

BACHELOR OF SCIENCE BACHELOR OF EDUCATION (ZBC) – THIRD SEMESTER

Third Semester			
S. No.	Name of Subject	Credits	Total Marks
1	Solutions, Phase Equilibria, Conductance, Electrochemistry & Functional Group Organic Chemistry-II	4	100
2	Solutions, Phase Equilibria, Conductance, Electrochemistry & Functional Group Organic Chemistry-II Lab	3	100
3	Plant Anatomy and Embryology	4	100
4	Plant Anatomy and Embryology Lab	3	100
5	Physiology and Biochemistry	4	100
6	Physiology and Biochemistry Lab	3	100
7	IT Skills for Chemists	3	100
8	Contemporary India and Education	4	100
9	Reading and Reflecting on Texts(P)	4	100
Total		32	

Subject Name: SOLUTIONS, PHASE EQUILIBRIA, CONDUCTANCE, ELECTROCHEMISTRY & FUNCTIONAL GROUP ORGANIC CHEMISTRY-II

Physical Chemistry

Solutions

Thermodynamics of ideal solutions: Ideal solutions and Raoult's law, deviations from Raoult's law – non-ideal solutions. Vapour pressure-composition and temperature-composition curves of ideal and non-ideal solutions. Distillation of solutions. Lever rule. Azeotropes.

Partial miscibility of liquids: Critical solution temperature; effect of impurity on partial miscibility of liquids. Immiscibility of liquids- Principle of steam distillation. Nernst distribution law and its applications, solvent extraction.

Phase Equilibrium

Phases, components and degrees of freedom of a system, criteria of phase equilibrium. Gibbs Phase Rule and its thermodynamic derivation. Derivation of Clausius – Clapeyron equation and its importance in phase equilibria. Phase diagrams of one-component systems (water and sulphur) and two component systems involving eutectics, congruent and incongruent melting points (lead-silver, FeCl₃-H₂O and Na-K only).

Conductance

Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Kohlrausch law of independent migration of ions.

Transference number and its experimental determination using Hittorf and Moving boundary methods. Ionic mobility. Applications of conductance measurements: determination of degree of ionization of weak electrolyte, solubility and solubility products of sparingly soluble salts, ionic product of water, hydrolysis constant of a salt. Conductometric titrations (only acid-base).

Electrochemistry

Reversible and irreversible cells. Concept of EMF of a cell. Measurement of EMF of a cell. Nernst equation and its importance. Types of electrodes. Standard electrode potential. Electrochemical series. Thermodynamics of a reversible cell, calculation of thermodynamic properties: G, H and S from EMF data.

Calculation of equilibrium constant from EMF data. Concentration cells with transference and without transference. Liquid junction potential and salt bridge.

pH determination using hydrogen electrode and quinhydrone electrode.

Potentiometric titrations -qualitative treatment (acid-base and oxidation-reduction only).

Organic Chemistry

Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

Carboxylic acids and their derivatives

Carboxylic acids (aliphatic and aromatic)

Preparation: Acidic and Alkaline hydrolysis of esters.

Reactions: Hell – Vohlard - Zelinsky Reaction.

Carboxylic acid derivatives (aliphatic): (Upto 5 carbons)

Preparation: Acid chlorides, Anhydrides, Esters and Amides from acids and their interconversion.

Reactions: Comparative study of nucleophilicity of acyl derivatives. Reformatsky Reaction, Perkin condensation.

Amines and Diazonium Salts

Amines (Aliphatic and Aromatic): (Upto 5 carbons)

Preparation : from alkyl halides, Gabriel's Phthalimide synthesis, Hofmann Bromamide reaction.

Reactions: Hofmann vs. Saytzeff elimination, Carbylamine test, Hinsberg test, with HNO₂, Schotten – Baumann Reaction. Electrophilic substitution (case aniline): nitration, bromination, sulphonation.

Diazonium salts: Preparation: from aromatic amines.

Reactions: conversion to benzene, phenol, dyes.

Amino Acids, Peptides and Proteins:

Preparation of Amino Acids: Strecker synthesis using Gabriel's phthalimide synthesis. Zwitterion, Isoelectric point and Electrophoresis.

Reactions of Amino acids: ester of –COOH group, acetylation of –NH₂ group, complexation with Cu²⁺ ions, ninhydrin test.

