Panchakot Mahavidyalaya

Sarbari, Neturia, Purulia

CBCS syllabus addressing Professional Ethics, Human Values, Gender, Environment and Sustainability

PROFESSIONAL ETHICS

Department: Philosophy
Course: Honors
Paper Title: C-3 Indian Ethics
Paper Code: BPHICCHT201
Syllabus:

1. Introduction: concerns and presuppositions (6)
2. Theory of karma, rebirth(6)
3. Dharma: its meaning definition and classification, sadharana dharma, svatharma, varna dharma, asrama dharama, (6)
4. Niskama karma, lokasamgraha (6)
5. Purusarthas and their interrelations(12)
6. Buddhist ethics: triratna, anuvrata, mahavrata, ahimsa, bondage and liberation.(12)

Department: Philosophy
Course: Honors
Paper Title: Ethics in the Public domain
Paper Code: BPHIGEHT11
Syllabus:

1. Morality
2. Cultural, Relativism
3. Subjectivity
4. Media Ethics
5. Caste & Poverty

Department: Philosophy
Course: Honors
Paper Title: C-5 Western Ethics
Paper Code: BPHICCHT301
Syllabus:
Good, right, justice, duty and obligation, crime and punishment, freewill and responsibility, Kant's categorical imperative, hedonism, utilitarianism.

Department: Sanskrit
Course: Program
Paper Title: Classical Sanskrit Literature (Poetry) ध्रुपदीसंस्कृतसाहित्यम् (महाकाव्यम्)
Paper Code: BSNSCCRT401
Syllabus:
[A] Prescribed Course:
Section 'A'
Raghuvaṁśa: Canto-I (Verse: 1-25)
Section 'B'
Kumārasambhava: Canto-V (Verse: 1-30)
Section 'C'
Kirātārjunīya: Canto I (1-25 Verses)

Section 'D'
Nītiśataka: (1-20 Verses, 1st two Paddhatis)
Section 'E'
Origin and Development of Mahākāvya and Khaṇḍakāvya

HUMAN VALUES

Department: Sanskrit
Course: Program
Paper Title: Self Management in the Śrīmadbhagavadgītā श्रीमद्भगवद्गीतायामात्यसंयमः
Paper Code: BSNSCCRT101
Syllabus:
[A] Prescribed Course:
Section 'A'
Cognitive and emotive apparatus:
Hierarchy of indriya, manas, buddhi and ātman III.42; XV. 7, Role of the ātman –XV.7; XV.9, Mind as a product of prakṛti VII.4. Properties of three guṇas and their impact on the mind – XIII. 5-6; XIV.5-8 & 11-13; XIV.17.
Section 'B' Controlling the mind:
Confusion and conflict, Nature of conflict I.1; IV.16; I.45; II.6, Causal factors – Ignorance – II.41; Indriya – II.60, Mind – II.67; Rajoguṇa – III.36-39; XVI.21; Weakness of mind- II.3; IV.5. Detail of the Core Course for Sanskrit Meditation–difficulties –VI.34-35; procedure VI.11-14 Balanced life- III.8; VI.16-17, Diet control- XVII. 8-10, Physical and mental discipline – XVII. 14-19, VI. 36. Means of conflict resolution to the importance of knowledge – II. 52 ; IV.38-39; IV.42 Clarity of buddhi – XVIII.30-32. Process of decision making – XVIII.63. Control over senses – II.59, 64. Surrender of kartṛbhāva –XVIII .13-16; V.8-9. Desirelessness- II.48; II.55. Putting others before self – III.25
Section 'C'
Self management through devotion:
Surrender of ego – II.7 ; IX.27; VIII.7; XI.55 ; II.47 16 Credits Abandoning frivolous debates – VII.21, IV.11; IX.26
Acquisition of moral qualities - XII.11; XII.13-19

Department: Sanskrit
Course: Program
Paper Title: Art of Balanced Living सुष्ठु जीवनयापनपद्धतिः
Paper Code: BSNSDSRT2
Syllabus:
[A] Prescribed Course:
Section 'A'
Self-presentation:
Method of Self-presentation : Hearing (śravaṇa), Reflection (manana) & meditation (nididhyāsana) – (Bṛhadāraṇyakopaniṣad, 2.4.5)
Section 'B'
Concentration:
Concept of Yoga : (Yogasūtra, 1.2) Restriction of fluctuations by practice (abhyāsa) and passionlessness (vairāgya) :(Yogasūtra, 1.1216) Eight aids to Yoga (aṣṭāṅgayoga) : (Yogasūtra, 2.29, 30,32, 46, 49, 50; 3.1-4). Yoga of action (kriyāyoga) : (Yogasūtra, 2.1) Four distinct means of mental purity (cittaprasādana) leading to oneness : (Yogasūtra, 1.33
Section 'C' Refinement of Behaviour:
Methods of Improving Behavior : jñāna-yoga, dhyāna-yoga, karma-yoga and bhakti-yoga (especially karma-yoga) Karma : A natural impulse, essentials for life journey, co-ordination of the world, an ideal duty and a metaphysical dictate (Gītā, 3.5, 8, 10-16, 20 & 21)

Department: Philosophy
Course: Hons
Paper Title: C-5 Western Ethics
Paper Code: BPHICCHT301

Syllabus:

Good, right, justice duty and obligation, crime and punishment, freewill and responsibility, Kant's categorical imperative, hedonism, utilitarianism.

Department: History
Course: Hons
Paper Title: Europe in Transition
Paper Code: BHISCCHT502

Syllabus:

1. Changing European economy: 15th and 16th century: proto-industrialization; price revolution; agricultural revolution and enclosure movement – 20 classes
2. Renaissance and reformation: social roots; rediscovery of the classics; humanism; reformation: religious and national context – 25 classes
3. 17th century European crisis: economic, social and political dimensions; Europe as centre of world system – 15 classes

Scientific revolution and scientific culture: the origin of enlightenment – 15 classes

Department: Bengali
Course: Hons
Paper Title: SANSKRITA SAHITYER ITIHAS সংস্কৃত সাহিত্যের ইতিহাস
Paper Code: BBNGCCHT401

Syllabus:

১) রামায়ন-মহাভারত [১৫ ক্লাস]
২) কালিদাস [১৫ ক্লাস]
৩) শূদ্রক [১৫ ক্লাস]
৪) ভাস, বানভট্ট, জয়দেব [২৫ ক্লাস]

Department: Political Science
Course: Hons
Paper Title: Human Rights in India
Paper Code: BPLSDSHT2

Syllabus:

1. Indian Constitution & Human Rights.
2. History of Dalit movements.
3. History of Civil Liberties movement in India.
4. Human Rights Commissions: National & State.
5. Human Rights Violations in India, cases and trends.
6. Role of Media, Civil Society & Judiciary for the protection of Human Rights

Department: Political Science
Course: Hons
Paper Title: Human Rights
Paper Code: BPLSDSHT5

Syllabus:

1. Human Rights: Meaning and expanding scope.
2. Universal Declaration of Human Rights & Different Covenants and Agreements.

3. Protective mechanisms in International Laws.
4. Women & Child Rights as Human Rights.
5. Crimes against humanity: Major forms & Humanitarian Intervention.
6. Global Human rights: major issues and need for global awareness

GENDER

Department: History
Course: Hons
Paper Title: Early History of India (Proto-History to 6th century B.C.)
Paper Code: BHISCCHT101

Syllabus:

1. Reconstructing Ancient Indian History: Sources and approaches of historical reconstruction; historical interpretation with special reference to gender, environment, technology and regions – 15 Classes
2. Pre-history and Proto-history: Paleolithic, Neolithic habitation; growth of Chalcolithic culture; economic and technological evolution – 15 Classes
3. The Harappan civilization and its origin, antiquity, morphology of major cities, agricultural base and development; growth of commerce and trade; religious beliefs and practices – 15 Classes
4. Background to early historic India: the Aryan problem: debate and reconstruction; the Vedic age: economy, polity, society and religion; latter-Vedic age: economy, polity, society and religion; Sixteen Mahajanapadas – Rise of Magadha, Persian and Greek invasion – 30 Classes

Department: History
Course: Hons
Paper Title: Cultural History of Bengal: Reform and Revival
Paper Code: BHISCCHT402

Syllabus:

