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NH-52, Namsai, Arunachal Pradesh -792103

BACHELOR OF SCIENCE BACHELOR OF EDUCATION (PCM) – FIFTH SEMESTER

Fifth Semester			
S. No.	Name of Subject	Credits	Total Marks
1	Integral calculus	5	100
2	Matrix	5	100
3	Element of Modern Physics	4	100
4	Element of Modern Physics Lab	3	100
5	Polymer Chemistry and Green Chemistry	4	100
6	Polymer Chemistry and Green Chemistry Lab	3	100
7	Knowledge and Curriculum	4	100
8	Assessment for Learning	4	100
9	Drama and Art in Education(P)	4	100
Total		36	

Subject Name: INTEGRAL CALCULUS

Integration by Partial fractions, integration of rational and irrational functions. Properties of definite integrals. Reduction formulae for integrals of rational, trigonometric, exponential and logarithmic functions and of their combinations.

Areas and lengths of curves in the plane, volumes and surfaces of solids of revolution. Double and Triple integrals.

Books Recommended

1. G.B. Thomas and R.L. Finney, *Calculus*, 9th Ed., Pearson Education, Delhi, 2005.
2. H. Anton, I. Bivens and S. Davis, *Calculus*, John Wiley and Sons (Asia) P. Ltd., 2002.

Subject Name: MATRIX

R , R_2 , R_3 as vector spaces over R . Standard basis for each of them. Concept of Linear Independence and examples of different bases. Subspaces of R_2 , R_3 .

Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations. Interpretation of eigen values and eigen vectors for such transformations and eigen spaces as invariant subspaces.

Types of matrices. Rank of a matrix. Invariance of rank under elementary transformations. Reduction to normal form, Solutions of linear homogeneous and non-homogeneous equations with number of equations and unknowns upto four.

Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3. Computation of matrix inverses using elementary row operations. Rank of matrix. Solutions of a system of linear equations using matrices. Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics.

Books Recommended

1. A.I. Kostrikin, Introduction to Algebra, Springer Verlag, 1984.
2. S. H. Friedberg, A. L. Insel and L. E. Spence, Linear Algebra, Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
3. Richard Bronson, Theory and Problems of Matrix Operations, Tata McGraw Hill, 1989.

Subject Name: ELEMENTS OF MODERN PHYSICS

Planck's quantum, Planck's constant and light as a collection of photons; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson-Germer experiment.

Problems with Rutherford model- instability of atoms and observation of discrete atomic spectra; Bohr's quantization rule and atomic stability; calculation of energy levels for hydrogen like atoms and their spectra.

Position measurement- gamma ray microscope thought duality, Heisenberg uncertainty principle- impossibility trajectory; Estimating minimum energy of a confined principle; Energy-time uncertainty principle. Experiment; Wave-particle of a particle following a particle using uncertainty

Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of wave function, probabilities and normalization; Probability and probability current densities in one dimension.

One dimensional infinitely rigid box- energy eigenvalues and eigen functions, normalization; Quantum dot as an example; Quantum mechanical scattering and tunnelling in one dimension - across a step potential and across a rectangular potential barrier.

Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, semi-empirical mass formula and binding energy.

Radioactivity: stability of nucleus; Law of radioactive decay; Mean life & half-life; α decay; β decay - energy released, spectrum and Pauli's prediction of neutrino; γ -ray emission.

Fission and fusion - mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions.

Reference Books:

- Concepts of Modern Physics, Arthur Beiser, 2009, McGraw-Hill
- Modern Physics, John R. Taylor, Chris D. Zafiratos, Michael A. Dubson, 2009, PHI Learning
- Six Ideas that Shaped Physics: Particle Behave like Waves, Thomas A. Moore, 2003, McGraw Hill
- Quantum Physics, Berkeley Physics Course Vol.4. E.H. Wichman, 2008, Tata McGraw-Hill Co.
- Modern Physics, R.A. Serway, C.J. Moses, and C.A. Moyer, 2005, Cengage Learning
- Modern Physics, G. Kaur and G.R. Pickrell, 2014, McGraw Hill

