B. Sc. B. Ed. (CBCS) Semester- III
GROUP B: GENERIC COURSE (GC)
GCEE 201: ENVIRONMENTAL EDUCATION & SUSTAINABLE DEVELOPMENT

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course

The Course 'Environmental Education' aims to orient student-teachers to analyze and understand environment concerns through the process of inquiry, critical analysis, intellectual discourse and essential projects.

Course Contents

Unit I: Importance and Scope of Environment

Importance need and scope of Environmental Conservation and Regeneration, Structure and functions of different ecosystems, India as a mega biodiversity nation, Role of individual in conservation of natural resources: water, energy and food, Equitable uses of resources for sustainable livelihoods, Environmental legislation: awareness and issues involved in enforcement.

Unit II: Natural Resources

Community participation in natural resource management- water, forests. Deforestation in the context of tribal life, Sustainable land use management, Traditional knowledge and biodiversity conservation, Developmental projects including Government initiatives and their impact on biodiversity conservation.

Unit III: Practices in Environment Management

Consumerism and waste generation and its management, Environmental degradation and its impact on the health of people, Organic farming,

Agricultural waste: their impact and management, Rain water harvesting and water resource management, Biomedical waste management.

Unit IV: Sustainable Environment in Global World

Environmental conservation in the globalised world, Alternative sources of energy, Impact of natural disaster/man-made disaster on environment, Biological control for sustainable agriculture, Heat production and greenhouse gas emission, Impact of industry/mining/transport on environment, Sustainable use of forest produces.

Modes of Learning Engagement:

- Case studies and success stories (involve local material).
- Problem solving and enquiry methods
- Small assignments which may include observation of important relevant days, preparation of bulletin board material, games, crossword puzzles, worksheet etc.
- Setting up of Eco-clubs.
- Conducting a seminar and developing a seminar document
- Project work and writing of project report
- Discussion of activities pertaining to two different classes and subjects.
- Activities on infusion of appropriate concerns.

Practicum:

- The students on completion of each topic of Unit-I will submit a small assignment in the form of an activity. This may include observation of importance of relevant season, preparation of bulletin board material, wall games, crossword puzzles, worksheet etc.
- The class can also form an environment club. The activity has to be on some local specific issue pertaining to the native place of the students.
- From the wide range of topics suggested in Units, the student will be assigned one topic. The student will develop a seminar document, which will be submitted after the seminar.

Suggested Readings:

1. NCERT (1981) Environmental Education at School Level. New Delhi. NCERT.
2. Odum, E.P (1971). Fundamental Ecology. London. W.B. Saunders Company.
3. Palmer, Joy A. (1998). Environmental education in the 21st Century. London. Routledge.
4. Sharma R. C and Tan, Marle C (Eds.) (1990). Resource Book in Environmental education for school lectures. Bangkok. UNESCO.

5. Sharma, R.C. (1981). 'Environmental Education. New Delhi. Metropolitan Publishers.
6. हरिशचन्द्रव्यास (2001). पर्यावरणशिक्षा, नई दिल्ली.
7. सक्सेनाहरिमोहन (2003). पर्यावरण अध्ययन, श्रीगंगानगर. अग्रवालसाहित्य सदन।
8. पंकजश्रीवास्तव (1998). 'पर्यावरणशिक्षा'. भोपाल. मध्यप्रदेशहिन्दीग्रंथअकादमी।
9. सक्सेना ए.बी. (1998). पर्यावरणशिक्षा. नईदिल्ली. आर्यबुकडिपो।
10. UNESCO (1990). Sourcebook in Environmental Education for School Teachers. Bangkok.
11. CEE (1995). Joy of learning handbook of environmental education activities. Vol.I-3 to 5.—Ahmedabad. Centre for Environment Education,
12. CEE (1996) Joy of learning. Handbook of environmental education activities. Vol.II-6 to 8.-- Ahmedabad: Centre for Environment Education
13. Pandya (1999). Mamata, Guide to green material: experiences and learning in developing effective environmental education material. Ahmedbad. Centre for Environment Education,
14. Sharma, R. C. (1981). Environmental Education. Delhi. Metropolitan.
15. Reddy, K. Purushotham. (2007). Environmental education. New Delhi. Neel kamal Publications Pvt. Ltd.
16. NCERT (2009). Project book in Environmental Education for class VII, VII, IX and X. New Delhi. NCERT.
17. NCERT (2011). Teachers' Handbook on Environmental Education for the higher secondary stage. New Delhi.
18. NCERT (2013). Project book in Environmental Education for the higher secondary stage. New Delhi. NCERT.

GROUP C: CORE COURSE (CC)
Semester III
PHY 201: PHYSICS: ELECTRODYNAMICS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Know the fundamental concepts of electricity and magnetism.
- Appreciate the link between electricity and magnetism.
- Apply the concepts in understanding the various physical phenomena.
- Solve the problems related to electrodynamics.
- Apply the theory in related practicals.

Course Contents

Unit I: Electro Statics:

Coulomb's law, calculations of E for simple distributions of charges at rest, dipole and quadrupole fields, Work done on a charge in an electrostatic field, conservative nature of the electrostatic field, Electric potential,relation between electric field and electric potential, torque on a dipole in a uniform electric field and its energy, flux of the electric field, Gauss's law and its application for finding E for symmetric charge distributions, Gaussian pillbox, Fields at the surface of conductor, Screening of E field by a conductor, capacitors, electrostatic field energy, force per unit area of the surface of conductor in an electric field, conducting sphere in a uniform electric field, point charge in front of a grounded infinite conductor.

Unit II: Dielectrics

Parallel plate capacitor with a dielectric, dielectric constant, polarization and polarization vector, displacement vector D, molecular interpretation of Claussius – Mossotti equation, boundary conditions satisfied by E and D at the interface between two homogenous dielectrics, illustration through simple example

UnitIII: Electric Currents (steady and alternating)

Steady current, current density J, non-steady currents and continuity equation, Kirchoff's law and analysis of multi loop circuits, rise and decay of current in LR and CR circuits, decay constants, transients in LCR circuits, AC circuits, complex numbers and its application in solving AC circuit problems, complex impedance and reactance, Measurement of capacitance using impedance at different frequencies, series and parallel resonance, Q factor, power consumed by an AC circuit, power factor, Y and ∇ networks and transmission of electric power.

UnitIV: Magneto statics

Force on a moving charge: Lorentz force, equation and definition of B, force on a straight conductor carrying current in a uniform magnetic field, Torque on a current loop, magnetic dipole moment, angular momentum and gyromagnetic ratio.

Motion of charged particles in electric and magnetic fields

Linear accelerator, E as deflecting field – CRO, sensitivity, Transverse B field, curvatures of tracks for energy determination of nuclear particles, principle of a cyclotron, Mutually perpendicular E and B fields- mass spectrograph, velocity selector, its resolution.Response curve for LCR circuit and resonance frequency, quality factor.

Magnetic Fields in Matter

Biot-Savart law, calculation of H in simple geometrical situations, Ampere's Law, the divergence and curl of B, field due to a magnetic dipole, magnetization current, magnetization vector, magnetic permeability (linear cases), interpretation of a bar magnet as a surface distribution of solenoidal current, the field of a magnetized object**.**

Plane electromagnetic wave in vacuum, Wave equation for E and B of linearly, Circularly and elliptically polarized electromagnetic waves, Poynting vector, Reflection and Refraction at a plane boundary of dielectrics, Polarization by Reflection and total internal Reflection, Faraday effect, Wave in conducting medium, Reflection and Refraction by the ionosphere.

Suggested Readings:

1. Barkeley Physics Course; Electricity and Magnetism, Ed. E.M. Purcell (McGraw-Hill).
2. Halliday and Resnik; Physics, Vol 2.(Wiley Eastern)
3. D.J. Griffith; Introduction to Electrodynamics (Prentice-Hall of India).
4. Reitz and Milford; Electricity and Magnetism (Addison-Wesley).
5. A.M. Portis; Electromagnetic Fields.
6. Pugh and Pugh; Principles of Electricity and Magnetism (Addison-Welsley).
7. Panofsky and Phillips; Classical Electricity and Magnetism (India Book House).
8. S.S.Atwood; Electricity and Magnetism (Dover).

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

1. To Study resonance in a series LCR circuit and determine Q of the circuit.
2. To determine difference between two small resistances using Carey Foster's bridge.
3. To study the variation of current in RC circuit for different time constants (using a DC source).
4. To find the e/m of electron by Milikan's oil drop experiment.
5. To determine the self inductance of a coil by Anderson's bridge.
6. To compare the two capacities by De Sauty's bridge.
7. To study the variation of magnetic field along the axis of a current carrying circular coil. Plot the graph and find radius of the coil.

Group C: Core Course (CC)
Semester III
CHM 201: CHEMISTRY: ORGANIC CHEMISTRY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

- To acquire basic knowledge to students teachers about the concept of hybridization and geometry of atoms and the three-dimensional structure of organic molecules, Stereochemistry and Reaction Mechanism, General aspects of Organic Reactions; an understanding of nucleophiles, electrophiles, electronegativity and resonance.
- To acquire basic knowledge to students teachers about understanding of Cyclo alkanes, Cyclo Alkenes and Alkadienes, how to use their understanding of organic mechanisms to predict the outcome of reactions, the fundamentals of electronic structure and bonding in aromatic systems, reactivity patterns of aromatic molecules, chemical properties of Alkyl and Aryl Halides and general periodicity patterns of (organic/inorganic) molecules and the ability to design synthetic approaches to such species.

Course Contents

Unit I: Stereochemistry and Reaction Mechanism

A. **Stereochemistry of Organic Compounds**

Concept of isomerism, Types of isomerism; Optical isomerism – elements of symmetry, molecular chirality, enantiomers, stereogeniccenter, optical activity, properties of enantiomers, chiral and achiral molecules with two

stereogeniccenters, diastereomers, threo- and erythrodiastereomers, meso compounds, resolution of enantiomer, inversion, retention and racemisation.

Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature.

Geometric isomerism – determination of configuration of geometric isomers, E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds.

Conformational isomerism – conformational analysis of ethane and n-butane; conformations of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives, Newman projection and Sawhorse formulae, Fischer and flying wedge formulae, Difference between configuration and conformation.