1. From utility to free trade: evangelicals, the Orientalists, Willian Jones and the Asiatic Society; the Fort William College and the Hindu College; Derozio and Young Bengal movement – 20 classes
2. Anglicist – Orientalist controversy; Macaulay minutes and coming of western education; Rammohan, Vidyasagar and Abdul Latif on education; vernacular education and women education, science education and the Raj – 20 classes
3. Society in the late 18th century; religious and social reforms; Rammohal and *Brahmo* movement; Vidyasagar and his reforms; Vivekananda and Ramkrishnite movement; Aligarh movement – 15 classes
   Conservative response: growth of traditional-modernizer s and their thought on social upliftment; debates around gender; making of religious and linguistic identities; caste: *Sanskritizing* and anti-*Brahminical* trends – 20 classes

Department: History
Course: Hons
Paper Title: Age of Gandhian Nationalism
Paper Code: BHISCCHT403

Syllabus:

1. Historiography of Indian nationalism; Nationalism: trends up to 1919: political ideology and making of associations; formation of INC; moderates and extremists; *Swadeshi* movement and revolutionaries – 20 classes
2. Gandhian nationalism: ideas and movements: Gandhi's perspectives and methods; Ghandhi and emergence of mass politics: from *Khilaphat* to Quit India movement; Gandhi and Subhas Chandra Bose; INA and freedom movement; Gandhian movements in Manbhum and role of local leaders – 25 classes

3. Gandhian nationalism and social groups: land lords and middleclass; peasants and workers; tribes and *dalits*; women and business groups – 20 classes
   Gandhian nationalism and India's freedom struggle: debates – 10 classes

Department: English
Course: Hons
Paper Title: Women's Writing
Paper Code: BENGCCHT-501
Syllabus:
1. Emily Dickinson: 'I cannot live with you',
'Because I could not stop for death'. [3+3 class hours]
Sylvia Plath: 'Lady Lazarus' [3 class hours]
Eunice De Souza: 'Advice to Women', 'Bequest' [3+3 class hours]
2. Harriet Beecher Stowe: *Uncle Tom's Cabin* [18 class hours]
3. Katherine Mansfield: 'Honeymoon' [7 class hours]
Jhumpa Lahiri: 'Interpreter of Maladies' [7 class hours]
Mahashweta Devi: 'The Hunt', tr. GayatriChakravortySpivak (Seagull, 2002) [7 class hours]
4. Virginia Woolf: 'Shakespeare's Sisters', Profession for Woman'. [6+5 class hours]
Rassundari Debi: Excerpts from *Amar Jiban* in Susie Tharu and K. Lalita, eds.*Women's writing in India,* vol. 1 (New Delhi: OUP, 1989) pp. 191–2. [5 class hours]

Department: English
Course: Hons
Paper Title: Indian Writing in English
Paper Code: BENGCCHT201
Syllabus:
1. R.K. Narayan: *The Guide* [17 class hours]
2. Anita Desai: *In Custody*[17 class hours]
3. H.L.V. Derozio: 'The Orphan Girl' [2 class hours]
Kamala Das: 'Introduction' [4 class hours]
Jayanta Mahatatra: 'Hunger' [4 class hours]
Nissim Ezekiel: 'The Night of the Scorpion' [4 class hours]
Robin S. Ngangom: 'A Poem for Mother' [4 class hours]
4. Mulk Raj Anand: 'Lullaby' [4 class hours]
Khushwant Singh: 'The Mulberry Tree' [4 class hours]
Salman Rushdie: 'The Commonwealth Literature Does Not Exist' [5 class hours]
Arundhati Roy: 'The Cost of Living' [5 class hours]

Department: English
Course: Hons
Paper Title: Popular Literature
Paper Code: BENGCCHT302
Syllabus:
1. Lewis Carrol: *Through the Looking Glass* [18 class hours]
2. Agatha Christie: *The Murder of Roger Ackroyd* [18 class hours]
3. Jerome K Jerome: *Three Men in a Boat* [17 class hours]
4. Durgabai Vyam and Subhash Vyam: *Bhimayana: Experiences of Untouchability* OR, Autobiographical Notes on Ambedkar (For the Visually Challenged students) [17 class hours]

Department: English
Course: Hons
Paper Title: Postcolonial Literatures
Paper Code: BENGCCHT602

Syllabus:
1. Chinua Achebe: *Things Fall Apart* [18 class hours]
2. V. S. Naipaul: *Mystic Masseur* [18 class hours]
3. Bessie Head: 'The Collector of Treasures' [6 class hours]
Ama Ata Aidoo: 'The Girl who can' [6 class hours]
Grace Ogot: 'The Green Leaves' [6 class hours]
4. Pablo Neruda: 'Tonight I can Write.' Tr. W.S. Merwin in *Twenty Love Poems and a Song of Despair* by Pablo Neruda (Penguin Classics) [4 class hours]
Derek Walcott: 'A Far Cry from Africa' [4 class hours]
David Malouf: 'Wild Lemons' [4 class hours]
Mamang Dai: 'The Voice of the Mountain' [4 class hours]

Department: English
Course: Program
Paper Title: Selections from English poems, plays and short stories
Paper Code: BENGCCRT 201
Syllabus:
1. H.E. Bates : *The Ox* [20 class hours]
2. Lady Gregory : *The Rising of the Moon* [20 class hours]
3. Shakespeare : Sonnet no.18 – *Shall I Compare Thee* [5 class hours]
Shelley : To Moon [5 class hours]
Tennyson : Crossing the bar [5 class hours]
W.B. Yeats : Lake Isle of Innisfree [5 class hours]

Department: English
Course: Program
Paper Title: Selections from English Prose and Poems-II
Paper Code: BENGGERT3A
Syllabus:
1. R.K. Narayan : *Engine Trouble*[10 class hours]
2. H.E. Bates : *The Ox* [20 class hours]
3. Lady Gregory : *The Rising of the Moon*[20 class hours]
4. Shakespeare : Sonnet no.18 – *Shall I Compare Thee* [5 class hours]
Shelley : To Moon [5 class hours]
Tennyson : Crossing the bar [5 class hours]
W.B. Yeats : Lake Isle of Innisfree [5 class hours]

Department: Bengali
Course: Hons
Paper Title: ADHUNIK KABYA-KABITA আধুনিক কাব্য-কবিতা
Paper Code: BBNGCCHT302
Syllabus:
১) বীরাঙ্গনা কাব্য, মাইকেল মধুসূদন দত্ত [১৭ ক্লাস]
(শকুন্তলা, তারা, শূর্পণখা, কেকয়ী, জনা পত্রিকা)
২) বৃত্রসংহার, হেমচন্দ্র বন্দ্যোপাধ্যায় (নির্বাচিত সর্গ - ১, ১০, ১১, ২২, ২৩, ২৪)। [১৭ ক্লাস]
৩) উনিশ শতকের গীতিকবিতা- নির্বাচিত কবিতা ক) পুরুলিয়া, মাইকেল মধুসূদন দত্ত খ) সুরবালা, বিহারীলাল চক্রবর্তী গ) বঙ্কিম বিদায়, গোবিন্দচন্দ্র দাস ঘ) বেলাশেষে, মানকুমারী বসু ঙ) মানববন্দনা, অক্ষয়কুমার বড়াল [১৭ ক্লাস]
৪) বিশ শতকের কবিতা ক) বোধ, জীবনানন্দ দাশ খ) আমার কৈফিয়ৎ, নজরুল ইসলাম গ) বন্দীর বন্দনা, বুদ্ধদেব বসু ঘ) কাস্তে, দীনেশ দাস ঙ) ফুল ফুটুক না ফুটুক, সুভাষ মুখোপাধ্যায় চ) কলকাতার যীশু, নীরেন্দ্রনাথ চক্রবর্তী ছ) জন্মভূমিকেই, শামসুর রাহমান জ) বাবরের প্রার্থনা, শঙ্খ ঘোষ। [১৯ ক্লাস]

Department: Bengali

Course: Hons
Paper Title: ENGREJI SAHITYER ITIHAS ইংরেজি সাহিত্যের ইতিহাস
Paper Code: BBNGCCHT303
Syllabus:
১) জিওফ্রে চসার [৫ ক্লাস]
২) শেক্সপিয়ার [১০ ক্লাস]
৩) মিল্টন, ওয়ার্ডসওয়ার্থ, কোলরিজ, শেলী, কীটস, এলিয়ট, ইয়েটস [৩৫ ক্লাস]
৪) স্কট, ডিকেন্স, চার্লস ল্যাম্ব [১৫ ক্লাস]

Department: Political Science
Course: Hons
Paper Title: Understanding Political Theory
Paper Code: BPLSCCHT101
Syllabus:
1. What is Politics & Political Theory, Approaches to Political Theory: Normative, Empirical and Marxist.
2. Critical and contemporary perspectives in political theory: Feminism & Post-modernism.
3. Basic concepts: Rights, Liberty, Equality, Justice, Democracy & Citizenship
4. Ideology: Meaning & variants—(a) Anarchism(b) Liberalism (c) Neo-liberalism (d)Socialism
5. Theories of the State: Idealist, Marxist & Gandhian.
6. Modern western Marxism: Gramsci's 'hegemony'.

