বাঁকুড়া বিশ্ববিদ্যালয়
বাংলা বিভাগ
বিষয় : রেট পরীক্ষার পাঠক্রম ২০১৮-১৯

বিভাগ- ক
বিষয় : রিসার্চ মেথডলজি (৫x৫=২৫)

বিভাগ- খ
বিষয় : বাংলা ভাষা ও সাহিত্য (১০+১৫=২৫)

১) আদি ও মধ্যযুগের বাংলা সাহিত্য : আধুনিক ও উত্তরাধুনিক তত্ত্বসমূহের আলোকে মূল্যায়ন
২) আধুনিক বাঙালি কবিদের সৃষ্টিবিশ্ব : তত্ত্বকেন্দ্রিক মূল্যায়ন
৩) বাংলা কথাসাহিত্য : তুলনামূলক পাঠ
৪) বাংলা নাটক : বিষয় ও তত্ত্বকেন্দ্রিক মূল্যায়ন
৫) বাংলা প্রবন্ধ : তুলনামূলক ও শৈলীগত মূল্যায়ন

BANKURA UNIVERSITY

SYLLABUS OF RET (RESEARCH ELLIGIBILITY TEST) IN BOTANY

SUBJECT

Microbiology

1. **History of Microbiology and bacterial classification**: - Early history and milestone discoveries in Microbiology
2. **Bacterial Taxonomy**:- Brief idea about the modern approach of bacterial taxonomy.
3. **Ultrastructure of prokaryotic cell**:- Cell wall and cell membrane of bacteria and archaea; Muerin biosynthesis; capsule, pili, and flagella. Mechanism of flageller movement and chemotaxis; Reserve material and other cytoplasamic inclusions; Endospore – structure, formation and regulation of endospore formation and germination.

4. **Bacterial genetic material**: – Structure and replication of bacterial chromosome; Plasmid – structure type and properties, episome; Spontaneous and induced mutation of bacteria.
5. **Bacterial growth and nutrition** :- Growth curve, growth factor, growth kinetics ; batch and continuous culture; synchronous culture , enrichment culture, diauxic growth; Microbial growth control by disinfectant, antiseptic and chemotherapeutic agents – a brief account of their types and mode of action. Brief idea about Autotrophy, heterotrophy and Mixotrophy.
6. **Genetic recombination in bacteria:** – Molecular mechanism of Transformation, Conjugation, Transduction, Gene mapping and Complementation test.
7. **Gene regulation and metabolic inhibition in bacteria**: - Operon concept; *lac* and *trp* operon; catabolic repression, attenuation and riboswitch; allosteric control, types of feedback inhibition and isozyme.
8. **Microbes in N_2 Cycle**:-Nitrification, Denitrification, Ammonification; Mechanism of biological N_2 fixation; structure and regulation of *nif* gene.
9. **Virus:** - Organization and structure of Capsid, Viral genome –types and structure; Replication of virus and viral nuclic acid, Lytic and lysogenic cycle of bacteriophage , regulation of lysogeny , induction of lysogeny and significance of lysogeny; Viroid and Prion.
10. **Fundamentals of Immunology**:- Innate and acquired immunity, T-cell, B-cell, MHC, Cytokines, Antigen- types and characteristics; Structure and functions of immunogloblins, Cell mediated and Humoral Immunity; Ag-Ab reactions and Immunological techniques – RIA, ELISA .

Phycology

1. Modern criteria of algal classification with special emphasis on chloroplast ultrastructure, flagella and pigments.
2. Endosymbiosis and its significance in algae.
3. Cyanophyta: General features & ecology; genetic recombination; heterocyst structure and function; affinities.
4. Rhodophyta: General features; specialities in sexual reproduction and post-fertilization changes.
5. Chlorophyta: Characteristic features of different classes highlighting distinctive features of different orders; evolutionary trends.
6. Photosynthetic Stramenopiles: distinctive features
    a) Diatoms: Features and ecology.
    b) Xanthophyceans: General features, parallelism with green algae & affinities.
    c) Phaeophyceans: General features & ecology; lifecycle patterns.
7. Algal biotechnology: aquaculture, bioremediation, biodiesel, bioethanol and hydrogen production by algae, carbon sequestration by algae, algae as health food; Industrial use of algae, photobioreactors and raceway ponds.

Mycology

1**. Position of fungi in modern systematic:** Modern approaches towards classification of fungi.
2**. Ultrastructural features of fungal cell structures:** Nucleus and its division, cell wall and its biochemical composition, tissue organization, modifications of fungal hyphae.

3. **Life cycle patterns:** Basic pattern of sexuality, sexual mechanisms and their correlations in different groups of fungi, Parasexual cycle-basic concept.
4. **Fungal symbionts:** Mycorhizae-basic concept and their applications. Lichen-Phycobiont and mycobiont, histology, biology and physiology of lichen thallus, economic importance of lichen.
5. **Beneficial uses of fungi:** Fungi in medicine and antibibtic production, alcohol production and organic acid production; industrial production of alcohol and penicillin.
6. **Edible Mushrooms:** cultivation technology, nutritional and medicinal properties of mushrooms.
7. **Fungi as animal parasites:** Mycoses of vertebrates- types and symptoms, insect fungus association. .
8. **Mastigomycotina:** A comprehensive knowledge with emphasis on occurrence of sex hormones and sporangia to conidia transition.
9. **Ascomycotina:** A comprehensive knowledge with emphasis on types of ascocarps and methods of spore dispersal.
10. **Basidiomycotina:** A comprehensive knowledge with emphasis on fruiting structures and methods of spore dispersal.
11**. Deuteromycotina:** A general account with emphasis on sporulating structures of the members, classification with special reference to conidial ontogeny.
12. **Fungal diseasesin animal and man** and their management.

Plant Pathology

1. History of the development of Plant Pathology.
2. Plant diseases: Classification and types.
3. Pathogenesis: Contact, entry and penetration, infection of host tissue and disease development relationship between pathogen and host factor(s).
4. Plant pathogen in offence: enzymes, toxins and growth regulators.
5. Host plant in defense: structural and biochemical defense; concept of horizontal and vertical resistance.
6. Physiological changes in host plants as a result of infection: Photosynthesis, Respiration Translocation of water and nutrients; Molecular changes in protein and nucleic acid in diseased plants.
7. Plant disease epidemiology: Factors responsible for development of plant disease epidemic; Disease forecasting and Remote Sensing; Computer simulation technique.
8. Strategies of plant disease management: Cultural, chemical, biological and integrated management of pest and diseases; Biopesticides and their applications in management of plant diseases.
9. Seed pathology: Factors responsible for seed deterioration, effect of fungal deterioration of seeds and grains, mycotoxin production and control of seed deterioration.
10. Wood decay: Decay of wood and wood products by wood rotting fungi; Structural and biochemical changes of wood as a result of decay.
11. Study of plant diseases: Symptoms, etiology, disease cycles and control measures of some important diseases of the following crops: Rice, Wheat, Potato, Sugarcane and Tea.

Bryology

1. Introduction: Diversity in forms, habitats, economic importance and ecological values.
2. Classification of Bryophytes – traditional and modern systems.
3. Brief idea about: a) Bryophyte phylogeny b) Fossil Bryophytes c) Photoperiodism
d) Water relations e) Axenic culture of Bryophytes h) Peristome characteristics and their importance i) Broad ideas.

Pteridology

1. Introduction about pteridophytes.
2. Concept about primitive and advanced characters as proposed by Bower.
3. An idea about the outline system of classifications of ferns by Copeland (1947) and Pichi Sermolli (1977).
4. Comparative studies on the vegetative and reproductive organographies, evolutionary tendencies and affinities of the members belonging to different groups of Rhyniopsida. Zosterophyllopsida, Trimerophytopsida, Psilopsida, Lycopsida (Drepanophycales, Protolepidodendrales, Lycopodiales, Selaginellales, Lepidodendrales and Isoetales) and Sphenopsida (Hyeniales, Sphenophyllales, Calamitales and Equisetales).
5. A comparative study of the members belonging to the following taxonomic groups and also their systematic treatments, evolutionary tendencies and affinities: (a) Coenopteridales, (b) Marattiales, (c) Ophioglossales, (d) Filicales (Schizaeaceae, Gleicheniaceae, Cyatheaceae, Polypodiaceae), (e) Salviniales, (f) Marsileales.
6. Stelar concept, types and evolution
7. Soral evolution in ferns
8. Spores : Types, germination pattern, gametophyte development and types.

9. Mating systems in ferns, control of sexuality in homosporous pteridophytes by Antheridogen activity, Apogamy and Apospory.