Subject Name: ELEMENTS OF MODERN PHYSICS-LAB

1. To determine value of Boltzmann constant using V-I characteristic of PN diode.
2. To determine work function of material of filament of directly heated vacuum diode.
3. To determine value of Planck's constant using LEDs of at least 4 different colours.
4. To determine the ionization potential of mercury.
5. To determine the wavelength of H-alpha emission line of Hydrogen atom.
6. To determine the absorption lines in the rotational spectrum of Iodine vapour.
7. To study the diffraction patterns of single and double slits using laser source and measure its intensity variation using Photosensor and compare with incoherent source – Na light.
8. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
9. To determine the value of e/m by magnetic focusing.
10. To setup the Millikan oil drop apparatus and determine the charge of an electron.

Reference Books:

- Advanced Practical Physics for students, B.L. Flint & H.T. Worsnop, 1971, Asia Publishing House.
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
- A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

Subject Name: POLYMER CHEMISTRY AND GREEN CHEMISTRY

Introduction and history of polymeric materials:

Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, Texture of Polymers.

Functionality and its importance:

Criteria for synthetic polymer formation, classification of polymerization processes, Relationships between functionality, extent of reaction and degree of polymerization. Bifunctional systems, Poly-functional systems.

Kinetics of Polymerization:

Mechanism and kinetics of step growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations, Mechanism and kinetics of copolymerization, polymerization techniques.

Crystallization and crystallinity:

Determination of crystalline melting point and degree of crystallinity, Morphology of crystalline polymers, Factors affecting crystalline melting point.

Nature and structure of polymers-Structure Property relationships.

Determination of molecular weight of polymers (M_n , M_w , etc) by end group analysis, viscometry, light scattering and osmotic pressure methods. Molecular weight distribution and its significance. Polydispersity index.

Glass transition temperature (T_g) and determination of T_g , Free volume theory, WLF equation, Factors affecting glass transition temperature (T_g).

Polymer Solution – Criteria for polymer solubility, Solubility parameter, Thermodynamics of polymer solutions, entropy, enthalpy, and free energy change of mixing of polymers solutions, Flory- Huggins theory, Lower and Upper critical solution temperatures.

Properties of Polymers (Physical, thermal, Flow & Mechanical Properties).

Brief introduction to preparation, structure, properties and application of the following polymers: polyolefins, polystyrene and styrene copolymers, poly(vinyl chloride) and related polymers, poly(vinyl acetate) and related polymers, acrylic polymers, fluoro polymers, polyamides and related polymers. Phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, silicone polymers, polydienes, Polycarbonates, Conducting Polymers, [polyacetylene, polyaniline, poly(p-phenylene sulphide polypyrrole, polythiophene)].

Reference Books:

- Seymour's Polymer Chemistry, Marcel Dekker, Inc.
- G. Odian: Principles of Polymerization, John Wiley.

- F.W. Billmeyer: Text Book of Polymer Science, John Wiley.
- P. Ghosh: Polymer Science & Technology, Tata Mcgraw-Hill.
- R.W. Lenz: Organic Chemistry of Synthetic High Polymers.

CHEMISTRY PRACTICAL - DSE LAB: POLYMER CHEMISTRY

Polymer synthesis

1. Free radical solution polymerization of styrene (St) / Methyl Methacrylate (MMA) / Methyl Acrylate (MA) / Acrylic acid (AA).
 - a. Purification of monomer
 - b. Polymerization using benzoyl peroxide (BPO) / 2,2'-azo-bis-isobutyronitrile (AIBN)
2. Preparation of nylon 66/6
 1. Interfacial polymerization, preparation of polyester from isophthaloyl chloride (IPC) and phenolphthalein
 - a. Preparation of IPC
 - b. Purification of IPC
 - c. Interfacial polymerization
3. Redox polymerization of acrylamide
4. Precipitation polymerization of acrylonitrile
5. Preparation of urea-formaldehyde resin
6. Preparations of novalac resin/resold resin.
7. Microscale Emulsion Polymerization of Poly(methylacrylate).