Department: Political Science
Course: Hons
Paper Title: International Relations: Basic Theories and Approaches
Paper Code: BPLSCCHT401
Syllabus:
1.International Relations as an academic discipline.
2. Realism & its different variants.
3. Liberalism: Classical & Modern
4. Marxist theories of International Relations: World System theory, Critical theory & New Marxists.
5. Social Constructivists: Meaning, Features & Trends.
6. Feminism as an alternative perspective

Department: Political Science
Course: Hons
Paper Title: Modern Political Philosophy
Paper Code: BPLSCCHT502
Syllabus:
1. Modernity & its discourse: Enlightenment, its basic features.
2. Utilitarianism: Basic features, Later shifts in the thought of J.S. Mill.
3. Anarchism: its origin and core points.
4. Feminism: Different Waves; Eco-feminism.
5. Libertarinism.
6.Communitarianism.

Department: Geography
Course: Hons
Paper Title: DS 5 – Social Geography
Paper Code: BGEODSHT5
Syllabus:
Unit 1:
1. Social Geography: Concept, Origin, Nature and Scope

2. Concept of Space, Social differentiation and stratification; social processes
3. Social Categories: Caste, Class, Religion, Race and Gender and their Spatial distribution
4. Basis of Social region formation; Evolution of social-cultural regions of India
5. Peopling Process of India: Technology and Occupational Change; Migration.
6. Social groups, social behaviour and contemporary social environmental issues with special reference to India

Unit 2:

1. Concept of Social Well-being, Quality of Life, Gender and Social Well-being
2. Measures of Social Well-being: Healthcare, Education, Housing, Gender Disparity
3. Social Geographies of Inclusion and Exclusion, Slums, Gated Communities, Communal Conflicts and Crime.
4. Social Planning during the Five Year Plans in India
5. Social Policies in India: Education and Health
6. Social Impact Assessment (SIA): Concept and importance

ENVIRONMENT AND SUSTAINABILITY

Department: All (BA/BSc/BCom)
Course: Hons
Paper Title: Fundamentals of Environmental Studies
Paper Code: BAECCEST104
Syllabus:

Unit 1: Basics of Environmental Studies **(05 lectures)**

Definition, Nature, Scope and Importance; Components of environment: Environmental education

Unit 2: Natural Resources: Renewable and Nonrenewable Resources **(10 lectures)**

Nature and natural resources their conservation and associated problems:
Forest resources: Uses, types and importance, Joint Forest Management & Tribal population, Deforestation and its effects
Water resources: Distribution of water on Earth; Use, over exploitation of surface and ground water; Dams: Benefits and problems; Flood and Drought
Mineral resources: Mineral resources in India; Use and exploitation, Social impacts of mining
Food resources: World food problems and food insecurities.
Energy resources: Renewable and Nonrenewable energy sources; Use of alternate energy sources - Case studies
Land resources: Land as a resource; Land degradation, landslides, soil erosion, desertification
Use of resources for sustainable development

Unit 3: Ecology and Ecosystems **(08 lectures)**

Concept of ecology, Population ecology, Community ecology
Concept of an ecosystem, different types of ecosystem
Food chains, food weds and ecological succession
Energy flow in the ecosystem and energy flow models

Unit 4: Biodiversity and its conservation **(08 lectures)**

Biodiversity: Levels of biological diversity
Values of biodiversity
Hot-Spots of biodiversity, Mega-biodiversity countries
Threat to biodiversity
Threatened and endemic species of India
Conservation of biodiversity (*In- situ* and *Ex-situ)*
Ecosystem services: Ecological, Economical, Social, Ethical, Aesthetical and Informational values

Unit 5: Environmental Pollution and Management **(08 lectures)**

Nature, Causes, Effects and Control measures of –
(i) Air pollution (ii) Water pollution (iii) Soil pollution (iv) Noise pollution
v) Nuclear hazards
Fireworks Pollution: Definition, Composition/Ingredients, effects, monitoring strategies
Solid waste management: Causes, effects and disposal methods; Management of biomedical and municipal solid wastes
Disaster management: Floods, Earthquake, Cyclone and Landslides

Unit 6: Environmental Policies and Practices **(10 lectures)**

Constitutional Provisions for protecting environment- Articles 48(A), 51 A (g)
Environmental Laws: The Environment (Protection) Act, 1986; The Air (Prevention and Control of Pollution) Act, 1981; The Water (Prevention and Control of Pollution) Act 1974; Forest (Conservation) Act, 1980
The wildlife Protection Act, 1972
Climate change, Global warming, ENSO, Acid rain, Ozone layer depletion; Montreal and Kyoto Protocols

Unit 7: Human Communities and Environment **(06 lectures)**

Human population growth; Impacts on environment
Population explosion – Family Welfare Programme
Environment and human health: Concept of health and disease; Common communicable and Non-communicable diseases; Public awareness
Environment movements in India: Chipko Movements, Silent Valley Movement, Movements in Karnataka

Unit 8: Field Work Report/Project Report/Term paper (based on any one of the following topics and to be evaluated by internal teachers only) **(05 lectures)**

Environmental assets - River/Forest/Grassland/Hill/Mountain *etc*.
Environmental pollution - Urban/Rural/Industrial/Agricultural
Study of common Plants/Insect /Birds/Wild life *etc*.
Study of simple ecosystems: Pond/River/Hill slope *etc*.
Municipal solid waste management and handling.

Department: All (BA/BSc/BCom)
Course: Program
Paper Title: Fundamentals of Environmental Studies
Paper Code: BAECCEST204
Syllabus:

Unit 1: Basics of Environmental Studies **(05 lectures)**

Definition, Nature, Scope and Importance; Components of environment: Environmental education

Unit 2: Natural Resources: Renewable and Nonrenewable Resources **(10 lectures)**

Nature and natural resources their conservation and associated problems:
Forest resources: Uses, types and importance, Joint Forest Management & Tribal population, Deforestation and its effects
Water resources: Distribution of water on Earth; Use, over exploitation of surface and ground water; Dams: Benefits and problems; Flood and Drought
Mineral resources: Mineral resources in India; Use and exploitation, Social impacts of mining
Food resources: World food problems and food insecurities.
Energy resources: Renewable and Nonrenewable energy sources; Use of alternate energy sources - Case studies
Land resources: Land as a resource; Land degradation, landslides, soil erosion, desertification
Use of resources for sustainable development

Unit 3: Ecology and Ecosystems **(08 lectures)**

Concept of ecology, Population ecology, Community ecology
Concept of an ecosystem, different types of ecosystem
Food chains, food weds and ecological succession
Energy flow in the ecosystem and energy flow models

Unit 4: Biodiversity and its conservation **(08 lectures)**

Biodiversity: Levels of biological diversity
Values of biodiversity
Hot-Spots of biodiversity, Mega-biodiversity countries
Threat to biodiversity
Threatened and endemic species of India
Conservation of biodiversity (*In- situ* and *Ex-situ)*
Ecosystem services: Ecological, Economical, Social, Ethical, Aesthetical and Informational values

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Study of simple ecosystems: Pond/River/Hill slope *etc*.
Municipal solid waste management and handling.

Department: Chemistry
Course: Program
Paper Title: Green Chemistry
Paper Code: BCEMDSRC-3
Syllabus:

Theory

Introduction to Green Chemistry (5L)

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

Principles of Green Chemistry and Designing a Chemical synthesis (25L)

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

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

risk = (function) hazard × exposure; waste or pollution prevention hierarchy.

