

**Syllabus and Course Scheme**  
**Academic year 2020-21**



# **University of Kota**

**FACULTY OF EDUCATION**

## **SYLLABUS**

**Integrated Programme of**

**B.Sc.-B.Ed.**

**Examination Part- III (2021)**

**Four Years Integrated Course**

## Scheme of B.Sc.-B.Ed. III Year

Theory Paper	Course Code	Title of the Paper	Evaluation			Total
			External	Internal	Practical	
I	B.Sc.- B.Ed. 16	Elementary Computer Application (Compulsory)*	100	-	-	100
II	B.Sc.-B.Ed. 17	Language Across the Curriculum	80	20	-	100
IV	B.Sc.-B.Ed-18(G-A)	Guidance and Counseling in School	80	20	-	100
V VI & VII	B.Sc.-B.Ed 19, 20 & 21 (G-B)	<b>Content (PCB &amp; PCM Group)(Select any Three)</b> 1. Chemistry(I,II,III) 2. Botany (I,II,III) 3. Zoology(I,II,III) 4. Physics (I,II,III) 5. Mathematics(I,II,III)	50+50+50 50+50+50 50+50+50 50+50+50 66+66+46	- - - - -	50 50 50 50 22	200 200 200 200 200
VIII	B.Sc.-B.Ed. 22(a,b)	Pedagogy of a School Subject (part-1) , Ist & IInd Year(candidate shall be required to offer any two papers from the following for part-1 & other for part-2). 1. General Science 2. Biology Physics 3. Chemistry 4. Mathematics 5. Physics	80	20		100
<b>Practicum</b>	B.Sc.-B.Ed. 23	<b>Special Training Programme</b> • Micro Teaching(5 Skills) • Simulated Teaching(5 Lessons) • Practice Lesson during Internship Teaching(4 Weeks 15 Lessons) • Observation of Teaching of Peer Group(5) • Technology Based Lessons(2 Lessons) • Criticism Lesson			10 10 50 05 10 15	100
		<b>Final Lesson</b>	<b>100</b>			100
						1100

**Note\*** - B.Sc. B.Ed. integrated III<sup>rd</sup> year syllabus and scheme course code 16 will be according to B.Sc. Ist year & course code 19, 20 & 21 will be according to B.Sc. III<sup>rd</sup> year academic course of University of Kota, Kota.

# **B.Sc. B.Ed. 17**

## **LANGUAGE ACROSS THE CURRICULUM**

### **Objectives:**

The student teacher will be able:

- To understand children's language background for effective teaching and learning.
- To create sensitivity to the language diversity that exists in the classroom
- To be familiar with theoretical issues, and to develop competence in analyzing current school practices and coming up with appropriate alternatives.
- To enhance the theoretical understanding of multilingualism in the classroom.
- To understand the nature of classroom discourse and develop strategies for using oral language in the classroom in a manner that promotes learning in the subject area.
- To understand the nature of reading comprehension in the content area and writing in specific content areas.
- To understand the interplay of language and society.
- To understand function of language and how to use it as a tool.
- To understand language and speech disorder and make remedial measures too.

### **Unit-I : Language and Society:-**

1. Language – Introduction, types, components, linguistic skills and interrelationship between language and literacy.
2. Relationship of language and society: Identification, power and discrimination.
3. Nature of multilingualism: Managing multilingualism in classroom
4. Constitutional status of languages: Hindi, English, Regional languages
5. Language policy in Education

### **Unit- II : Language development**

1. Theories of language development and its implementation in teaching, psychological basis of language.
2. The home language and school language and teaching learning process, the power dynamics of the standard language as the school language Vs. home language on dialects.
3. Deficit theory and discontinuity theory of language and teaching – learning process.

### **Unit-III : Language acquisition**

1. Understanding Hindi alphabets & its logical & simple classification
2. Language acquisition and cognitive development, Learning languages with fun

3. Culture acquisition through language.

### **Unit-IV : Classroom and Language:-**

1. Understanding the nature of classroom, discourse, strategies for using and language in the classroom to promote learning in the subject area.
2. Tools for learning: Dictionary, Discussion, Natural exposition, Word puzzles
3. The nature of questioning in the classroom, Types of questions and teacher control.