B. **General aspects of Organic Reactions:**

Inductive effect,hyperconjugation, conjugation and Resonance, Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking, Types of reagents – electrophiles and nucleophiles, Types of organic reactions, Energy considerations.Reactive intermediates – Carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species.Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

Unit II: Chemistry of Cyclo alkanes, Cyclo Alkenes and Alkadienes

A. **Cycloalkanes**: Nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings. The case of cyclopropane ring, banana bonds, Stereochemistry of cyclo alkanes.

B. **Cycloalkenes**: Methods of formation, conformation and chemical reactions of cycloalkenes.

C. **Alkadienes:** Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes, Structure of allenes and butadiene, methods of formation, polymerization, chemical reaction – 1, 2 and 1, 4 additions, Diels-Alder reaction.

Unit III: Aromatic Hydrocarbons

A. **Arenes and Aromaticity:** Nomenclature of benzene derivatives, the aryl group, Aromatic nucleus and side chain, Structure of benzene; molecular

formula and Kekule structure, stability and carbon-carbon bond lengths of benzene, resonance structure, MO picture. **Aromaticity**: The Huckle rule, aromatic ions.

B. **Aromatic Electrophilic Substitution**: General pattern of the mechanism, role of σ- and π- complexes, Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts' reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio, Side chain reactions of benzene derivatives, Birch reduction; Methods of formation and chemical reactions of alkylbenzenesalkynylbenzenes and biphenyl, naphthalene and Anthracene.

UnitIV:Alkyl and Aryl Halides

Nomenclature and classification of alkyl halides, methods of formation, chemical reactions, Mechanisms of nucleophilic substitution reactions of alkyl halides, SN^2 and SN^1 reactions with energy profile diagrams, Polyhalogencompounds: Chloroform, carbon tetrachloride.

Methods of formation of aryl halides, nuclear and side chain reactions, addition-elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions,relative reactivities of alkyl halides vsallyl, vinyl and aryl halides, synthesis and uses of DDT and BHC.

Suggested Readings:

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Eliel, E. L. &Wilen, S. H. Stereochemistry of Organic Compounds; Wiley: London, 1994.
5. Jerry March, Advanced Organic Chemistry: Reactions, Mechanisms, and Structure, Sixth Edition
6. Peter Sykes, A Guidebook to Mechanism in Organic Chemistry Paperback – 2003.
7. Harkishan Singh and V. K. Kapoor. Medicinal and Pharmaceutical Chemistry. VallabhPrakashan Publishers, Delhi. 1996.

8. R L Madan Chemistry for Degree Students B.Sc. 2Nd Year S. Chand Publishing.
9. Hashmatali, Reaction Mechanism in Organic Chemistry S. Chand publishing.
10. John Leonard, Barry Lygo, Garry Procter Advanced Practical Organic Chemistry, Third Edition

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

1. **Organic Chemistry: Laboratory techniques**

- **Calibration of Thermometer**
  Naphthalene (80-82°C), Acetanilide (113.5-114°C), Urea (132.5-133°C), Distilled Water (100°C)
- **Distillation**
  Simple distillation of ethanol-water mixture using water condenser
  Distillation of nitrobenzene and aniline using air condenser
- **Crystallization**
  Concept of induction of crystallization, Phthalic acid from hot water (using fluted filter paper and stem less funnel), Acetanilide from boiling water, Naphthalene from ethanol,Benzoic acid from water
- **Decolourisation and crystallization using charcoal**
  Decolourisation of brown sugar (sucrose) with animal charcoal using gravity filtration.
  Crystallization and decolorisation of impure naphthalene (100g of naphthalene mixed with 0.3g of Congo Red using 1g decolorizing carbon) using ethanol.
- **Sublimation (simple and Vacuum)**
  Camphor, Naphthalene, Phthalic acid and Succinic acid.
- **Determination of melting point/ boiling points**
  Determination of melting point: Naphthalene, Benzoic acid, Urea, Succinic acid, Cinnamic acid, Salicylic acid, Acetanilide, m-Dinitrobenzene p-Dichlorobenzene, Aspirin.
  Determination of boiling points: Ethanol, Cyclohexane, Toluene, Aniline and Nitrobenzene.

2. Functional Group Analysis

a. Detection of extra elements (N, S and halogens), solubility behavior and functional groups (Alcoholic, phenolic, carboxylic, carbonyl, esters, carbohydrates, amines, amides, nitro and anilide) in simple organic compounds.

b. Identification of an organic compound through the functional group analysis and preparation of suitable derivatives.

GROUP C: CORE COURSE (CC)
Semester III
ZOO 201: ZOOLOGY: ANIMAL CELL BIOLOGY AND GENETICS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives:

To enable students to comprehend the modern concepts and applied aspects of Cell Biology and modern concepts of Genetics and to create awareness regarding inheritance.

Note: The paper is divided in four independent units.

Unit I: Cell

Introduction to cell: Discovery, characteristics of prokaryotic (bacterial) and eukaryotic cells (plant and animal cells), cell theory, viruses and viroids.

Cell membrane: Ultra structure, chemical composition, models, unit membrane concept, fluidity, glycocalyx and functions of cell membrane. Transport across cell membrane: Passive transport (osmosis, diffusion), facilitated (mediated) diffusion; active transport (primary and secondary) and endocytosis and exocytosis.

Mitochondria: Ultra structure, chemical composition, functions, origin, electron transport chain and generation of ATP molecules.

Unit II: Cell Organelle

Ultrastructure, types, chemical composition and functions of

(i) ER and Golgi-complex
(ii) Lysosome, Ribosome,
(iii) Centriole,
(iv) Cilia and flagella

Nucleus: occurrence, number, shape, size and structure (nuclear envelopes, nuclear matrix and nucleolus)

Chromosomes: Introduction, structure (chromatids, primary and secondary constrictions, nucleolar organizer and telomeres) types; Chemical composition and functions. Chromosomal organizations: Nucleosome concept, Euchromatin, heterochromatin.

Unit III: Cell Cycle and Division

a) Cell reproduction: Cell cycle and significances of mitosis and meiosis. Regulation of Cell cycle.
b) Mendelian principles of inheritance- monohybrid and di-hybrid cross, back cross and test cross.
c) Deviation of Mendelism – incomplete dominance, co-dominance with examples.
d) Gene interactions: Epistasis, complementary, supplementary, duplicate genes with cumulative effects and collaborator genes.
e) Multiple alleles: Characters, examples pseudoalleles, inheritance of A, B , AB, O and Rh blood groups (antibody reactions)

Unit IV: Genetics

a) Chromosomal mutations-
   i. Variation in chromosome number (aneuploidy and euploidy)
   ii. Structural changes in chromosomes (deletion, duplication, inversion and translocation).
b) Sex–determination: Genetic (sex chromosome, genic balance and haplo-diploidy mechanisms), hormonal and environmental control of sex determinations with examples.
c) Sex-linked inheritance: white eye colour in Drosophila, colour blindness and hemophilia in man.
d) Linkage: Definition, difference between linkage and independent assortment, chromosomal theory of linkage, kinds, linkage groups and significances.
e) Crossing over- Definition, mechanism, theories, kinds, frequency, factors affecting crossing over and significances.

Suggested Readings:

1. Molecular Biology of the Cell, Alberts et al, *5thed Garland Science 2008*.
2. Molecular Cell Biology, H Lodish MP Scott et al 7th Ed, McMillan Pub 2013.
3. Biochemistry, Molecular Biology and Genetics 5th ED, Lippincott Willaims and Wilkinson, 2013.
4. Cell Biology Gerald Karp, 7thed, Wiley Pub 2014

5. Cell and Development Biology by Sastry, Singh &Tomar- (Rastogi Publications . 2008)
6. Essentials of Molecular Biology ,2nded, David Freifileder, Panima Publishing N Delhi 1996
7. Biochemistry and Molecular Biology , K Wilson & J Walker, 7th Cambridge 2010.
8. Cell and Molecular Biology by P.K Gupta – (RastogiPublications 2008)
9. Cell Biology by C.B Power –(Himalaya publishing House, Bombay)
10. Cell Biology by de Robertis et. al-(W.B Saunders , Philadelphia)
11. A textbook of Cytology by R.C Dalela& S.R. Verma – (Jaiprashnath& Co. Meerut)
12. Cell Biology by J.D. Burke – (Scientific Book Agency , Calcutta)
13. Cell Biology : A molecular approach by R.D Dyson- Allyn& Bacon, Boston)
14. Cell Biology by R.M. Dowben – (Harper & Row, New York)
15. Cell function by L. L Langley – (Affiliated East West Press, New Delhi)
16. Cytology by C.D. Darlington
17. Cell and Molecular Biology by de Robertis EDP & de Robertis EMI Jr. (1996) . Holt WB Saunders Internationl
18. Genetics- P.S. Verma& V.K. Agarwal , S. Chand&Co.Delhi
19. Principles of Genetics Gardner , Ed 7th Wiley Eastern Pvt Ltd 2013
20. Genetic – Winchester , Oxford IBH Publications
21. Genetic – Stickberger, Macmillian Publications.
22. Immunology , Kuby 7thed, Owen Punt Stenford McMillan, 2013

Practical

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

Course Contents

- Microscope : Simple and compound microscope, working mechanism and maintenance
- Study of bacterial and enkaroytic cell.
- Slides of sub cellular components (Cell organelles)
- Erythrocyte plasma membrane permeability.
- Study of Karyotype and Idiogram of man.

- Study of Barr Bodies in human buccal epithelial cells.
- Identification of blood groups (ABO) and Rh factor in man.
- *Drosophila* culture and life cycle.
- Sexual Dimorphism in *Drosophila,* Identification of wild or mutant varieties.
- Study of salivary gland chromosomes of Drosophila
- Problems on pedigree analysis.
- Meiotic studies of testes of cockroach.

GROUP C: CORE COURSE (CC)
Semester III
BOT 201: BOTANY: GYMNOSPERMS AND REPRODUCTIVE BIOLOGY IN FLOWERING PLANTS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 60, Internal: 20, Practical: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 12 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 12 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of this course the student teachers will be able to:

- Understand the morphology, anatomy, reproduction and classification of Gymnosperms;
- Understand the structure, development and processes associated with Angio spermembryology;

Course Contents

Unit I: Morphology and Anatomy of Gymnosperms

- General characters, distribution, classification, affinities and economic importance of Gymnosperms
- Study of morphology, anatomy and reproduction in Cycadopsida: *Cycas.*
- Study of morphology, anatomy and reproduction in Coniferopsida:*Pinus* and Gnetopsida:*Ephedra*

Unit II: Reproduction in Gymnosperm Part - I

- Flower – Structure, morphology, embryological perspective.
- Microsporangium – Development of wall layers, tapetum types, microsporogenesis, tetrad types.
- Male gametophyte – Development and structure; vegetative and generative cells; male gametes.
- Mega sporangium (ovule): Development, types, mega sporogenesis, tetrad

types.