1. Green solvents– supercritical fluids, water as a solvent for organic reactions, ionic liquids, fluorous biphasic solvent, PEG, solventless processes, immobilized solvents and how to compare greenness of solvents.
2. Energy requirements for reactions – alternative sources of energy: use of microwaves and ultrasonic energy.
3. Selection of starting materials; avoidance of unnecessary derivatization – careful use of blocking/protecting groups.
4. Use of catalytic reagents (wherever possible) in preference to stoichiometric reagents; catalysis and green chemistry, comparison of heterogeneous and homogeneous catalysis, biocatalysis, asymmetric catalysis and photocatalysis.
5. Prevention of chemical accidents designing greener processes, inherent safer design, principle of ISD "What you don't have cannot harm you", greener alternative to Bhopal Gas Tragedy (safer route to carcarbaryl) and Flixiborough accident (safer route to cyclohexanol) subdivision of ISD, minimization, simplification, substitution, moderation and limitation.
6. Strengthening/ development of analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes.

Examples of Green Synthesis/ Reactions and some real world cases (22L)

1. Green Synthesis of the following compounds: adipic acid, catechol, disodium iminodiacetate (alternative to Strecker synthesis)

1. Microwave assisted reactions in water: Hofmann Elimination, methyl benzoate to benzoic acid, oxidation of toluene and alcohols; microwave assisted reactions in organic solvents Diels-Alder reaction and Decarboxylation reaction

3. Ultrasound assisted reactions: sonochemical Simmons-Smith Reaction (Ultrasonic alternative to Iodine)

1. Surfactants for carbon dioxide – replacing smog producing and ozone depleting solvents with CO_2 for precision cleaning and dry cleaning of garments.
2. Designing of Environmentally safe marine antifoulant.
3. Rightfit pigment: synthetic azopigments to replace toxic organic and inorganic pigments.
4. An efficient, green synthesis of a compostable and widely applicable plastic (poly lactic acid) made from corn.
5. Healthier Fats and oil by Green Chemistry: Enzymatic Inter esterification for production of no Trans-Fats and Oils
6. Development of Fully Recyclable Carpet: Cradle to Cradle Carpeting

Future Trends in Green Chemistry (8L)

Oxidation reagents and catalysts; Biomimetic, multifunctional reagents; Combinatorial green chemistry; Proliferation of solventless reactions; co crystal controlled solid state synthesis (C_2S_3); Green chemistry in sustainable development.

Practical

Safer starting materials

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

Using renewable resources

1. Preparation of biodiesel from vegetable/ waste cooking oil.

Avoiding waste

Principle of atom economy.

1. Use of molecular model kit to stimulate the reaction to investigate how the atom economy can illustrate Green Chemistry.
2. Preparation of propene by two methods can be studied
   a. Triethylamine ion + OH- → propene + trimethylpropene + water

   H2SO4/heat
   b. I-propanol → Propene + water
1. Other types of reactions, like addition, elimination, substitution and rearrangement should also be studied for the calculation of atom economy.
   Use of enzymes as catalysts
   Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide.
   Alternative Green solvents
   Extraction of D-limonene from orange peel using liquid CO2 prepared form dry ice. Mechanochemical solvent free synthesis of azomethines
   Alternative sources of energy
1. Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II).
2. Photoreduction of benzophenone to benzopinacol in the presence of sunlight.

Department: Zoology
Course: Hons
Paper Title: Core T2 – Perspectives in Ecology
Paper Code: BZOOCCHC-102
Syllabus:
Unit 1: Introduction to Ecology
History of ecology, Autecology and synecology, Levels of organization, Laws of limiting factors, Study of Physical factors, The Biosphere.
Unit 2: Population
Unitary and Modular populations
Unique and group attributes of population: Demographic factors, life tables, fecundity tables, survivorship curves, dispersal and dispersion.
Geometric, exponential and logistic growth, equation and patterns, r and K strategies Population regulation - density-dependent and independent factors
Population Interactions, Gause's Principle with laboratory and field examples, Lotka-Volterra equation for competition.
Unit 3: Community
Community characteristics: species diversity, abundance, , dominance, richness, Vertical stratification, Ecotone and edge effect. Ecological succession with one example
Unit 4: Ecosystem
Types of ecosystem with an example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies
Unit 5: Applied Ecology
Wildlife Conservation (in-situ and ex-situ conservation).
Management strategies for tiger conservation; Wild life protection act (1972)
List of Practical
1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided
2. Determination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Wiener diversity index for the same community
3. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winkler's method), Chemical Oxygen Demand and free CO2
4. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary/Sea coast

Department: Zoology
Course: Hons
Paper Title: Wildlife Conservation and Management
Paper Code: BZOODSHC-3
Syllabus:

Unit 1: Introduction to Wild Life

Values of wild life - positive and negative; Conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies.

Unit 2: Evaluation and management of wild life

Habitat analysis, Physical parameters: Topography, Geology, Soil and water Biological Parameters: food, cover, forage, browse and cover estimation Standard evaluation procedures: remote sensing and GIS.

Unit 3: Management of habitats

Setting back succession; Grazing logging; Mechanical treatment; Advancing the successional process; Cover construction; Preservation of general genetic diversity
Restoration of degraded habitats

Unit 4: Population estimation

Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores; Pug marks and census method.

Unit 5: Aims and objectives of wildlife conservation

Wildlife conservation in India – through ages; different approaches of wildlife conservation; modes of conservation; in-situ conservation and ex-situ conservation: necessity for wildlife conservation

Unit 6: Management planning of wild life in protected areas

Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence; Ecology of perturbence.

Unit 7: Man and Wildlife

Causes and consequences of human-wildlife conflicts; mitigation of conflict – an overview; Management of excess population

Unit 8: Protected areas

National parks & sanctuaries, Community reserve; Important features of protected areas in India; Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve.

List of Practical

1. Identification of flora, mammalian fauna, avian fauna, herpeto-fauna
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses)
3. Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers, etc.
4. Demonstration of different field techniques for flora and fauna
5. PCQ, ten tree method, Circular, Square & rectangular plots, Parker's 2 Step and other methods for ground cover assessment, Tree canopy cover assessment, Shrub cover assessment.
6. Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences)

Department: Zoology
Course: Program
Paper Title: Wildlife Conservation and Management
Paper Code: BZOODSRC-1
Syllabus:

Unit 1: Introduction to Wild Life

Values of wild life - positive and negative; Conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies.

Unit 2: Evaluation and management of wild life

Habitat analysis, Physical parameters: Topography, Geology, Soil and water Biological Parameters: food, cover, forage, browse and cover estimation Standard evaluation procedures: remote sensing and GIS.

Unit 3: Management of habitats

Setting back succession; Grazing logging; Mechanical treatment; Advancing the successional process; Cover construction; Preservation of general genetic diversity

Restoration of degraded habitats

Unit 4: Population estimation

Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores; Pug marks and census method.

Unit 5: Aims and objectives of wildlife conservation

Wildlife conservation in India – through ages; different approaches of wildlife conservation; modes of conservation; in-situ conservation and ex-situ conservation: necessity for wildlife conservation

Unit 6: Management planning of wild life in protected areas

Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence; Ecology of perturbence.

Unit 7: Man and Wildlife

Causes and consequences of human-wildlife conflicts; mitigation of conflict – an overview; Management of excess population

Unit 8: Protected areas

National parks & sanctuaries, Community reserve; Important features of protected areas in India; Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve.

List of Practical

1. Identification of flora, mammalian fauna, avian fauna, herpeto-fauna
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses)
3. Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers, etc.
4. Demonstration of different field techniques for flora and fauna
5. PCQ, ten tree method, Circular, Square & rectangular plots, Parker's 2 Step and other methods for ground cover assessment, Tree canopy cover assessment, Shrub cover assessment.
6. Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences)

Department: Botany

Course: Program

Paper Title: Biodiversity (Microbes, Algae, Fungi and Archegoniate)

Paper Code: BBOTCCRC101

Syllabus:

Unit 1: Microbes (10 Lectures) Viruses – Discovery, general structure, replication (general account), DNA virus (T-phage); Lytic and lysogenic cycle, RNA virus (TMV); Economic importance; Bacteria – Discovery, General characteristics and cell structure; Reproduction – vegetative, asexual and recombination (conjugation, transformation and transduction); Economic importance.

