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# UNIVERSITY OF DELHI

SCHEME OF EXAMINATION 009

AND

COURSES OF READING

FOR

4 YEAR BACHELOR OF ELEMENTARY EDUCATION

- Part I — 2001
- Part II — 2002
- Part III — 2003
- Part IV — 2004

17/5



Syllabi applicable for students seeking admission to the  
B.El. Ed. Course in academic year 2000-2001

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Publication Division  
University of Delhi

## F.11 CHILD DEVELOPMENT

100 Marks

- Unit 1 Concept, Issues and Theories of Human Development : what is development and why should we study it; developmental principles; influences of heredity and environment; methods for studying development; concepts of socialisation, education and acculturation in the context of development; theories of Erikson, Piaget and Kohlberg; significant development periods in the human life span.
- Unit 2 Birth and Infancy : importance of conception; pre-natal development and birth; physical and mental development of infants; emotions in infancy; the infant in the family and implications for personality development.
- Unit 3 The Pre-school Child : physical growth and motor development; intellectual characteristics; development of personality with special reference to identification and child-rearing techniques; gender-stereotyping; morality; play patterns of pre-school children.
- Unit 4 The Elementary School Child : physical growth and development; the developing mind - intelligence, language and thought; the social world of the child - parents and children, friends, school and media, play; moral attitudes and behavior; development of self-identity; self-concept; gender roles; play, interests and activities of the elementary school child.
- Unit 5 Children with Special Needs : concept of special children - talented, creative, gifted children; slow learners and under achievers; emotionally disturbed children; culturally and socially disadvantaged children.

## F.12 CONTEMPORARY INDIA

100 Marks

- Unit 1 India as 'society'; 'civilization'; 'nation-state'; India's emergence from the freedom struggle as a nation state.
- Unit 2 The Constitution : its framework and scope; major social policies enshrined in the Constitution; provision related to childhood and education; concurrent status of education; national policy on education (1986).
- Unit 3 Economic Issues : poverty and inequality; employment; private and public sector; new economic policy.
- Unit 4 Political Issues : main features of the democratic system; central, state-level and local systems of government.
- Unit 5 Social and Cultural Issues : major characteristics of India's pluralist make-up; gender-related issues; family and child-rearing in India (to be studied with the help of a project based on locally done field work).
- Unit 6 Major Issues in Contemporary India (to be studied by class-room and individual projects) : childhood in India; environment and development; reservation as an egalitarian policy; social conflict.

## C 1.1 NATURE OF LANGUAGE

50 Marks

- Unit 1 Aspects of Linguistic Behavior : verbal and non-verbal communication; human and non-human communication; defining features of a human system of communication; language and mind; language and society; language as rule governed behaviour and linguistic variability; speech and writing.
- Unit 2 Linguistic Systems : the organization of sounds; the structure of sentences; the concepts of Universal Grammar; nature and structure of meaning; basic concepts in phonology, morphology, syntax and semantics (to be taught through suitable illustrations).
- Unit 3 Text and Linguistic Systems : organization of text discourse structure, oral and written; nature of classroom discourse. Structure of a story, poem, essay etc. points of entry into texts to teach them more effectively (to be taught through practicum).
- Unit 4 Languages of India : multilingualism; using the multilingual resource of a classroom (to be taught through practicum).

## C 1.2 CORE MATHEMATICS

50 Marks

- Unit 1 Number and Measurement : counting and place value; arithmetic operations; approximation; estimation; fractions and decimals; concept and measurement of length, mass/weight, area, volume, time.
- Unit 2 Space and Shape : symmetry and pattern - properties of two and three dimensional Objects e.g. symmetries, projection, perspective, tessellation, closest packing etc.
- Unit 3 Algebra : number patterns - forming and solving simple linear equations - other mathematical investigations and puzzles.
- Unit 4 Practical Arithmetic and Handling Data : collecting, representing and interpreting data; using elementary statistical techniques; timetables and time tabling; Flow charts; percentage; ratio and proportion; interest; discount; tax.
- It is envisaged that the various concepts and operations will be reconstructed through activities and problems, using concrete materials as often from the kitchen as from mathematical kits, to arrive at solutions or conduct investigations. This would be followed by reflective discussions on the concepts, solutions, results and the methods used (both right and wrong).

