M.Ed. DEGREE PROGRAMME

SEMESTER I

CORE COURSE

Course Code: 904.7 ADVANCED METHODOLOGY OF SCIENCE EDUCATION

COURSE OUTLINE

Contact Hours : 108 Maximum Weight : 32

Duration of Exam : 3 hrs No. of Credits : 4

COURSE OBJECTIVES

- To understand the nature of science as a dynamic, expanding body of knowledge.
- To enable the students to understand the objectives of teaching science.
- To assimilate the features of contemporary science education.
- To explore the areas of paradigm shifts in science education.
- To know about and to critically study the innovative curricular efforts in India and abroad.
- To develop the skills needed for devising the science curriculum and for developing support materials for curriculum transaction.
- To develop the ability and skills for evaluating the range of outcomes in science education.
- To understand the role of assessment in science education.
- To acquaint with the coping strategies for teachers stress and burnout.
- To enhance and facilitate professional competencies of teacher educands of science education.

COURSE CONTENT

Unit I: Nature of Modern Science Education (12 hrs)

a. Science -Nature and Scope.

b. Development of Science over the Centuries.

c. Social Functions of Science: Social and Personal Values of Science Education.

d. Science Education in the Modern Perspectives- Nature and use of Scientific Method.

e. Science and Philosophy: Positivism and Constructivism.

f. Scientific Literacy.

g. Process Skills in Science: Basic Processes, The integrated Processes-Its Application.

h. Integrating Life Skills in Science Teaching.

i. Relevance of Science Education at Primary, Secondary and Tertiary levels.

Unit II: Goals and objectives of Science Education (17 hrs)

a. International Goals of Science Education, Science Technology and Society (STS) Goals.

b. National Goals of Science Education given by various Education commissions, National Curriculum Frame Work-2005

c. Taxonomies of Educational Objectives: Cognitive, Affective and psychomotor. Taxonomies of Bloom, Simpson, Dave, Anderson and Krathwohl, Mc Comark and Yager. Integrating the taxonomies for science education

d. Specific Performance objectives of Physical Science/Biological Science (according to own discipline).

Unit III: Science Curricula (25 hrs)

a. Curriculum Development

Approaches: Unified, Disciplinary, Interdisciplinary, Integrated, Correlated.

Patterns: Subject centered, Teacher initiated, Learner initiated.

b. Characteristics of significant Curricular Experiments

In Abroad: PSSC, HPP, CHEM, CBA, BSCS, Nuffield sciences, SAPA.

In India: Reforms by NCERT, SSA, DPEP, NCF.

Reforms by SCERT, KCF (Kerala Curriculum Framework) in Kerala.

c. Science syllabus revision in Kerala- Modernisation of the Science Syllabus from primary to Higher secondary level (Critical Study of Syllabus, Teacher's Hand Books, Textbooks, Guidebooks and other Auxiliary Materials) significance of My Science Diary.

d. An Assessment of the learner-centered/Activity oriented curriculum.

Unit IV: Facilities and Hindrances (14 hrs)

a. Academic, Administrative and Financial Facilities available for promoting Science Teaching. Science Fairs, Science Clubs, Field Trips and National Talent Search Exams.

b. Hindrances to Science Instruction - Academic hazards, Administrative, Financial Hazards and lack of Resources.

Unit V: Evaluation of Educational Outcomes (20 hrs)

a. Internal and External evaluation, Formative and Summative Evaluation, Continuous and Comprehensive Evaluation, Criterion Referenced-Norm Referenced Evaluation.

b. Assessing Process Skills in Science.

c. Diagnostic tests, Teacher-made tests and Standardised Test in Science.

d. Techniques of Evaluation involved in continuous and comprehensive Evaluation and grading.

e. Evaluating Projects, Seminars and group discussions, Symposia.

f. Online Assessment - Cybercoaching.

g. Authentic Assessment using Portfolios/Rubrics.

Unit VI: Empowering the Science Teacher (20 hrs)

a. Professional Competencies and challenges of science Teachers.

b. Components of classroom Management.

c. Programmes for Science teachers-Staff Development.

d. Coping Strategies for teacher's Stress, Burnout.

e. Extension Activities for Science Teachers.

Advanced Practicum (Any 2 items - one from each part)

PART - A

l. Suggest certain coping strategies for Science Teacher's stress.