Unit 2: Algae (12 Lectures) General characteristics; Ecology and distribution; Range of thallus organization and reproduction; Classification of algae; Morphology and life cycles of the following: Nostoc, Chlamydomonas, Oedogonium, Vaucheria, Fucus, Polysiphonia. Economic importance of algae.

Unit 3: Fungi (12 Lectures) Introduction- General characteristics, ecology and significance, range of thallus organization, cell wall composition , nutrition, reproduction and classification; True Fungi- General characteristics, ecology and significance, life cycle of Rhizopus (Zygomycota) Penicillium, Alternaria (Ascomycota), Puccinia, Agaricus (Basidiomycota); Symbiotic Associations-Lichens: General account, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance.

Unit 4: Introduction to Archegoniate (2 Lectures) Unifying features of archegoniates, Transition to land habit, Alternation of generations.

Unit 5: Bryophytes (10 Lectures) General characteristics, adaptations to land habit, Classification, Range of thallus organization. Classification (up to family), morphology, anatomy and reproduction of Marchantia and Funaria. (Developmental details not to be included). Ecology and economic importance of bryophytes with special mention

of Sphagnum.
Unit 6: Pteridophytes (8 Lectures) General characteristics, classification, Early land plants (Cooksonia and Rhynia). Classification (up to family), morphology, anatomy and reproduction of Selaginella, Equisetum and Pteris. (Developmental details not to be included). Heterospory and seed habit, stelar evolution. Ecological and economical
importance of Pteridophytes.
Unit 7: Gymnosperms (6 Lectures) General characteristics, classification. Classification (up to family), morphology, anatomy and reproduction of Cycas and Pinus. (Developmental details not to be included). Ecological and economical importance.

Practical
1. EMs/Models of viruses – T-Phage and TMV, Line drawing/Photograph of Lytic and Lysogenic Cycle.
2. Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; Binary Fission; Conjugation; Structure of root nodule.
3. Gram staining
4. Study of vegetative and reproductive structures of Nostoc, Chlamydomonas (electron micrographs), Oedogonium, Vaucheria, Fucus* and Polysiphonia through temporary preparations and permanent slides. (* Fucus - Specimen and permanent slides)
5. Rhizopus and Penicillium: Asexual stage from temporary mounts and sexual structures through permanent slides.
6. Alternaria: Specimens/photographs and tease mounts.
7. Puccinia: Herbarium specimens of Black Stem Rust of Wheat and infected Barberry leaves; section/tease mounts of spores on Wheat and permanent slides of both the hosts.
8. Agaricus: Specimens of button stage and full grown mushroom; Sectioning of gills of Agaricus.
9. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose)
10. Mycorrhiza: ecto mycorrhiza and endo mycorrhiza (Photographs)
11. Marchantia- morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemma cup, w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore, l.s. sporophyte (all permanent slides).
12. Funaria- morphology, w.m. leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, l.s. capsule and protonema.
13. Selaginella- morphology, w.m. leaf with ligule, t.s. stem, w.m. strobilus, w.m. microsporophyll and megasporophyll (temporary slides), l.s. strobilus (permanent slide).
14. Equisetum- morphology, t.s. internode, l.s. strobilus, t.s. strobilus, w.m. sporangiophore, w.m. spores (wet and dry)(temporary slides); t.s rhizome (permanent slide).
15. Pteris- morphology, t.s. rachis, v.s. sporophyll, w.m. sporangium, w.m. spores (temporary slides), t.s. rhizome, w.m. prothallus with sex organs and young sporophyte (permanent slide).
16. Cycas- morphology (coralloid roots, bulbil, leaf), t.s. coralloid root, t.s. rachis, v.s. leaflet, v.s. microsporophyll, w.m. spores (temporary slides), l.s. ovule, t.s. root (permanent slide).
17. Pinus- morphology (long and dwarf shoots, w.m. dwarf shoot, male and female), w.m. dwarf shoot, t.s. needle, t.s. stem, , l.s./t.s. male cone, w.m. microsporophyll, w.m. microspores (temporary slides), l.s. female cone, t.l.s. & r.l.s. stem (permanent slide).

Department: Botany
Course: Program
Paper Title: Plant Ecology and Taxonomy
Paper Code: BBOTCCRC201
Syllabus:
Unit 1: Introduction (2 Lectures)
Unit 2: Ecological factors (10 Lectures) Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes.
Unit 3: Plant communities (6 Lectures) Characters; Ecotone and edge effect; Succession; Processes and types.
Unit 4: Ecosystem (8 Lectures) Structure; energy flow trophic organisation; Food chains and food webs, Ecological

pyramids production and productivity; Biogeochemical cycling; Cycling of carbon, nitrogen and Phosphorous
Unit 5: Phytogeography (4 Lectures) Principle biogeographical zones; Endemism
Unit 6 Introduction to plant taxonomy (2 Lectures) Identification, Classification, Nomenclature.
Unit 7 Identification (4 Lectures) Functions of Herbarium, important herbaria and botanical gardens of the world and India; Documentation: Flora, Keys: single access and multi-access.
Unit 8 Taxonomic evidences from palynology, cytology, phytochemistry and molecular data. (6 Lectures)
Unit 9 Taxonomic hierarchy (2 Lectures) Ranks, categories and taxonomic groups
Unit 10 Botanical nomenclature (6 Lectures) Principles and rules (ICN); ranks and names; binominal system, typification, author citation, valid publication, rejection of names, principle of priority and its limitations.
Unit 11 Classification (6 Lectures) Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series).
Unit 12 Biometrics, numerical taxonomy and cladistics (4 Lectures) Characters; variations; OTUs, character weighting and coding; cluster analysis; phenograms,
cladograms (definitions and differences)
Practical
1. Determination of pH, and analysis of two soil / water samples for carbonates, chlorides, nitrates, sulphates, organic matter by rapid kit field test.
3. Comparison of bulk density, porosity and rate of infiltration of water in soil of three habitats.
4. (a) Study of morphological adaptations of hydrophytes and xerophytes (four each). (b)Study of biotic interactions of the following: Stem parasite (Cuscuta), Root parasite (Orobanche), Epiphytes, Predation (Insectivorous plants)
5. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)
6. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law
7. Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position
according to Bentham & Hooker's system of classification):Malvaceae - *Sida / Abutilon*; Asteraceae - *Vernonia / Ageratum, Eclipta / Tridax*;
Solanaceae -*Solanum nigrum, Withania*; Lamiaceae - *Leucas, Ocimum*; Liliaceae - *Lilium / Allium.*
8. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted with record book).

Department: Botany
Course: Program
Paper Title: Nursery and Gardening
Paper Code: BBOTSERT604
Syllabus:
Unit 1: Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants. (4
Lectures)
Unit 2: Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion - Seed production technology - seed testing and certification. (6 Lectures)
Unit 3:Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants - green house - mist chamber, shed root, shade house and glass house. (6Lectures)
Unit 4: Gardening: definition, objectives and scope - different types of gardening - landscape and home gardening - parks and its components - plant materials and design - computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.
(8 Lectures)
Unit 5: Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study of cultivation of different

vegetables: cabbage, brinjal, lady's finger, onion, garlic,tomatoes, and carrots - Storage and marketing procedures. (6 Lectures)

Department: Physics
Course: Program
Paper Title: Renewable Energy and Energy harvesting
Paper Code: BPHSSERT304
Syllabus:

Fossil fuels and Alternate Sources of energy: Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity. **(3 Lectures)**

Solar energy: Solar energy, its importance, storage of solar energy, solar pond, non-convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems. **(6 Lectures)**

Wind Energy harvesting: Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies. **(3 Lectures)**

Ocean Energy: Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices. **(3 Lectures)**
Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, Ocean Bio-mass. **(2 Lectures)**

Geothermal Energy: Geothermal Resources, Geothermal Technologies. **(2 Lectures)**

Hydro Energy: Hydropower resources, hydropower technologies, environmental impact of hydro power sources. **(2 Lectures)**

Piezoelectric Energy harvesting: Introduction, Physics and characteristics of piezoelectric effect, materials and mathematical description of piezoelectricity, Piezoelectric parameters and modeling piezoelectric generators, Piezoelectric energy harvesting applications, Human power. **(4 Lectures)**

Electromagnetic Energy Harvesting

1. Linear generators, physics mathematical models, recent applications . **(2 Lectures)**
2. Carbon captured technologies, cell, batteries, power consumption **(2 Lectures)**
3. Environmental issues and Renewable sources of energy, sustainability. **(1 Lectures)**

Demonstrations and Experiments

1. Demonstration of Training modules on Solar energy, wind energy, etc.
2. Conversion of vibration to voltage using piezoelectric materials
3. Conversion of thermal energy into voltage using thermoelectric modules.