Polymer characterization

1. Determination of molecular weight by viscometry:
 - (a) Polyacrylamide-aq.NaNO₂ solution
 - (b) (Poly vinyl propylidene (PVP) in water
2. Determination of the viscosity-average molecular weight of poly(vinyl alcohol) (PVOH) and the fraction of —head-to-head— monomer linkages in the polymer.
3. Determination of molecular weight by end group analysis: Polyethylene glycol (PEG) (OH group).
4. Testing of mechanical properties of polymers.

5. Determination of hydroxyl number of a polymer using colorimetric method.

Polymer analysis

1. Estimation of the amount of HCHO in the given solution by sodium sulphite method
2. Instrumental Techniques
3. IR studies of polymers
4. DSC analysis of polymers
5. Preparation of polyacrylamide and its electrophoresis

*at least 7 experiments to be carried out.

Reference Books:

- Malcohm P. Stevens, Polymer Chemistry: An Introduction, 3rd Ed.
- Harry R. Allcock, Frederick W. Lampe and James E. Mark, Contemporary Polymer Chemistry, 3rd ed. Prentice-Hall (2003)
- Fred W. Billmeyer, Textbook of Polymer Science, 3rd ed. Wiley-Interscience (1984)
- Joel R. Fried, Polymer Science and Technology, 2nd ed. Prentice-Hall (2003)
- Petr Munk and Tejjraj M. Aminabhavi, Introduction to Macromolecular Science, 2nd ed. John Wiley & Sons (2002)
- L. H. Sperling, Introduction to Physical Polymer Science, 4th ed. John Wiley & Sons (2005)
- Malcolm P. Stevens, Polymer Chemistry: An Introduction, 3rd ed. Oxford University Press (2005)
- Seymour/ Carraher's Polymer Chemistry, 9th ed. by Charles E. Carraher, Jr. (2013)

Introduction to Green Chemistry

What is Green Chemistry? Need for Green Chemistry. Goals of Green Chemistry. Limitations/ Obstacles in the pursuit of the goals of Green Chemistry

Principles of Green Chemistry and Designing a Chemical synthesis

Twelve principles of Green Chemistry with their explanations and examples and special emphasis on the following:

- Designing a Green Synthesis using these principles; Prevention of Waste/ byproducts; maximum incorporation of the materials used in the process into the final products , Atom Economy, calculation of atom economy of the rearrangement, addition, substitution and elimination reactions.

- Prevention/ minimization of hazardous/ toxic products reducing toxicity. risk = (function) hazard × exposure; waste or pollution prevention hierarchy.
- Green solvents– supercritical fluids, water as a solvent for organic reactions, ionic liquids, fluoruous biphasic solvent, PEG, solventless processes, immobilized solvents and how to compare greenness of solvents.
- Energy requirements for reactions – alternative sources of energy: use of microwaves and ultrasonic energy.
- Selection of starting materials; avoidance of unnecessary derivatization – careful use of blocking/protecting groups.
- Use of catalytic reagents (wherever possible) in preference to stoichiometric reagents; catalysis and green chemistry, comparison of heterogeneous and homogeneous catalysis, biocatalysis, asymmetric catalysis and photocatalysis.
- Prevention of chemical accidents designing greener processes, inherent safer design, principle of ISD “What you don’t have cannot harm you”, greener alternative to Bhopal Gas Tragedy (safer route to carcarbaryl) and Flixiborough accident (safer route to cyclohexanol) subdivision of ISD, minimization, simplification, substitution, moderation and limitation.
- Strengthening/ development of analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes.

Future Trends in Green Chemistry

Oxidation reagents and catalysts; Biomimetic, multifunctional reagents; Combinatorial green chemistry; Proliferation of solventless reactions; co crystal controlled solid state synthesis (C2S3); Green chemistry in sustainable development.