### **Unit-V : Development of Reading and writing**

1. Nature of reading comprehension in the content area (Informational reading), nature of expository texts vs. narrative texts, transactional texts vs reflective texts.
2. Scheme theory, text structures , know how of examining content area of texts books.
3. Strategies for reading text book, children, note making, summarizing, making reading writing connections.
4. Process writing: Analyse children's writing to understand their conception, writing with a sense of purpose, writing to learn and understand.

### **Practicum/Field Work**

1. Narrate your first experience of first day for internship programme.
2. Collect a literary style poem of any language and critically analyse it diagnoses speech defects of primary level student and make a remedial strategy.
3. Prepare a list of at least 10 proverb of any language and interpret their cultural significance.
4. Collect a titerary style poem of any language and analyse it.

### **Evaluation Procedure**

100 Marks

Any two practicum & one test

10=10 = 20 Marks

(Covering Unit I to V)

External Evaluation

80 Marks

### **Reference**

1. Agnihotri, R.K. (1995). Multilingualism as a classroom resource. In K. Heugh, A Siegruhn, & P. Pluddemann (Eds.) Multilingual education for South Africa 9pp. 3-&). Heinemann Educational Books.
2. Anderson, R.C. (1984). Role of the Reader's Schema in comprehension, learning and memory. In R. C. Anderson, J. Osborn, & R.J. Tierney (Eds.), Learning to read in American Schools: Basad readers and Content texts. Psychology Press.

3. Eller, R.G. (1989). Johnny can't talk, either: The perpetuation of the deficit theory in classrooms. *The Reading Teacher*, 670-674.
4. Erlwanger, S. H. (1973). Benny's conception of rules and answers in IPI Mathematics. *Journal of children's Mathematical Behavior*, 1(2), 7-26 University of Kota, Kota 30
5. Grellet, f. (1981). *Developing reading skills: A practical Guide to reading comprehension exercises*. Cambridge University Press.
6. Ladson-Billings. G. (1995). *Toward a Theory of Culturally Relevant Pedagogy*. *American Educational research journal*. 32(3), 465-491.
7. NCERT. (2006d) *Position Paper National Focus Group on teaching of Indian language (NCF-2005)*. New Delhi: NCERT.
8. Sankhla, Arjun Singh, (2013) *Hindi Bhasha Shikshan aur Praveenta*, Arihant Shiksha Prakashan Jaipur.
9. Thwaite, A. & Rivalland, J.(2009) *How can analysis of classroom Taks help teachers reflect on their practices?* *Australian Journal of Language and Literacy*, the 32(1) 38

## **B.Sc. B.Ed. 18**

### **GUIDANCE AND COUNSELLING IN SCHOOL**

#### **OBJECTIVES:-**

**MARKS- 100**

The course will enable the student teachers to –

- Understand the concept, need and meaning of guidance.
- Get acquainted with the principles, issues, problems and procedure of guidance.
- Develop understanding about the role of school in guidance.
- Understand the various areas, tools and techniques in guidance.
- Understand the concept, need and meaning of counseling.
- Get acquainted with the principles and process of counseling.
- Understand the tools and techniques in counseling.

#### **UNIT 1. GUIDANCE IN SCHOOL**

- Concept, Need and Meaning of Guidance.
- Principles of Guidance.
- Procedure of Guidance (steps).
- Issues and problems of Guidance.
- Role of school in Guidance.

## **UNIT 2. AREAS, TOOLS AND TECHNIQUES IN GUIDANCE.**

- Personal, Educational and vocational Guidance.
- Tools :- Records of students.
- Rating scale.
- Psychological tests.
- Questionnaire and Inventories.
- Techniques in Guidance (a) Observation, (b) Interview, (c) Sociometry.

## **UNIT 3. COUNSELLING IN SCHOOL**

- Concept, Need and Meaning of Counseling.
- Principles of Counseling.
- Counseling Process and Role.
- Directive, Non-Directive and Eclectic counseling.
- Qualities and role of a school counselor.

## **UNIT 4. TOOLS AND TECHNIQUES IN COUNSELING**

- Individual counseling and Group counseling.
- Lectures, discussions and Dramatics as techniques in counseling.
- Importance of follow-up in counseling.
- Counseling for the children with special needs.
- Counseling for parents.

## **UNIT 5. GUIDANCE AND COUNSELING FOR SPECIAL NEEDS POPULATION**

### **GUIDANCE OF CHILDREN WITH SPECIAL NEEDS**

- Problems and needs.
- Guidance of the gifted and creative students.
- Guidance of under achiever.
- Slow learning and first generation learners.
- Guidance of learning disabled, Drug addicts and alcoholics.
- De addiction centers, Career resource centre.
- Evaluation of counseling, Need for research and reforms in guidance and counseling.