Department: Physics
Course: Program
Paper Title: Physics of Earth
Paper Code: BPHSDSRT4
Syllabus:

The Earth and the Universe:

(a) Origin of universe, creation of elements and earth. A Holistic understandingof our dynamic planet through Astronomy, Geology, Meteorology and Oceanography. Introduction to various branches of Earth Sciences.
(b) General characteristics and origin of the Universe. The Milky Way galaxy,solar system, Earth's orbit and spin, the Moon's orbit and spin. The terrestrial and Jovian planets. Meteorites & Asteroids. Earth in the Solar system, origin,size, shape, mass, density, rotational and revolution parameters and its age.
(c) Energy and particle fluxes incident on the Earth.

Structure:

(a) The Solid Earth: Mass, dimensions, shape and topography, internal structure, magnetic field, geothermal energy. How do we learn about Earth's interior?
(b) The Hydrosphere: The oceans, their extent, depth, volume, chemicalcomposition. River systems.

(c) The Atmosphere: variation of temperature, density and composition withaltitude, clouds.
(d) The Cryosphere: Polar caps and ice sheets. Mountain glaciers.
(e) The Biosphere: Plants and animals. Chemical composition, mass. Marine andland organisms

Dynamical Processes:

(a) The Solid Earth: Origin of the magnetic field. Source of geothermal energy.Convection in Earth's core and production of its magnetic field. Concept of plate tectonics; sea-floor spreading and continentaldrift. Origin of oceans, continents, mountains andrift valleys. Earthquake and earthquake belts. Volcanoes: types products anddistribution.
(b) The Hydrosphere: Ocean circulations. Oceanic current system and effect ofcoriolis forces.
(c) The Atmosphere: Atmospheric circulation. Weather and climatic changes.Earth's heat budget. Cyclones.
(d) Climate: i. Earth's temperature and greenhouse effect.
ii. Paleoclimate and recent climate changes.
iii. The Indian monsoon system.
(e) Biosphere: Water cycle, Carbon cycle, Nitrogen cycle, Phosphorous cycle.The role of cycles in maintaining a steady state.

Evolution:

Nature of stratigraphic records, Standard stratigraphic time scale and introductionto the concept of time in geological studies. Introduction to geochronologicalmethods in their application in geological studies. History of development inconcepts of uniformitarianism, catastrophism and neptunism. Law ofsuperposition and faunal succession. Introduction to the geology andgeomorphology of Indian subcontinent.
a. Time line of major geological and biological events.
b. Origin of life on Earth.
c. Role of the biosphere in shaping the environment.
d. Future of evolution of the Earth and solar system: Death of the Earth.

Disturbing the Earth – Contemporary dilemmas:

(a) Human population growth.
(b) Atmosphere: Green house gas emissions, climate change, air pollution.
(c) Hydrosphere: Fresh water depletion.
(d) Geosphere: Chemical effluents, nuclear waste.
(e) Biosphere: Biodiversity loss. Deforestation. Robustness and fragility of ecosystems.

Department: History
Course: Hons
Paper Title: Colonialism and Developments in the Environment: India
Paper Code: BHISGEHT2
Syllabus:

1. Geography, ecology and cultures in pre-Colonial India: land, forests, ecology of hills and mountains – 15 classes
2. Colonialism and developments: new regimes of land, forests, irrigation; tribal and peasants resistance – 25 classes
3. Environmental issues in Independent India: displacement and degradation – 20 classes
   Environmental movements in Independent India – 15 classes

Department: History
Course: Hons
Paper Title: Delhi Sultanate Administration and Economy
Paper Code: BHISCCHT302
Syllabus:

1. The Delhi Sultanate: sources and historiography; political structure in the Turko-Afghan period; overview of political history – 20 classes
2. Ruling elites; military organization; Mongol threats; territorial changes; *iqta* system; relations with rural intermediaries – 20 classes

3. Society and economy in North India; environmental contexts; agricultural production and technology; rural society and revenue system – 20 classes
4. Urbanization and non-agricultural production; monetization, market regulations and trade; Indian Ocean trade – 15 classes

Department: History
Course: Hons
Paper Title: Consolidation of Mughal Rule Under Akbar
Paper Code: BHISCCHT303
Syllabus:

1. Overview of the growth of Mughal power till Akbar; administrative evolution: *Mansab* and *Jagir*; the Mughal ruling class and nobility; state and religion under Akbar and a comparative study with the other Mughal rulers – 20 classes
2. Rural economy and society: environmental context; agrarian sector: zones, productions, crop patterns, technology and management of water resources; agrarian structure: revenue, and land rights; village community and the peasantry – 25 classes
3. Urban centres: morphology of cities; urban economy: crafts and manufacturers – 15 classes
urban social structure: merchants, bankers, artisans and labourers; trade routes: internal trades, ocean trades- 15 classes

Department: Political Science
Course: Hons
Paper Title: Environment and Politics
Paper Code: BPLSCCHT602
Syllabus:

1. Environmental concerns in globalising world.
(Pollution of Global Commons, Global Trade versus Environment, Global warming etc.)
2. North South divide in environmental negotiations.
3. Sustainable Development: Meaning, features and critique.
4. United Nations Framework Convention on Climate Change (UNFCCC, 1992): Basic features of the Convention/ Key provisions.
5. India's stand in environmental negotiations.
6. Environmentalism, Major strands of environmentalism; Some major environmental movements in India (Chipko, Narmada Banchao Andolan and Silent Valley movement).

Department: Geography
Course: Hons
Paper Title: Environmental Geography
Paper Code: BGEOCCHT-501
Syllabus:

1. Geographers' approach to environmental studies
2. Perception of environment in different stages of civilization
3. Concept of holistic environment and system approach
4. Ecosystem: Concept, structure and functions
5. Environmental pollution and degradation: Land, water and air
6. Space–time hierarchy of environmental problems: Local, regional and global
7. Urban environmental issues with special reference to waste management
8. Environmental programmes and policies – Global, national and local levels

Department: Geography
Course: Hons
Paper Title: CC 5 – Climatology
Paper Code: BGEOCCHT301

Syllabus:

Unit 1: Elements of the Atmosphere

1. Nature, composition and layering of the atmosphere
2. Insolation: controlling factors. Heat budget of the atmosphere.
3. Temperature: horizontal and vertical distribution. Inversion of temperature: types, causes and consequences.
4. Greenhouse effect and importance of ozone layer.

Unit 2: Atmospheric Phenomena and Climatic Classification

1. Condensation: Process and forms. Mechanism of precipitation: Bergeron-Findeisen theory, collision and coalescence. Forms of precipitation.
2. Air mass: Typology, origin, characteristics and modification.
3. Fronts: warm and cold; frontogenesis and frontolysis.
4. Weather: stability and instability; barotropic and baroclinic conditions.
5. Circulation in the atmosphere: Planetary winds, jet stream, index cycle
6. Tropical and mid-latitude cyclones
7. Monsoon circulation and mechanism with reference to India
8. Climatic classification after Köppen, Thornthwaite and Oliver

Department: Geography
Course: Hons
Paper Title: CC 11 – Environmental Geography
Paper Code: BGEOCCHT501
Syllabus:

1. Geographers' approach to environmental studies
2. Perception of environment in different stages of civilization
3. Concept of holistic environment and system approach
4. Ecosystem: Concept, structure and functions
5. Environmental pollution and degradation: Land, water and air
6. Space–time hierarchy of environmental problems: Local, regional and global
7. Urban environmental issues with special reference to waste management
8. Environmental programmes and policies – Global, national and local levels

Department: Geography
Course: Hons
Paper Title: DS 4-Soil and Biogeography
Paper Code: BGEODSHT4
Syllabus:

1. Factors or soil formation. Man as an active agent of soil transformation.
2. Soil profile. Origin and profile characteristics of Lateritic, Podzol and Chernozem soils
3. Definition and significance of soil properties: Texture, structure and moisture,
4. Definition and significance of soil properties: pH, organic matter and NPK
5. Soil erosion and degradation: Factors, processes and mitigation measures
6. Principles of soil classification: Genetic and USDA. Concept of land capability and its classification.
7. Concepts of biosphere, ecosystem, biome, ecotone, community and ecology
8. Concepts of trophic structure, food chain and food web. Energy flow in ecosystems
9. Geographical extent and characteristic features of: Tropical rain forest, Taiga and Grassland biomes
10. Bio-geochemical cycles with special reference to carbon dioxide and nitrogen
11. Deforestation: Causes, consequences and management
12. Bio-diversity: Definition, types, threats and conservation measures

Department: Geography
Course: Hons
Paper Title: GE 1 – Climate Change: Vulnerability and Adaptation
Paper Code: BGEOGEHT14

Syllabus:

Unit 1: Elements of the Atmosphere

1. Nature, composition and layering of the atmosphere,
2. Insolation: controlling factors. Heat budget of the atmosphere.
3. Temperature: horizontal and vertical distribution. Inversion of temperature: types, causes and consequences.
4. Greenhouse effect and importance of ozone layer.