Reference Books:

- Ahluwalia, V.K. & Kidwai, M.R. New Trends in Green Chemistry, Anamalaya Publishers (2005).
- Anastas, P.T. & Warner, J.K.: Green Chemistry - Theory and Practical, Oxford University Press (1998).
- Matlack, A.S. Introduction to Green Chemistry, Marcel Dekker (2001).
- Cann, M.C. & Connely, M.E. Real-World cases in Green Chemistry, American Chemical Society, Washington (2000).
- Ryan, M.A. & Tinnesand, M. Introduction to Green Chemistry, American Chemical Society, Washington (2002).
- Lancaster, M. Green Chemistry: An Introductory Text RSC Publishing, 2nd Edition, 2010.

LAB: GREEN CHEMISTRY

1. Safer starting materials

- Preparation and characterization of nanoparticles of gold using tea leaves.

2. Using renewable resources

- Preparation of biodiesel from vegetable/ waste cooking oil.

3. Avoiding waste

Principle of atom economy.

- Use of molecular model kit to stimulate the reaction to investigate how the atom economy can illustrate Green Chemistry.
- Preparation of propene by two methods can be studied
(I) Triethylamine ion + OH⁻ → propene + trimethylpropene + water H₂SO₄/Δ
(II) 1-propanol → propene + water
- Other types of reactions, like addition, elimination, substitution and rearrangement should also be studied for the calculation of atom economy.

4. Use of enzymes as catalysts

- Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide.

5. Alternative Green solvents

Extraction of D-limonene from orange peel using liquid CO₂ prepared from dry ice.

Mechanochemical solvent free synthesis of azomethines

6. Alternative sources of energy

- Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II).
- Photoreduction of benzophenone to benzopinacol in the presence of sunlight.

Reference Books:

- Anastas, P.T & Warner, J.C. Green Chemistry: Theory and Practice, Oxford University Press (1998).
- Kirchoff, M. & Ryan, M.A. Greener approaches to undergraduate chemistry experiment. American Chemical Society, Washington DC (2002).
- Ryan, M.A. Introduction to Green Chemistry, Tinnensand; (Ed), American Chemical Society, Washington DC (2002).
- Sharma, R.K.; Sidhwani, I.T. & Chaudhari, M.K. I.K. Green Chemistry Experiment: A monograph International Publishing House Pvt Ltd. New Delhi. Bangalore ISBN 978-93-81141-55-7 (2013).
- Cann, M.C. & Connelly, M. E. Real world cases in Green Chemistry, American Chemical Society (2008).
- Cann, M. C. & Thomas, P. Real world cases in Green Chemistry, American Chemical Society (2008).
- Lancaster, M. Green Chemistry: An Introductory Text RSC Publishing, 2nd Edition, 2010.

- Pavia, D.L., Lampman, G.M., Kriz, G.S. & Engel, R.G. Introduction to Organic Laboratory Techniques: A Microscale and Macro Scale Approach, W.B.Saunders, 1995.

Subject Name: KNOWLEDGE AND CURRICULUM

Unit 1: Knowledge and Knowing

Knowledge Meaning

- What is knowledge?
- What is knowing? Can doing, thinking and feeling be discerned separately in knowing?
- Differentiate between information, knowledge, belief and truth.

Knowing Process

- What are different ways of knowing?
- How knowledge can be constructed? What is involved in construction of knowledge?
- What are the relative roles of knower and the known in knowledge transmission and construction?

Facets of Knowledge

Different facets of knowledge and relationship, such as:

- local and universal
- concrete and abstract
- theoretical and practical
- contextual and textual?
- school and out of school

(With an emphasis on understanding special attributes of 'school knowledge.)

- What is the role of culture in knowing?
- How is knowledge rendered into action? How to reflect on knowledge?

Views of Gandhi, Tagore, Krishnamurti and Aurobindo on knowledge and education

Unit 2: Forms of Knowledge and its Organisation in Schools

- Can we categorise knowledge? On what basis?
- What forms of knowledge are included in school education?
- On what basis are knowledge categories selected in school education?
- Who selects, legitimises, and organises categories of knowledge in Schools? In what form?
- How does school knowledge get reflected in the form of curriculum, Syllabus and textbooks?