Plant Physiology

1. Solute transport and photoassimilates translocation: uptake, transport and translocation of water, ions, solutes and macromolecules, mechanisms of loading and unloading of photoassimilates.

2. Present day concept of phytohormones and plant growth regulators; Phytohormone families and members of each family; growth promoting and retarding chemicals; general mode of phytohormone action; hormone binding proteins; second messengers; gene activation; examples of target cells for hormone action; a brief idea about modern techniques for hormone assay.

3. Auxins: Chemistry, biosynthesis and degradation/deactivation of IAA; a brief account of the auxin structure and activity relationship; antiauxins and auxin antagonists; mechanism of auxin action – acid growth theory, auxin mutants and signaling.

4. Gibberellins: Diversity, chemical and structural characteristics of gibberellins; biosynthesis of GAs, antigibberellins and their site of action, role of gibberellins on cereal seed germination, dwarfism and flowering; mode of action of gibberellins, gibberellin mutants and signaling.

5. Cytokinins: Chemical and structural characteristics, biosynthesis and degradation; role of cytokinins in cell division, chloroplast development, senescence, movement of nutrient, organogenesis and embryogenesis; mode of action, cytokinin mutants and signaling.

6. Abscisic acid: Chemical and structural characteristic, biosynthesis and degradation; role of ABA in seed maturation, germination, gravitropism and stomatal closure; mode of action, ABA mutants and signaling.

7. Ethylene : Hormonal status; chemical characteristics, biosynthesis and metabolism; triple responses, Yang cycle; factors regulating ethylene biosynthesis; quantification of ethylene, mode of ethylene action; its role in higher plants, commercial uses of ethylene, ethylene mutants and signaling.

8. Seed dormancy: Types, control mechanism, chemical and physical manipulative methods of breaking seed dormancy; biological significance of dormancy.

9. Flowering: Photoperiodic control, hormonal regulation; nature of floral stimulus; experimental evidence to prove the mobile nature of floral stimulus, gene- induced regulation floral development, ABC model, second messenger and flowering.

10. Senescence: Types of senescence, biochemical indices of senescence, physiobiochemical changes occurring during leaf senescence, senescence regulatory genes.

11. Fruit ripening: Climacteric and nonclimacteric fruits; hormonal regulation of fruit ripening, biochemical changes occurring during fruit ripening.

Biochemistry and Molecular Biology of Plants

1. The atom and chemical bonds, stabilizing interactions, reaction orders, pH, buffer, physicochemical properties of water.

2. Carbohydrate metabolism: Glycolysis and its control and significance; TCA Cycle and Oxidative Phosphorylation; Pentose phosphate pathway and its control and significance; Gluconeogenesis and its control and significance, Glyoxalate cycle.

3. Amino acids and Proteins : Classification and structures, properties, determination of amino acid sequence in a polypeptide; Structural organization of Proteins, Post translational modification of protein, , chaperone and protein folding, protein targeting, Ramachandran plot

4. Enzyme kinetics: Deduction of Michaelis-Menten equation, Lineweaver-Burk plot; enzyme inhibition, isozymes, allosteric enzymes, ribozymes and abzymes.

5. Lipid metabolism: biosynthesis and oxidation of fatty acids

6. Photosynthesis and Photorespiration:

Photosynthesis: Z-scheme, PCRC, Different modes of CO_2 concentrating mechanisms, energetics and significance. Photorespiration: Compartmentalized reactions, regulation,, energetics and significance; Structural and functional characteristics of Rubisco and its regulation

7. Cell signaling: Signal perception Molecular mechanisms of signal transduction and regulation.

8. DNA & RNA Metabolism: DNA topology, DNA damage and repair transcription, processing, regulation, post-transcriptional control and gene silencing,

9. Gene expression: Principles of gene regulation; Regulation of gene expression in prokaryotes and eukaryotes.

10. Plant genes, promoters, intron splicing, vectors, codon optimization, gene mapping and cloning of plant genes

11. Recombinant DNA technology: Principles and methods of recombinant DNA technology- expression of cloned genes in *E. coli*, cloning in yeast: transformation in yeast, yeast artificial chromosome (YAC), retrovirus like vector (Ty) in yeast/shuttle vector, Molecular improvement of crops.

Taxonomy of Angiosperm & Phytogeography

1. Taxonomy and Systematics - Concept, objective and relevance to conservation

2. Plant Nomenclature – ICN, Principles, Rules, Recommendations and Appendices, Type concept, Valid publication and Rejection of names.

3. Taxonomic hierarchy, delimitation of taxa and attribution of rank. Species concept.

4. Recent Systems of Angiosperm classification including APGII (2009).

5. Taxonomic literature: Types, definition and examples.

6. Objective Taxonomy: Phenetics and Cladistics: Principles, Methods, Merits and Demerits.

7. Biosystematics-methods, categories and relationship with traditional taxonomv.

8. Circumscription and phylogeny: Magnoliales, Hamamelidales, Apiales, Lamiales, Campanulales, Alismatales, Pandanales, Cyperales and Orchidales.

9. Biodiversity: components, levels, values, Hotspots and conservation.

10. Concept of Phytogeography: Endemism, Plant migration, Disjunction, Vicariance, Phytochorionomy (Brief introduction).

11. Major Phytochona of the World and India.

Palynology & Reproductive Biology:

1. Microspore tetrads, polarity of spores and pollen grains.
2. Spore-pollen morphology: Symmetry, shape, size, aperture patterns, NPC System for numerical expression of apertural details, exine stratification, surface structures and sculptures of sporoderm; LO-analysis and edge-analysis.
3. Chemical nature of sporopollenin, development of pollen wall, Ubisch body, exineless pollen grains. Extraexinous wall material - perine, viscin-threads. pollen-kitt.
4. Application of palynology: Palynology in taxonornic and phylogenetic deductions; Aeropalynology with reference to allergy; Melissopalynology; Palaeopalynology; Forensic palynology.
5. Pollen dispersal units; concept of anthesis.
6. Pollination modes; floral constructions with respect to specific pollination modes.
7. Pollination syndromes/floral syndromes, with special reference to melittophilous, miophilous and lepidiphilous flowers.
8. Breeding systems, different levels of structural and functional adaptations for higher degree of outbreeding; self-incompatibility and compatibility control with reference to pollen-pistil interactions.

Evolution:

9. Early ideas leading to the firm establishment of the reality of evolution.
10. Pre Darwinian scenario of the theories on evolution.
11. Darwinian paradigm: Natural Selection as the driving force of evolution.
12. Mendelian and Post-Mendalian developments in understanding the cause of heritable changes among the individuals of a species.

Gymnosperms:

1. Introduction to gymnospermy; general features of gymnosperms.
2. Origin of seed-habit: Origin and evolution of nucellus and integument; switchover from zooidogamy to siphonogamy - hydrasperman reproduction, prepollen and evolution of typical gymnospermous pollen grains.
3. Progymnospermopsida: Geologic distribution, characteristic features, range of vegetative morphology and reproductive structures and classification; the plexus progymnosperms as the progenitor of gymnosperms.
4. Classification of gymnosperms.
5. Geologic and geographic distributions, general features, organography and phylogeny of major clads of gymnosperms.
6. Development of female gametophytes among extant gymnosperms.
7. Embryogeny including polyembryony and karyology of extant gymnosperms.
8. Economic importance of gymnosperms with reference to timber, paper and board, resin, essential oils, drugs and food.

Palaeobotany:

9. Definition of fossil.
10. Principals of correlation and stratigraphy; dating of rocks; outline of Standard Geologic Time Scale.
11. Chemical evolution and origin of life; early life forms as known from Precambrians; origin of eukaryotes.
12. Mass extinctions with special references to the floral changes through Permo-Trassic (P-T) and Cretaceous-Tertiary (K-T) transitions.
13. Continental Drift Hypothesis.
14. Introductory idea of the importance of fossil plants in palaeoecological studies.

Plant Anatomy

1. Organization of shoot and root apical meristems. Changes in shoot apex during transition to flowering.
2. Development and differentiation: Polarity, symmetry, pattern formation (brief idea of genetic control of differentiation and organogenesis).
3. Origin, differentiation and phylogeny of xylem and phloem.
4. Leaf morphogenesis (brief idea of genetic control of differentiation and organogenesis).
5. Xylotomy and its importance.
6. Ultra structural features of sieve tube elements and their importance.

