

EDU 09.11 PEDAGOGIC PRACTICES IN NATURAL SCIENCE

Handbook

Contact Hours: 100 (Instruction) Maximum Marks: 100

(External: 80 , Internal: 20)

Unit	Objectives	Content	Scope of the content
Unit I (17 hrs). Aims and Objectives of teaching Natural Science	□□□To understand the Aims and Objectives of Teaching Science with special reference to biology 2.To familiarize the different taxonomies of instructional objectives.	1. Aims and Objectives of teaching Natural Science. Broad National Goals. - Taxonomy of educational objectives- cognitive affective and psychomotor domains, –Revised Bloom's Taxonomy, Mc Cormack & Yager Taxonomy. Process skills in Science at secondary stage, Developing process skills in students.	Aims of teaching science, values of teaching science- broad goals of teaching biological science- taxonomy of objectives-Bloom's Taxonomy-cognitive, affective and psychomotor domains- objectives and specifications- specifications of corresponding objectives-Revised bloom's taxonomy-knowledge dimension- process dimension- taxonomy table-comparison of bloom's taxonomy and RBT- terminology change and structural changes –taxonomy of McCormack and yager-concept domain, process, application, attitude, creativity, nature of science domain-13 process skills in science-observation, classifying, interpreting, hypothesising etc-strategies to foster process skills at secondary stage
UnitII. (23hrs) Micro Teaching and Models of teaching	1.To develop skills for effective teaching 2.To understand the meaning, scope and importance of models of teaching.	Micro teaching-Teaching skills for class room instruction, Essential skills for Science teaching, Micro teaching - a skill based practice. 136 Models of Teaching - The significant characteristics of Models of Teaching, <i>Functions of Models of Teaching.</i> , Families of Models of Teaching, Basic Procedure for the Implementation of a Model, Elements of a model, Concept Attainment Model, Inquiry Training Model and Advance Organizer Model	Micro teaching introduction-need –microteaching cycle-core and supplementary skills- components of each skill-models of teaching- four families- definition and concept- basic elements-syntax, social system,principles of reaction-support system and effects-basic elements of each mode-merits and limitations-

<p>Unit III. (20hrs) Pedagogic Analysis</p>	<p>1.To understand and practice the pedagogic analysis of 8th, 9th and 10th Biology.</p>	<p>Pedagogic Analysis- A conceptual overview, Pedagogic Analysis of the Biology content portions of 8th and 9th standard textbooks of Kerala state. Stating general instructional objectives and specific instructional objectives in terms of behavioural outcomes and curricular objectives.</p>	<p>Pedagogic analysis –concept-difference between methodology and pedagogic analysis- steps of pedagogic analysis-difference between content analysis and pedagogic analysis-pedagogic analysis of biology content at secondary level- - stating specific instructional objectives in terms of behavioural outcome –curricular objectives.</p>
<p>Unit IV (15 hrs). Planning of instruction</p>	<p>1.To acquaint with the planning of instruction at different levels</p>	<p>Objective Based Instruction- interdependence of objectives, learning experience, and evaluation Planning of Instruction-Year Plan, Unit Plan, Resource Unit . Lesson planning – Need, Stages (Herbartian steps) - Lesson plan preparation based on The Constructivist format, Herbartian steps, and Behaviourist format</p>	<p>instructional objectives- objective based instruction- triangular relation between objectives, learning experience and evaluation-planning of instruction-year plan- format of year plan-unit plan-format of unit plan-resource unit-contents of a resource unit-lesson planning- need- herbartian steps in lesson planning- different formats of lesson plan- constructivist lesson plan- behaviourist lesson plan</p>

<p>Unit V (15 Hrs) Co-curricular activities in science</p>	<p>□□□To acquaint with the co-curricular activities in Science.</p>	<p>Co-curricular activities - organization of field trips and study tours, their importance. Science Club - its pattern, organization and activities such as Science fairs, Science exhibition, Science debates, Nature rambling, Nature calendar. Educational implication of science library and science laboratory Role of experiments in science</p>	<p>Co-curricular activities – significance and values- organization of field trips and study tours-objectives and planning-, their importance. Science Club - its pattern, organization and activities such as Science fairs, Science exhibition, Science debates- organising science exhibition and fair-- Nature rambling, Nature calendar. Educational implication of science library and science laboratory –rules and precautions in science laboratory-register maintained in lab-Role of experiments in science</p>
--	---	---	--

<p>Unit VI (10 hrs) Evaluation in Science</p>	<p>1.To understand the Evaluation techniques and to prepare test items as per the existing state syllabus pattern in Science.</p>	<p>Evaluation - Different types of test items - merits and demerits. Construction and administration of Achievement tests and Diagnostic tests. Continuous and Comprehensive Evaluation, Evaluation Criteria for Assignment, Seminar and Project- Evaluation of noncognitive areas like creativity, skill, and interest.</p>	<p>Evaluation - Different types of test items – fixed response and free response-suggestions for construction of multiple choice/true or false- matching type completion type- simple recall type-short answer and essay type construction of achievement test-steps of constructing achievement planning to administration merits and demerits. Diagnostic tests- Construction procedure-remedial teaching-difference between Continuous and Comprehensive Evaluation, Evaluation Criteria for Assignment, Seminar and Project- Evaluation of non-cognitive areas like creativity, skill, and interest.</p>
---	---	--	--