## C 1.3 CORE NATURAL SCIENCE

50 Marks

### Part I

It is envisaged that most of the content will be transacted using the discovery approach, through simple observations and experiments,

followed by discussion. Where necessary additional information may be supplied by the teacher at the end of each activity.

- Unit 1 Classification, property, concept, relation, law.
- Unit 2 Measurement of length, mass and time; density; pressure; work and energy; weight; falling of bodies; gravitation; heat and temperature; states of matter; properties of magnets; electricity; refraction and dispersion.
- Unit 3 Physical and chemical changes; separation of mixtures; atoms and molecules; metals and non-metals; oxides; acids; bases and salts; air and combustion; water- hard and soft.
- Unit 4 Living and non-living; classification of living world; germination of seeds; life processes e.g. respiration, digestion, reproduction, photosynthesis, transportation, phenomena, interdependence of plants and animals.

### Part II

It is expected that investigative projects will involve some or all of the following elements - laboratory work, library reference, field-survey, group discussion, seeking expert opinion.

3 projects : not more than one project from each area :

- P1- Natural Phenomena  
 P2- Environment and Adaptation  
 P3- Technology  
 P4- Health
- for suggested lists of possible questions to be investigated See Annexure 1

### ANNEXURE 1

- P1
1. Why is the sky blue?
  2. Why does it rain?
  3. Why do stars twinkle?
  4. How many colours are there in a rainbow?
- P2
1. Why don't lizards fall from ceilings?
  2. Why does a dog go round in a circle before it sits down?
  3. How do fish survive without air?
  4. Can human beings live on grass?
  5. Why does a cat produce kittens and not baby camels?
- P3
1. How is glass made?
  2. How is electricity generated?
  3. From where does a TV set get its pictures?
  4. What is inside a camera?
- P4
1. Why do teeth decay?
  2. Why does hair fall?
  3. Does bad blood cause pimples?
  4. Why do ears run?



## C 1.4 CORE SOCIAL SCIENCE

50 Marks

- Unit 1 Nature of Social Science : data, method and evidence to be discussed in the context of history, geography, civics, sociology and economics. Role of social science discipline in the learner's development. Significance of perspective and context in the study of social science. (Exemplars: 1857, Secularism/Communism).
- Unit 2 Relationship between human experience and the growth of institutions to be studied in the context of the following concepts, monarchy, aristocracy; imperialism, fascism, nationalism, democracy and citizenship. (These concepts could be taught with examples from a content area which may be thought fit—the emphasis however, should be on the teaching of concepts).
- Unit 3 Relationship between human life, space and resources to be studied in the context of the following: movement from a subsistent economy to a surplus economy; demography and the distribution of wealth in society; spatial interaction (to be taught in the Indian context).
- Unit 4 Study of the relationships and interactions of people in groups: culture, social stratification and social change.
- Unit 5 Project work : interconnections are to be drawn between the various disciplines that fall within social sciences through project work, e.g.
- (a) Study of a slum setting in terms of economics, subsistence, politics, historical memories.
- (b) Take two products available to you as a consumer. Try and trace the process by which it is made available to you from its raw form to a finished product. Study the various factors of geography, economics, politics, history and sociology that may have influenced it in one way or another.

### F 2.3 COGNITION AND LEARNING

100 Marks

- Unit 1 The mind at work : cognition and approaches to cognition: individual and cultural differences.
- Unit 2 How children perceive : elementary cognitive processes—sensation, perception and attention.
- Unit 3 How children learn and remember : basic processes, strategies, knowledge, metamemory; current issues.
- Unit 4 The developing mind : concepts and concept formation; developing concepts of time, space, number, relationship etc.
- Unit 5 Child as a problem solver : reasoning and judgement, choice—Piagetian and Neo-Piagetian perspectives; nurturing creativity and developing problem solving skills.
- Unit 6 Alternative conceptions of learning. Factors contributing to learning : personal and environmental.
- Unit 7 The child's personal and social world : cognition and emotion.