Overview of Primary, Secondary, Tertiary and Quaternary Structure of proteins.

Determination of Primary structure of Peptides by degradation Edmann degradation (N-terminal) and C-terminal (thiohydantoin and with carboxypeptidase enzyme). Synthesis of simple peptides (upto

dipeptides) by N-protection (t-butyloxycarbonyl and phthaloyl) & C-activating groups and Merrifield solid-phase synthesis.

Carbohydrates: Classification, and General Properties, Glucose and Fructose (open chain and cyclic structure), Determination of configuration of monosaccharides, absolute configuration of Glucose and Fructose, Mutarotation, ascending and descending in monosaccharides. Structure of disaccharides (sucrose, cellobiose, maltose, lactose) and polysaccharides (starch and cellulose) excluding their structure elucidation.

Reference Books:

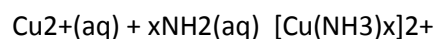
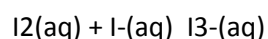
- Barrow, G.M. Physical Chemistry Tata McGraw-Hill (2007).
- Castellan, G.W. Physical Chemistry 4th Ed. Narosa (2004).
- Kotz, J.C., Treichel, P.M. & Townsend, J.R. General Chemistry, Cengage Learning India Pvt. Ltd.: New Delhi (2009).
- Mahan, B.H. University Chemistry, 3rd Ed. Narosa (1998).
- Petrucci, R.H. General Chemistry, 5th Ed., Macmillan Publishing Co.: New York (1985).
- Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. Organic Chemistry (Volume 2), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Nelson, D. L. & Cox, M. M. Lehninger's Principles of Biochemistry 7th Ed., W. H. Freeman.
- Berg, J.M., Tymoczko, J.L. & Stryer, L. Biochemistry, W.H. Freeman, 2002.

Subject Name: SOLUTIONS, PHASE EQUILIBRIA, CONDUCTANCE, ELECTROCHEMISTRY & FUNCTIONAL GROUP ORGANIC CHEMISTRY-II LAB

Physical Chemistry

Distribution

Study of the equilibrium of one of the following reactions by the distribution method:



Phase equilibria

- a) Construction of the phase diagram of a binary system (simple eutectic) using cooling curves.
- b) Determination of the critical solution temperature and composition of the phenol water system and study of the effect of impurities on it.
- c) Study of the variation of mutual solubility temperature with concentration for the phenol water system and determination of the critical solubility temperature.

Conductance

- a. Determination of cell constant
- b. Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid.
- c. Perform the following conductometric titrations:
 - i. Strong acid vs. strong base

- ii. Weak acid vs. strong base

Potentiometry

Perform the following potentiometric titrations:

- i. Strong acid vs. strong base
- ii. Weak acid vs. strong base
- iii. Potassium dichromate vs. Mohr's salt

Organic Chemistry

I Systematic Qualitative Organic Analysis of Organic Compounds possessing monofunctional groups (-COOH, phenolic, aldehydic, ketonic, amide, nitro, amines) and preparation of one derivative.

II

1. Separation of amino acids by paper chromatography
2. Determination of the concentration of glycine solution by formylation method.
3. Titration curve of glycine
4. Action of salivary amylase on starch
5. Effect of temperature on the action of salivary amylase on starch.
6. Differentiation between a reducing and a nonreducing sugar.

Reference Books:

- Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., Textbook of Practical Organic Chemistry, Prentice-Hall, 5th edition, 1996.
- Mann, F.G. & Saunders, B.C. Practical Organic Chemistry Orient-Longman, 1960.
- Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
- Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry, Universities Press.

Subject Name: PLANT ANATOMY AND EMBRYOLOGY

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Subject Name: PLANT ANATOMY AND EMBRYOLOGY PRACTICAL

Unit 1: Meristematic and permanent tissues

Root and shoot apical meristems; Simple and complex tissues

Unit 2: Organs

Structure of dicot and monocot root stem and leaf.

Unit 3: Secondary Growth

Vascular cambium – structure and function, seasonal activity. Secondary growth in root and stem, Wood (heartwood and sapwood)

Unit 4: Adaptive and protective systems

Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes.

Unit 5: Structural organization of flower

Structure of anther and pollen; Structure and types of ovules; Types of embryo sacs, organization and ultrastructure of mature embryo sac.