- Understanding the meaning and nature of curriculum: Need for Curriculum in schools
- Differentiating curriculum framework, curriculum and syllabus; their significance in school education
- Facets of curriculum: Core curriculum—significance in Indian context
- Meaning and concerns of 'hidden' curriculum
- Curriculum visualised at different levels: National-level; state-level; school-level; class-level and related issues(Connections, relations and differences)

Unit 3: Curriculum Determinants and Considerations

- Broad determinants of curriculum making:(At the nation or state-wide level)
 - (i) social-political-cultural-geographical-economic diversity;
 - (ii) socio-political aspirations, including ideologies and educational vision; (iii) Economic necessities;
 - (iv) Technological possibilities; (v) Cultural orientations;
 - (vi) National priorities;
 - (vii) System of governance and power relations; and
 - (viii) International contexts.
- Considerations in curriculum development:(At the level of the school)
 - (i) Forms of knowledge and its characterisation in different school subjects
 - (ii) Relevance and specificity of educational objectives for concerned level
 - (iii) Socio-cultural context of students – multi-cultural, multilingual aspects
 - (iv) Learner characteristics
 - (v) Teachers' experiences and concerns
 - (vi) Critical issues: Environmental concerns, gender differences, inclusiveness, value concerns and issues, social sensitivity.

Unit 4: Curriculum Development (at School Level)

- Understanding different approaches to curriculum development: Subject-centred; environmentalist (incorporating local concerns); behaviourist; competency-based (including 'minimum levels of learning'); learner-centred and constructivist.
- Process of curriculum making
 - (i) Formulating aims and objectives (based on overall curricular aims and syllabus)
 - (ii) Criteria for selecting knowledge and representing knowledge in the form of thematic questions in different subjects
 - (iii) Organising fundamental concepts and themes vertically across levels and integrating themes within (and across) different subjects
 - (iv) Selection and organisation of learning situations.

- Available infrastructure, curricular sites and resources (library, laboratory, school playground, neighbourhood, ICT etc.)
- School culture, climate and environment as the context for teachers 'work
- Construction of curriculum vis-a-vis teachers' role and support in 'transacting curriculum'; 'developing curriculum'; 'researching curriculum'
- Role of external agencies in providing curriculum and pedagogic supports to teachers within schools – local, regional, national

Unit 5: Curriculum Implementation and Renewal

- Operationalising curriculum into learning situations
- Teachers' role in generating dynamic curricular experiences through
 - (i) flexible interpretation of curricular aims;
 - (ii) contextualisation of learning;
 - (iii) varied learning experiences.
- Selection and development of learning resources (textbooks, teaching-learning materials and resources outside the school – local environment, community and media, etc.)
- Evolving assessment modes
- Appropriate reviewing and renewal of aims and processes.
- Process of curriculum evaluation and revision
 - (i) Need for a model of continual evaluation
 - (ii) Feedback from learners, teachers, community, and Administrators
 - (iii) Observable incongruencies and correspondence between expectations and actual achievements

Suggested Readings

1. Acharya, P. (1996). Indigenous Education and Brahminical Hegemony in Bengal, and Shahidullah, Kazi „The Purpose and Impact of Government Policy on Pathshala: Gurumohashays in Nineteenth Century Bengal'. In Nigel Crook (ed.) The Transmission of Knowledge in South Asia: Essays on Education, Religion, History and Politics. New Delhi: Oxford University Press, 98-118.
2. Badheka, G. (2001). Ball Shiksham aur Shikshak Bikaner: Vaagdevi Prakashan.
3. Dewey, J. (1952). The School and the Child, New York: The Macmillan Company, (Also available in Hindi School and Bachche Translation: RRCEE)
4. Palmer, Joy A. et. al (2001). Jean –Jacques Rousseau, John Dewey, Rabindranath Tagore, M.K. Gandhi, Maria Montessori Fifty Major Thinkers on Education From Confucius to Dewey, USA: Routledge.
5. Badheka, G. (1999). Montessori Paddhati. Chapter 5: Montessori Shala ka Vatavaran. Bikaner: Vaagdevi Prakashan.
6. Dewey, J. (2009). School aur Samaj. Delhi: Aakar. Chapter 2: School aur Bachche ka Jeevan (Also available in English Dewey (2007, 1899) The School and Society Cosimo: New York).