- Female gametophyte: Development, ultra structure, mono, bi and tetrasporic embryo sacs.

Unit III: Reproduction in Gymnosperms Part - II

- Pollination and fertilization: Definitions, types of pollination, pollen-pistil interaction, self-incompatibility ,double-fertilization.
- Endosperm: Definition, types – cellular, nuclear and helobial; endo spermhaustoria.
- Embryo: Classification, types, development of Crucifertype.

Unit IV: Angiosperm Embryology

- Fruit and seed: Development, structure of monocot and dicot seeds, dispersal mechanisms, importance.
- Fruits- Types, classification with examples.
- Brief account of apomixis andpolyembryony, causes and applications.
- Brief account of anther/ pollen culture, endosperm, embryo and protoplast culture, Applications of tissueculture.
- Origin and evolution of Angiosperms, Fossil Angiosperms.

Suggested Readings:

1. Sporne, K.R., 1974, Morphology of Gymnosperms, Hutchinson & Co.,London.
2. Gangulee, S.C., Kar and Ashok Kumar, College Botany Vol.II, Central Book Agency, Calcutta.
3. Singh V., P.C.Pande & D K Jain 2006 Diversity and Systematics of Seed Plants, Rastogi Publications,Meerut.
4. Pandey, Mishra and Trivedi, 2000, A Text book of BotanyVol.II.
5. Chopra G.L., 1972, Gymnosperms, S. Nagin & Co., Jullandar.
6. Bhojwani S S and S P Bhatnagar, 2007. The Embryology of Angiosperms, Vikas Publishing House,Delhi.
7. Raven P.H, R.F.Evert and S.E.Eichhorn, 1999, Biology of Plants, 5th Ed., W.H.Freeman and Co., Worth Publishers, NewYork.
8. Swamy B.G.L. and K.V. Krishnamurthy, 1980, From Flower to Fruit, TMH Publishing House, NewDelhi.
9. Johri B.M.(Ed.),1984, Embryology of Angiosperms, Springer-Verlag,Germany.

Practicals

Distribution of Marks for End Semester Practical Examination	
Activity	**Marks**
Experiments	10
Viva Voce	5
Record	5
Total Marks	**20**

All the following experiments are to be done. Few more experiments may be set at the institutional level.

Course Contents

- Study of morphology, anatomy and reproductive structures of genera of Gymnosperms included in theorysyllabus.
- Study of structure of anther, microsporogenesis and pollen grains using permanent slides andmounts.
- Study of structure of ovules and embryosac development (monosporic type) using permanentslides.
- Examination of a wide range of flowers for study ofpollination.
- *In vitro* germination of pollengrains.

GROUP C: CORE COURSE (CC)
Semester III
MTH 201: MATHEMATICS: LINEAR ALGEBRA

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: At the end of the course students will be able to:

(i) Understand concepts, principles and techniques of matrix and determinants in problem solving.
(ii) Understand the concept of Vector space, Isomorphism of Vector spaces, quotient spaces and Euclidean Vector spaces and apply these in problem solving.
(iii) Understand 3-Dimensional shapes viz. Sphere, Cone, Cylinder, Ellipsoid, Hyperboloid, its equations and applications in problem solving.

Unit: I

Matrices, determinants, Basic properties of determinants, Co-factor expansion, system of linear equations, Gauss elimination method, Elementary matrices, invertible matrices Gauss-Jordan method for finding inverse of a matrix. Vector space, subspaces, Linear combinations, Linear span, Linear dependence and Linear independence of vectors, Basis and Dimension, Finite dimensional vector space-some properties.

Unit: II

Quotient spaces, Homomorphism of vector spaces, Isomorphism of vector spaces, Direct sum, inner product spaces, Euclidean vector spaces, Distance, Length, Properties, Orthogonal vectors, Gramm Schmidt Orthogonalisation Process, Orthogonal Complement.

Unit: III

Matrices of lineartransformations, Change of basis and the effect of associated matrices, Kernal and Image of a Linear transformation, Rank Nullity theorem, Singular and Nonsingular linear transformations, Elementary matrices and transformations, Similarity, Eigen values, Eigen Vectors, Diagonalisation, Characteristic polynomial, Cayley-Hamilton theorem, Minimal polynomial.

Unit: IV

Quadratic curves, Surfaces, Sphere, Cylinder, Cone, Ellipsoid, Hyperboloid, Paraboloid.

Suggested Readings:

1. Theory and Problems of Linear Algebra, Seymour Lipschutz, Schaum Outline Series
2. Linear Algebra: K. Hoffman and R. Kunze (2009) Prentice-Hall
3. Introduction to Linear Algebra: G. Strang (2009) Wellesley CambridgePress
4. Linear Algebra done right: S. Axler (2014) Springer
5. Linear Algebra with applications: Bretscher (2012) Pearson
6. Calculus and Analytical Geometry by Thomas and Finney.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
I: Perspectives in Education (PE)
Semester III
PESS 201: SCHOOLING, SOCIALIZATION AND IDENTITY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of course, the student-teachers will be able to:

- Become aware of the processes of socialization at home and school that act as shaping factors in identity formation of the school going child (in Indian contexts)
- Reflect critically on factors that shape identity formation and influence sense of self of the growing 'student' as well as 'teacher' in school as well as out of school.
- Understand the processes that have shaped/continue to shape one's own sense of identity as 'student' and a 'person' located in multiple social contexts and roles
- Reflect on one's aspirations and possibilities in order to develop a growing sense of agency as a 'teacher', a 'professional', as well as a 'human being'.

Course Contents

Unit I: Socialization and Development of Self

- Understanding the nature and processes of socialization
- At home: family as a social institution; impact of parenting style/child rearing practices; transmission of parental expectations and values.

- In the community: neighbourhood, extended family, religious group and their socialization functions.
- At school: impact of entry to school; school as a social institution; value-formation in the context of schooling.

Unit II: Emergence of 'person' and 'identity' and Schooling for identity formation

- Understanding 'identity formation'; emergence of multiple identities in the formation of a person placed in various social and institutional contexts; the need for inner coherence; managing conflicting 'identities'.
- Determinants of identity formation in individuals and groups: such as caste, class, gender and religion.
- The influence of peer group, media messages, technology, and globalization on identity formation in contemporary Indian society.
- Schooling as a process of identity formation: ascribed, acquired and evolving.
- Potential role of school in developing national, secular and humanistic identities.

Unit III: Coping with social complexities: Role of education

- Expanding human activities and relations; decreasing unhealthy competition, uncertainty and insecurities and the resultant identity conflicts.
- Indian concept of 'vasudhaiva kutumbakam' and 'sarvadharm sambhava'.

Unit IV: Evolving a 'holistic identity' as a teacher

- Reflections on one's own aspirations and efforts in becoming a 'teacher'.
- Evolving an identity as a teacher, which is progressive and open to re-construction.
- Teachers' professional identity and Teachers' professional ethics.

Modes of Learning Engagement:

- Introductory lectures-cum-discussion, to introduce key themes of the course – socialization, identity formation, sociological notions and experiential sense of 'self' etc.
- Observations of schools and classrooms through the lens of course themes; interviews with teachers; making field notes.
- Group discussion and exploration, around selected readings and key questions.
- Viewing selected documentaries and film clippings.
- Writing critical reviews of readings and films viewed.
- Presentations of reviews.

- Reflective, autobiographical writing, towards self-understanding, on given topics.
- Journal writing, on course experiences (to be initiated with this course; to be continued through the year, with occasional sharing with a 'mentor').

Practicum/ Tutorials:

- Visit to a school and studying the role of school in socialization of the child.
- Preparing notes on ways of managing conflicting identities with illustrations.
- Studying the school activities which enhance secular identity in children.
- Observing school processes that contribute to peaceful living of teachers and students.
- Describing ones' own process of socialization quoting some experiences.
- Presentations based on readings and film reviews.
- Reflective written assignments (towards critical awareness of issues, for self-understanding and formulating aspirations as a teacher.
- Journal writing.
- Notes from field observations/interviews and linking these with course themes.

Suggested Readings:

1. Pathak, Avijit (2002). Social Implications of Schooling. New Delhi. Rainbow Publishers.
2. Kumar Krishna (2004). What is Worth Teaching? 3rd edition, Orient Longman.
3. Krishnamurti, J. Education and the Significance of Life. KFI Publications.
4. Butler, J. (1990). Gender Trouble Feminism and the subversion of Identity. New York. Routledge.
5. Sharma, R&E. Annamalai. (2003). Indian Diaspora In Search of Identity. Mysore. CIIL.
6. Kumar,K. (2001). Prejudice and Pride School Histories of the Freedom Struggle. New Delhi. Viking/Penguin.
7. Amalendu Misra (2004). Identity and Religion Foundations of Anti-Islamism in India. New Delhi. Sage Publications.
8. Dipankar Gupta (Ed.) (2004). Caste in question Identity or Hierarchy. New Delhi. Sage Publications.
9. Kamala Ganesh & Usha Thakkar (Ed.) (2005). Culture and Making of Identity in India. New Delhi. Sage Publications.

10. Saraswati, T.S. (Ed.) (1999). Culture, Socialization and Human Development. Theory Research and Applications in India. New Delhi. Sage Publication.
11. Sen Amartya (2006). Identity and Violence. The Illusion of Destiny. New Delhi. Allen and Lane Penguin Books India Pvt. Ltd.
12. Shashi Tharoor (2007). The Elephant, the Tiger &The Cell phone. (Particularly part two of the book). New Delhi. Penguin Viking.
13. Srinivas M.N. (1986). Social Changes in Modern India. Bombay. Allied Publishers.
14. Vidyanathan, T.G. (1989). 'Authority and Identity in India', in 'Another India.' Dae dalus, Fall, 118 (H): 147-69.

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
II: Enhancing Professional Capacities (EPC)
Semester III
EPYH 201: YOGA, HEALTH AND WELL BEING

Time: 3 Hours Max. Marks: 50
Credits- 4 Theory: 40, Internal: 10

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 08 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 08 marks each.

iv) All questions will carry equal marks.