Pharmacognosy

1. Definition. History and scope of Pharmacognosy including indigenous system of medicine.
2. Drugs: Various systems of classification of drugs of natural origin, Morphological and microscopic examination of drugs.
3. Extraction and purification of natural products; Chromatographic study of drugs; Spectroscopic techniques; Methods of identification and analysis of results; Applications of phytochemical analysis.
4. Importance of Crude drug; Preparation of drugs for commercial market: a) Collection, Harvesting, Drying, Garbling, Packaging, storage and preservation. b) Drug evalution. Significance of pharmacopoeial standards, Adulteration, contamination and substitution.
5. Pharmacological activities of natural products, its' importance in pharmaceutical industries.

6.Silviculture: Definition, scope and objective; Farm forestry, social forestry and agro Forestry; Natural and artificial regeneration of forests; Non-timber forest products of economic values.

7. Plants as a source of petroleum substitute.

Ecology

1. The Environment**:** Physical environment; biotic environment; biotic and abiotic interactions.
2. Ecosystem:Structure and function; energy flow and mineral cycling (CNP); primary production and decomposition.
3. Habitat and niche:Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement.
4. opulation ecology:Characteristics of a population; population growth curves; population regulation; life history strategies (*r* and *K* selection); concept of metapopulation – demes and dispersal, interdemic extinctions, age structured populations.
5. Species interactions:Types of interactions, interspecific competition, herbivory, carnivory, pollination, symbiosis.
6. Community ecology:Nature of communities; community structure and attributes; levels of species diversity and its measurement; edges and ecotones.
7. Ecological succession:Types; mechanisms; changes involved in succession; concept of climax.
8. Applied ecology:Environmental pollution; global environmental change.
9.Conservation of Biodiversity–Brief idea about *In situ* (Afforestation, Social Forestry, Agro forestry, Botanical Gardens, Biosphere Reserves, National Parks, Sanctuaries and Sacred Groves and *Ex situ* (Cryopreservation, Gene Banks, Seed Banks, Pollen Banks, Sperms Banks, DNA Banks, Tissue Culture and Biotechnological Strategies), ecorestoration, environmental education.

Genetics and Plant breeding

1. Introduction to Plant Genetics: Brief history of classical and molecular genetics; Extension of Mendelism; Allelism; Gene action, Interaction with environment, Penetrance and expressivity; Gene interaction – epistasis, pleiotropy, polygenic inheritance.
2. Linkage, Crossing over and Chromosome Mapping: Physical basis of crossing over; Recombination and gene mapping; Construction of genetic and physical mapping.
3. Genome Organization in Eukaryotes: Genome types; Eukaryote nuclear genome; gene concept; Organization of structural and functional components of chromosome-centromere, telomere, NOR; Sex chromosome in plants; Genome duplication, alteration and their evolutionary role; Genes and gene number, content and C-value paradox.
4. Structural and Numerical Alterations of Chromosomes: Deficiency, Duplication, Inversion, Translocation and their meiotic behavior; Origin and significance of haploids, aneuploids, euploids, autopolyploids and allopolyploids.
5. Genetic Integrity and Diversity: Basis of chromosome separation; Recombination mechanism; Evolutionary significance, genetic control; Structure and function of Transposable elements and their role in evolution; Repair and retrieval system of genes.
6. Genomes, Genomics and Proteomics: Basic concept of geneome sequencing- Arabidopsis, Rice and Human Genome; Genome annotation, Synteny, Gene Search and Comparative Genetic data; Proteomics – Application, Protein expression profiling.
7. Population Genetics and Plant Breeding: Defination, Gene Frequency in population; Genetic Equilibrium; Hardy-Weinberg Law; Speciation Mechanism; Breeding system and genetic consequences in plants; Qualitative and quantitative traits; Marker Assisted Breeding for agronomic importance; QTL mapping.

Cell biology and Bioinformatics

1. Introduction: Cellular organization – its origin and evolution
2. Biomembranes: Structural models, composition and dynamics, biogenesis and assembly, transport of macromolecules and ions.
3. Mitochondria: Biogenesis, origin and evolution, mitochondrial genome.
4. Chloroplast: Biogenesis, origin and evolution, chloroplast genome.
5. Nucleus: Chromatin organization and activation, packaging and its higher order structure, chromosome, basic nucleolar structure structures and dynamics.
6. Cytoskeletons: Nature, intermediate filaments, microtubules, actin-binding filaments.
7. Cell signaling and interaction: Signal transduction, its basic components and types, intercellular junctions and adhesions.
8. Cell cycle: Phases and control in Yeasts; Cancer – molecular events, proto-oncogenes, tumor-suppressor gene and their inter-play, therapy.
9. Bioinformatics: Genome and protein information resources, sequence analysis, multiple sequence alignment, homology and analogy, pattern recognition, analysis package, application and prospects in medicine and agriculture.

RESEARCH METHODOLOGY

Statistics

1. Variable and attribute, primary and secondary data.
2. Sampling and sample designs: Classification and tabulation of data; Frequency distribution; Diagrammatic and graphical presentation.
3. Central tendency: Arithmetic, geometric and harmonic mean; Median; Mode.
4. Measures of disparsion: Variance; Mean deviation; Standard deviation and error; Moment; Skewness and kurtosis.
5. Correlation and regression analysis: Bivariate and multivariate.
6. Normal, binomial and poisson distribution.
7. Test of hypothesis: t, u and Chi square test.
8. Analysis of variances and covariance: Bivariate and multivariate.
9. Calculations of mean, variance, standard deviation, standard error, coefficient of variance, Use of t-test for comparing two means.
10. Determination of the relationship between variables using correlation and regression analysis.
11. Analysis of variance: ANOVA, ANCOVA, *U*-test.
12. Use of Chi-square test for goodness of fit.

Instrumentation

1. Isolation and purification of Protein, RNA, DNA (genomic and plasmid); Analysis of and proteins, RNA and DNA by one and two dimensional gel electrophoresis, isoelectric focusing gels;
2. Protein sequencing methods, detection of post-translation modification of proteins; Isolation, separation and analysis of carbohydrate and lipid molecules
3. DNA sequencing methods, strategies for genome sequencing; Methods for analysis of gene expression at RNA and protein level, Micro array based techniques;
4. Molecular cloning of DNA or RNA fragments in bacterial; expression of recombinant Proteins using bacterial and plant vectors; Isolation of specific nucleic acid sequences; generation of genomic and cDNA libraries in plasmid BAC and YAC vectors;
5. RFLP, RAPD and AFLP techniques
6. Analysis of biomolecules using UV/visible, fluorescence, NMR; Structure determination using X-ray diffraction
7. Different Radiolabeling techniques, Incorporation of radioisotopes in biological samples, molecular imaging of radioactive material.
8. Fermentation Technology.
9. Demonstration of instruments; Electrophoretic techniques (1D, 2D); Chromatographic Techniques (Paper, Thin Layer, HPLC, GC), Restriction Mapping, RAPD, Transformation, PCR, SEM, Confocal and TEM.
10. Microscopy: Principles of light and electron microscopy; Light, Fluorescence, Confocal, SEM, TEM and AFM.

SYLLABUS
RET Examination-2019, Chemistry
Bankura University

Group A: Research Methodology

A1. Introduction to Research Methodology: Meaning of Research, Objectives of Research, Motivations in Research, Types of Research, Criteria of good Research, What is Research Problem? Basic and Applied research.

A2. Review of Literature and Literature survey: Meaning and Purpose of the Literature Review & Literature Survey, Identification of the related Literature.

A3. The Research Report: General format of the Research report, style and formatting of writing, typing of the research report.

A4. Testing of Hypotheses and Sampling design: Definition, Concepts Concerning Testing of Hypotheses, Formulation of hypotheses and related difficulties; Needs of sampling, Sampling for chemical analysis, Random sampling

A5. Analysis of Variance & Chi-Square test: What is ANOVA? Basic ANOVA concepts, Definition of chi-square test, Significance in Statistical analysis, Understanding of t-tests.

A6. Error Analysis: Basics of a measurement and its interpretation, mean, standard deviation, variance, correlation coefficient.

A7. Quantification of research output: Impact Factor, *h*-index, *i10*-index and *i20*-index, *G*-index

A8. Computer Applications in Research: Literature survey using web, handling search engines, Preparing presentations: (i) Research papers: Using word processing software – MS Word/Latex/others, Drawing graphs and diagrams – Origin/Excel/others. (ii) Seminar presentations – Power point for oral and poster presentations,(iii) Data presentation.