Task and assignments:

1. Prepare a lesson transcript using any one of the models of teaching and practice it in the school.
2. Construct a Diagnostic Test on topic of your choice and administer it in school class. Interpret the test and report Develop an e-content material for any topic in mathematics at secondary level

**EDU 10.11 PROFESSIONALIZING NATURAL SCIENCE
EDUCATION**

Contact Hours: 50 (Instruction) Maximum Marks: 50 (External: 40,
Internal: 10)

Unit	Objectives	content	Scope of content
Unit I (12 hrs) Professional Science Teacher	1.To be a Professional Science Teacher. 2.To familiarize the competencies and soft skills required for a teacher	Definition of profession, Teaching as a profession - Professional ethics, Traits of professionalism, Teaching competencies required by a science teacher. Soft Skills required for a teacher. Teacher Competencies listed by NCTE. Professional growth of Science teacher. Teaching, Research and Extension, Research journals in Science & Science Education Role of SCERT and NCERT in the Professional growth of Science teacher. Internet resources and websites for professional growth of science teachers like ERIC, INFLIBNET etc.	Features of professionalism-teaching as a profession-elements of teaching profession-professional ethics-obligation towards students, colleagues, parents and society-teacher competence-competencies related to planning, teaching, assessing etc.,-professional growth of teacher-professional development in teaching, research and extension-role of SCERT and NCERT-publications and journals-NList-INFLIBNET
UnitII (13hrs) Technological Pedagogical Analysis of content Knowledge (TPACK)	1.To understand and find inter relationship of different areas of TPACK. 2.To develop skill in technological pedagogical analysis of content knowledge (TPACK).	Technological Pedagogical Analysis of content Knowledge (TPACK) Techno pedagogy – meaning, need and scope Technological Pedagogical Content Knowledge (TPACK) Science teacher as techno pedagogue- Techno-Pedagogical	TPK Frame work-TPACK Knowledge areas, content knowledge, (CK)- Pedagogic Knowledge(PK)-Technology Knowledge(TK)-Technological content knowledge(TCK)- Technological pedagogical knowledge(TPK)-Pedagogical content knowledge(PCK)- features of TPACK-micro blogging-E-portfolio-digital lesson plan-wikis-online journals

	<p>2.To develop skill in networking through different ways.</p> <p>3.□To understand the use of video conferencing and smart class rooms.</p>	<p>Skills of Natural Science teacher</p> <p>Digital Resources – CD, DVD, Websites, m-learning.</p> <p>Analysis of school biology topic using ICT Tools</p> <p>Relevance of Online Publishing using blogs, forums, wikis, online journals etc.</p>	
<p>Unit III (10 hrs)</p> <p>Gifted students in science</p>	<p>1.To understand the importance of nurturing gifted children.</p>	<p>Gifted students in science</p> <p>Identifying and nurturing the scientifically gifted children. Creativity and Critical thinking in Science.</p> <p>NTSE(National Talent Search Examination by NCERT),</p>	<p>Giftedness- characteristics of gifted students-strategies and programmes for gifted students-double promotion-acceleration –summer schools etc., enrichment programmes-NTSE- National science talent search scheme-objectives and fellowships-selection of students-critical thinking-creativity- components of creativity-strategies to foster creativity</p>
<p>Unit IV (15 hrs)</p> <p>Science and Technology</p>	<p>1.To understand the role of science in changing society</p> <p>2.To acquaint with the emerging technology and ICT in science learning</p>	<p>Complementarities between Science and Technology - use of ICT in science</p> <p>Educational uses of e-mail, e-discussion, chat, Wiki , Blog in education - how to use blog in education, utilizing social net working effectively,</p> <p>Communication Technology- Technology based new emerging communication media</p> <p>Virtual class room and virtual reality, virtual labs (iLab Project at MIT)</p> <p>Computer Aided Teaching, Expert System and Intelligent</p>	<p>Interplay between Science and Technology – science and social change- land mark inventions -use of ICT in science</p> <p>Educational uses of e-mail, e-discussion, chat, Wiki , Blog in education - how to use blog in education, utilizing social net working effectively,</p> <p>Communication Technology- Technology based new emerging communication media-significance and access-[Tele-conferencing, webinar, video conferencing, micro blogging etc] . Virtual labs, class room and virtual reality- merits and limitations- (iLab Project at MIT)</p> <p>Computer Aided instruction, Expert System and Intelligent Tutoring Systems, Module</p>