### **Tasks and Assignments**

- |               |          |
|---------------|----------|
| 1. Class Test | 10 Marks |
| 2. Any one    | 10 Marks |

- Interview of a school counselor.
- Visit to a guidance or counseling centre and write a report.
- Administration of an individual test and preparing a report.

### **References:-**

1. Anastasi A, Differential Psychology, New Youk: Macmillan Co, 1996

2. Arbuckle Dugland, Guidance and Counselling in the classroom, Allyn & Bacon Inco, 1985.
3. Baqrki. B.G., Mukhopadhyaya. B., Guidance and Counselling; A Manual, New Delhi: Stanley Publishers, 1990.
4. Crow & Crow, An introduction to Guidance, New Delhi: Eurasia Publishing House, 1992.
5. Freeman E.S., Theory and Practice of Psychological Testing, New Delhi: Henry Holt 1992.
6. Jones. A.J., Principles of Guidance, New Delhi: McGrew Hills Publishers, 1970.
7. Kochhar S.K., Educational and vocational Guidance in secondary schools, New Delhi, sterling publishers Pvt. Ltd., 1990.
8. Kolher. S.K., Educational and Vocational Guidance, New Delhi: Practice Hall India Ltd., 1995.
9. NCERT, Guidance and Counseling in Indian Education,

## **B.Sc.B.Ed.22 (a &b)**

### **PEDAGOGY OF GENERAL SCIENCE**

#### **Objectives-**

1. Student-teachers will be able to-
2. Understand General Science as an interdisciplinary area of learning.
3. Understands aims and objectives of teaching General Science at different levels.
4. Explore different ways of creating learning situations for different concepts of science:
5. Formulate meaningful inquiry episodes, problem-solving situations, investigatory and discovery learning projects based on upper primary, secondary and higher secondary stages.
6. Facilitate development of scientific attitudes in learners.
7. Examine different pedagogical issues in learning science. 6. Stimulate curiosity, inventiveness and creativity in science.
8. Develop ability to use science concepts for life skills.
9. Develop competencies for teaching, learning of science through different measures.
10. Construct appropriate assessment tools for evaluating learning of science.
11. Understands the CCE pattern of Evaluation.

#### **Course Content**

##### **Unit 1: Nature of General Science as a Discipline**

Meaning, Concept, Needs of General science teaching.  
Nature and scope of General science teaching

Main discoveries and development of science (special reference to ancient India) Science as a domain of enquiry, as a dynamic and expanding body of knowledge, science as a process of constructing knowledge. Science as an interdisciplinary area of learning (Physics, chemistry, biology etc.); science for environment, health, peace & equity, science and society. Fact, concept, principles, laws and theories- their characteristics in context of general science.

Constructivist approach in learning General Science.

## **Unit 2: General science as a school subject**

Importance of General science in school curriculum.

Aims & objectives of teaching General science at secondary level. Writing objectives in behavioural terms. Bloom's taxonomy (revised).

Correlation of General Science with other School Subjects

Changing trends and goals of teaching General Science with reference to N.C.F. 2005.

Concept mapping of themes related to General Science.

## **Unit III: Methodology of Teaching and learning of General science**

Methods and devices of teaching General science at secondary level – Lecture-cum-Demonstration, Project, Problem solving, Heuristic, Laboratory method.

Techniques of teaching General Science

## **Unit IV: Pedagogical Analysis and mode of learning Engagement**

Pedagogical analysis of the Units with reference to concepts, learning outcomes, activities and learning experiences and evaluation techniques of following content at secondary level-

Physics –light, Electricity, magnetism, Gravitation, Work and Energy, Sound

Chemistry– Atom And molecules, Chemical Reactions, Acid ,Bases and Salt, Carbon and Its Compounds, metal and non-metals

Biology –Cell and its Structure, Life processes, Diversity in living organisms,

Environmental Science– Our Environment , natural resources and its management



Modes of learning engagement in General Science-

Providing opportunities for group activities and observations.

Group/Individual Presentation

Providing opportunities for sharing ideas

Teaching aids and activities in laboratory work

Reflective written assignment

### **Unit V: Assessment & Evaluation of General Science learning**

Meaning, concept and construction of Achievement test, diagnostic test and remedial teaching.