References :

1. C R Kothari , Research Methodology: Methods and Techniques , New Age International (P) Ltd. (2010) , New Delhi

2. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. *An introduction to Research Methodology*, RBSA Publishers.
3. Handbook of Communication and Social Interaction Skills by John O. Greene, Brant Raney Burleson.
4. Trochim, W.M.K., 2005. *Research Methods: the concise knowledge base*, Atomic Dog Publishing. 270p.
5. Ranjit Kumar, Research Methodology: A Step-by-Step Guide for Beginners, SAGE Publications
6. Shanghai Arch Psychiatry. 2017; 29(3): 184-188.

Group B: CHEMISTRY

AS PER WITH THE BANKURA UNIVERSITY UG AND PG SYLLABUS IN CHEMISTRY

BANKURA UNIVERSITY
বাঁকুড়া বিশ্ববিদ্যালয়

Department of English

Syllabus of Ph.D. Entrance Examination / Research Eligibility Test

FULL MARKS: 50 **Time: 2 hours**

Part A : Research Methodology (05 questions of 05 marks each)

Part B : Subject related

1: An essay to assess knowledge of literature and writing skills

(01 question of 15 marks)

2: Critical Appreciation of an unseen poem

(01 question of 10 marks)

BANKURA UNIVERSITY

RESEARCH ENTRANCE TEST (RET), 2018

Syllabus

Research Methodology

1. Concepts and Significance of Research in Geography; Motivation in Research; Criteria of good Research; Objectives and Types of Research
2. Approaches to Research in Geography: Qualitative, Quantitative, Qualitative, Experimental, Inferential
3. Research Methods: Inductive and Deductive, Descriptive and Analytical
4. Identification of a Research Problem, Research Questions and Hypothesis Building
5. Research Design: Meaning of Research Design, Need for Research Design, Important Concepts, Different Research Design
6. Research Methods and Methodology: Qualitative and Quantitative Methods, Different types of Sample Design
7. Data Management: Methods of Data Collection, Reliability and Authenticity of Data; Treatment of Data anomaly; Processing and Analysis of Data
8. Application of Remote Sensing & GIS in geographical research
9. Report Writing: Research Synopsis, Literature Review, Referencing Style, Writing a Research Paper / Report – Significance and Layout

General Geography

This part will cover all aspects of geography i.e. Physical, Human, Economic, Social, Cultural, Environmental, Political etc. at Masters Level.

BANKURA UNIVERSITY

DEPARTMENT OF HISTORY

Main Campus, Bankura Block-II, P.O.: Purandarpur, Dist.: Bankura, Pin- 722155,
West Bengal

Syllabus for RET Examination

Part I: Research Methodology (25 marks)

a. Emergence of 'History' as a discipline in the nineteenth century in Europe. Positivism, Whig History. History and Science. Writings of Ranke.
b. Narratives and History. Facts and Events of History. Idea of 'Objectivity' in History.
c. Structuralism and History. Marxist interpretation of History. British Marxist Historians and rise of social history.
d. Annales School: Early years—Marc Bloch and Lucien Febvre. Writing Total History: Fernand Braudel and *longue duree*. History of *mentalite*: Emmanuel le Roy Ladurie.
e. Small voice of History: Impact of Post-modernism and Post-colonialism on historiography. Writings of Subaltern Studies collective. Analysing Power and Discourse—Michel Foucault. Memory and Oral history.

Part II: From Subject (25 marks)

As per UGC-NET curriculum.

DEPARTMENT OF MATHEMATICS
BANKURA UNIVERSITY

SYLLABUS FOR RET EXAMINATION FOR ADMISSION TO Ph.D. PROGRAMME IN MATHEMATICS

Part I. Research Methodology (50% **of total marks)**
Part II. Subject Specific (MATHEMATICS) (50% **of total marks)**

Part I: Research Methodology

Meaning of Research, Objectives of Research, Motivations in Research, Types of Research, Research Approaches, Law and hypothesis. Significance of Research, Research Methods v/s Methodology, Research and Scientific Methods, Research Process, Criteria of good Research.

What is a research problem? Selecting the problem, Necessity of and techniques in defining the problem.

Purpose of the Review, Identification of the related Literature, Organizing the related Literature, Literature survey using web, handling search engines

Axiom of choice, Zorn's Lemma, Hausdorff-maximality principle, Well-ordering theorem and their equivalences, Cartesian product of sets. Relations, Equivalence relations. Cardinal numbers. Totally ordered sets, Well-ordered sets, Ordinal numbers.

Descartes' rule signs, Relations between roots and coefficients, Reciprocal equations, Binomial equations, Special roots, Cubic equations, Biquadratic equations.

Definition of Probability, Random variables, Probability Distribution Functions, Mean, Median, Mode, Skewness and Kurtosis, Binomial, Poisson, Geometric, Normal and Uniform distributions, Moment Generating Function, Characteristic Function.

Population, Sampling, Collection of data, Classification of data, Measures of Central Tendency, Measures of Dispersion, Correlation and Regression, Estimation of Parameters, Interval Estimation, Confidence Interval, Testing of Hypothesis, Null Hypothesis, Alternative Hypothesis, Types of Errors, Best Critical Region, Power of a Test.

Laplace Transform, Fourier Transform.

Linear programming problem, simplex methods, duality.

Part II: Subject Specific (Mathematics)

• **Analysis:** Countable and uncountable sets, Real number system as a complete ordered field, Archimedean property, supremum, infimum. Sequences and series, convergence, limsup, liminf. Bolzano Weierstrass theorem, Heine Borel theorem. Continuity, uniform continuity, differentiability, mean value theorem. Sequences and series of functions, uniform convergence. Riemann sums and Riemann integral, Improper Integrals. Monotonic functions, types of discontinuity, functions of bounded variation, Lebesgue measure, Lebesgue integral. Functions of several variables, directional derivative, partial derivative, derivative as a linear transformation, inverse and implicit function theorems. Metric spaces, compactness, connectedness. Normed linear Spaces. Spaces of continuous functions as examples.
• **Linear Algebra:** Vector spaces, subspaces, linear dependence, basis, dimension, algebra of linear transformations. Algebra of matrices, rank and determinant of matrices, linear equations. Eigenvalues and eigenvectors, Cayley-Hamilton theorem. Matrix representation of linear transformations. Change of basis, canonical forms, diagonal forms, triangular forms, Jordan forms. Inner product spaces, orthonormal basis. Quadratic forms, reduction and classification of quadratic forms.
• **Complex Analysis:** Complex Analysis: Algebra of complex numbers, the complex plane, polynomials, power series, transcendental functions such as exponential, trigonometric and hyperbolic functions. Analytic functions, Cauchy-Riemann equations. Contour integral, Cauchys theorem, Cauchys integral formula, Liouvilles theorem, Maximum modulus principle, Schwarz lemma, Open mapping theorem. Taylor series, Laurent series, calculus of residues. Conformal mappings, Mobius transformations.
• **Algebra:** Permutations, combinations, pigeon-hole principle, inclusion-exclusion principle, derangements. Fundamental theorem of arithmetic, divisibility in Z, congruences, Chinese Remainder Theorem, Eulers ϕ- function, primitive roots. Groups, subgroups, normal subgroups, quotient groups, homomorphisms, cyclic groups, permutation groups, Cayleys theorem, class equations, Sylow theorems. Rings, ideals, prime and maximal ideals, quotient rings, unique factorization domain, principal ideal domain, Euclidean domain. Polynomial rings and irreducibility criteria. Fields, finite fields, field extensions, Galois Theory.
• **Topology:** basis, dense sets, subspace and product topology, separation axioms, connectedness and compactness.
• **Ordinary Differential Equations (ODEs):** Existence and uniqueness of solutions of initial value problems for first order ordinary differential equations, singular solutions of first order ODEs, system of first order ODEs. General theory of homogenous and non-homogeneous linear ODEs, variation of parameters, Sturm-Liouville boundary value problem, Greens function.
• **Partial Differential Equations (PDEs):** Lagrange and Charpit methods for solving first order PDEs, Cauchy problem for first order PDEs. Classification of second order PDEs, General solution of higher order PDEs with constant coefficients, Method of separation of variables for Laplace, Heat and Wave equations.
• **Numerical Analysis:** Numerical solutions of algebraic equations, Method of iteration and

Newton-Raphson method, Rate of convergence, Solution of systems of linear algebraic equations using Gauss elimination and Gauss-Seidel methods, Finite differences, Lagrange, Hermite and spline interpolation, Numerical differentiation and integration, Numerical solutions of ODEs using Picard, Euler, modified Euler and Runge-Kutta methods.

• **Calculus of Variations:** Variation of a functional, Euler-Lagrange equation, Necessary and sufficient conditions for extrema. Variational methods for boundary value problems in ordinary and partial differential equations.