Unit 6: Pollination and fertilization

Pollination mechanisms and adaptations; Double fertilization; Seed-structure appendages and dispersal mechanisms.

Unit 7: Embryo and endosperm

Endosperm types, structure and functions; Dicot and monocot embryo; Embryo endosperm relationship

Unit 8: Apomixis and polyembryony

Definition, types and Practical applications

Practical

1. Study of meristems through permanent slides and photographs. 2
2. Tissues (parenchyma, collenchyma and sclerenchyma); Macerated xylary elements, Phloem (Permanent slides, photographs)
3. Stem: Monocot: Zea mays; Dicot: Helianthus; Secondary: Helianthus (only Permanent slides).
4. Root: Monocot: Zea mays; Dicot: Helianthus; Secondary: Helianthus (only Permanent slides).
5. Leaf: Dicot and Monocot leaf (only Permanent slides).
6. Adaptive anatomy: Xerophyte (Nerium leaf); Hydrophyte (Hydrilla stem).
7. Structure of anther (young and mature), tapetum (amoeboid and secretory) (Permanent slides).
8. Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous.
9. Female gametophyte: Polygonum (monosporic) type of Embryo sac Development (Permanent slides/photographs).
10. Ultrastructure of mature egg apparatus cells through electron micrographs.
11. Pollination types and seed dispersal mechanisms (including appendages, aril, caruncle) Photographs and specimens).
12. Dissection of embryo/endosperm from developing seeds.
13. Calculation of percentage of germinated pollen in a given medium.

Suggested Readings

1. Bhojwani, S.S. & Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
2. Mauseth, J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA

Subject Name: PHYSIOLOGY AND BIOCHEMISTRY

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Subject Name: PHYSIOLOGY AND BIOCHEMISTRY LAB

Unit 1: Nerve and muscle

Structure of a neuron, Resting membrane potential, Graded potential, Origin of Action potential and its propagation in myelinated and non-myelinated nerve fibres, Ultra-structure of skeletal muscle, Molecular and chemical basis of muscle contraction

Unit 2: Digestion

Physiology of digestion in the alimentary canal; Absorption of carbohydrates, proteins, lipids

Unit 3: Respiration

Pulmonary ventilation, Respiratory volumes and capacities, Transport of Oxygen and carbon dioxide in blood

Unit 4: Excretion

Structure of nephron, Mechanism of Urine formation, Counter-current Mechanism

Unit 5: Cardiovascular system

Composition of blood, Hemostasis, Structure of Heart, Origin and conduction of the cardiac impulse, Cardiac cycle

Unit 6: Reproduction and Endocrine Glands

Physiology of male reproduction: hormonal control of spermatogenesis; Physiology of female reproduction: hormonal control of menstrual cycle Structure and function of pituitary, thyroid, Parathyroid, pancreas and adrenal

Unit 7: Carbohydrate Metabolism

Glycolysis, Krebs Cycle, Pentose phosphate pathway, Gluconeogenesis, Glycogen metabolism, Review of electron transport chain

Unit 8: Lipid Metabolism

Biosynthesis and β oxidation of palmitic acid

Unit 9: Protein metabolism

Transamination, Deamination and Urea Cycle

Unit 10: Enzymes

Introduction, Mechanism of action, Enzyme Kinetics, Inhibition and Regulation

PRACTICAL

1. Preparation of hemin and hemochromogen crystals
2. Study of permanent histological sections of mammalian pituitary, thyroid, pancreas, adrenal gland
3. Study of permanent slides of spinal cord, duodenum, liver, lung, kidney, bone, cartilage
4. Qualitative tests to identify functional groups of carbohydrates in given solutions (Glucose, Fructose, Sucrose, Lactose)
2. Estimation of total protein in given solutions by Lowry's method.
3. Study of activity of salivary amylase under optimum conditions

SUGGESTED READINGS

- Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley & Sons, Inc.
- Widmaier, E.P., Raff, H. and Strang, K.T. (2008) Vander's Human Physiology, XI Edition., McGraw Hill
- Guyton, A.C. and Hall, J.E. (2011). Textbook of Medical Physiology, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company

- Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry. VI Edition. W.H Freeman and Co.
- Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009). Principles of Biochemistry. IV Edition. W.H. Freeman and Co.
- Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009). Harper's Illustrated Biochemistry. XXVIII Edition. Lange Medical Books/Mc Graw3Hill.