7. Krishnamurti, J. (2006). Krishnamurti on Education. Part I: Talks to Students:
8. Chapter 1: On Education, Chapter 4: On Freedom and Order, Part II: Discussion with Teachers: Chapter 1: On Right Education. Chennai: Krishnamurti Foundation of India.
9. Rousseau, Jacques J. (1979). Emile or on Education, translated by Allan Bloom Basic. 7-18.
10. Sykes, M. (1988). The Story of Nai Taleem, Nai Taleem Samiti, Sevagram: Vardha. Chapter 3: The Seed Germinates, Chapter 4: Basic National Education, (Also available in Hindi Nai taleem Ki Kahani Translation: RRCEE)
11. Thakur, R. (2004). Ravindranath ka Shikshadarshan Chapter 1: Tote ki Shiksha, Chapter 7: Aashram Shiksha, New Delhi: Granthshipli.
12. Weir (Eds.), Curriculum, syllabus design and equity: A primer and model. Routledge.
13. Shulman, L.S. (1986). Those who understand: Knowledge growth in teaching. Educational Researcher, 4–14.
14. Sternberg, R.J. (2013). Intelligence, competence, and expertise. In A. J. Elliot & C. S.
15. Dweck (Eds.), Handbook of competence and motivation (pp. 15–30). Guilford Publications.
16. Stiggins, R. (2005). From formative assessment to assessment for learning: A path to success in standards-based schools. Phi Delta Kappan, 324–328.
17. Sykes, M. (1987). The story of Nai Talim. Wardha: Nai Talim Samiti.
18. Tagore, R. (2003). Civilization and progress. In Crisis in civilization and other essays. New Delhi: Rupa & co.
19. The PROBE Team. (1999). Public report on basic education in India. Delhi: Oxford
20. NCERT (2014). Basics in Education-Textbook for B. Ed. Course. New Delhi: NCERT

Subject Name: ASSESSMENT FOR LEARNING

Unit 1: Assessment and Evaluation-An Overview

- Perspective on assessment and evaluation for learning in a constructivist paradigm
- Distinction between ‘Assessment of Learning’ and ‘Assessment for Learning’
- Purpose of assessment in a ‘constructivist’ paradigm:
 - engaging with learners’ minds in order to further learning in various dimensions
 - promoting holistic development of students taking care of cognitive, social and emotional aspects in balanced and integrated way.
- Purposes and approaches of assessment in behaviouristic and cognitivist paradigms.
- Critical review of current evaluation practices and their assumptions about learning and development
- Clarifying the terms
 - test, measurement, examination, assessment and evaluation
 - formative and summative evaluation
 - continuous and comprehensive assessment
 - grading

Unit 2: Object Context of Assessment

- Dimensions and levels of learning

- Retention/recall of facts and concepts; application of specific skills
- manipulating tools and symbols; problem-solving; applying learning to diverse situations
- Meaning-making propensity; abstraction of ideas from experiences; seeing links and relationships; inference; analysis; reflection
- originality and initiative; collaborative participation; creativity; flexibility
- Contexts of assessment
 - subject-specific
 - learner-centred

Unit 3: Assessment of subject based learning

- Enlarging notions of 'subject-based learning' in a constructivist perspective
- Assessment tools
 - different kinds of tasks: projects, assignments, performances
 - different kinds of tests and their construction
 - observation of learning processes by self, by peers, by teacher
 - self-assessment and peer-assessment
 - constructing Portfolios
- Quantitative and qualitative aspects of assessment: appropriate tools for each
- Teacher competencies in evolving appropriate assessment tools:
 - visualizing appropriate assessment tools for specific contexts, content, and learner
 - formulating tasks and questions that engage the learner and demonstrate the process of thinking; scope for original responses
 - evolving suitable criteria for assessment
 - organizing and planning for student portfolios and developing rubrics for portfolio assessment
 - using assessment feedback for furthering learning