Objectives of the Course: On completion of the course, the student teacher will be able to:

- Understand the importance of games, sports and yoga for development of holistic health.
- Know the status, identify health problems and be informed of remedial measures.
- Know about safety and first aid.
- Acquire the skills for physical fitness.
- Practice yogasanas, meditation and relaxation.
- Understand various policies and programmes related to health, physical education and yoga.

Course Contents

Unit I: Concept of Health, Body, First Aid

- Concept of health, importance, dimensions and determinants of health, health needs of children and adolescents including differently abled children.
- Understanding of the body system – skeleton, muscular, respiratory circulatory and digestive in relation to health.

- Common health problems and diseases- causes, prevention and cure, immunization and first aid.

Unit II: Food - habits, hygiene, diseases and their prevention, Safety, security and physical fitness

- Food and nutrition, food habits, nutrients and their functions.
- Preservation of food value during cooking, indigenous and modern ways of preserving food.
- Practices related to food hygiene, malnutrition, obesity, food and waterborne and deficiency diseases and prevention.
- Safety and security – disasters in and outside schools, ways of prevention.
- Safety from snake and dog bites, animal attacks, prevention and treatment.
- Physical fitness, strength, endurance and flexibility, its components, sports skills and self- defence activities.

Unit III: Athletics and Games

- Athletics – general physical fitness exercises.
- Games – lead up games, relays and major games.
- Rhythmic activities, gymnastics and their impact on health.

Unit IV: Yoga, Policies and Programmes for Health

- Yogic practices – importance of yoga, yogasanas and pranayamas
- Role of institutions in developing healthy individuals- family, school and sports
- Health services, policies and health and physical education related programmes, blood banks and role of media

Modes of Learning Engagement:

- Interactive discussions, group work, sharing experiences, organizing activities, analyzing topics on health related issues.
- Demonstrations, observations, field visits, preparing work books, maintaining diary, participating in school health checkup, practical classes of first aid, projects and assignments.
- Playing games and sports and performing Asanas and Pranayamas

Practicum/ Tutorials:

- Rules regulations related to games, sports and yoga.
- Playing Volleyball, Basketball, Badminton and recreation games.
- Performing Suryanamaskara and selected yogasanas, mudras and pranayamas.
- Standing Asanas- Konasana, Trikonasana, Vrikshasana, Veerebhadrasana
- Sitting Asanas – Vajrasana, Gumukhasana, Navasana, Veerasana
- Lying on the stomach – Bhujangasana, Dhanurasana

- Body twisting asanas – Ardha Matsyendrasana, Vakrasana
- Back bending – Ushtrasana
- Mudras – Arham, Ananda Mudra
- Pranayama – Anuloma viloma, Bhramari

Suggested Readings:

1. Pande, P. K. (1988). Sports Medicine. Delhi. Khel Sahitya Kendra.
2. Larry G. Shaver. (1982). Essentials of Exercise Physiology. Delhi. Surjeet Publications.
3. Kanabur, Vyjayanthi V. (2007). Sports Nutrition the Scientific Facts. New Delhi. Kanishka Publishers.
4. Dheer. S. Kamal Radhika (2002). Organization and Administration of Physical Education. Friends Publications.
5. Chandler Timothy, Mohin Mike, Vamphew Wary (2007). Sports and Physical Education. London. Routledge Taylor Francis Group.
6. Verma, Veena (1999) Sports Psychology. Delhi. Sports Publication.
7. Prakash, Agam (1999) A Textbook of Health Education. Delhi. Sports Publication.
8. Uppla AK. (1996). Physical Fitness. New Delhi. Friends Publication.
9. Thani Lokesh (2003) Rules of Games and Sports. New Delhi. Sports Publication.
10. Sonkar Sathish. (1998). Methods, Measurement and Evaluation in Physical Education. Jaipur, Book Enclave.
11. NCERT, Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
12. Seetharam AR (1996) Yoga for Healthy Living. Mysore. Paramahamsa Yogashrama.
13. Ganguly, S.K., Bera, T.K., Gharote, M.L.(2003) Yoga in relation to Health related physical fitness and academic achievement of school boys. In Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
14. Gharote, M.L. (1976). Physical Fitness in relation to the practice of selected yogic exercises. In Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
15. Kulkarni,D.D. (1997).Yoga and Neurophychology. In Position Paper, FGR (2006). Health and Physical Education. New Delhi. NCERT.
16. षर्मा, ओ. पी., (2004). 'खेल के मैदानों की माप एवं निर्माण की विधि नई दिल्ली. खेल साहित्य केन्द्र।
17. पसरीजा मीनू, सपरा चारु, (2004). 'खेल चिकित्सा ज्ञान कोष नई दिल्ली. स्पोटर्स पब्लिकेषन्स।
18. खान, एराज अहमद, वर्मा, उमाषंकर (1988). 'फुटबाल' पटना. भारती भवन पब्लिषर्स एंड डिस्ट्रीब्यूटस।

GROUP E: PROFESSIONAL EDUCATION COURSES (PEC)
IV: Engagement with the field (EF)
Semester III
EFWC 201: WORKING WITH COMMUNITY

Time: 2 weeks Max. Marks: 50
Credits- 2 External Assessment: 10

Objectives of the Course: On completion of the course, the student teacher will be able to:

- Acquaint themselves with the factors working in the society/community i.e. knowledge of social realities.
- Develop the dignity of labour among them.
- Arouse their interest in the social and economic reconstruction oj the country.
- Make themselves aware of the educational problems and needs of thi society.
- Enable themselves for preparing youth for sustainable development.
- Develop their personality through community service.

Methodology: The students will spend 2 weeks at a stretch during the academic year in the identified village. Separate activities will be undertaken every year out of the following or given by the Institute.

Suggested Activities:

1. Shramdaan and beautification
2. Study of educational scenario of a community. Reporting the profile of each Institution/NGO/social organization, which is directly or indirectly concerned with educational /literacy programme.
3. Micro planning exercises for assessing the educational status of the community.
4. Organization of “Nukad Natak” “Cultural Programmes”, “Rallies” etc. for motivating the villagers for sending their wards to schools.
5. School mapping exercises for assessing the educational need of the community.
6. Study of enrolment, stagnation and dropout problems.
7. Exploring the community resources and finding means and ways of using them for betterment of school.
8. Adopting a community and implementation of the Lab Area Concept in adopted community.

9. Survey of nearby community (adopted community) and assessing its educational needs, social needs etc.
10. Conducting awareness programmes in the community- like Environment conservation, tree plantation, watershed management, health programmes like vaccination, polio drop etc. AIDS awareness, electoral awareness, load safety, human rights, women rights etc.
11. Organization of Literacy programmes in the community
12. Cleanliness drives in the community and awareness about their needs.
13. Character building programmes
14. Developing healthy food habits among the community
15. Conducting Vocational training programmes for self- employment.
16. Promoting peace oriented values in the community.
17. Remedial teaching work for poor and needy in the community.
18. Action Research regarding local problems in consultation with the community.
19. Promoting peace oriented values in the community.
20. Conducting Adult Education programmes
21. Assistance and working with local community in actual relief work whenever needed.
22. Training of community in First Aid.
23. Helping the children with special needs.
24. Conducting Vocational training programmes for self- employment.

Modes of Learner Engagement:

Proposed activities of the programme will be organized keeping in view the budgetary provision and the time of duration along with the required available facilities at the time of organization of the programme.

Modes of Internal Assessment:

Internal assessment of Punctuality, Regularity, Discipline, Cooperation and Performing Arts will be done through observation of the students and viva-voce will be conducted on their experiences and written report prepared by the student teachers.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCPH-I-201: PHYSICS: RENEWABLE ENERGY SOURCES

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Describe about the exploration of renewable energy systems and their effective tapping technologies.
- Discuss the source of energy in various renewable energy systems.
- Estimate the amount of energy in different types of renewable energy systems.
- Explain the feasibility of different types of energy sources.
- Apply the concepts learnt in new types of renewable energy.

Course Contents

Unit I: Solar Energy

Sun as Source of Energy, Availability of Solar Energy, Nature of Solar Energy, Solar Energy & Environment. Various Methods of using solar energy–Photothermal, Photovoltaic, Photosynthesis, Present &Future Scope of Solar energy. Hybrid wind energy systems-wind & diesel power, wind+ conventional grid, wind & Photovoltaic system etc.

Unit II: Wind Energy

Wind Energy: Basics &Power Analysis, Wind resource assessment, Power Conversion Technologies and applications, Wind Power estimation techniques, Principles of Aerodynamics of windturbine blade ,various aspects

of wind turbine design, Wind Turbine Generators: Induction, Synchronous machine, constant V&F and variable V&F generations, Reactive power compensation. Site Selection, Concept of wind form & project cycle, Cost economics & viability of wind farm.

Unit III: Geothermal, Tide and Wave Energy

Availability of Geothermal Energy – size and Distribution, Recovery of Geothermal Energy, Various Types of Systems to use Geothermal Energy, Direct heat applications, Power Generation using Geothermal Heat, Sustainability of Geothermal Source, Status of Geothermal Technology ,Economics of Geothermal Energy.

Unit IV: Hydrogen Energy and Nuclear Energy

HydrogenProduction: Direct electrolysis of water, thermal decomposition of water, biological and biochemical methods of hydrogen production.

Hydrogen Energy: Hydrogen as a renewable energy source, Sources of Hydrogen, Fuel for Vehicles.

Nuclear Energy: Potential of Nuclear Energy, International Nuclear Energy Policies and Regulations. Nuclear Energy Technologies–Fuel enrichment, Different Types of NuclearReactors, Nuclear Waste Disposal and Nuclear Fusion.

Suggested Readings:

1. L L Freris, Wind energy Conversion Systems (PrenticeHall, 1990).
2. D A Spera, Wind Turbine Technology: Fundamental concepts of wind turbine technology(ASMEPress,NY,1994).
3. G L Johnson, Wind Energy Systems(PrenticeHall,1985).
4. J F Manwell, J GMcGowanandA LRogers, Wind Energy Explained(John Wiley & SonsLtd., 2010)
5. N K Bansal, et al., Renewable Sources of Energy and Conversion Systems (Tata McGraw-Hill, 1990)
6. Kreith and Kreider, Solar Energy Handbook (McGraw Hill, 1982)
7. M A Green, SolarCells,(Prentice Hall, 1981)
8. T Ohta, Solar Hydrogen Energy Systems (Pergamon Press, 1979)
9. D Methis, Hydrogen Technology for Energy(Knowledge Pubns, 2007)

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCPH-II-201: PHYSICS: NANO SCIENCE

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Get brief ideas regarding Nano Science.
- Know about synthesis and characterization of nano materials.
- Understand various applications of nano science.
- Establish multi-disciplinary links.