Unit 2: Atmospheric Phenomena and Climatic Classification

1. Condensation: Process and forms. Mechanism of precipitation: Bergeron-Findeisen theory, collision and coalescence. Forms of precipitation.
2. Air mass: Typology, origin, characteristics and modification.
3. Fronts: warm and cold; frontogenesis and frontolysis.
4. Weather: stability and instability; barotropic and baroclinic conditions.
5. Circulation in the atmosphere: Planetary winds, jet stream, index cycle
6. Tropical and mid-latitude cyclones
7. Monsoon circulation and mechanism with reference to India
8. Climatic classification after Köppen, Thornthwaite and Oliver

Department: Zoology
Course: Hons
Paper Title: Environment and Public Health
Paper Code: BZOOGEHC17A
Syllabus:

Unit 1: Protista

1. Protozoa
2. General characters of Protozoa; Life cycle of *Plasmodium*

Unit 2: Porifera

General characters and canal system in Porifera

Unit 3: Radiata

General characters of Cnidarians and polymorphism

Unit 4: Aceolomates

General characters of Helminthes

Unit 5: Pseudocoelomates

1. General characters of Nematoda
2. Parasitic adaptations

Unit 6: Annelida

1. General characters of Annelida
2. Metamerism

Unit 7: Arthropoda

1. General characters
2. Social life in insects.

Unit 8: Mollusca

1. General characters of mollusc

1. Pearl Formation

Unit 9: Echynodermata

1. General characters of Echinodermata
2. Water Vascular system in Starfish

Unit 10: Protochordata

Salient features

Unit 11: Pisces

1. General Characters
2. Osmoregulation, Migration of Fish

Unit 12: Amphibia

General characters, Adaptations for terrestrial life, Parental care

Unit 13: Reptilia

1. General Characters
2. Amniotes; Origin of reptiles. Terrestrial adaptations in reptiles.

Unit 14: Aves

1. General Characters
2. The origin of birds; Flight adaptations

Unit 15: Mammalia

1. General Characters
2. Early evolution of mammals; Primates; Dentition in mammals.

List of Practical

1. Study of following specimens:
1. Non Chordates: *Euglena*, *Noctiluca*, *Paramecium*, *Sycon*, , *Physalia*, *Tubipora*, *Metridium*, *Taenia*, *Ascaris*, *Nereis*, *Aphrodite*, Leech, *Peripatus*, *Limulus*, Hermitcrab, *Daphnia*, Millipede, Centipede, Beetle, *Chiton*, *Dentalium*, *Octopus*, *Asterias*, and *Antedon*.
2. Chordates: *Balanoglossus*, *Amphioxus*, *Petromyzon*, *Pristis*, *Hippocampus*, *Labeo*, *Icthyophis*/*Uraeotyphlus*, Salamander, *Rhacophorus, Draco*, *Uromastix*, *Naja*, *Viper*, model of Archaeopteryx, any three common birds- (Crow, duck, Owl), Squirrel and Bat.
2. Study of following Permanent Slides:
   Cross section of *Sycon*, Sea anemone and *Ascaris* (male and female). T. S. of Earthworm passing through pharynx, gizzard, and typhlosolar intestine. Bipinnaria and Pluteus larva.
1. Temporary mounts of:
1. Septal & pharyngeal nephridia of earthworm.
2. Unstained mounts of Placoid, cycloid and ctenoid scales.
2. Dissections of:
1. Digestive and nervous system of Cockroach
2. Urinogenital system of Rat

Department: History
Course: Hons
Paper Title: Early History of India (Proto-History to 6th century B.C.)
Paper Code: BHISCCHT101
Syllabus:

1. Reconstructing Ancient Indian History: Sources and approaches of historical reconstruction; historical interpretation with special reference to gender, environment, technology and regions – 15 Classes
2. Pre-history and Proto-history: Paleolithic, Neolithic habitation; growth of Chalcolithic culture; economic and technological evolution – 15 Classes
3. The Harappan civilization and its origin, antiquity, morphology of major cities, agricultural base and development; growth of commerce and trade; religious beliefs and practices – 15 Classes
4. Background to early historic India: the Aryan problem: debate and reconstruction; the Vedic age: economy, polity, society and religion; latter-Vedic age: economy, polity, society and religion; Sixteen Mahajanapadas – Rise of Magadha, Persian and Greek invasion – 30 Classes

Department: Sanskrit
Course: Program
Paper Title: Environmental Awareness in Sanskrit literature
Paper Code: BSNSDSRT4
Syllabus:
Section 'A' Environmental Issues and Importance of Sanskrit Literature :
Science of Environment : Definition, Scope and Modern Crises : Role of Environment in human civilization; Meaning and definitions of The Environment; Various name for Science of Environment: 'Ecology', 'Paryavarana', Prakriti Vijnana'; Main components of Environment: living organisms(Jaiva Jagat) and non-living materials (Bhoutika Padarth). Elementary factor of Environment Physical elements, Biological elements and Cultural

elements. Modern Challenges and Crises of Environment : Global warming, Climate change, Ozone depletion, Explosively increase in Pollution, Decrease in underground water label, River pollution, Deforestation in large scale. Natural calamities such as flood, draft and earthquakes Environmental Background of Sanskrit Literature : Importance of Sanskrit Literature from the view point of Science of environment ; Concept of ' Mother Earth' and worship of Rivers in Vedic literature; Brief survey of 06 environmental issues such as protection and preservation of mother nature, planting trees in forests, and water preservation techniques as propounded in the Sanskrit Literature. Buddhist and Jain concepts of ecology, protection of trees, love for animals and birds;

Section 'B' Environment Awareness in Vedic Literature :

Environmental Issues and Eco-system in Vedic Literature Divinity to Nature, Co-ordination between all natural powers of universe; Cosmic order 'Rta' as the guiding force for environment of whole universe (Rgveda, 10.85.1); Equivalent words for Environment in Atharvaveda : 'Vritavrita' (12.1.52), 'Abhivarah,'(1.32.4.), 'Avritah' (10.1.30), 'Parivrita'' (10.8.31); five basic elements of universe covered by environment : Earth, Water, Light, Air, and Ether. (Aitareya Upanishad 3.3) ; Three constituent elements of environment known as 'Chandansi': Jala (water),Vayu (air), and Osadhi (plants) (Atharvaveda, 18.1.17); Natural sources of water in five forms: rain water(Divyah),natural spring(Sravanti), wells and canals (Khanitrimah), lakes (Svayamjah) and rivers(Samudrarthah) Rigveda, 7.49.2). Environment Preservation in Vedic Literature: Five elementry sources of environment preservation: Parvat(mountain), Soma (water),Vayu (air), Parjanya (rain) and Agni (fire) (Atharvaveda, 3.21.10); Environment Protection from Sun (Rgveda,1.191.1-16,Atharvaveda,2.32.1-6, Yajurveda,4.4,10.6); Congenial atmosphere for the life created by the Union of herbs and plants with sun rays (Atharvaveda,5.28.5);Vedic concept of Ozone-layer Mahat ulb'(Rgveda,10.51.1; Atharvaveda,4.2.8); Importance of plants and animals for preservation of global ecosystem; (Yajurveda ,13.37); Eco friendly environmental organism in Upanishads (Brhadaranyaka Upanishad,3.9.28,Taittiriya Upanishad,5.101, Iso-Upanishad,1.1).