Subject Name: IT SKILLS FOR CHEMISTS

Computer programming

Constants, variables, bits, bytes, binary and ASCII formats, arithmetic expressions, hierarchy of operations, inbuilt functions. Elements of the BASIC language. BASIC keywords and commands. Logical and relative operators. Strings and graphics. Compiled versus interpreted languages. Debugging. Simple programs using these concepts. Matrix addition and multiplication. Statistical analysis.

BASIC programs for curve fitting, numerical differentiation and integration (Trapezoidal rule, Simpson's rule), finding roots (quadratic formula, iterative, Newton-Raphson method).

HANDS ON

Introductory writing activities: Introduction to word processor and structure drawing (ChemSketch) software. Incorporating chemical structures, chemical equations, expressions from chemistry (e.g. Maxwell-Boltzmann distribution law, Bragg's law, van der Waals equation, etc.) into word processing documents.

Handling numeric data: Spreadsheet software (Excel), creating a spreadsheet, entering and formatting information, basic functions and formulae, creating charts, tables and graphs. Incorporating tables and graphs into word processing documents. Simple calculations, plotting graphs using a spreadsheet (Planck's distribution law, radial distribution curves for hydrogenic orbitals, gas kinetic theory- Maxwell-Boltzmann distribution curves as function of temperature and molecular weight), spectral data, pressure-volume curves of van der Waals gas (van der Waals isotherms), data from phase equilibria studies. Graphical solution of equations.

Numeric modelling: Simulation of pH metric titration curves. Excel functions LINEST and Least Squares. Numerical curve fitting, linear regression (rate constants from concentration- time data, molar extinction coefficients from absorbance data), numerical differentiation (e.g. handling data from potentiometric and pH metric titrations, pKa of weak acid), integration (e.g. entropy/enthalpy change from heat capacity data).

Statistical analysis: Gaussian distribution and Errors in measurements and their effect on data sets. Descriptive statistics using Excel. Statistical significance testing: The t test. The Ftest.

Presentation: Presentation graphics

Reference Books:

- McQuarrie, D. A. Mathematics for Physical Chemistry University Science Books (2008).
- Mortimer, R. Mathematics for Physical Chemistry. 3 Ed. Elsevier (2005).
- Steiner, E. The Chemical Maths Book Oxford University Press (1996).
- Yates, P. Chemical calculations. 2 Ed. CRC Press (2007).
- Harris, D. C. Quantitative Chemical Analysis. 6th Ed., Freeman (2007) Chapters 3-5.

- Levie, R. de, How to use Excel in analytical chemistry and in general scientific data analysis, Cambridge Univ. Press (2001) 487 pages.
- Noggle, J. H. Physical chemistry on a Microcomputer. Little Brown & Co. (1985).
- Venit, S.M. Programming in BASIC: Problem solving with structure and style. Jaico Publishing House: Delhi (1996).

Subject Name: CONTEMPORARY INDIA AND EDUCATION

UNIT 1 - CONTEMPORARY INDIA

- Meaning of Contemporary India.
- Social Stratification-forms and function; caste and class; pollution and purity ;
- Types of Society-tribal, Agrarian; industrial, post industrial society; Urbanisation; Industrialisation; , Globalization, modernization, economic liberalization and digitalization etc
- Population size; composition and distribution in India; consequences of population growth; educational scenario of India;
- Concept of diversity in terms of educational opportunities-religion, caste, class, gender, language, region and tribes;
- Challenges of diversity in achieving universal education
- Demands of diverse social groups towards education;
- Role of education in creating positive attitude towards diversity;

UNIT 2 - Constitutional Provisions and Education

Normative orientation of Indian education: A historical enquiry

- Constitutional provisions on education that reflect National ideals: Democracy, and the values of equality, justice, freedom, concern for others' wellbeing, secularism, respect for human dignity and rights.
- India as an evolving Nation: Vision, Nature and Salient Features – Democratic and Secular polity, Federal structure: Implications for educational system
- Aims and purposes of education drawn from the normative vision & Fundamental Rights & Duties of Citizens
- Constitutional interventions for universalization of education and promoting the achievement of freedom, justice, equality and fraternity
- Decentralization of Education and Panchayati Raj (specifically through 73rd and 74th amendment)
- Role of Central and State governments in the development of education