Unit I: Overview

Size effects and crystals, nanoscopic scale and quantum confinement, one dimensional, two dimensional and three dimensional nanostructured materials, quantum Dots, types of nanostructure and properties of nanomaterials: shell structures, metal oxides, semiconductors, composites, mechanical, physical, chemical properties, carbon age, new form of carbon (CNT to Graphene), influence of nano over micro/macro,effects of nano scale dimensions on various properties –structural, thermal, chemical, magnetic, optical and electronic properties, effect of nano scale dimensions on mechanical properties - vibration, bending, fracture, emergence and challenges of nanoscienceand nanotechnology.

UnitII: Synthesis of Nano materials

Top-down and bottom-up approaches, Mechanical alloying and Ball milling, Plasma synthesis, Sol-Gel Synthesis, Inert gas Condensation, Electro deposition and other techniques,chemical vapour deposition, physical vapour deposition, Laser ablation, pulsed laser deposition.

Unit III: Characterization tools

X-ray powder diffraction, Single crystal diffraction techniques, Thermogravimetry, Differential Thermal Analysis and Differential Scanning Calorimetry, Electron Energy Loss Spectroscopy, High Resolution Imaging Techniques- Scanning Electron Microscopy, Atomic Force Microscopy and Transmission Electron Microscopy,Optical characterization techniques- Raman spectroscopy and Ultra Violet-Visible (UV-Vis) spectroscopy

Unit IV: Applications

Functional materials, Biomedical applications, Molecular Electronics and Nanoelectronics, Nano coating, Nanomaterials for renewable energy, Nanobots, Molecular electronics and Nanoelectronics, Environment related application, Membrane based application, Polymer based application.

Suggested Readings:

1. W R Fahrner,Nanotechnology and Nanoelectronics, (Springer (India) Private Ltd., 2011).
2. MMadou, Fundamentals of Microfabrication, (CRC Press, New York, 1997).
3. N Taniguchi, Nano Technology, (Oxford University Press, New York, 2004).
4. W Ahmed and MJ Jackson, Emerging Nanotechnologies for Manufacturing, (Elsevier Inc.,2014).
5. C P Poole, F J Owens, Introduction to Nanotechnology, (John Wiley and Sons, 2004).
6. CN R Rao and A K Sood, Graphene synthesis, properties and Phenomena (Wiley VCH, 2010).
7. A Krueger, Carbon Materials and Nanotechnology (Wiley-VCH, 2010).

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCCH-I-201: CHEMISTRY: GREEN CHEMISTRY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Get brief ideas regarding Green Chemistry.
- Know about green synthesis.
- Understand various applications of green materials.
- Understand Future trends in Green Chemistry.

Unit I:

Green Chemistry: History, need, and goals. Green chemistry and Sustainability.Dimensions of sustainability, Limitations/Obstacles in pursuit of the goals of Green Chemistry.Opportunities for the next generation of materials designers to create a safer future.

Unit II:

Examples of green synthesis/reaction:

Green starting materials, Green reagents, Green solvents and reaction conditions, Green catalysis, Green synthesis- Real world cases, Traditional processes and green ones), Synthesis of Ibuprofen, Adipic acid etc and selected examples from US Presidential, Green Chemistry Challenge Award Winners.Basic principles of Green Chemistry and their illustrations with examples.Prevention of waste/by-products.Maximum incorporation of the materials used in the process into the final product (Atom Economy): Green metrics, Prevention/Minimization of hazardous/toxic products.Designing

safer chemicals - different basic approaches, Selection of appropriate auxiliary substances (solvents, separation agents etc.), Energy requirements for reactions—use of microwave, ultrasonic energy, Selection of starting materials—use of renewable starting materials. Avoidance of unnecessary derivatization—careful use of blocking/protection groups.Use of catalytic reagents (wherever possible) in preference to stoichiometric reagents. Designing biodegradable products.Prevention of chemical accidents. Strengthening/development of analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes.Development of accurate and reliable sensors and monitors for real time in process monitoring.

Unit III:

Examples of green synthesis/reaction: Green starting materials, Green reagents, Green solvents and reaction conditions, Green catalysis, Green synthesis- Real world cases, (Traditional processes and green ones) Synthesis of Ibuprofen, Adipic acid etc. and selected examples from US Presidential Green Chemistry Challenge Award Winners.

Unit IV:

Future trends in Green Chemistry: Oxidation-reduction reagents and catalysts; Biomimetic, multifunctional reagents; Combinatorial green chemistry; Proliferation of solvent less reactions; Non-covalent derivatization. Biomass conversion, emission control. Bio catalysis.

Text Books and Reference Books:

1. Green Chemistry: Theory and Practice. P.T. Anastas and J.C. Warner.Oxford University Press.
2. Green Chemistry: Introductory Text. M. Lancaster Royal Society of Chemistry (London).
3. Introduction to Green Chemistry. M.A. Ryan and M.Tinnesand, American Chemical Society (Washington).
4. Real world cases in Green Chemistry, M.C. Cann and M.E. Connelly. American Chemical Society (Washington).
5. Real world cases in Green Chemistry (Vol. 2) M.C. Cann and T.P.Umile. American Chemical Society (Washington)

PRACTICUM/ PROJECT WORK:

Candidate will be given a topic of project at the beginning of Semester III. The candidate is expected to collect pertinent literature and make a presentation based on the literature and the proposed plan of work at the end of Semester III.

Assignments will also be given based on different aspects of green chemistry. A committee of faculty members of chemistry section will evaluate the projects and assignment.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCZO-I-201: ZOOLOGY: BIODIVERSITY

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Get brief ideas regarding Biodiversity.
- Understand the faunal Biodiversity.
- Understand the Duties of the central and the State Government, Biodiversity management committees in conservation.

Course Contents

Unit I: Biodiversity General Account

1. Introduction to Biodiversity (Elements and concept of biodiversity).
2. Types of Biodiversity
3. Climatic Zones or zoogeographic zones of India
4. Indian Biodiversity, Vegetational Zones, Zones of Faunal distribution
5. Major Biodiversity areas of the world and India
6. Biodiversity Hot Spots
7. National Parks and Sanctuaries of Rajasthan and their biodiversity

Unit II: Faunal Biodiversity

1. Mammalian morphology, Adaptations in various groups of mammals.
2. Behavior and social organization in mammals; social and mating systems; territories; communication.
3. Bird's morphology, Adaptations in various groups of birds, morphological and physiological adaptations.

4. Bird migration, breeding behavior, parental care.
5. Biology of major Indian amphibians, fresh water and marine turtles, crocodilians, lizards and snakes.
6. Identification and study of venomous snakes, action of their venom and first aid for snake bites.

Unit III: Conservation Biology

1. Introduction to conservation biology, values of biodiversity and conservation ethics.
2. Patterns and process of biodiversity, losses and threats to biodiversity.
3. Significance of ecological restoration in conservation.
4. Duties of the central and the State Government, Biodiversity management committees.
5. Red Data Book and its significance. Role of NGOs in conservation, International NGOs; UNEP, GEF, WCS, Bird Life International, Important NGOs in India& their contributions WWF, ATREE, BNHS, WTI, Kalpavriksha etc.
6. Important NGO movements, Chipko movement, Narmada BachavoAandholan, PaniPanchayats, Seed Movement etc.
7. Wildlife Protection Act, Biodiversity Act, Forest Act and other Rules and Acts for Biodiversity protection and conservation.

Unit IV: Tools and Techniques

1. Counting Methods or Population assessment (Total Count, Road Side Count, Waterhole Count, Nest Count, Camera trap Methods, Pugmark Census, Call Census, Radio tagging, Line transect, Quadrate Method, Mark-Recapture)
2. Sampling techniques and strategies (random, stratified and systematic).
3. Concept of species richness, evenness and diversity and their measures, Diversity indices.
4. Basic introduction of GPS and GIS

Suggested Readings:

1. Caughley, G., and Sinclair, A.R.E. (1994). Wildlife Ecology and Management. Blackwell Science.
2. Woodroffe R., Thirgood, S. and Rabinowitz, A. (2005). People and Wildlife, Conflict or Coexistence? Cambridge University.
3. Bookhout, T.A. (1996). Research and Management Techniques for Wildlife and Habitats, 5th edition. The Wildlife Society, Allen Press.
4. Sutherland, W.J. (2000). The Conservation Handbook: Research, Management and Policy. Blackwell Sciences

5. Hunter M.L., Gibbs, J.B. and Sterling, E.J. (2008). Problem-Solving in Conservation Biology and Wildlife Management: Exercises for Class, Field, and Laboratory. Blackwell Publishing.

Practicals:

- Identification of mammalian fauna, avian fauna, herpeto-fauna
- Identification of Venomous and Non venomous snakes
- Demonstration of basic equipment needed in biodiversity studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses)
- Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers etc.
- Demonstration of different field techniques for flora and fauna
- Visits to nearby Zoo, Museum, Forest, sea-shore, Nursery, Aquaria or any other relevant site must be arranged. The report of these visits will be submitted as part of the Practical work.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCBO-I-201: BOTANY: BIODIVERSITY

Time: 3 Hours Max. Marks: 80
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The student teacher will be able to:

- Understand the plant biodiversity and its significance in human lives
- Understand the threats to plant biodiversity
- Understand about biodiversity conservation.

Course Contents

Unit I: Biodiversity

Plant diversity and its scope- Genetic diversity, Species diversity, Plant diversity at the ecosystem level, Agrobiodiversity and cultivated plant taxa, wild taxa. Values and uses of Biodiversity: Ethical and aesthetic values, Uses of plants.

Unit II: Biodiversity Management

Loss of ecosystem diversity, Loss of agrobiodiversity, Projected scenario for biodiversity loss.

Management of Plant Biodiversity**:** Organizations associated with biodiversity management- Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR;

Biodiversity legislation and conservations, Biodiversity information management and communication.

Unit III: Biodiversity Conservation

Conservation of Biodiversity- ecosystem diversity, *In situ* and *ex situ* conservation, Social approaches to conservation, Biodiversity awareness programmes, Sustainable development.

Unit IV: Importance of Forestry

Role of plants in relation to Human Welfare; Importance of forestry in relation to medicine, timber, gums and resins.