Blue print: Meaning, concept, need and construction.

Open-book tests: Strengths and limitations

Continuous and Comprehensive Evaluation (CCE) in Sciences.

Difficulties Faced by the teacher in evaluation process and suggestive measures to overcome them.

#### **Practicum/Field Work-**

Any two of the following

Visit Ayurveda college/ science labs to address lauding their working process and draft a report on their contribution to prosperity.

Prepare a concept map on any theme of General Science and explain its importance for Teaching and learning.

Collect Information about Indian Cultural traditions and find out the scientific basis

or hidden concern for life and preservation of environment.

Being a Science teacher how you will remove superstitions from the Society. Report your Strategic planning.

Prepare a diagnostic test and apply it in school, after discussion with concerning teacher and give remedial measures.

### Evaluation Procedure

100 Marks

Any two practicum & one test

10+10=20 Marks

(Covering Unit I to V)

External Evaluation

80 Marks

### References-

1. Sood, J.K. (1987): Teaching Life Sciences, Kohli Publishers, Chandigarh.
2. Sharma, L.M. (1977): Teaching of Science and Life Sciences, DhanpatRai& Sons, Delhi.
3. Kulshreshtha, S.P. (1988): Teaching of Biology, Loyal Book Depot, Merrut
4. Yadav, K. (1993): Teaching of Life Science Anmol Publishers, Daryaganj, Delhi.
5. Yadav, M.S. (2000): Modern Methods of Teaching Sciences, Anmol Publishers, Delhi
6. Singh, U.K. &Nayab, A.K. (2003) : Science Education Commonwealth
7. Venkataih, S. (2001): Science Education in 21st Century, Anmol Publishers, Delhi.
8. Yadav, M.S. (Ed.) (2000): Teaching Science at Higher Level, Anmol Publishers, Delhi.
9. Edger, Marlow &Rao, D.B. (2003): Teaching Science Successfully, Discovery
10. Mangal, S.K. (1996): Teaching of Science, Arya Book Depot, and New Delhi.
11. Dave, R.H.: (1969): Taxonomy of Educational Objectives and Achievement
12. Testing, London University Press, London.
12. Sood. J.K. (1989): New Directions in Science Teaching, Kohli Publishers, Chandigarh.

# PEDAGOGY OF BIOLOGY

## Objectives-

Student-teachers will be able to:-

1. Develop insight on the meaning and nature of Biology for determining aims and strategies of teaching- learning.
2. Appreciate that science is a dynamic and expanding body of knowledge.
3. Appreciate the fact that every child possesses curiosity about his/her natural surroundings.
4. Identify and relate everyday experiences with learning of Biology.
5. Appreciate various approaches of teaching- learning of Biology.
6. Explore the process, skill in science and role of laboratory in teaching- learning.
7. Use effectively different activities / experiments/ demonstrations / laboratory experiences for teaching-learning of Biology.
8. Integrate the Biology knowledge with other school subjects.
9. Analyze the contents of Biology with respect to Content, process, skills, knowledge organization and other critical issues.
10. Perform Pedagogical analysis of various topics in Biology.
11. Develop process-oriented objectives based on the content themes/Units.
12. To understand meaning, concept and various types of assessment.

## Course Content

### Unit I: Nature of Biology as a Discipline

Meaning, Concept, Nature and Need of Biology and Biology teaching.  
Scope of Biology teaching

Historical development of Biology as a discipline. Contribution of Indian and western Biologist like HargobindKhurana, Mohinder Singh Randhawa, Salim Ali, Mendel, Darwin, and Lamark in the field of Biology

Constructivist approach in learning Biology.

## **Unit II: Biology as a school subject**

Importance of Biology in school curriculum.

Aims & objectives of teaching Biology at school level. Writing objectives in behavioural terms. Bloom's taxonomy (revised).

Correlation of Biology with other School Subjects  
Changing trends and goals of teaching Biology

## **Unit III: Methodology of Teaching and learning of Biology**

Scientific attitude and scientific temper: Nurture the natural curiosity, aesthetic senses

and creativity in biology: essential skills, methods and process that lead to exploration, Generalization and validation of scientific knowledge in Biology.

Lecture –cum Demonstration, Team teaching, Project method, Problem solving method, Inquiry approach, Programmed instruction, Investigatory approach, Concept mapping, Collaborative learning, and Experiential learning in Biology: Facilitating learners for self-study.

