS (15 hours)

Evaluation of teachers, rating by superiors or colleagues Evaluation by pupils – Self evaluation – comparing performance with lesson plan – video tapes – class room interaction analysis (Flanders).

Activity: Prepare a self –assessment scale

UNIT V - PROBLEMS OF SCIENCE TEACHING (15 hours)

Problems of Science Teaching – Urban and Rural areas – Global Problems – Pollution – Diseases – Global warming, over population, malnutrition, superstitious beliefs. Developing scientific temper.

Activity: Compare the problems faced by science teachers at rural and urban schools.

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- Chauhan, S.S., Innovation in Teaching and Learning Process, Vikas Publishing House,1985.
- Natrajan, C., (Ed.), 1997, Activity Based Foundation Course on Science Technology and Society, Homi Bhaba Centre for Science Education, Mumbai.
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