Suggested Readings:

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and
   Practices.Oxford and IBH Publications Co. Pvt. Ltd. New Delhi
2. Sharma P.D., 2010 Ecology and Environment. Rastogi Publications, Meerut

Practicals:

- Visit to nearby botanical gardens, biological park. The report of this needs to be submitted.
- Study of aquatic biodiversity by visit to some pond or lake.
- Study of aquatic biodiversity by making temporary micropreparations of the phytoplanktons, algae etc.
- Herbarium sheets preparation.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCMT-I-201: MATHEMATICS: DISCRETE MATHEMATICS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

Objectives: At the end of the course students will be able to:

(i) Understand the concepts of Set Relation and function
(ii) Understand the concept of Graphs and planar graphs apply these in problem solving.
(iii) Explain the concept of Boolean algebra and lattices.

Course Contents

Unit I:

Set Relation and function, binary relations, equivalence relations and partitions, partial order relation and lattices chains and anti chains, pigeon hole principle, principle of inclusion and exclusion.

Unit II:

Computability and formal languages ordered sets languages, phase structure grammars types of grammars and languages permutations, combinations' and discrete probability

Unit III:

Graphs and planar graphs; basic terminology, multigraphs, weighted graphs paths and circuits travelling sales person problem, plannar graphs, trees.

Unit IV:

Boolean algebra: lattices, algebraic structures, duality, distributive and complemented lattices, boolean lattices, and boolean algebras, boolean functions as expressions.

Suggested Readings:

1. Elements of Discrete mathematics: C.L. Liu, McGraw Hill, International editions, 2008.
2. Graph Theory: NarsinghDeo, Prentice Hall of India, 2004.
3. Discrete Mathematics: N.L. Biggs, Oxford Science Publication, 1985.
4. Discrete Mathematics and its Applications: Kenneth H. Rosen, McGraw Hill, 1999.
5. Discrete Mathematics with Applications: T. Koshy, Academic Press, 2005.

GROUP G: CHOICE BASED COURSES (CBC)

Semester III

CBCED-I-201: EDUCATION: GUIDANCE & COUNSELLING IN SCHOOL

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of the course, student-teachers will be able to:

- Develop an understanding of the concepts of guidance and counselling.
- Develop an understanding of educational, vocational and personal guidance.
- Acquaint the students with the testing devices and techniques of guidance.
- Develop an understanding of collection and dissemination of occupational guidance.
- Sensitize student-teachers to the problems faced by students in the contemporary world.
- Create an awareness of the working of guidance centers.
- Provide guidance &counseling for school level students.

Course Contents

Unit I: Concept of Guidance and Counseling

- Meaning, Nature & Functions of Guidance.
- Principles of Guidance.
- Need of Guidance at various stages of life.
- Types of Guidance:
  (i) Educational Guidance – Meaning and need at Secondary level.
  (ii) Vocational Guidance – Meaning and need at Secondary level.

(iii) Personal Guidance – Meaning and need at Secondary level.

Unit II: Concept of Guidance and Counseling

- Meaning, Nature and Functions of Counseling
- Theories of Counseling:
    - Theory of Self (Rogers)
    - Rational Emotive Behavioural Therapy (Albert Ellis).
- Types of Counseling: Directive, Non directive, Eclectic.
- Process of Counseling (Initial disclosure, in depth exploration and commitment to action).

Unit III: Testing and Non- testing devices for the study of an Individual

- Tests: Aptitude, Attitude, Interest, Achievement, personality, IQ and Emotional, Mental ability, Intelligence etc.
- Techniques used in guidance: Questionnaire, Interview schedule, Case study, Diary and Autobiography.
- Professional efficacy and interest.

Unit IV: Contemporary issues and Skills in Guidance & Counselling

- Dealing with depression and academic stress (with regard to their identification and intervention). Guidance Implication in (Current Indian scenario, Education and Guidance: Democracy and Guidance, Individual Differences and Guidance, planning of Guidance cell in school.
- Skills in Counseling (Listening, Questioning, Responding, Communicating.
- Role of Teacher as a counselor and professional ethics associated with it.
- Career Counseling and Dissemination of Occupational Information.

Practicum/ Tutorials:

- Organize a workshop in school on guidance for secondary level students.
- Group discussion among pupil teachers on types of guidance.
- Pupil Teacher should guide at least one school student in any area of guidance and prepare a report to this effect.
- Organize an orientation program for student teacher on skills in counseling (listening, questioning, communicating etc.)
- Organize a Counseling program for the student who is guided by teacher student in the area/type of Guidance.Student teacher would practice on Counseling skill (at least three Time duration with 5-7 Minute per skill)
- Apply “Professional Interest test” on secondary student on the basis of interprelation, and give professional guidance to the students.
- Prepare a case study of one student with special needs at school level and give suggestions for remedial measure, too.
- Make a flow chart on Job Analyze opportunities and present it in school

among secondary students.

- Organize a programme on occupational detail Information (like area, agencies and future etc.) for school level
- Prepare a plan and establish a guidance and Counseling cell in school.
- Make a stress releasing strategy for school students and find out its effectiveness.

Suggested Readings:

1. Sharma, Shati Prabha. Career Guidance and Counselling: principles and techniques. Kanihka publisher. 2005
2. Sharma, RN & Sharma, Rachana. Guidance and Counselling in India. Atlantic Pub. & Distributors, New Delhi, 2004
3. Singh, Y.K. Guidance and Career Counselling. APH Publishing New Delhi. 2007 4. Nayak, AK. Guidance & Career Counselling. APH Publishing corp. 2007
4. Abraham, Jessy. Guidance & Counselling for Teacher Education. Sarup & sons. New Delhi. 2003
5. अस्थाना, विपिन, परामर्श एवं निर्देशन. अग्रवाल प्रकाशन, 2014
6. अस्थाना, विपिन एवं अस्थाना निधि निर्देशन और उपबोधन, अग्रवाल प्रकाशन, 2013–14
7. भटनागर, सुरेश एवं वर्मा, रामपाल. वृतिक सूचना एवं वृतिक निर्देशन, अग्रवाल प्रकाशन 2012
8. जयसवाल, सीताराम शिक्षा में निर्देशन एवं परामर्श अग्रवाल प्रकाशन 2014
9. उपाध्याय, राम वल्लभ एवं जयसवाल,सीताराम शिक्षा में निर्देशन एवं परामर्श की भूमिका अग्रवाल प्रकाशन 2014

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCED-II-201: EDUCATION: PEACE ORIENTED VALUE EDUCATION

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: After completion of the course, student-teachers will be able to:

- Understand the importance of peace education.
- Analyse the factors responsible for disturbing peace.
- Appreciate the role of peace in life.
- Develop insight of understanding of concept of Indian values according to time, space and situation.
- Scientifically analyse values in Indian culture and tradition.
- Develop positive attitude about Indian human values
- Understand the Indian values according to Shradhha and logic.
- Understand the co-ordination with Indian values and life style.
- Analyse the ethical, artistic and pleasant values.
- Analyse absolute values in globalization and universlization.
- Develop the teaching learning method for adoptation and assimilation in life value.
- Explain fundamental aims and values that provide the intellectual basis of contemporary education policy and practice.
- Engage with issues in a manner that make them sensitive to promote certain educational values while marginalizing others.
- Explore the meaning of Ethics and values.
- Understand the process of value education.

Course Contents

Unit I: Understanding Education for Peace

- Meaning, aims, objectives of Peace and Peace Education.

- Need and Importance of Peace Education.
- Barriers: Psychological, Cultural, Political.
- Peace promoting values: compassion, cooperation and love.
- Empowerment of self through critical self- reflection.
- Reducing prejudices and nurturing ethical behaviour.

Unit II: Nature andsources of values, Classification of values

- Meaning, concept need and importance of values and ethics.
- Personal and Social values
- Intrinsic and extrinsic values on the basis of personal interest and social good.
- Social, moral, spiritual and democratic values on the basis of expectation of society and one's self inspiration.
- Identification of Analysis of emerging issues involving value conflicts
- Design and development of instructional material for nurturing values.

Unit III: Values in religious scriptures

- Bhagwadgita- Nishkam Karma, Swadharma, Laksagrah and Stithpragya.
- Bible – Concept of truth, compassion, forgiveness
- Dhamnipada- Astangmarg, Aryastya and Madhyamarg
- Gurugranth Sahib- Concept of Kirath, Sungat, Pangat & Jivanmukti
- Quran – Concept of spiritual and moral values (adah, raham & theory of justice) & social responsibilities.

Unit IV: Methods and Evaluation of Value Education

- Traditional Methods: Story Telling, Ramleela, Tamasha, street play and folk songs.
- Practical Methods: Survey, role play, value clarification, Intellectual discussions.
- Causes of value crisis: material, social, economic, religious evils and their peaceful solution.
- Role of school- Every teacher as teacher of values, School curriculum as value laden.
- Moral Dilemma (Dharmsankat) and one's duty towards self and society

Practicum/Tutorials:

- Preparation of a report on school programmes for promotion of peace.
- Observation of classroom situation and identification of factors promoting peace.
- Analyse morning assembly programme of a school from the point of view of value education.
- Analysis of a text book of a school subject from the point of view of values hidden.
- Practice of role- play in two situations and preparation of report.

- Report on value conflict resolution in a situation.