## **Unit IV: Pedagogical Analysis and mode of learning Engagement**

Pedagogical analysis of the Units with reference to concepts, learning outcomes, activities and learning experiences and evaluation techniques of following content at secondary and Senior Secondary level- Biology for environment and health, peace, equity, origin of life and evolution, biodiversity, Photosynthesis, Life processes and factors affecting it.

Modes of learning engagement in Biology-

- a. Observations and experiments in Biologys: interdisciplinary linkages,
- b. Providing oportunities for group activities
- c. Group/Individual Presentation
- d. Providing oportunities for sharing ideas
- e. Designing different working Models for concept formation.
- f. Teaching aids and activities in laboratory work
- g. Reflective written assignment

## **Unit V: Assessment & Evaluation in Biologys**

Meaning, concept and construction of Achievement test

Blue print: Meaning, concept, need and construction.

Construction of test items (open-ended and structured) in Biology and administration of tests.

Open-book tests: Strengths and limitations

Formative and Summative Assessment in Biology.

Continuous and Comprehensive Evaluation (CCE)

Assessment of project work in biology (both in the laboratory and in the field)

Performance based assessment: learners' record of observations, field diary, herbarium and collection of materials.

Oral presentation of learners' work in Biology, portfolio;

Developing assessment framework in Biology; assessment of experimental work in Biology.

### **Practicum/Field Work**

Any Two of the following

1. Preparation of Scrap book to show the Contribution of any two Biologist

1. Conduct any activity among students for linking child's natural curiosity with natural phenomena like weather, flora and fauna; contexts. Report your Observations.
2. Preparation/ designing programmed instruction material on any topic of Biology to facilitate learners for self –study.
3. Prepare a low cost or waste material based experiment for secondary/ senior secondary schools.
4. Prepare a plan to assess Students' Practical work in Biology.

**Evaluation Procedure**

100 Marks

Any two practicum & one test

10+10=20 Marks

(Covering Unit I to V)

External Evaluation

80 Marks

**References-**

1. Sood, J.K., 1987: Teaching Life Sciences, Kohali Publisher, Chandigarh.
2. Sharma, L.M., 1977: Teaching of Science & Life Science, Dhanpat Rai & Sons, Delhi
3. Kulshrestha, S.P., 1988: Teaching of Biology, Loyal Book Depot, Meerut
4. Yadav K., 1993: Teaching of Life Science, Anmol Publisher, Daryaganj Delhi.
5. Yadav, M.S., 2000 : Modern Methods of Teaching Science, Anmol Publishers, Delhi.
6. Singh, U.K. & Nayab, A.K., 2003: Science Education Commonwealth Publishers, Daryaganj, New Delhi
7. Venkataih, S., 2001: Science education in 21st century Anmol Publishers, Delhi
8. Yadav, M.S.(Ed.), 2000 : Teaching Science at Higher Level, Anmol Publishers, Delhi
9. Ediger, Marlow & Rao, D.B., 2003 : Teaching Science Successfully Discovery Publishing House, New Delhi
10. Mangal, S.K., 1996: Teaching of Science, Arya Book Depot, New Delhi
11. Dave, R.H., 1969 : Taxonomy of Educational objectives & Achievement Testing, London University Press, London.

# PEDAGOGY OF CHEMISTRY

## Objectives-

1. Student-teachers will be able to:-
2. Gain insight on the meaning and nature of chemistry for determining aims and strategies of teaching-learning.
3. Appreciate that chemistry is a dynamic and expanding body of knowledge.
4. Appreciate the fact that every child possesses curiosity about his/her natural surroundings.
5. Identify and relate everyday experiences with learning chemistry.
6. Trace historical background of Chemistry..
7. Appreciate various approaches of teaching-learning of chemistry.
8. Analyze the contents of Chemistry with respect to Content, process, skills, knowledge organization and other critical issues.
9. Perform Pedagogical analysis of various topics in Chemistry.
10. Use effectively different activities/ demonstration/laboratory experiences for teaching-learning of chemistry.
11. Integrate chemistry knowledge with other school subjects.
12. To understand meaning, concept and various types of assessment.

## Course Content

### Unit I : Nature of Chemistry as a Discipline

Concept, Nature and Needs of Chemistry and Chemistry teaching.  
Scope of Chemistry teaching.  
Historical Background of Chemistry with special reference to India.  
Constructivist approach in learning Chemistry.