## F 2.4 LANGUAGE ACQUISITION

50 Marks

- Unit 1 Language and cognition : cognitive prerequisites for language acquisition ; biological foundations ; language and thought, innatist hypothesis; cognitive, social and linguistic development ; Piagetian and Vygotskian perspectives.
- Unit 2 Language development : the earliest stages and the babbling period ; stages of language development ; the role of motherese and caretaker speech; phonology; morphology ; syntax and semantics; sociolinguistic aspects.
- Unit 3 Comprehension and production : perceptual strategies; perception of speech and speech comprehension; notions of complexity ; speech production; encoding and performance measures; the role of errors in language production.
- Unit 4 Formal means of language acquisition with special reference to reading and writing : learning to read and understand; measures of readability; schematheory; using cloze, dictation and translation with children ; mechanics of writing ; representational systems ; teaching writing.
- Unit 5 Language disorders : learning about language by studying language disorders ; brain structure and functions; inhibitions ; stuttering; aphasia; language among the mentally retarded.
- Unit 2 and 5 will have a corresponding practicum.

### F 2.5 HUMAN RELATIONS AND COMMUNICATION

50 Marks

- Unit 1 Personal development : self identity and human relationships ; psychoanalytic and humanistic perspectives, perspectives from women.
- Unit 2 Communication : the adult-child gap, assumptions and attitudes; channels of communication ; the hidden curriculum.
- Unit 3 Human relations in education : Behaviourist versus Humanistic perspectives; peer learning constructs and dimensions; community involvement.
- The course is to be designed as a series of workshops on concepts and processes with a debrief on theory and building connections in each unit. The course content should be contextualized to an Indian milieu.

### P 2.1 LANGUAGE ACROSS THE CURRICULUM

50 Marks

- Unit 1 Language and learning : language as a means of construction of reality ; language and experience; concept-formation.
- Unit 2 Language at school : distinction between language as a school-subject and language as a means of learning and communication; the concept of register and style ; different school-subjects as registers.



Unit 3 Basic Language competencies required at school : oracy, listening, reading and writing. Special study of reading : cognitive basis of reading, analysis of the tasks involved in reading, motivation to read, stages of learning to read, reading ability.

Unit 4 The child's language and the school : school language and home language; language as an aspect of teacher-child relationship; language environment of school : language of textbooks in different subjects.

#### Suggested Projects

1. To elaborate their theoretical understanding, students should undertake a project involving listening to children's reading, miscue analysis, developing a reading test and administering it.
2. Analysis of text books and other materials used in different subjects from the point of view of registers and styles used in them.

#### F 3.6 BASIC CONCEPTS IN EDUCATION

100 Marks

Unit 1 Philosophical and sociological perspectives : basic assumptions about human nature, knowledge and learning.

Unit 2 Knowledge : distinction between 'body of knowledge' and the child's construction of knowledge. Knowledge in the context of curriculum, syllabus and textbooks ; school knowledge and children's experiential knowledge; universal and local facets of knowledge.

Unit 3 The learner : the child as learner ; the individual child and the age-group; home and school ; socialisation and learning; activity and experience.

Unit 4 The teacher : teaching as a professional activity ; teacher and parents; teacher and the curriculum ; teacher and society.

Unit 5 General introduction to progressive thought in education : the tradition of Rousseau - Pestalozzi, Montessori, Dewey and Susan Isaacs. Progressive educational thought in the Indian context : Tagore, Gandhi, Ginnbai and Krishnamurti. Detailed study of Tagore's essay 'My School and Dewey's essay 'My Pedagogic Creed'.

Unit 6 Societal context of education : equality, authority, conflict and change.

#### F 3.7 SCHOOL PLANNING AND MANAGEMENT

50 Marks

Unit 1 Organisation and management of school education : role of Centre, State and local bodies; sources of funding.

Unit 2 The school as a system I : induction, training and teacher support programmes; planning the school curriculum - academic, co-curricular and sports ; community involvement.