• **Linear Integral Equations:** Linear integral equation of the first and second kind of Fredholm and Volterra type, Solutions with separable kernels. Characteristic numbers and eigenfunctions, resolvent kernel.

• **Classical Mechanics:** Generalized coordinates, Lagranges equations, Hamiltons canonical equations, Hamiltons principle and principle of least action, Two-dimensional motion of rigid bodies, Eulers dynamical equations for the motion of a rigid body about an axis, theory of small oscillations.

BANKURA UNIVERSITY
THE DEPARTMENT OF PHILOSOPHY,
Syllabus of RESEARCH ENTRANCE TEST (RET)

THE PATTERN OF EVALUATION FOR RESEARCH ENTRANCE TEST (RET)

Total mark: 50

Group A: 25 marks

Group B: 25 marks

Group A: Research Methodology: 25 marks

There will be 25 MCQ pattern compulsory Questions of 1mark each that is 25 x 1=25.

Group B: Subject Specific (PHILOSOPHY): 25 marks

In this group, there will be 7 Short-note type questions where the examinee will be asked to answer any 5 questions. Each question will carry 5 marks i.e. 5 x 5=25 marks.

		Total No. of Questions	No. of Questions to be answered	Marks
Group A	**RESEARCH METHODOLOGY**	**25**	**25**	**25 x 1=25**
Group B	**SUBJECT SPECIFIC (PHILOSOPHY)**	**7**	**5**	**5 x 5=25**

Group A: Research Methodology Syllabus (25 Marks)

Unit 1:
Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of Research, and Research Methods versus Methodology, Research and Scientific Method, Research Process

Unit 2:
What is a Research Problem?; Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem

Unit 3:
Meaning of Research Design, Need for Research Design, Important Concepts Relating to Research Design, Different Research Designs

Unit 4:
Sampling Design, Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, How to Select a Random Sample?, Random Sample from an Infinite Universe, Complex Random Sampling Designs

Unit 5:
Measurement and Scaling Techniques, Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling, Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques

Unit 6:
Methods of Data Collection, Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some Other Methods of Data Collection, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method, Guidelines for Constructing Questionnaire/Schedule, Guidelines for Successful Interviewing, Difference between Survey and Experiment

Unit 7:
Processing and Analysis of Data, Processing Operations, Some Problems in Processing, Elements/Types of Analysis, Statistics in Research

Unit 8:
Sampling Fundamentals, Need for Sampling, Some Fundamental Definitions, Important Sampling Distributions, Central Limit Theorem, Sampling Theory, Sandler's A-test, Concept of Standard Error, Estimation, Estimating the Population Mean (m), Estimating Population Proportion, Sample Size and its Determination, Determination of Sample Size through the Approach, Based on Precision Rate and Confidence Level, Determination of Sample Size through the Approach, Based on Bayesian Statistics

Unit 9:
What is a Hypothesis? Basic Concepts Concerning Testing of Hypotheses ,Procedure for Hypothesis Testing, Flow Diagram for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Tests of Hypotheses, Important Parametric Tests, Hypothesis Testing of Means, Hypothesis Testing for Differences between Means, Hypothesis Testing for Comparing Two Related Samples, Hypothesis Testing of Proportions, Hypothesis Testing for Difference between Proportions, Hypothesis Testing for Comparing a Variance to Some Hypothesized Population Variance, Testing the Equality of Variances of Two Normal Populations ,Hypothesis Testing of Correlation Coefficients, Limitations of the Tests of Hypotheses

Unit 10:
Analysis of Variance and Covariance, Analysis of Variance (ANOVA),What is ANOVA? The Basic Principle of ANOVA, ANOVA Technique, Setting up Analysis of Variance Table, Short-cut Method for One-way ANOVA, Coding Method, Two-way ANOVA, ANOVA in Latin-Square Design, Analysis of Co-variance (ANOCOVA), ANOCOVA Technique, Assumptions in ANOCOVA

Unit 11:
Interpretation and Report Writing, writing References, writing bibliography etc., The Computer: It's Role in Research

Group B: Subject Specific Syllabus (25 Marks)

As per UGC-NET curriculum

BANKURA UNIVERSITY
বাঁকুড়া বিশ্ববিদ্যালয়

Department of Physics

Syllabus of Research Eligibility Test

Group-A

(Research Methodology) (25 marks)

1. **Research Aptitude**

- Research: Meaning, Types, and Characteristics, Positivism and Post-positivistic approach to research.
- Methods of Research: Experimental, Descriptive, Historical, Qualitative and Quantitative methods.
- Steps of Research.
- Thesis and Article writing: Format and styles of referencing.
- Application of ICT in research.
- Research ethics.

2. **Mathematical Reasoning and Aptitude**

- Types of reasoning.
- Number series, Letter series, Codes and Relationships.
- Mathematical Aptitude (Fraction, Time & Distance, Ratio, Proportion and Percentage, Profit and Loss, Interest and Discounting, Averages etc.).

3. **Logical Reasoning**

- Understanding the structure of arguments: argument forms, structure of categorical propositions, Mood and Figure, Formal and Informal fallacies, Uses of language, Connotations and denotations of terms, Classical square of opposition.
- Evaluating and distinguishing deductive and inductive reasoning.
- Analogies.
- Venn diagram: Simple and multiple use for establishing validity of arguments.
- Indian Logic: Means of knowledge.

4. **Data Interpretation**

- Sources, acquisition and classification of Data.
- Quantitative and Qualitative Data.
- Graphical representation (Bar-chart, Histograms, Pie-chart, Table-chart and Line-chart) and mapping of Data.
- Data Interpretation.
- Data and Governance.

Group-B

(Physics- subject based questions) (25 marks)

1. **Basic Mathematical Methods :**

   Calculus : Vector algebra and vector calculus, Linear algebra, matrices, Linear differential equations, Fourier-series, Elementary complex analysis.

2. **Classical Dynamics :**

   Basic principles of classical dynamics, Lagrangian and Hamiltonian formalisms, Symmetries and conservation laws, Motion in the central field of force, Collisions and scattering, Mechanics of a system of particles, Small oscillations and normal modes, Wave motion-wave equation, phase velocity, group velocity, dispersion. Special theory of relativity-Lorentz tranformations, addition of velocities, mass-energy equivalance.

3. **Electromagnatics :**

   Electrostatics-Laplace and Poisson equations, boundary value problems, Magnetostatics-Ampere's theorem, Blot-Sayart law, electromagnetic induction, Maxwell's equations in free space and in linear isotropic media. Boundary conditions on the fields at interfaces, Scaler and vector potentials, Gauge invarience, Electromagnetic waves-reflection and refraction, dispersion, interferance, coherence, diffraction, polarization, Electrodynamics of a charged particle in electric and magnetic fields. Radiation from moving charges, radiation from a dipole, Retarded potential.

4. **Quantum Physics and Applications :**

   Wave-particle duality, Heisenberg's uncertainity Principle. The Schrodinger equation particle in a box., Harmonic Oscillator, Tunnelling through a barrier, motion in a central potential,Orbital angular momentum. Angular momentum algebra, spin. Addition of angular momenta. Time independent perturbation theory. Ferml's Golden Rule. Elementary theory of scattering in a central potential, Phase shifts, partial wave analysis, Borm approximation, identical particles, spin-statistics connection.

5. **Thermodynamic and Statistical Physics :**

   Laws of thermodynamics and their consequences. Thermodynamic potentials and Maxwell's relations. Chemical potential, phase equilibria. Phase space, microstates and microststes. Partition function, Free Energy and connection with thermodynamic quantities. Classical and quantum statistics, Degenerate electron gas. Blackbody radiation and Planck's distribution law, Boss-Einstein condensation. Einstein and Debye models for latticce specific heat.

6. **Experimental Design :**

   Measurement of fundamental constants; e.h.c. Measurement of High & Low Resistences, L and C. Detection of X-rays, Gamma rays, charged particles, neutrons etc. Ionization chamber, proportional counter, GM counter, Scintillation detectors, Solid State detectors, Emission and Absorption Spectroscopy, Measurement of Magnetic field, Hall effect, magnetoresistance. X-ray and neutron Diffrection, Vacuum Techniques; basic idea of conductance, pumping speed etc. Pumps; Mechanical Pump,

Diffusion pump; Gauges; Thermocouple, Penning, Pirani, Hot Cathode. Low Temperature; Cooling a sample over a range upto 4K and measurement of temperature. Measurement of Energy and Time using electronic signals from the detectors and associated instrumentation; Signal processing, A/D conversion & multichannel analyzers, Time-of-flight technique; Coincidence measurements; true to chance ratio, correlation studies. Error Analysis and Hypothesis testing Propagation of errors, Plotting of Graph, Distributions, Least aquares fitting, criteria for goodness of fite-chi square test.