### Unit II : Chemistry as a school subject

Importance of Chemistry in school curriculum.

Aims & objectives of teaching Chemistry at school level. Writing objectives in behavioural terms. Bloom's taxonomy (revised).

Correlation of Chemistry with other School Subjects

Changing trends and goals of teaching Chemistry.

### **Unit III : Methodology of Teaching and learning of Chemistry**

Scientific attitude and scientific temper: Nurture the natural curiosity, aesthetic senses and creativity in Chemistry: essential skills, methods and process that lead to exploration: Generalization and validation of scientific knowledge in Chemistry.

Lecture –cum Demonstration, Team teaching, project method, problem solving method, Heuristic method, Group discussion, programmed instruction, Inductive- Deductive, investigatory approach, Concept mapping, Collaborative learning, and Experiential learning in chemistry: Facilitating learners for self-study.

### **Unit IV: Pedagogical Analysis and mode of learning Engagement**

Pedagogical analysis of the Units with reference to concepts, learning outcomes, activities and learning experiences and evaluation techniques of following content at secondary and Senior secondary level-Solutions, colloids, chemical equilibrium, electrochemistry, mechanical and thermal properties of matter, chemical bonding and molecular structure, periodic table, Atom and molecules, Chemical Reactions, Acid, Bases and Salt, Carbon and Its Compounds, metal and non-metal etc.)

Modes of learning engagement in Chemistry-

- a. Observations and experiments in Chemistry: interdisciplinary linkages,
- b. Relating knowledge to students' daily life situations.
- c. Providing opportunities for group activities and idea Sharing
- d. Group/Individual Presentation
- e. Teaching aids and activities in laboratory work
- f. Reflective written assignment

### **Unit V: Assessment & Evaluation of Chemistry learning**

Meaning, concept and construction of Achievement test, Diagnostic testing and remedial teaching.



Blue print: Meaning, concept, need and construction.  
Open-book tests: Strengths and limitations  
Continuous and Comprehensive Evaluation (CCE) in Sciences.

Assessment of project work in work in Chemistry( both in the laboratory and in the field )

Performance-based assessment; learner's record of observations, field diary,. Oral presentation of learners work, portfolio;

Developing assessment framework inChemistry; assessment of experimental work in Chemistry.

### **Practicum/Field Work-**

Any two of the following -

1. Perform Some Simple Experiment to clarify any Concept in Chemistry and to develop Observation Skills. Prepare a report of entire activity.
2. Organization of exploratory activities to develop scientific attitude and temper. Report your Experiences
3. Plan an innovation methodof teaching chemistry so as to facilitate the correlation of content with other subjects/ day to day life. Teach that lesson in class and report complete activity with your experiences.
4. Write a reflective journal on some innovative trends in Chemistry teaching and their importance in Achieving aims of teaching chemistry at different level.
5. Prepare a diagnostic test and apply it in school, after discussion with concerning teacher and give remedial measures.

## References

6. adav, M.S.1995, Teaching of Chemistry, Anmol Publication, New Delhi.
7. Megi, J.S. &Negi, Rasuita, 2001, Teaching of Chemistry.
8. Yadav,M.S. 2000: Teaching Science at Higher level, Anmol Publications, New Delhi.
9. Misra,D.C. : Chemistry Teaching, Sahitya Preparation, Agra
10. Khirwadbar, Anjab 2003: Teaching of Chemistry by Modern Method, Sarup& Sons. New delhi.
11. Das, R.C., 1985: Science Teaching in Schools, Sterling publishers Pvt. Limited. New Delhi
12. Venkataih, S., 2001: Science Education in 21st Century, Anmol Publishers, New Delhi.
13. Rao,D.B., 2001 : World conference on Science Education Discovery publishing work, New Delhi.
14. Singh,U.K&Nayab, A.K. : 2003 : Science Education, Commonwealth Publishers, Daryaganj, New Delhi.
15. Singh,Y.K.& Sharma Archnesh, 2003 : Modern Methods of Teaching Chemistry A.P.H. Publishing corporation, Daryaganj,New Delhi.