Unit 4: Data Analysis, Feedback and Reporting

- Statistical tools- percentage, graphical representation, frequency distribution, central tendency, variation, normal distribution, percentile rank, correlation and their interpretation
- Feedback as an essential component of formative assessment
 - use of assessment for feedback; for taking pedagogic decisions such as for selecting teaching methodology, providing additional inputs or giving more time for the understand of some concepts.
 - Types of teacher feedback (oral, written, comments); peer feedback
 - Place of marks, grades(absolute and relative) and qualitative descriptions
 - Feedback for strengthening self-esteem, motivation and identity of all the learners including Children with Special Needs.
- Developing and maintaining a comprehensive learner profile
- Purposes of reporting: to communicate to students, parents and placement
 - progress on learning and profile of learner
 - certification,
- Reporting a consolidated learner profile
- Issues and challenges involved in reporting on assessment.

Unit 5: Examination Reform: Issues and directions

Examination system:

- Examination for gradation and certification
- Exit Vs Entrance Examination for social selection and placement
- Impact of the prevailing examination system on learning, self-esteem, motivation of students and other stakeholders.
- Entrance tests and their influence on students and school system.
- Sociological and psychological analysis of the related issues

School-based assessment and evaluation: policies, practices and possibilities

- Impact of examination-driven schooling on the social identity and socialization of children
- Policy initiatives to reduce ill effects of examinations on the students:
 - a. Non-detention policy
 - b. Focus on CCE in Right of Children to Free and Compulsory Education Act 2009
- Multiple tools and techniques as alternatives to paper pencil tests.
- De-linking school-based assessment from examinations: some possibilities and alternate practices

Examination reform efforts in as a follow up of:

- 1 Secondary Education Commission (1952-53)
- 2 Kothari Commission (1964-66)
- 3 National Policy on Education (1986) and Programme of Action (1992)
- 4 National Curriculum Frameworks -1975, 1988, 2000 1st 2005 developed for school education

(Discussion should cover analysis of recommendations, implementations and the emerging concerns)

Directions for examination reform:

- Introducing flexibility in examination-in view of the needs of the students and other stakeholders
- Improving quality and range of questions in exam papers
- Including school-based credits
- Assessment and Examinations for vocational courses
- Alternative modes of certification
- Examination Management
- Role of ICT in Examination
- On-demand and on-line examinations
- Capacity building of paper setters and evaluators
- Addressing issues and challenges of high stake testing, commercialisation of assessment and competitive ranking and also teacher accountability in assessment