7. **Electronics :**

Physics of p-n junction, Diode as a circuit element; clipping, clamping; Rectification, Zener regulated power supply : Transistor as a circuit element : CC, Cb, and CE configuration, 'Transistor as a switch, OR, AND, NOT gates. Feed back in Amplifiers. Operational amplifier and its applications : inverting , non-inverting amplifier, adder, integrator, differentiator, wave form generator, comparator, & Schmidt trigger. Digital integrated circuits-NAND & NOR gates as building blocks, X-OR Gate, simple combinational circuits, Half & Full adder, Flip-flop, shift register, counters. Basic principles of A/D & D/ A converters; Simple applications of A/D & D/A converters.

8. **Atomic & Molecular Physics :**

Quantum states of an electron in an atom. Hydrogen atom spectrum. Electron spin. Stern-Gerlach experiment. Spin-orbit coupling, fine structure, relativistic correction, spectro-scopic terms and selection rules, hyperfine structure. Exchange symmetry of wave functions. Pauli's exclusion principle, periodic table alkali-type spectra, LS & JJ coupling, Zeeman, Paschen-Back and Stark effects. X-Rays and Auger transitions, Compton effect Principles of ESR, NMR Molecular Physics : Convalent, Ionic and Vander Waal's interaction. Rotation/Vibration spectra. Raman Spectra, selection rules, nuclear spin and intensity alternation, isotope effects, electronic states of diatomic molecules, Frank-Condom principle. Lasersspontaneous and stimulated emission, optical pumping, population inversion, coherence (temporal and spatial) simple description of Ammonia maser, CO2 and He-Ne Lasers.

9. **Condensed Matter Physics :**

Crystal classes and systems, 2d & 2d lattices, Bonding of common crystal structures, reciprocal lattice, diffraction and structure factor, elementary ideas about point defects and dislocations. Latics vibrations, Phonons, specific heat of solids, free electron theory-Fermi statistics; heat capacity. Electron motion in periodic potential, energy bands in metals, insulators and semi-conductors; tight binding approximation; Impurity levels in doped semi-conductors. Electronic transport from classical kinetic theory, electrical and thermal conductivity. Half effect and thermo-electric power transport in semi-conductors. Di-electrics-Polarization mechnisms, Clausius-Mossotti equation, Piezo, Pyro and ferro electricity. Dia and Para megnetism; exchange interactions, magnetic order, ferro, anti-ferro and ferrimagnetism. Super conductivity-basic phenomenology; Meissner effect, Type-1 & Type-2 Super conductors, BCS Pairing mechanism.

10. **Nuclear and Particle Physics :**

Basic nuclear properties-size, shape, charge distribution, spin & parity, binding, empirical mass formula, liquid drop model. Nature of nuclear force, elements of two-body problem, charge independence and charge symmetry of nuclear forces. Evidence for nuclear shell structure. Single particle shell model-its validity and limitations, collective model. Interactions of charged particles and e.m. rays with matter. Basic principles of particle detectors-ionization chamber; gas proportional counter and GM counter, scintillation and semiconductor detectors. Radio-active decays (a By), basic theoretical understanding Nuclear reactions, elementary ideas of reaction mechanisms, compound nucleus and direct reactions, elementary ideas of fission and fusion.

Particle Physics : Symmetrice and conservation laws, classification of fundamental forces and elementary particles, iso-spin, strangeness, Gell-Mann Nishijima formula, Quark model. C.P.T. invariance in different interactions, partynonconservation in weak interaction.

BANKURA UNIVERSITY

DEPARTMENT OF POLITICAL SCIENCE

SYLLABUS FOR RESEARCH ENTRANCE TEST (RET)

Full Marks: 50

Question Pattern

		No. of Questions will be Given	No. of Questions will be Attempted	Marks
Group- A	**From Research Methodology Part (Section- 'A')**	**3**	**2**	**2 x 10 = 20**
Group- B	**From Research Methodology Part (Section- 'A')**	**3**	**1**	**1 x 5 = 5**
Group- C	**From Subject Specific Part (Section- 'B')**	**7**	**2**	**2 x 10 = 20**
Group- D	**From Subject Specific Part (Section- 'B')**	**5**	**1**	**1 x 5 = 5**

SECTION ‘A’: RESEARCH METHODOLOGY (25 Marks)

1. Social Science Research: Concept, Need and Ethics.
2. Research Design: Experimental, Explorative and Descriptive.
3. Hypothesis: Meaning, Characteristics and Types.
4. Data Collection: Different Methods of Sampling (Probability and Non-Probability).
5. Instruments for Survey Research: Observation, Questionnaire, Schedule.
6. Data Analysis: Quantitative and Qualitative.

SECTION- 'B': SUBJECT SPECIFIC SYLLABUS (25 Marks)

Unit - 1: Political Theory

Concepts:

Liberty, Equality, Justice, Democracy,

Political Traditions:

Liberalism, Socialism, Marxism, Feminism, Postmodernism

Unit - 2: Political Thought (Western and Indian)

Plato, Aristotle, Machiavelli, Hobbes, Locke, Rousseau, Hegel, Karl Marx, John Rawls

Dharamshastra, Kautilya, Aggannasutta, Barani, Kabir, Pandita Ramabai, Bal Gangadhar Tilak, Swami Vivekanand, Rabindranath Tagore, M. K Gandhi, Sri Aurobindo, Periyar E. V. Ramasamy, Muhammad Iqbal, M.N.Roy, V D Savarkar, Dr. B.R.Ambedkar, J L Nehru, Ram Manohar Lohia, Jaya Prakash Narayan, Deendayal Upadhyaya

Unit - 3: Comparative Political Analysis

Approaches: Institutional, Political Culture, Political Economy and New Institutionalism; Comparative Methods

State theory: debate over the nature of state in capitalist and socialist societies; post-colonial state; welfare state; globalization and nations-states

Political regimes: democratic (Electoral, Liberal, Majoritarian and Participatory) and non-democratic regimes (Patrimonialism, Bureaucratic authoritarianism, Military dictatorship, Totalitarianism, and fascist).

Constitutions and Constitutionalism: forms of constitutions, rule of law, judicial independence and liberal constitutionalism; emergency powers and crisis of constitutionalism.

Development: Underdevelopment, Dependency, Modernization, World Systems Theory, development and democracy.

Actor and Processes: Electoral Systems, Political Parties and Party System, Interest groups, Social movements, new social movements, Non-Governmental Organisations (NGOs) and civil society campaigns; Revolutions.

Unit - 4: International Relations and India's Foreign Policy

Approaches to the study of International relations: Idealism, Realism, Structural Marxism, Neoliberalism, Neorealism, Social Constructivism, Critical International Theory, Feminism, Postmodernism.

Concepts: State, state system and non-state actors, Power, Sovereignty, Security: traditional and non-traditional.

Conflict and Peace: Changing Nature of Warfare; Weapons of mass destruction; deterrence; conflict resolution, conflict transformation.

United Nations: Aims, Objectives, Structure and Evaluation of the Working of UN; Peace and Development perspectives; Humanitarian intervention. International law; International Criminal Court

Contemporary Challenges: International terrorism, Climate change and Environmental Concerns, Human Rights, Migration and Refugees; Poverty and Development; Role of Religion, Culture and Identity Politics.

Perspectives on India's Foreign Policy: India's Identity as postcolonial, development, rising power and as emerging political economy

Continuity and change in India's Foreign Policy: Principles and determinants; Non-Alignment movement: historical background and relevance of Non-Aligned Movement; India's Nuclear Policy

India's relations with major powers: USA, USSR/ Russia, People's Republic of China

India's relations with neighbourhood: SAARC, Gujaral doctrine, Look Eas t/ Act East, Look West.

India's Negotiation Strategies in International Regimes: The United Nations, World Trade Organisation, International Monetary Fund, Intergovernmental Panel on Climate Change

Contemporary Challenges: maritime security, energy security, environmental security, migrants and refugees, water resources, international terrorism, cyber security

Unit - 5: Political Institutions in India including Indian Political Processes

Making of the Indian Constitution: Colonialism heritage and the contribution Indian National Movement to the making of the Indian Constitution

Constituent Assembly: Composition, Ideological Moorings, Constitutional Debates

Philosophy of the Constitution: Preamble, Fundamental Rights, Directive Principles

Union Executive: President, Prime Minister and Council of Ministers

Union Parliament: Structure, Role and Functioning, Parliamentary Committees

Judiciary: Supreme Court, High Court, Judicial Review, Judicial Activism, Judicial Reform.