Section 'C' Environment Awareness in Classical Sanskrit Literature :

Environmental Awareness and Tree plantation : Planting of Trees in Puranas as a pious activity (Matsya Purana ,59.159;153.512 ; Varaha Purana 172. 39),Various medinal trees to be planted in forest by king (Sukraniti,4.58-62) Plantation of new trees and preservation of old trees as royal duty of king (Arthasastra, 2.1..20); Punishments for destroying trees and plants (Arthasastra,3.19), Plantation of trees for recharging under ground water(Brhatsamhita, 54.119). Environmental Awareness and Water management : Various types of water canels & 'Kulya' for irigation : canal originated from river 'Nadimatr mukha kulya', canal originated from nearbv mountain 'Parvataparsva vartini kulya', canal originated from pond,'Hrdasrta kulya', Preservation of water resources 'Vapi – kupa –tadaka' (Agnipuranas,209-2;V.Ramayana,2.80.10-11); Water Harvesting system in Arthasastra (2.1.20-21);Underground Water Hydrology in Brhatsamhita (Dakargaiadhyaya,chapter54); 06 Credits Unit: III Universal Environmental Issues in Literature of Kalidasa : Eight elements of Environment and concept of 'Astamurti' Siva (Abhijnasakuntalam1.); Preservation of forest,water resources, natural resources; protection of animals, birds and plant in Kalidasa's works, Environmental awareness in Abhijnasakuntalam Drama, Eco- system of indian monsoon in Meghdoot, Seasonl weather conditions of Indian sub continent in Rtusamhara, Himalayan ecology in Kumarasambhava, Oceanography in Raghuvamsa (canto-13).

Department: Geography
Course: Hons
Paper Title: CC 6 – Geography of India
Paper Code: BGEOCCHT302
Syllabus:

Unit 1: Geography of India

1. Tectonic and stratigraphic provinces, physiographic divisions
2. Climate, soil and vegetation: Characteristics and classification
3. Population: Distribution, growth, structure and policy
4. Distribution of population by race, caste, religion, language, tribes and their correlates
5. Agricultural regions. Green revolution and its consequences
6. Mineral and power resources distribution and utilisation of iron ore, coal, petroleum, gas;
7. Industrial development: Automobile and information technology
8. Regionalisation of India: Physiographic (R. L. Singh), Socio-cultural (Sopher) and Economic (Sengupta)

Unit 2: Geography of West Bengal

1. Physical perspectives: Physiographic divisions, forest and water resources
2. Population: Growth, distribution and human development
3. Resources: Mining, agriculture and industries
4. Regional Problem: Darjeeling Hills, Jangalmahal and Sundarban

Department: Geography
Course: Hons
Paper Title: CC 8 – Regional Planning and Development
Paper Code: BGEOCCHT401
Syllabus:

Unit 1: Regional Planning

1. Concept of regions: Types of regions and their delineation.
2. Types of planning, principles and objectives of regional planning, multi- level planning in India
3. Tools and techniques of regional planning, need for regional planning in India
4. Metropolitan concept: metropolitan areas, and urban agglomerations

Unit 2: Geography of West Bengal

1. Development: Meaning, growth versus development
2. Concept and strategies of regional development with reference to India
3. Theories and models for regional development : Growth pole model of perroux; growth centre model in Indian context
4. Theories and models for regional development: Cumulative causation (Myrdal) and core periphery (Hirschman, Rostov and Friedman)
5. Changing concept of development, concept of underdevelopment; efficiency-equity debate
6. Indicators of development: Economic, social and environmental. Human development.
7. Regional development in India, regional inequality, disparity and diversity
8. Need and measures for balanced development in India

Department: Geography
Course: Hons
Paper Title: DS 5 – Social Geography
Paper Code: BGEODSHT5
Syllabus:

Unit 1:

7. Social Geography: Concept, Origin, Nature and Scope
8. Concept of Space, Social differentiation and stratification; social processes
9. Social Categories: Caste, Class, Religion, Race and Gender and their Spatial distribution
10. Basis of Social region formation; Evolution of social-cultural regions of India
11. Peopling Process of India: Technology and Occupational Change; Migration.
12. Social groups, social behaviour and contemporary social environmental issues with special reference to India

Unit 2:

7. Concept of Social Well-being, Quality of Life, Gender and Social Well-being
8. Measures of Social Well-being: Healthcare, Education, Housing, Gender Disparity
9. Social Geographies of Inclusion and Exclusion, Slums, Gated Communities, Communal Conflicts and Crime.
10. Social Planning during the Five Year Plans in India
11. Social Policies in India: Education and Health
12. Social Impact Assessment (SIA): Concept and importance

Department: Geography
Course: Hons
Paper Title: GE 2 – Rural Development
Paper Code: BGEOGEHT14A
Syllabus:

1. Defining Development: Inter-Dependence of Urban and Rural Sectors of the Economy

2. Paradigms of Rural Development: Lewis Model of Economic Development, 'Big Push' theory of Development, Myrdal's thesis of 'Spread and Backwash Effects'
3. Need for Rural Development, Gandhian Approach to Rural Development
4. Rural Economic Base: Agriculture and Allied Sectors, Seasonality and Need for expanding Non-Farm Activities,
5. Rural Co-operatives and agricultural marketing
6. Area Based Approach to Rural Development: Drought Prone Area Programmes, PMGSY
7. Target Group Approach to Rural Development: SJSY, MNREGA, Jan DhanYojana
8. Provision of Services – Physical and Socio-Economic Access to Elementary Education and Primary Health Care and Micro credit; Concept of PURA
9. Rural Governance: Panchayati Raj System, Rural Development Policies and Programmes in India
10. Rural Infrastructural Development programmes relating to: Rural Electrification,
11. Transport, Housing, and Connectivity
12. Rural Development Programmes for Women and children: Janani SurakshaYojana , National Nutrition Mission, Drinking water and sanitation programmes, NRHM, Sarva Sikha Mission

Department: Geography
Course: Hons
Paper Title: DS 2- Urban Geography
Paper Code: BGEODSHT2
Syllabus:
Unit1:

1. Urban Geography: nature and scope, different approaches and recent trends in urban geography
2. Origin of urban places in Ancient, Medieval, Modern and Post-Modern periods- factors, stages, and characteristics.
3. Theories of Urban Evolution and Growth: Hydraulic Theory, Economic Theory
4. Aspects of urban places: Location, site and situation, Size and Spacing of Cities: The Rank Size Rule, The Law of the Primate City
5. Urban Hierarchies : Central Place Theory; August Loch's theory of Market Centres
6. Patterns of urbanisation in developed and developing countries

Unit 2:

1. Ecological processes of urban growth; Urban fringe; City- Region
2. Theories of city structure-concentric zone theory, sector theory, multiple nuclei theory
3. Urban Issues: problems of housing, slums, civic amenities (water and transport)
4. Patterns and trends of urbanization in India
5. Policies on urbanization. Urban change/landscape in post-liberalized period in India
6. Case studies of Delhi, Kolkata, and Chandigarh with reference to land use

Department: Geography
Course: Hons
Paper Title: DS 3- Population Geography
Paper Code: BGEODSHT3
Syllabus:
Unit 1:

1. Development of Population Geography as a field of specialization. Relation between population geography and demography. Sources of population data, their level of reliability and problems of mapping.
2. Population distribution: density and growth. Classical and modern theories in population distribution and growth, Demographic transition model.
3. World patterns determinants of population distribution and growth. Concept of optimum population.
4. Population distribution, density and growth profile in India.

Unit 2:

1. Population Composition and Characteristics– Age-Sex Composition; Rural and Urban Composition; Literacy.
2. Measurements of fertility and mortality. Concept of cohort and life table
3. Population composition of India. Urbanisation, Occupational structure.

4. Migration: Causes and types
5. National and international patterns of migration with reference to India.
6. Population and development: population-resource regions. Concept of human development index and its components.
7. Population policies in developed and less development countries. India's population policies, population and environment, implication for the future.
8. Contemporary Issues – Ageing of Population; Declining Sex Ratio; Population and environment dichotomy, HIV/AIDS.