Suggested Readings:

1. अवस्थी शशि – प्राचीन भारतीय समाज, हिन्दी माध्यम कार्यान्वयन निदेशालय, दिल्ली विश्वविधालय, दिल्ली 1993
2. उर्वशी, सरती – नैतिक शिक्षा एवं बालविकास, प्रभात प्रकाशन, चावडी बाजार, दिल्ली , 1979
3. काणे पी.बी. – धर्मशास्त्री का इतिहास, उ.प्र. हिन्दी संस्थान, हिन्दी भवन, महात्मा गाधी मार्ग, लखनऊ।
4. गुप्ता नत्थूलाल – मूल्यपरक शिक्षा पद्धति, जयकृष्ण अग्रवाल, महात्मा गाधी मार्ग, अजमेर 1989
5. गोयनका जयदयाल – महत्वपूर्ण शिक्षा, गीताप्रेस गारे खपुर।
6. पाण्डेय गोविन्दचन्द – मूल्य मीमांसा – राजस्थान हिन्दी ग्रन्थ अकादमी, तिलक नगर, जयपुर, 1973।
7. प्र सहस्र बुद्धे : जीवन मूल्य, सुरूचि साहित्य, केशवकुंज, झण्डे वालान, नई दिल्ली,
8. भारती धर्मवीर – मानव मूल्य और और साहित्य, भारतीय ज्ञानपीठ, काशी, 1972
9. मानव सेवा संघ, वृंदावन – मानवता के मूल सिद्धान्त 1981
10. मिश्र विधानिवास – अध्यापन, भारतीय दृष्टि, एनसीटीई, नई दिल्ली 1988
11. विमल कुमार – मूल्य मीमांसा, राजकमल प्रकाशन, दिल्ली
12. Acharya Mahaprija : Towards Inner Harmony, New Delhi, B. Jain Publishers, 1999
13. Dutt, N.K. and Ruhela S.P. : Human Values and Education, Sterling Publishers Pvt. Ltd., New Delhi, 198
14. Gandhi K.L. : Value Education, Gyan Publishing House, New Delhi, 1993
15. Gupta, Nathu Lal : Value Education : Theory and Practice : Jaikrishan Agarwal,Mahatma Gandhi Road, Ajmer – 2000
16. I.A. Lolla : Value Certification : An advanced Handbook for trainers and Teachers, Calif, University Associate Press, Krischan Boum, Howard 1977
17. Prem Kripal : Value in Education, NCERT, New Delhi 1981
18. Rajput, J.S. (2001). Values in Education, New Delhi, Sterling Publishers, 2005
19. Rokeach M. : The Nature of Human Values, The Free Press , New York 1973
20. Sharma R.S. : The Monk who sold his Ferrari, Mumbai, Jaico Publishing House, 2003
21. Swami Ragunath Anand: Eternal Values for a Changing Society, BVB Bombay 1971.
22. Gupta, K. M. (1989). Moral Development of School Children Gurgaon: Academic Press.
23. Krishnamurthy, J. (2000). Education and the Significance of Life. Pune: KFI.
24. Dhokalia, R. P. (2001). External Human Values and World Religious. New Delhi: NCERT.

25. Sheshadri, C., Khadere, M. A., & Adhya, G. L. (ed.) (1992). Education in Value. New Delhi: NCERT, London, Allen and Unwin.
26. Singh, R. N. (ed.) (2003). Analytical study of Sikh Philosophy, Commonwealth Publishers: New Delhi- 02.
27. Khan Masood Alia (ed.) (2006). Islamic Thought and its Philosophy. Commonwealth Publishers: New Delhi- 02.
28. Khan, Intakhab Alam (2007). Peace, Philosophy and Islam, Academic Excellence. Delhi- 31.

GROUP G: CHOICE BASED COURSES (CBC)

Semester III

CBCLH-201: LANGUAGE: jpukRed y[ku ,o vuokn

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

bdkbZ 1%

रचनात्मक लेखन परिभाषा, परिचय, उपयोगिता रचनात्मक लेखन के विविध रूप – कविता, कहानी उपन्यास, नाटक, एकांकी

bdkbZ 2%

❖ अनुवाद एवं रचनात्मक लेखन

- अनुवाद का अर्थ, स्वरूप और महत्व
- अनुवाद : इतिहास और परंपरा
- अनुवाद के तत्व – स्रोत भाषा, लक्ष्य भाषा, संप्रेषण कोशगत अर्थ, अनुवाद सामग्री भावार्थ
- अनुवाद के स्वरूप – शाब्दिक अनुवाद, भावानुवाद छायानुवाद, सारानुवाद।

bdkbZ 3%

❖ अनुवाद प्रक्रिया : आयाम एवं प्रमुख पक्ष

❖ अनुवाद प्रक्रिया के विभिन्न चरण प्रमुख पक्ष

रचना का चयन	(अ) रचनाकार
पठन	(ब) अनुवादकर्ता
विश्लेषण	(स) पाठक
भाषिक अंतरण	
पुनरीक्षण	

संशोधित भाषातंरण

bdkbi 4%

❖ अनुवाद एवं रचनात्मक लेखन : सम्यक मूल्यांकन
- अनुवाद कार्य की आवश्यकता एवं महत्व
- बौद्धिक – सांस्कृतिक आदान–प्रदान में अनुवाद कार्य की भूमिका

lanHkxaFk%

1 अनुवाद विज्ञान –सिद्धांत और अनुप्रयोग हिन्दी माध्यम कार्यान्वयन निदेशालय
2 भारतीय भाषाएँ एवं हिन्दी अनुवाद : समस्या समाधान डॉ. कैलाशचंद भाटिया (गूगल पुस्तक)
3 रचनात्मक लेखन – संपादक प्रो रमेश गौतम भारतीय ज्ञानपीठ दिल्ली
4 अनुवाद : अवधारणा एवं अनुप्रयोग सं. डॉ. चन्द्रभान रावत नेशनल पब्लिशिंग हाउस, दिल्ली

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCLE-201: LANGUAGE: LANGUAGE LITERATURE & EDUCATION

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

- Acquaint themselves with literary creations in other Indian language.
- Appreciate literary pieces from other languages of India.
- Understand the literary and cultural ethos of the country.

Unit I: Language, Society & Culture

- Language and Society
- Language and Culture
- Language and Identity
- Language and Gender

Unit II: Literature, Society & Culture

- Concept and Scope of Literature
- Literature and Society
- Importance of Literature for Society
- Impact of Literature on Society and Vice Versa

Unit III: Language and Education

- Language for Education
- Role of Language in Education
- Relationship between Language and Education
- Impact of Language on Education

Unit IV: Literature and Education

- Literature for Education
- Role of Literature in Education
- Relationship between Literature and Education

- Impact of Literature on Education

Suggested Readings:

1. Hall, G. *Literature in Language Education*. London: Palgrave Macmillan. 2005.
2. Aldama, Frederick Luis. *Why the Humanities Matter: A Commonsense Approach.* Austin: University of Texas Press. 2008.
3. Yadav, Saryug. *Language, Literature and Education*. New Delhi: Academic Excellence. 2008.
4. Mishra, A. K. *Literature, Culture and Language Education*. New Delhi: Lakshi Publishers. 2012.

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCGE-201: GEOGRAPHY: BASICS OF GEOGRAPHICAL INFORMATION SYSTEM- GIS

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

Objectives: The students will be able to:

- To introduce elementary concepts of GIS
- To explain main characteristics of geographical data
- To understand the application of GIS in solving problems of spatial nature.

Unit I:

Definition and components of GIS – hardware, software, data, people or 'liveware'; Structure of GIS

Unit II:

Geographical data: types and characteristics; Spherical and plane coordinate systems in GIS;
Implications of earth's shape and datum in geo-referencing,

Unit III:

Digital representation of geographic data: Data structure, Spatial data model, Raster and Vector models;
GIS data standards: concepts and components; Digital Elevation Model (DEM).

Unit IV:

Recent trends in GIS; Mobile GIS; Global Position System; Integration of Remote sensing and GIS; GIS data base management systems; GIS information products; Applications of GIS.

Suggested Readings:

1. Burrough, P.A. and McDonnell, R. (1998): Principles of Geographic Information Systems. Oxford University Press, Oxford.
2. Chang, K.T. (2003): Introduction to Geographic Information Systems. Tata McGraw Hill Publications Company, New Delhi.
3. Chauniyal, D. D. (2004): Remote Sensing and Geographic Information Systems, Sharda Pustak Bhawan, Allahabad. (in Hindi).
4. Demers, M. N. (2000): Fundamentals of Geographic Information Systems. John Wiley and Sons, Singapore.
5. ESRI (1993): Understanding GIS. Redlands, USA
6. Fraser Taylor, D.R. (1991): Geographic Information Systems. Pergamon Press, Oxford.
7. George, J. (2003): Fundamentals of Remote Sensing. Universities Press Private Ltd, Hyderabad.
8. Glen, E. M. and Harold, C. S. (1993): GIS Data Conversion Handbook. Fort Collins, Colorado, GIS Word Inc.
9. Guptill, S.C., and Morrison, J.L. (1995): Elements of Spatial Data Quality. Elsevier/ Pergamon, Oxford.
10. Heywood, I. (2003): An Introduction to Geographical Information Systems. 2nd edition, Pearson Publishing Company, Singapore.
11. Korte, G. M. (2002): The GIS Book. On Word Press: Thomson Learning, New York and Singapore.
12. Lo, C.P. and Yeung, A. K. W. (2002): Concepts and Techniques of Geographic Information Systems. Prentice Hall of India, New Delhi.
13. Longley, P., Goodchild, M.F., Maguire, D. and Rhind, D. (1999): Geographic Information Systems.
14. Principles, Techniques, Management, Applications. John Wiley and Sons, New York.
15. Martin, D. (1996): Geographic Information Systems: Socioeconomic Implications. Routledge, London.
16. Michael F. G. and Karan K. K. (ed.) (1990): Introduction to GIS. NCGIA, Santa Barbara, California.
17. Demers, M. N. (2000): Fundamentals of Geographic Information Systems. John Wiley and Sons, Singapore.
18. ESRI (1993): Understanding GIS. Redlands, USA
19. Fraser Taylor, D.R. (1991): Geographic Information Systems. Pergamon Press, Oxford.
20. George, J. (2003): Fundamentals of Remote Sensing. Universities Press Private Ltd, Hyderabad.

21. Glen, E. M. and Harold, C. S. (1993): GIS Data Conversion Handbook. Fort Collins, Colorado, GIS Word Inc.
22. Guptill, S.C., and Morrison, J.L. (1995): Elements of Spatial Data Quality. Elsevier/ Pergamon, Oxford.
23. Heywood, I. (2003): An Introduction to Geographical Information Systems. 2nd edition, Pearson Publishing Company, Singapore.

Practical: Basics of Geographical Information System

- Principles of GIS; Properties of EMR
- Geographical data: types and characteristics;
- Spherical and plane coordinate systems in GIS;
- Implications of earth's shape and datum in geo-referencing
- Preparation of choropleths maps

Practical Record File: Students will be required to prepare a practical record file consisting of all exercises in the paper.

Assessment Modalities: The assessment modality will involve a term-end examination towards the end of the semester.