Executive and Legislature in the States: Governor, Chief Minister, State Legislature

Electoral Process and Election Commission of India: Conduct of Elections, Rules, Electoral Reforms.

Local Government Institutions: Functioning and reforms.

State, Economy and Development: Nature of Indian State, Development Planning model, New Economic Policy, Growth and Human Development.

Process of globalisation: social and economic implications.

Identity Politics: Religion, Tribe, Caste, Region, Language.

Social Movements: Dalit, Tribal, Women, Farmers, labour

Civil Society Groups: Non-Party Social Formations, Non-Governmental Organisations, Social Action Groups.

Regionalisation of Indian Politics: Reorganisation of Indian States, States as Political and Economic Units, Sub-State Regions, Regional disparities, Demand for New States,

Gender and Politics in India: Issues of Equality and Representation.

Ideology and Social basis of Political Parties: National Parties, State Parties.

Electoral Politics: Participation, Contestation, Representation, Emerging trends.

Unit - 6: Public Administration

Public Administration: meaning and evolution; public and private administration

Approaches: System Theory, Decision Making, Ecological Approach

Public administration theories and concepts: Scientific Management Theory, Rational Choice theory, New Public Administration, Development Administration,

Theories and Principles of Organization: Scientific Management Theory, Bureaucratic Theory, Human Relations Theory

Organisational Communication: Theories and Principles, Chester Bernard Principles of Communication, Information Management in the organization

Unit - 7: Governance and Public Policy in India

Governance, good governance and democratic governance, role of state, civil society and individuals.

Accountability and control: Institutional mechanism for checks and balances, legislative control over executive, administrative and budgetary control, control through parliamentary committees, judicial control over legislature and executive, administrative culture, corruption and administrative reforms

Institutional mechanisms for good governance: Right to Information, Consumer Protection Act, Citizen Charter; Grievance redress system: Ombudsman, Lokpal, Lokayukta

Planning and Development: Decentralised planning, planning for development, sustainable development, participatory development, e-governance; NITI Aayog

Public policy as an instrument of socio-economic development: public policies with special reference to housing, health, drinking water, food security, MGNREGA, NHRM, RTE

BANKURA UNIVERSITY

Department of Sanskrit

RET Examination Syllabus

The full marks of upcoming RET exam would be 50. In the first part (25) there would be eight questions from Research Methodology. Each question carries 5 marks. Students have to answer 5 among 8. The medium of the answer would be either in Sanskrit with Devanagari script or in English. For the second part (25) detailed syllabus of subject is given below. In this part students have to answer one question (15 marks) in Sanskrit with Devanagari script among four. Another question would be of 10 marks among four. The medium of this answer would be either in Sanskrit with Devanagari script or in English.

Part – A (Research Methodology), Marks - 25

- Fundamentals of Research – Characteristic, Aim, Scope, Problem, Bibliographical source, Type, Qualification, Selection of a topic, etc.
- Research Techniques and Methodology.
- Documentation - Organisation, Footnote, Parenthetical Documentation, Abbreviation, Translitaration, Reference, etc.
- Manuscriptology – Nature of Manuscript, Collection and Preservation, Descriptive Catalogue, Critical Edition, etc.
- Presentation – Structure of the Thesis, Mechanism of Typing, Language and Style, etc.
- Linguistic Contribution of Sanskrit.
- Computational Sanskrit methodology

Part – B(Subject- Sanskrit), Marks - 25

वैदिक-साहित्य

(क) वैदिक-साहित्य का सामान्य परिचय :

- वेदों का काल : मैक्समूलर, ए.वेबर, जैकोबी, बालगंगाधर तिलक, एम. विन्टरनिट्ज, भारतीय परम्परागत विचार संहिता साहित्य
- संवाद सूक्त: पुरुरवा उर्वशी, यम यमी, सरमा पणि, विश्वामित्र नदी
- ब्राह्मण साहित्य
- आरण्यक साहित्य
- वेदांग : शिक्षा, कल्प, व्याकरण, निरुक्त, छन्द, ज्योतिष

(ख) वैदिक साहित्य का विशिष्ट अध्ययन :

निम्नलिखित सूक्तों का अध्ययन :

- **ऋग्वेद**: अग्नि (1.1), वरुण (1.25) सूर्य (1.125), इन्द्र (2.12) उषस् (3.61), पर्जन्य(5.83), अक्ष(10.34), ज्ञान (10.71), पुरुष (10.90), हिरण्यगर्भ (10.121), वाक् (10.125), नासदीय(10,129)
- **शुक्लयजुर्वेदः**- शिवसंकल्प, अध्याय 34 (1-6)
  प्रजापति, अध्याय 23 (1-5)
- **अथर्ववेद**:- राष्ट्राभिवर्धनम् (1.29) काल (10.53) पृथिवी (12.1)

ब्राह्मण साहित्य : प्रतिपाद्य विषय, विधि एवं उसके प्रकार, अग्निहोत्र, अग्निष्टोम, दर्शपूर्णमास यज्ञ, पंचमहायज्ञ, आख्यान (शुन:शेप, वाङ्मनस)।

उपनिषद् - साहित्य : निम्नलिखित उपनिषदों की विषयवस्तु तथा प्रमुख अवधारणाओं का अध्ययन:
ईश, कठ, केन, बृहदारण्यक, तैत्तिरीय, श्वेताश्वतर

वैदिक व्याकरण, निरुक्त एवं वैदिक व्याख्या पद्धति :

- **ऋक्प्रातिशाख्यः** निम्नलिखित परिभाषाएँ
  समानाक्षर, सन्ध्यक्षर, अघोष, सोष्म, स्वरभक्ति, यम, रक्त, संयोग, प्रगृह्य. रिफित ।
- निरुक्त (अध्याय 1 तथा 2)
  चार पद नाम विचार, आख्यात विचार, उपसर्गों का अर्थ, निपात की कोटियाँ,
- निरुक्त अध्ययन के प्रयोजन
- निर्वचन के सिद्धान्त
- निम्नलिखित शब्दों की व्युत्पत्ति :

आचार्य, वीर, ह्रद, गो, समुद्र, वृत्र, आदित्य, उपसू, मेघ, वाक्, अश्व, अग्नि, जातवेदस्, वैश्वानर, निघण्टु

- निरुक्त (अध्याय 7 दैवत काण्ड)
- वैदिक स्वर: उदात्त, अनुदात्त तथा स्वरित।
- वैदिक व्याख्या पद्धति प्राचीन एवं अर्वाचीन

दर्शन- साहित्य

(क) प्रमुख भारतीय दर्शनों का सामान्य परिचय :

प्रमाणमीमांसा, तत्त्वमीमांसा, आचारमीमांसा

(चार्वाक, जैन, बौद्ध, न्याय, सांख्य, योग, न्याय, वैशेषिक, मीमांसा के संदर्भ में)

(ख) दर्शन- साहित्य का विशिष्ट अध्ययन:

- ईश्वरकृष्ण; सांख्यकारिका - सत्कार्यवाद, पुरुषस्वरूप, प्रकृतिस्वरूप, सृष्टिक्रम, प्रत्यय कैवल्य।
- सदानन्द, वेदान्तसार - अनुबन्ध चतुष्ठय अज्ञान, अध्यारोप-अपवाद, लिंगशरीरोत्पा पंचीकरण, विवर्त, महावाक्य, जीवन्मुक्ति।
- अन्नंभट्ट, तर्कसंग्रह / केशव मिश्र, तर्कभाषा:-

  पदार्थ, कारण, प्रमाण (प्रत्यक्ष अनुमान, उपमान, शब्द), प्रामाण्यवाद, प्रमेय।
- लौगाक्षिभास्कर; अर्थसंग्रह
- पतंजलि योगसूत्र, (व्यासभाष्य): चित्तभूमि, चित्तवृत्तियाँ, ईश्वर का स्वरूप, योगाङ्ग, समाधि, कैवल्य
- बादरायण ब्रह्मसूत्र - 1.1 (शांकरभाष्य)
- विश्वनाथपंचानन; न्यायसिद्धान्तमुक्तावली (अनुमानखण्ड)
- सर्वदर्शनसंग्रहः - जैनमत, बौद्धमत

व्याकरण एवं भाषाविज्ञान

(क) सामान्य परिचय : निम्नलिखित आचार्यों का परिचय

- पाणिनि, कात्यायन, पतंजलि, भर्तृहरि, वामनजयादित्य, भट्टोजिदीक्षित, नागेशभट्ट, जैनेन्द्र, कैयट, शाकटायन, हेमचन्द्रसूरि, सारस्वतव्याकरणकार
- पाणिनीय शिक्षा
- भाषाविज्ञान