		Tutoring Systems, Module preparation for e-content Development, Course ware, Free softwares in Science Learning Management Systems – MOODLE	preparation for e-content Development, Course ware, Free softwares in Science – examples- Learning Management Systems – MOODLE
--	--	---	--

Tasks and Assignments

1. Prepare a summary of an article related to science education from an e-journal. OR
2. Prepare a Techno pedagogic Content Analysis of a biology lesson from Secondary Level

REFERENCES (For EDU 9.11 and 10.11)

- Anderson, J.B. (1980). Cognitive Psychology and its Implications. San Francisco: W. H. Freeman and Company.
- Anderson, C. and K. Roth. (1992). Teaching for Meaningful and Self Regulated Learning of Science. Advances in Research of Teaching, Vol. 1, J. Brophy, ed. Greenwich, Conn : JAI.
- 81
- Alsop, S. & Hicks, K. (2003) Teaching science. New Delhi: Kogan page India Private Ltd.
- Arons, A.B. (1983). Achieving Wider Scientific Literacy. Daedalus Spring 91—122.
- Aggarwal, D.D. (2001): Modern Methods of Teaching Biology. Sarup Teaching Series. Sarup & Sons, New Delhi.
- Bhaskara Rao, D. (2000): Teaching of Biology. Nagarjuna Publishers, Guntur.
- Bhatt, B. D., & Sharma, S.R. (1996). Methods of Teaching Science. Delhi: Kanishka Publishing House.
- Bloom, B.S. (Ed). (1956). Taxonomy of Educational Objectives : New York :David McKay Company.
- Bloom, B.S. (Ed.) (1956). Taxonomy of Educational Objectives, Handbook 1—Cognitive Domain, Harcourt Brace & World Inc., New York.
- Chikara, M. S. and S. Sarma (1985): Teaching of Biology, Prakash Brothers, Ludhiana.
- Dale, E. (1967): Audiovisual Methods in Teaching. (2nd ed.). New York: The Drygen Press, Inc. 117
- Das, R.C. (1985). Science Teaching in Schools. New Delhi: Sterling Publishers.
- Elkind, D. (1977). Piaget and Science Education. In.
- Gagne, R.M., Briggs, L.J. & Wagner, W.W. (1986). Principles of Instructional Design (3rd ed.). Chicago: Holt, Rinehart and Winston Inc
- Gentn, D. & Stevens, A.L.(Eds.).(1983). Mental Models. Hillsdale, New Jersey: Larence Erlbaum Associates, Publishers.
- Gupta, S.K. (1985). Teaching of Physical Science in Secondary Schools. New Delhi : Sterling Publications (Pvt.) Limited.
- Hull, D. L., (1988). Science as a process. Chicago: The University of Chicago Press.
- Joyce, B. & Weil, M. (1986). Models of Teaching (3rd ed.) New Jersey: Prentice Hall Inc.
- Kohli, V.K. (1986). How to teach Science. Ambala City, Haryana: Vivek Publishers.
- Lowman, J. (1995). Mastering the Technique of Teaching. Second Edition, San Francisco.
- Mangal, S.K., Teaching of Science, New Delhi: Arya Book Depot. 1997.
- Mohan, R (1995). Innovative science teaching for physical science. New Delhi: Prentice Hall.
- Mohan R (2011) Teacher Education, New Delhi Prentice Hall India Ltd

- Narendra Vaidya: Science Teaching in Schools for the 21st century, Deep and Deep Publications Pvt.Ltd.,1999.
- N. Vaidya & J.S. Rajput (Eds.), Reshaping our School Science Education. New Delhi: Oxford & I.B.H. Publishing Company.
- N.C.E.R.T. (1989). Instructional objectives of school subjects. New Delhi: N.C.E.R.T.
- N.C.E.R.T. (1993). National curriculum for elementary and secondary education (rev. ed.). New Delhi:
- N. C. E. R.T. NCERT . (2005)National Curriculum Frame Work New Delhi: NCERT
- SCERT. (2007) Kerala Curriculum Frame Work Thiruvananthapuram:
- SCERT S.Venkataih(Ed)..Science Education.Anmol publications Pvt Ltd.,2000
- S.K.Kochhar..Methods and Techniques of Teaching, Sterling Publishers pvt ltd 2003
- Sharma Jagdish,Model of Science Teaching,Raj Publishing House, Jaipur.(2006)
- Siddiqui,N.H.and Siddiqui.M.N., Teaching of Science Today and Tomorrow.Delhi:Doaba House.1983.
- Sivarajan, K & Faziluddin, A., Science Education—Methodology of Teaching and Pedagogic Analysis. Calicut University Co-Operative Store.
- Sharma, R.C. (1985).Modern Science Teaching. New Delhi: Dhanpat Rai & Sons.
- UNESCO,New UNESCO Source Book for Science, France UNESCO.
- Yadav.M.S Teaching of Science,Mangaldeep Publication, N.Delhi 1992.