Unit 3 The school as a system II : types of schools. The management committee and its functions; school administration ; staffing pattern ; the school budget ; annual planning ; documentation and information systems; physical infrastructure requirements; selection of materials and equipment for the school and selection of suppliers.

Unit 4 Maintaining standards : physical and psychological needs of children, teaching and non-teaching staff in a school ; developing a collaborative perspective. Staff supervision - models and application ; evaluation and feedback ; establishing accountability.

#### Project :

- (A) Case study of an "Existing School" or "Planning for a New School" (i) objectives (ii) vision of the school; (iii) strategic population (its needs, whether first or second generation learners, socio-economic background etc.); achieving targets realistically.
- (B) A group project on the status of education in a particular area (collating and interpreting data about school enrolment, retention, availability of facilities etc.)

#### P 3.2 LOGICO-MATHEMATICS EDUCATION

50 Marks

Unit 1 Nature of children's logico-mathematics thinking : theories of Piaget, Bruner, Dienes and Vygotsky; intuitive mathematics; mental mathematics; cultural differences and specificities.

Unit 2 Language and mathematics; language of mathematics.

Unit 3 Critical study of some pedagogic considerations with reference to learning theory and practice : readiness; consolidating mental arithmetic; circular reactions (ref. Piaget) ; zone of proximal development (ref. Vygotsky) ; organising and structuring learning tasks; group and individual activity ; drill ; memorization and algorithmization.

Unit 4 Mathematics in the context of schools : text-books, curricula and class-room practices; nature of mathematics - conceptual and procedural; areas (space, measurement, operations etc.); research on children's learning in specific areas ; errors ; feedback; testing and evaluation ; the hidden curriculum; mathematics phobia and failure.

Unit 5 Content specific pedagogy : number, place, value, fractions, decimals, role of readymade kits.

#### P 3.3 PEDAGOGY OF ENVIRONMENTAL STUDIES

50 Marks

Unit 1 Concept of Environmental Studies (EVS), its evolution and significance as a curricular area at primary level; EVS - an approach, a discipline or both ; environmental studies and environmental education ; its scope-integration related to the physical, social, historical and cultural aspects of the environment.

Unit 2 Basic considerations in developing curriculum in EVS : relating cognitive growth of children to the development of concepts ; alternative frameworks ; differences in approaches to the construction and transaction of curriculum at classes I and II and classes III to V ; a review of different sets of curricular materials including text books.

Unit 4 Understanding the method of science : process approach in EVS ; planning for and organisation of teaching learning activities ; unit and lesson planning ; role of inquiry, experiment, discussion, drama etc ; evaluation and testing.

Examples of practical work to be undertaken :

- (i) Organising and planning for an excursion; learning how to make observations and recording them ; conducting surveys.
- (ii) Using equipment and materials : films, reports, documents, newspapers, local maps, atlas, wall charts ; map drawing and reading weather charts ; making charts, diagrams and models.
- (iii) Collection and presentation of specimens : leaves, rocks, stamps, flags, news items etc. (classifying the material collected and maintaining a museum).
- (iv) Undertaking a project e.g. planting and nurturing a tree (in science) and an oral history project (in social studies).

#### F 4.8 CURRICULUM STUDIES

50 Marks

Unit 1 Determinants of curriculum : national aspirations and needs ; culture ; social change ; value system and ideological factors.

Unit 2 Basic considerations in curriculum design (with reference to John Dewey) : the learner ; the subject matter ; the teacher ; the milieu.

Unit 3 The curriculum ; curriculum and syllabus ; curriculum and text books ; curriculum as the teacher's programme for the school day ; hidden curriculum (reflections of gender-stereotype, prejudice against linguistic and religious minorities etc.)

Unit 4 Curriculum organisation : subject-centred; thematic; activity or experience-based (child centred).

Unit 5 Study of an innovative curriculum (Basic curriculum as an example of the past and any one innovative curriculum in the present).

Unit 6 Influences shaping the daily curriculum : ideological factors ; children's social background ; teacher's social background ; physical conditions of the school.