# PEDAGOGY OF MATHEMATICS

## Objectives:

The students will be able to-

1. Gain insight into the meaning, nature, scope and objectives of mathematics
2. Appreciate mathematics as a tool to engage the mind of every student.
3. Understand the process of developing the concepts related to Mathematics.
4. Appreciate the role of mathematics in day to day life.
5. Learn important mathematics: mathematics more than formulas and mechanical procedures.
6. Pose and solve meaningful problems.
7. Construct appropriate assessment tools for evaluation mathematics learning.
8. Understand methods and techniques of teaching mathematics.
9. Perform pedagogical analysis of various Topics in mathematics at secondary level.
10. Understand an use I.C.T. in teaching of mathematics.
11. Understand and use continuous and comprehensive evaluation, diagnostic testing and remedial teaching in Mathematics.

## Course Contents

### Unit: I - Nature of Mathematics as a Discipline

Mathematics is not merely subject of computations skill, it is much more, it has a logical structure.

Nature of mathematics – building blocks of mathematics (Concept, objectives, variables, function & relation, symbolization)

Important processes of mathematics-estimation, approximation, understanding or visualizing pattern representation, reasoning & proof, making connections, mathematical communication.

Historical development of mathematics as a discipline Contribution of Indian and western mathematicians like Ramanujan, Aryabhata, Bhaskaracharya, Pythagoras and Euclid.

Constructivist approach in learning mathematics.

### Unit: II - Mathematics as a School Subject

Importance of mathematics in school curriculum.

Aims and objectives of teaching mathematics at secondary level. Writing objectives in behavioral terms. Bloom's taxonomy (revised)

Correlation of mathematics with other school subjects.

Changing trends and goals of teaching mathematics with reference of NCF 2005 Concept mapping of themes related to mathematics.

### **Unit: III Mathematics as a School Subject**

Nature of concept, concept formation and concept assimilation.

Methods of teaching mathematics at secondary level –

- a. Lecture cum demonstration
- b. Inductive-Deductive
- c. Problem Solving
- d. Project
- e. Heuristic
- f. Analytic & Synthetic

Techniques of teaching mathematics

- g. Oral work
- h. Written work
- i. Drill work
- j. Home assignment

### **Unit: IV - Pedagogical analysis and mode of learning engagement**

Pedagogical analysis of the Units with reference to concepts, learning outcomes, activities and learning experiences and evaluation techniques of following content at secondary level-

- k. Number system

- l. Measures of central tendency
- m. Congruency and similarity
- n. Trigonometrical ratios and identities
- o. Area and Volume
- p. Profit, loss and partnership
- q. Compound interest
- r. Graphical representation data

Modes of learning engagement in mathematics

- s. Providing opportunities for group activities
- t. Group/Individual Presentation
- u. Providing opportunities for sharing ideas
- v. Designing different Working Models for concept formation

(e) Teaching aids and activities in laboratory work (f) Reflective written assignments

**Unit: V Assessment & Evaluation of Mathematics learning**

Assessment of critical thinking, logical reasoning and to discourage mechanical manipulation and rote learning-

- w. Planning of evaluation mathematics
- x. Formative, Summative and predictive evaluation in mathematics
- y. Continuous and compressive evaluation (CCE) in mathematics at secondary level
- z. Diagnostic Testing, Remedial Teaching and enrichment programme for:
  - i. Gifted Learners
  - ii. Slow Learners
  - iii. Learners with Dyslaxica
  - iv. Difficulties Faced by the Teacher in Teaching of Mathematics and Suggestive Measure to overcome them.

Construction of achievement test/question paper in mathematics

## Practicum/Field Work-

Any two of the following-

Prepare a Concept map related to any theme of Mathematics and Explain how it facilitates teaching and learning.

Prepare a project related to Mathematics and report your steps.

Prepare a power point presentation on brief history and contribution of two mathematicians.

Conduct a group activity on any topic of mathematics and report your Experiences. Observation of Mathematics class-room teaching in any secondary school and prepare a list of errors committed by students.

### Evaluation Procedure

100 Marks

Any two practicum & one test

10+10=20 Marks

(Covering Unit I to V)

External Evaluation

80 Marks

### References

1. Mangal, S.K. Sadharan Ganit Shikshan, Arya Book Depot, New Delhi.
2. Bhatnagar A.B. New Dimensions in the teaching of Maths, Modern Publishers, Meerut.
3. Jain S.L.: Ganit Shikshan Sansthan, Rajsthan Hindi Granth Academy ,Jaipur.
4. Agrawal S.M. Teaching of Modern Mathematics Dhanpat Rai & Sons, Delhi.
5. Jagadguru Swami: Vedic Mathematics, Moti Lal Banarasidas Publisher, Delhi
6. Kapur J.N. Modern Mathematics for Teachers, Arya Book Depot, New Delhi