UNIT3 - Policy Framework for Development of Education in India

- Overview of educational reformation in the Pre-independence period- Macaulay's minutes, Wood & Despatch, Hunter Commissions; Sargent Report, Basic education, Naye Talim;
- Education in Post Independence Period: Mudaliar Commission(1952) Education Commission (1964-66); NPE 1968; NPE 1986 and its modified version 1992; Right to Education Act- 2009; Knowledge Commission;
- Emerging trends in the interface between
 - ✓ Political process and education;
 - ✓ Economic developments and education; and
 - ✓ Socio-cultural changes and education.
 - ✓ Idea of Common School System

- ✓ National System of Education
- Language Policy
- Learning Without Burden-1993
- Justice Verma Commission-2012
- Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNMTT)

UNIT 4 – Initiatives of the Government of India

- Sarva Shiksha Abhiyan (SSA)
- Rashtriya Madhyamik Shiksha Abhiyan (RMSA)
- Mid-day Meal
- Schemes for girls, SC, ST and Marginalised Group
- ICT In School Education- National Repository of Open Educational Resources (NROER)

Unit5 - Contemporary Indian Education: Concerns and Issues

- Universalisation of School Education
- Right to Education and Universal Access:
 - ✓ Issues of a) Universal enrolment b) Universal retention c) Universal success
 - ✓ Issues of quality and equity.
(The above to be discussed with specific reference to physical, economic, social and cultural access, particularly to girl child and weaker sections as well as differently-abled children)
 - ✓ School safety
- Equality of Educational Opportunity:
 - ✓ Meaning of equality and constitutional provisions
 - ✓ Prevailing nature and forms of inequality, including dominant and minor groups and related issues
- Inequality in schooling: Public-private schools, rural-urban Schools and international schools, single teachers' schools and many other forms of inequalities in school systems and the processes leading to disparities
- Differential quality in schooling: Variations in school quality
- Issues in contemporary India like Industrialization, Urbanization, Globalization, Modernization and Economic liberalization etc and their effect on education.

Practicum

- Critical appraisal of Constitutional values as practiced in an Educational Institution
- Comparative study of different kind of schools
- Conflicts and Social Movements in India: Women, Dalit and tribal movements,
- Marginalization and education of children from slums and distress migration
- Impact of electronic media on children
- Understanding youth culture in the present times and the impact of internet and other Visual mediums.
- Organization of Literacy Programmes (Night School/Classes) for adults and continuing education among Youths (A Pilot Project).
- Causes and Poverty and Eradication of Slum Areas/ Rural Areas.
- Presentation on the reports and policies on USE
- Conduct of survey of government and private schools to identify various forms of inequality
- Survey of backward locality to find out the causes of low literacy.
- Study of functioning utility of Shala, Vikas Samiti in a Secondary School.
- Study of voluntary agency working in the field of educational and school development of society.

Suggested Readings

1. Anand, C. L. et al.: Teacher and Education in Emerging India, NCERT, New Delhi, 2000.
2. Mani, R. S.: Educational Ideas and Ideals of Gandhi and Tagore, New Book Society, New Delhi.
3. Mohanty Jagannth: Indian Education in Emerging Society, Sterling Publication, New Delhi, 2002.