2. Compare and contrast two curricular experiments (Indian and abroad).

3. Critically analyse the recent Science syllabus revision in Kerala

PART-B

1. Prepare teachers portfolio based on select topic

2. Construct and standardize an achievement test on any topic of Physics/Chemistry text, Kerala Syllabus.

3. Construct a test for assessing process skills of secondary school students.

References

1. Abruscato, Joseph (1992).*Teaching children science*. Boston: Allyn and Bacon.

2. Bhatt, B. D. and Sharma, S. R. (1993).*Methods of science teaching.* New Delhi: Kanishka Publishing House.

3. Bhatt, P. C. (1988).*Science Process Skills in Teaching and learning*. New Delhi: Common Wealth Publishers.

4. Biehler, Robert F. & Snowman, Jock (1993).*Psychology Applied to Teaching*. Boston: Houghton Mifflin Company.

5. Chamberlain, Kathleen and Crane, Corby Christine (2009). *Reading, Writing and Inquiry in the science classroom*. USA: Corwin press.

6. Dembo, Myron H. (1990).*Applying Educational Psychology in the classroom*. New York: Longman.

7. Devereux, Jane (2007). *Science for primary and early years*. Los Angeles: Sage publications.

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10. Elizabeth Hegarthy (l99) *The student Laboratory and Science curriculum* . New York: Rout ledge.

ll. Martin, David Jerner (2006). *Elementary Science Methods*: *A Constructive Approach'* (Ed.W). Singapore: Wadsworth Publishing.

12. Nivek, P. S. (1 993).*Science and social change*. New Delhi: Himalaya publishing House'

13. Parkinson, John (1994). *The Effective Teaching of secondary science*. New York: Longman.

14. Petrina, Stephen (2007).*Advanced teaching methods for the technology classroom.* Hershey: Information Science Publishing.

15. Sharma, H.L. (1989).*School science education in India*. New Delhi: Common Wealth Publishers.

16. Singh, V. K. and Nayak, A. K. (1997).*Teaching of science*. New Delhi: Common Wealth Publishers.

17. Trowbridge N.L. and Bybee W.R. (1996) *Teaching Secondary school science.* New Jersey: Prentice Hall.

18.Vaidya, Narendra (1996). *Science teaching in the 2l't century*. New Delhi: Deep and Deep Publishers.

Mahatma Gandhi University

M.Ed. Degree (CBCSS) First Semester Examination

Core Course 904.7 ADVANCED METHODOLOGY OF SCIENCE EDUCATION

Duration of Exam: 3 hrs. Max. Weight : 32

PART- A

Answer any two questions. Each question carries a weight of 4

1. Explain the Taxonomy of Educational objectives. Differentiate between the taxonomy proposed by Bloom and Yager.
2. What are the modern techniques of teaching science at secondary level. Give their merits and demerits.
3. Discuss the scope of ICT in science education. Suggest an ICT programme for any topic in science at higher secondary level.
4. What are the facilities available for science teaching in India? Explain two of them.

(2x4= 8 weight)

PART B

Answer any six questions. Each question carries a weight of 2.

5. Differentiate product and process approach in science education.
6. What do you mean by hidden curriculum? Give one example.
7. What is PSSC?
8. Differentiate between criterion referenced and norm referenced evaluation.
9. Construct a criterion to evaluate a project.
10. Suggest any two extension activities for science teachers.
11. Differentiate between interdisciplinary and integrated curriculum.
12. What is Cyber coaching?

(6x2=12 weight)

PART-C

Answer any six questions. Each question carries a weight of 1.

13. What are the components of Scientific Attitude?
14. What is life skill?
15. Suggest any two activities to inculcate scientific temper in

elementary school students.

16. What are the academic hazards to science instruction?
17. Mention any two social functions of science education.
18. What is diagnostic test?
19. Suggest any two strategies for coping the stress of teaching.
20 What are the objectives of SSA?

(6x1=6 weight)

PART D

Answer all questions. Each question carries ½ weight

21. What is Action Research?
22 What is meant by SAPA?
23 Define process oriented learning.
24 Define scientific literacy.
25 Suggest any two areas from science where the teacher can develop positivism.
26 What is modernization of science syllabus?
27 Name the techniques used for continuous evaluation in Science.
28. Give any two components of classroom management.
29 Which are the auxiliary materials used in science education?
30 What is the significance of 'My Science Diary'?
31 What is the purpose of National Talent Search Exam?
32 Write any two features of taxonomy proposed by Simpson.

(12 x ½ = 6 weight)