- The term-end examination may carry:
  - Lab Work (Any 2 out of 3 exercise)
  - Record File
  - Viva

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCHS-201: HISTORY: HERITAGE & TOURISM

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks

Objectives: The students will be able to:

- Understand the different facets of heritage, Tourism and their significance.
- Highlights the legal and institutional frameworks for heritage protection in India as also the challenges facing it.
- The implications of the rapidly changing interface between heritage and history will also be examined.
- The course will be strongly project- based on visits to Museum/Heritage Sites

Unit I:

- Heritage- Meaning and Significance,
- Types- Cultural Heritage, Natural Heritage, Living Heritage (Folk Art, Festivals, Living Styles etc.)
- Tangible and Intangible Heritage

Unit II:

- Heritage Organization/ Structure: Forts, Palaces
- Museums, Natural Reserves.
- Role and Significance of Heritage in tourism, Heritage Tourism, Cultural Tourism and Eco Tourism

Unit III:

- Museum and the Cultural Heritage: India's Cultural Policy

- Policy of Government of Rajasthan
- General Principles and Societies role for maintenance of Rajasthan

Unit IV:

- World Heritage sites of India with special reference to Rajasthan
- Role of UNESCO in Heritage
- Guidelines of UNESCO

Tutorials/Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/lecture periods, Peer group teaching may be encouraged. Hard spots if any may be resolved during tutorials. Visit to Tourist site and Preparation of report (Practical).

Suggested Readings:

- गढ़वीर. माथुर. पर्यटनः दशावदिशा दृ लिटरेरीसर्किल. जयपुर
- सहाय, शिवस्वरूप. पर्यटन सिधान्त और प्रबंधन तथा भारत में पर्यटन. मोती लाल बनारसी दास
- सहाय, शिव स्वरूप. पर्यटकों का देश भारत. मोती लाल बनारसी दास
- Roy Chowdhury, Maduparna. Diplaying India's Heritage. Orient Blackswan
- David Lowenthal. The past :The Heritage Crusade and the Spoils of History.Cambridge,2010
- Layton R.P. Stone and J. Thomas. Destruction and conservation of cultural property, London :Rutledge,2001
- Lahiri N. Marshaling .The Past –Ancient India its Modern Histories, Ranikhet: Permanent Black.2012, Chapter 4 and 5
- S S Biswas. Protecting the cultural heritage (National Legislations and International Conventions). New Delhi : INTACH, 1999
- Agarwal O.P. Essentials of conservation and Museology, Delhi, 2006

GROUP G: CHOICE BASED COURSES (CBC)
Semester III
CBCPS-201: POLITICAL SCIENCE: DEMOCRACY AT WORK

Time: 3 Hours Max. Marks: 100
Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: On completion of the course the students – teacher will be able to:

- Acquire knowledge about the working of democracy in India.
- Understand the societal basis of democracy as providing opportunities to flourish diversity through civil liberties.
- Understand Democracy as Representative, Responsible and Participatory.
- Appreciate the Democratic process as not merely a rule of Majority but Tolerance to words dissent.
- Acquaint themselves with the dividends of Democracy in India.

Unit I:

Democratic society: Understanding of Diversities, Fundament Rights, Fundamental Duties, Mass Media, Political Parties, Pressure Groups.

Unit II:

Democratic Government: Universal Adult Franchise, Representation, Parliamentary Government, Federal system, Local government at Rural and Urban areas.

Unit III:

Democratic Process: Accommodation of Social, Economic and Cultural diversities, Rule of law, Independent Judiciary

Unit IV:

Redressal of Public Grievances, Right to Information, Right to Education, MGNREGA.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings*

(*Reading lists may overlap in terms of subject matter. Therefore, students are advised to consult them accordingly.)

1. D.D. Basu : An Introduction to the Constitution of India, New Delhi. Prentice Hall, 1994.
2. G. Austin : Working a Democratic Constitution the Indian Experience. Delhi, Oxford University Press, 2000.
3. R. C. Agarwal :Indian Government and Politics (India Political System) 5th ed. S.Chand and Co., New Delhi 2000
4. N.G. Jayal (ed.), Democracy in India, Delhi, Oxford University Press. 2001.
5. A.G.Noorani, Constitutional Questions in India : The President, Parliament and the States Delhi, Oxford University Press, 2000.
6. Payl, Flather : Recasting Indian Politics – Essays on a Working Democracy Palgsave 2002.
7. Niraja Gopal Jayal. Democratic Governance in India : Challenges of Poverty Development and identity. Sage Publications, New Delhi
8. S.N.Singh, Caste Tribe and Religion in Indian Politics, Sai, New Delhi, 2006
9. डॉ जयराम उपाध्याय – भारत का संविधान, सेन्ट्रल लॉ एजेन्सी, इलाहाबाद, 2007
10. बी. एल. फड़ीया – भारतीय शासन एवं राजनीति, साहित्य भवन पब्लिकेशनस, आगरा, 2007
11. डॉ ए पी अवस्थी – भारतीय शासन व राजनीति, लक्ष्मी नारायण अग्रवाल, आगरा 2006
12. एस एम सईद – भारतीय राजनीतिक व्यवस्था, सुलभ प्रकाशन,लखनऊ 2004

GROUP G: CHOICE BASED COURSES (CBC)

Semester III

CBCEC-201: ECONOMICS: RECENT TRENDS & PRACTICES IN ECONOMICS

Time: 3 Hours Max. Marks: 100

Credits- 4 Theory: 80, Internal: 20

NOTE FOR PAPER SETTER FOR THEORY EXAMINATION

i) Paper setter will set 9 questions in all, out of which students will be required to attempt 5 questions.

ii) Q.No. 1 will be compulsory and will carry 16 marks. There will be atleast 4 short-answer type questions selected from the entire syllabus.

iii) Two long answer type questions will be set from each of the four units, out of which the students will be required to attempt one question from each unit. Long-answer type questions will carry 16 marks each.

iv) All questions will carry equal marks.

Objectives: The students will be able to:

The objective of this course is the make the students aware of the fundamentals of economics and also the contemporary issues

Unit I: Educational Economics

- Review of Economic Principles
- Human Capital Theory
- Job Signalling
- Educational Production Functions
- The Market for Teachers
- Teacher Incentives
- Market Dimensions of Higher Education
- Student Aid Policy and Collegiate Outcomes
- Financial Issues in Higher Education

Unit II: Social Economics

- Discrimination, the market, statistical discrimination, minimum wage, gender
- Discrimination, exclusion
- Income inequality and poverty, causes of income inequality and poverty (inflation)
- Income distribution over time, the official poverty rate

- Unemployment, measurement, types and cost of unemployment, interpreting theunemployment rate, social security

Unit III: Entrepreneurship and development

- The critical roles played entrepreneurship in Innovation systems.
- The differences between industrial and agricultural start-ups?
- Role of government in fostering entrepreneurship

Unit IV: Technology and globalization

- The importance of foreign technology in national innovation systems.
- Role played by global value chains play in evolution of innovation systems.
- Contribution of Policy approaches by emerging economies to tap into global value chains.

Tutorials/ Practicum: Students will work in groups on the practical aspects of the knowledge gained during contact/ lecture period. Peer group teaching may be encouraged. Hard spots, if any, may be resolved during tutorials.

Suggested Readings*:

(*Reading lists may overlap in terms of subject matter. Therefore, students are advised to consult them accordingly.)

1. Cohn and Geske, The Economics of Education, Chapter 1.
2. Hirshleifer, Jack (1985). The Expanding Domain of Economics. The American Economic Review, 75(6): 53-68. http://catalog.flatworldknowledge.com/catalog/editions/rittenberg-principles-ofmicroeconomics-1-0
3. Cohn and Geske, The Economics of Education, Chapter 2-4.
4. Ashenfelter, O. and Krueger, A. (1994). Estimates of the Economic Return to Schooling From A New Sample of Twins. American Economic Review, 84(5): 1157-1173.
5. Acemoglu, D., Introduction to Modern Economic Growth, Princeton University Press, 2009
6. Spence, M. (1973). Job Market Signalling. Quarterly Journal of Economics, 87(3): 355-374.
7. Cohn and Geske, The Economics of Education, Chapter 9.
8. Bound, J., Hershbein, B., and Long, B. (2009). Playing the Admissions Game: Student Reactions to Increasing College Competition. Journal of Economic Perspectives, 23(4): 119-146.
9. Deming, D., Goldin C., and Katz, L. (2012). The For-Profit Postsecondary School Sector:Nimble Critters or Agile Predators? Journal of Economic Perspectives, 26(1): 139-164.

10. Avery, C. and Turner, S. (2012) "Student loans: Do College Students Borrow too Much - or Not Enough?" Journal of Economic Perspectives, 26(1): 165-192.
11. Cohn and Geske, The Economics of Education, Chapter 12.
12. Heller, D. (1997). Student Price Response in Higher Education: An Update to Leslie andBrinkman. Journal of Higher Education, 68(6): 624-659.
13. Fu, X., Pietrobelli, C. and Soete, L. 2011. "The Role of Foreign Technology and Indigenous Innovation in the Emerging Economies: Technological Change and Catching-up," World Development, Vol. 39 No. 7, pp. 1204-1212, http://www.sciencedirect.com.ezp-prod1.hul.harvard.edu/science/article/pii/S0305750X11000647
14. Pietrobelli, C. and Rabellotti, R. 2011. "Global Value Chains Meet Innovation Systems: Are There Learning Opportunities for Developing Countries?" World Development, Vol. 39, No. 7, pp. 1261-1269.
15. Mazzoleni, R. 2008. "Catching Up and Academic Institutions: A Comparative Study of Past National Experiences," Journal of Development Studies, Vol. 44, No. 5, pp. 678-700.
16. Mok, K.H. 2012. "The Quest for Innovation and Entrepreneurship: The Changing Role of University in East Asia," Globalisation, Societies & Education, Vol. 10, Vo. 3, pp. 317-335.
17. Borros, M. 1997. Technology policy and Economic Growth. [Online]. Available at: http://brie.berkeley.edu/publications/WP%2097.pdf
18. Mokyr, J. 2005. Long term Economic Growth and the History of Technology. [Online]. Departments of Economic and History, Northwestern University. Available at: http://faculty.wcas.northwestern.edu/~jmokyr/ AGHION1017new.pdf
19ण Cortright, J. 2001. New growth theory: technology and learning. [Online]. Reviews of economic development literature and practice. No. 4. Available at: http://www.eda.gov/ImageCache/EDAPublic/ documents/pdfdocs/ 1ह3सतऋ5ि7ऋ5बिवतजतपहीजऋ2मचकधि अ1ध1ह3सतऋ5ि7ऋ5बिवतजतपहीजण्चकि