4. Naik, J.P.: Equality, Quality and Quantity: The Elusive Triangle of Indian Education. Bombay: Allied Publishers, 1975.
 5. Panday Shyam Swaroop : Shiksha Ki Darshnik Ewam Samajik Prushi Bhoomi, VinodPustak Mandir, Agra.
 6. UNESCO: Thinking Ahead: UNESCO and the Challenges of Today and Tomorrow. Paris: UNESCO, 1977.
 7. Badheka, G. (2006). *Divasvapna*. National Book Trust. Retrieved from <http://www.arvindguptatoys.com/>
 8. Carr, D. (2005). *Making sense of education: An introduction to the philosophy and theory of education and teaching*. Routledge.
 9. GOI. (1966). *Report of the education commission: Education and national development*. New Delhi: Ministry of Education
 10. GOI. (1986). *National policy of education*. GOI.
 11. GOI. (1992, 1998). National policy on education, 1986 (As modified in 1992). Retrieved from http://mhrd.gov.in/sites/upload_files/mhrd/files/NPE86-mod92.pdf
 12. GOI. (2009). The right of children to free and compulsory education act, 2009. Retrieved from http://mhrd.gov.in/sites/upload_files/mhrd/files/rte.pdf
 13. GOI. (2011). Sarva shiksha abhiyan- Framework for implementation based on the right of children to free and compulsory education act, 2009. GOI. Retrieved from [http://www.upefa.com/upefaweb/admin/myuploads/SSA Frame work \(revised\) 9-6-2011.pdf](http://www.upefa.com/upefaweb/admin/myuploads/SSA Frame work (revised) 9-6-2011.pdf)
 14. Govinda, R. (2011). *Who goes to school?: Exploring exclusion in Indian education*. Oxford University Press.
 15. Krishnamurti, J. (1992). Education and world peace. In *Social responsibility*. Krishnamurti Foundation.
 16. Kumar, K. (2013). *Politics of education in colonial India*. India: Routledge.
 17. Naik, J.P. (1982). *The education commission and after*. APH Publishing.
 18. Naik, J.P., & Nurullah, S. (1974). *A students' history of education in India (1800-1973)*. Macmillan.
 19. NCERT. (2005). *National curriculum framework. (NCF 2005)*. New Delhi: NCERT.
 20. NCERT. (2006a). *Position paper-National focus group on education with special needs*
 21. NCERT. (2006b). *Position paper-National focus group on gender issues in the curriculum (NCF 2005)*. NCERT.
 22. NCERT. (2006c). *Position paper-National focus group on problems of scheduled caste and scheduled tribe children (NCF 2005)*. New Delhi: NCERT.
 23. NCERT. (2006d). *Position paper-National focus group on teaching of Indian language*
- Raina, V. (2010). *FAQs on the right to free and compulsory education act 2009*. BharatGyan Vigyan Samiti, UNICEF.

Subject Name: READING AND REFLECTING ON TEXTS (P)

Objectives of the Course:

- To enable student-teachers to read and respond to a variety of texts in different ways and also learn to think together and appreciate that depending on the text and the purposes of reading, responses may be personal or creative or critical or all of these together.
- To develop meta-cognitive awareness in student-teachers to become conscious of their own thinking processes as they engage with diverse texts.
- To enhance their capacities as readers and writers by becoming participants in the process of reading.

Course Content:

Readings for Discussion, Analysis and Reflection

- Delpit, Lisa D. (1988). The Silenced Dialogue: Power and Pedagogy in Educating Other People Children. *Harvard Educational Review* 58(3), 280-298.
- Donovan, M. S. And Bransford, J. D. (Ed.) (2005). How students learn. Washington DC: The National Academies Press, Chapter 1: Introduction 1-26, Chapter 13: Pulling Threads 569-590.
- Gilligan, C. (1977). In a Different Voice: Women's Conception of Self and Morality. *Harvard Educational Review*, 47 (4), 481-517

- Ilich, I. (1970). Deschooling Society, London, UK: Marion Boyars.
- Vasanta, D. (2004). Childhood, Work and Schooling: Some Reflections. Contemporary Education Dialogue, Vol. 2(1), 5-29.
- Mukunda, K. V. (2009). What Did You Ask in School Today? A Handbook on Child Learning. Noida: Harper Collins. Chapter 4: Child Development, 79-96.
- Wood, D. (2000). Narrating Professional Development: Teacher s stories as texts for improving practice. Anthropology and Education Quarterly, 31(4), 426-448.

Audio-visual Resources :)Any Three of the following to be screened for the student-teachers and discussion to be followed)

- *A New Education for a New India* (CD ROM) (By Gnostic Centre/NCTE)
- *Had-Anhad: Journeys with Ram and Kabir* by Shabnam Virmani <http://www.kabirproject.org>
- *Teacher.s Journey*: An observational film on teaching methodologies of a primary school teacher in a single-teacher school in MP, India. Director- Deepak Verma,
- Azim Premji Foundation. For copies contact -madhumita@azimpremjifoundation.org
- *Where Knowledge is Free*: A documentary film about children branded by Caste and excluded from education. Director Binitesh Baruri. Available at Indian Institute of Dalit Studies, Q-3, Green Park Ext., New Delhi-16, Ph. 91-11-41643981 <http://www.dalitstudies.org.in>.