Suggested Redearings

- Kay Burke (2006) From Standards to Rubrics in 6 Steps, Tools for Assessing Student Learning, K-8, Corwing Press, A Sage Publicaitons Company, California.
- NCERT(1985). Curriculum and Evaluation, New Delhi:NCERT
- Norris N.(1990) Understanding Educational Evaluation, Kogan Page Ltd.
- Singh H.S. (1974) Modern Educational Testing. New Delhi: Sterling Publication
- Thorndike RL and Hagen (1977). Measurement and Evaluation in Psychology and Education.
- Baker, B, Costa, A., & Shalit, S. (1997). The norms of collaboration: Attaining communication competence. In A. Costa & R. Liebmann (Eds.), The process-centered school: Sustaining a renaissance community (pp. 119-142). Thousand Oaks, CA: Corwin.
- Barell, J. (2003). Developing more curious minds. Alexandria, VA: Association for Supervision and Curriculum Development.
- Black, P., Harrison, C., Lee, C., Marshall, B, & William, D. (2004). Working inside the black box: Assessment for learning in the classroom. Phi Delta Kappan, 86 (1), 8- 21.
- Bransford, J., Brown, A.L., & Cocking, R.R. (Eds.). (2000). How people learn: Brain, mind, experience, and school. Washington, DC: National Academy Press.
- Brooks, J.G. (2002). Schooling for life: Reclaiming the essence of learning Alexandria, VA: Association for Supervision and Curriculum Development.
- Burke, K. (2005). How to assess authentic learning (4th ed.), Thousand Oaks, CA
- Corwin, Burke, K, Fogarty, R., & Belgrad, S (2002). The portfolio connection: Student work linked to standards (2nd ed.) Thousand Oaks, CA: Corwin.
- Carr, J.F., & Harris, D.E. (2001), Succeeding with standards: Linking curriculum, assessment and action planning. Alexandria, VA: Association for Supervision and Curriculum Development.
- Conzemius, A., & O'Neill, J. (2001). Building shared responsibility for student learning, Alexandria, VA: Association for Supervision and Curriculum Development.
- Danielson, C. (2002). Enhancing student achievement: A framework for school improvement. Alexandria, VA: Association for Supervision and Curriculum Development.
- Depka, E. (2001). Designing rubrics for mathematics: Standards, performance tasks, check-lists, students-created rubrics. Thousands Oaks, CA: Corwin.
- Gentile, J.R. & Lalley, J.P. (2003). Standards and mastery learning: Aligning teaching and assessment so all children can learn. Thousand Oaks, CA: Corwin.
- Guskey, T.R. (2003). How classroom assessments improve learning. Educational Leadership, 60(5), 7-11.
- Guskey, T.R., & Bailey, J.M. (2001). Developing grading and reporting systems for student learning. Thousand Oaks, CA. Corwin.
- Newman, F.M. (1996). Authentic achievement: Restructuring schools for intellectual quality. San Francisco, CA: Jossey-Bass.
- Nitko, A.J. (2001). Educational assessment of students (3rd ed.). Upper Saddle River, NJ:PrenticeHall.

Subject Name: DRAMA AND ART IN EDUCATION (P)

Unit I: Visual Arts and Crafts

- Experimentation with different materials of Visual Art, such as pastel, poster, pen and ink, rangoli materials, clay, etc.
- Exploration and experimentation with different methods of Visual Arts like Painting, block printing, collage, clay modelling, paper cutting and folding, etc.
- Paper framing and display of Art works.

Unit II: Performing Arts: Dance, Music, Theatre and Puppetry

- Listening/viewing and exploring Regional Art forms of Music, Dance, Theatre and Puppetry.
- Viewing/listening to live and recorded performances of Classical and Regional Art forms
- Participation and performance in any one of the Regional Arts forms keeping in mind the integrated approach
- Planning a stage-setting for a performance/presentation by the student-teacher.

Unit III: Appreciation of Arts

- Meaning and concepts of Arts and Aesthetics and its significance at secondary level of School Education.
- Difference between Education in Arts and Arts in Education
- Identification of different performing Art forms and artists; Dance, Music and Musical Instruments, Theatre, Puppetry (based on a set of slides, videos, documentaries selected for the purpose)
- Knowledge of Indian Craft Traditions and its relevance in education (based on a set of slides, Videos Films, Documentaries selected for the purpose)
- Knowledge of Indian Contemporary Arts and Artists; Visual Arts based on the videos, Films and Documentaries selected for the purpose
- Indian festivals and its Artistic significance.

Unit IV Engagement in Analysis and Activities:

- Initiation into the craft of Drama and related activities for engagement in schools with learners
- Theme-based projects from any one of the curricular areas covering its social, economic, cultural and scientific aspects integrating various Arts and Craft forms.

Textbook analysis to find scope to integrate Art forms either in the text or activities or exercises; Documentation of the processes of any one Art or Craft form with the pedagogical basis such as weaving or printing of textiles, making of musical instruments, folk performances in the community, etc. How does the artist design their products, manage their resources, including raw materials, its marketing, problems they face, to make them aware of these aspects of historical, social, economic, scientific and environmental concerns?