  भाषा की परिभाषा, भाषा का वर्गीकरण (आकृतिमूलक एवं पारिवारिक), ध्वनियों का वर्गीकरण : स्पर्श, संघर्षी, अर्धस्वर, स्वर (संस्कृत ध्वनियों के विशेष संदर्भ में), मानवीय ध्वनियंत्र, ध्वनि परिवर्तन के कारण, ध्वनि नियम (ग्रिम, ग्रासमान, बर्नर)

  अर्थ परिवर्तन की दिशाएँ एवं कारण, वाक्य का लक्षण व भेद, भारोपीय परिवार का सामान्य परिचय, वैदिक संस्कृत एवं लौकिक संस्कृत में अन्तर, भाषा तथा वाक् में अन्तर, भाषा तथा बोली में अन्तर।

(ख) व्याकरण का विशिष्ट अध्ययन:

- **परिभाषाएँ** - संहिता, संयोग, गुण, वृद्धि, प्रातिपदिक, नदी, घि, उपधा, अपृक्त, गति, पद, विभाषा, सवर्ण, टि, प्रगृह्य, सर्वनामस्थान, भ, सर्वनाम, निष्ठा।
- **सन्धि** - अच् सन्धि, हल् सन्धि, विसर्ग सन्धि (लघुसिद्धान्तकौमुदी के अनुसार)
- **सुबन्त**- अजन्त राम, सर्व (तीनों लिंगों में), विश्वपा, हरि, त्रि (तीनों लिंगों में), सखि, सुधी, गुरु, पितृ, वारि, मधु गौ, रमा, मति, नदी, धेनु, मातृ, ज्ञान, हलन्त लिह, विश्ववाह, चतुर् (तीनों लिंगों में), इदम् (तीनों लिंगों में), किम् (तीनों लिंगों में), तत् (तीनों लिंगों में), राजन्, मघवन्, पथिन्, विद्वस् अस्मद्, युष्मद्
- **समास**- अव्ययीभाव, तत्पुरुष, बहुव्रीहि, द्वन्द्व, (लघुसिद्धान्तकौमुदी के अनुसार) तद्धित अपत्यार्थक एवं मत्वर्थीय (सिद्धान्तकौमुदी के अनुसार)
- **तद्धित** – अपत्यार्थक एवं मात्वर्थीय (सिद्धान्तकौमुदी के अनुसार)
- **तिङन्त** - भू, एध, अद्, अस्, हु, दिव्, पुञ्, तुद्, तन्, कृ, रुध्, क्रीञ्, चुर् ।
- **प्रत्ययान्त** - णिजन्त, सन्नन्त; यङन्तः यङ्लुगन्त; नामधातु।
- **कृदन्त**- तव्य/तव्यत्, अनीयर्, यत्, ण्यत्, क्यप्, शतृ,शानच्,क्त्वा, क्त, क्तवतु, तुमुन्, णमुल्
- **स्त्रीप्रत्यय** - लघुसिद्धान्त कौमुदी के अनुसार
- **कारकप्रकरण** - सिद्धान्तकौमुदी के अनुसार
- **परस्मैपद एवं आत्मनेपद विधान** - सिद्धान्तकौमुदी के अनुसार
- **महाभाष्य (पस्पशाह्निक)** -

  शब्दपरिभाषा, शब्द एवं अर्थ संबंध, व्याकरण अध्ययन के उद्देश्य, व्याकरण की परिभाषा, साधु शब्द के प्रयोग का परिणाम, व्याकरण पद्धति
- **वाक्यपदीयम् (ब्रह्मकाण्ड)** -

  स्फोट का स्वरूप, शब्द ब्रह्म का स्वरूप, शब्द ब्रह्म की शक्तियाँ, स्फोट एवं ध्वनि का संबंध शब्द अर्थ संबंध, ध्वनि के प्रकार, भाषा के स्तर

संस्कृत साहित्य, काव्यशास्त्र एवं छन्दपरिचय :

(क) निम्नलिखित का सामान्य परिचय :

- भास, अश्वघोष, कालिदास, शूद्रक, विशाखदत्त, भारवि, माघ, हर्ष, बाणभट्ट, दण्डी, भवभूति, भट्टनारायण, बिल्हण, श्रीहर्ष, अम्बिकादत्तव्यास, पंडिता क्षमाराव, बी. राघवन्, श्रीधर भास्कर वर्णेकर।
- काव्यशास्त्र - अलंकारसम्प्रदाय,ध्वनिसम्प्रदाय, रससम्प्रदाय, व्रकोत्तिसम्प्रदाय, औचित्यसम्प्रदाय।
- पाश्चात्य काव्यशास्त्र - अरस्तू, लॉन्जाइनस, क्रोचे ।

(ख) निम्नलिखित का विशिष्ट अध्ययन:

- **पद्य** - बुद्धचरितम् (प्रथम) रघुवंशम् (प्रथमसर्ग), किरातार्जुनीयम् (प्रथमसर्ग), शिशुपालवधम् (प्रथमसर्ग), नैषधीयचरितम् (प्रथमसर्ग)
- **नाट्य** - स्वप्नवासवदत्तम्, अभिज्ञानशाकुन्तलम्, वेणीसंहारम्, मुद्राराक्षसम् उत्तररामचरितम्, रत्नावली, मृच्छकटिकम् ।
- **गद्य** - दशकुमारचरितम् (अष्टम उच्छवास), हर्षचरितम् (पञ्चम उच्छवास), कादम्बरी (शुकनासोपदेश)
- **चम्पूकाव्य** - नलचम्पू: (प्रथम उच्छवास)
- **साहित्यदर्पण**: -
  काव्यपरिभाषा, काव्य की अन्य परिभाषाओं का खण्डन, शब्दशक्ति (संकेतग्रह, अभिधा, लक्षणा, व्यंजना), काव्यभेद (चतुर्थ परिच्छेद) श्रव्यकाव्य (गद्य, पद्य, मिश्र काव्य लक्षण)
- **काव्यप्रकाशः** -
  काव्यलक्षण, काव्यप्रयोजन, काव्यहेतु, काव्यभेद, शब्दशक्ति, अभिहितान्वयवाद, अन्विताभिधानवाद, रसस्वरूप एवं रससूत्र विमर्श, रसदोष, काव्यगुण, व्यंजनावृत्ति की स्थापना (पञ्चम उल्लास)
  अंलकार: -
  वक्रोक्ति, अनुप्रास, यमक, ष, उपमा, रूपक, उत्प्रेक्षा, समासोक्ति, अपह्नुति, निदर्शना, अर्थान्तरन्यास, दृष्टान्त, विभावना, विशेषोक्ति, स्वभावोक्ति, विरोधाभास, सर्कर, संसृष्टि
- **ध्वन्यालोकः (प्रथम उद्योत)**
- **बक्रोक्तिजीवितम् (प्रथम उन्मेष)**
- **भरतनाट्यशास्त्रम् (द्वितीय एवं षष्ठ अध्याय)**
- **दशरूपकम् (प्रथम तथा तृतीय प्रकाश)**
- **छन्द परिचय**
  आर्या, अनुष्टुप् इन्द्रवज्रा, उपेन्द्रवज्रा, वसन्ततिलका, उपजाति, वंशस्थ, द्रुतविलम्बित, शालिनी, मालिनी, शिखरिणी, मन्दाक्रान्ता, हरिणी, शार्दूलविक्रीडित, स्रग्धरा।

पुराणेतिहास, धर्मशास्त्र एवं अभिलेखशास्त्र

निम्नलिखित का सामान्य परिचयः

- रामायण - विषयवस्तु, काल, रामायणकालीन समाज, परवर्ती ग्रन्थों के लिए प्रेरणास्रोत साहित्यिक महत्त्व, रामायण में आख्यान
- महाभारत - विषयवस्तु, काल महाभारतकालीन समाज, परवर्ती ग्रन्थों के लिए प्रेरणास्रोत, साहित्यिक महत्त्व, महाभारत में आख्यान
- पुराण - पुराण की परिभाषा, महापुराण उपपुराण, पौराणिक सृष्टि विज्ञान, पौराणिक आख्यान।
- प्रमुख स्मृतियों का सामान्य परिचय।
- अर्थशास्त्र का सामान्य परिचय।

- लिपि : ब्राह्मी लिपि का इतिहास एवं उत्पत्ति के सिद्धान्त।
- अभिलेख का सामान्य परिचय