# PEDAGOGY OF PHYSICS

## Objectives-

Student-teachers will be able to:-

1. Gain insight on the meaning, nature and scope of physics for determining aims and strategies of teaching-learning.
2. Appreciate that science is a dynamic and expanding body of knowledge;
3. Trace historical background of physics.
4. Identify and relate everyday experiences with learning physics;
5. Appreciate various approaches of teaching-learning of physics;
6. Perform Pedagogical analysis of various topics in physics.
7. Analyze the contents of physics with respect to Content, process, skills, knowledge organization and other critical issues.
8. Use effectively different activities/demonstrations/laboratory experiences for teaching-learning of physics;
9. Integrate physics knowledge with other school subjects.
10. To understand meaning, concept and various types of assessment.

## Course Content

### Unit I: Nature of physics as a Discipline

Concept, Nature and Needs of Physics teaching.

Scope of Physics teaching.

Historical Background physics with special reference to India.

Contribution of C.V. Raman, M.N. Saha, K.S.Krishnan, J.C. Bose, H.JBhabha, S. Chandra Shekhar and A.P.J. Abdul Kalam in the field of Physics.

- a. Science as a domain of enquiry, as a dynamic and expanding body of knowledge; Science as a process of constructing knowledge; physics as interdisciplinary area of learning

## **Unit II: Physics as a school subject**

Importance of Physics in school curriculum.

Aims & objectives of teaching Physics at school level. Writing objectives in behavioural terms. Bloom's taxonomy (revised).

Correlation of Physics with other School Subjects

## **Unit III: Methodology of Teaching and learning of Physics -**

Scientific attitude and scientific temper: essential skills, methods and process that lead to exploration: Generalization and validation of scientific knowledge in Physics.

Lecture –cum -Demonstration, Team teaching, project method, problem solving method, Group discussion, Programmed instruction, Inductive- Deductive, Investigatory approach, Concept mapping, Collaborative learning, and Experiential learning in Physics: Facilitating learners for self-study.

## **Unit IV: Pedagogical Analysis and mode of learning Engagement**

Pedagogical analysis of the Units with reference to concepts, learning outcomes, activities and learning experiences and evaluation techniques of following content at secondary and Senior secondary level-light, Electricity, magnetism, Gravitation, Laws of motion, Work and Energy, Sound

Modes of learning engagement in Physics -

- b. Observations and experiments in Physics: interdisciplinary linkages,
- c. Relating knowledge to students daily life situations.
- d. Providing opportunities for group activities and idea Sharing
- e. Group/Individual Presentation
- f. Designing different working Models for concept formation



- g. Teaching aids and activities in laboratory work
- h. Reflective written assignment

### **Unit V: Assessment & Evaluation of Physics learning**

Meaning, concept and construction of Achievement test,

Blue print: Meaning, concept, need and construction.

Open-book tests: Strengths and limitations

Formative and Summative Assessment in physics.

Continuous and Comprehensive Evaluation (CCE)

Assessment of project work in Physics (both in the laboratory and in the field )

Performance-based assessment; learner's record of observations, Oral presentation of learners work, portfolio;

Developing assessment framework in Physics; assessment of experimental work in Physics.

#### **Practicum/Field Work-**

Any two of the following-

1. Prepare a concept map on any topic and explain how it Facilitates Students' Learning.
2. Description and Design of an Improvised Apparatus
3. Write a reflective journal on \_Radiations and Human Health'.

Planning an out of class activity to use local resources to teach Physics and report your experiences.

4. Prepare a plan to assess Students' Practical work in Physics.

## Evaluation Procedure

100 Mark

Any two practicum & one test

10+10=20 Marks

(Covering Unit I to V)

External Evaluation

80 Marks

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## References

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3. Vaidya, N. "The Impact of Science Teaching", Oxford and IBH Publishing Company, New Delhi, 1971.
4. Richardson, S. : "Science Teaching in Secondary Schools", Prentice Hall, USA, 1957.
5. Sharma, R.C. and Sukla : "Modern Science Teaching" DhanpatRai and Sons, Delhi, 2002.
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7. Rao Aman : Teaching of Physics, Anmol Publications, New Delhi, 1993.
8. Wadhwa Shalini : Modern Methods of Teaching Physics, Sarup and Sons, New Delhi, 2001.
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