Unit 6 Curriculum evaluation : role of evaluation in the curriculum improvement process; principles of curriculum evaluation such as goal oriented, continuous, comprehensive, diversified, systematic etc. ; models of curriculum evaluation - Tyler Bloom model, illuminative paradigm, state's countenance model etc.

Unit 7 Practicum : study of a primary school in (1) a slum; and (2) in a middle class locality.

- (i) Studying a curriculum in action
- (ii) Evaluating a course
- (iii) Classroom observations
- (iv) Control of curriculum.

#### F 4.9 GENDER AND SCHOOLING

50 Marks

Unit 1 Sex and Gender : Psychological and sociological perspectives (Radical Feminist, Socialist - Feminist, Psychoanalytic and other Perspectives) and recent debates.

Unit 2 Social construction of Gender : socialization, family and gender identity; the media, gender roles and stereotypes; caste, class, community and gender relations.

Unit 3 Gender inequalities in schooling ; organisation of schooling; gender bias in text books, curricular choices and the hidden curriculum (teacher attitudes, classroom interaction and peer culture).

Unit 4 Gender and schooling : case studies of interventions in school education; reflections from the field and strategies for change.

#### OP 4.1 PEDAGOGY OF LANGUAGE

50 Marks

Unit 1 The Learner : social and individual aspects ; nature of family background; schooling; exposure; the role of mass media; affective filter; attitudes; motivation; aptitude; social and linguistic stereotypes; ethnocentrism; authoritarianism.

Unit 2 Learning Contexts : typology and learning situations, monolingual and multilingual societies; first and second language acquisition.

Unit 3 Methods and Models : grammar-translation method; direct method; the structural approach; audiolingualism; communicative approaches; natural method; monitor model; total physical response; sociolinguistic approaches, teaching in a multilingual classroom.

Unit 4 Language acquisition in multilingual settings : theory of interference ; contrastive analysis and its limitations; error analysis; errors as stage in the process of learning ; interlanguage; approximative systems.

Unit 5 Materials and teaching aids : selection of materials ; gradation ; the concept of linguistic complexity ; cohesion and coherence; idea density; levels of readability; schema theory; teaching aids; language lab; CALT.

Unit 6 Evaluation : taxonomy of tests ; discrete point and integrative tests ; cloze, dictation and translation - new perspectives; communicative testing; process evaluation; participatory evaluation and the discourse of equality and justice; feedback into curriculum.



## OP 4.2 PEDAGOGY OF MATHEMATICS

50 Marks

- Unit 1 What is Mathematics : patterns; reasoning; generalizations; nature of mathematical statements—axioms and postulates; explanations and proofs ; parsimony; necessity and sufficiency.  
Nature of mathematics in the curriculum : structure ; language; notation; concepts and procedures.
- Unit 2 Development of children's logical thinking, reasoning and representation (formal operations and abstraction).
- Unit 3 Pedagogical considerations in geometry, practical arithmetic, number, algebra, data handling and statistics, ratio and proportional reasoning.
- Unit 4 Communicating Mathematics : activity; graphical methods; construction; measurement; modeling; computation. Use of computers and calculators in instruction.
- Unit 5 Helping children develop a mathematical view of the world; initiating students investigations and independent activity and problem solving strategies.  
Feedback, testing, evaluation and remedial teaching.

## OP 4.3 PEDAGOGY OF NATURAL SCIENCE

50 Marks

- Unit 1 Nature and structure of natural science; significance of natural science in the curriculum at the upper primary level.
- Unit 2 Relating the study of cognitive growth and learning to the development of understanding and appreciation of science. Aims and objectives of teaching science.
- Unit 3 Disciplinary and integrated approach to teaching : levels of disciplinary growth of different natural sciences—descriptive, inductive, causal and formal. Significance and bases of integration; aims and objectives of teaching integrated science. Role of observation, experiment, discovery and intuition.
- Unit 4 Basic considerations in developing and transacting curriculum. Appraisal of existing curricula including innovative curricula in India and abroad. Text analysis-text book, work-book and teacher's guide.
- Unit 5 Evaluation in science : cognitive, psycho-motor and affective aspects. Test construction, analysis and interpretation.

### Practical

1. Devising simple experiments related to topics in Class VI, VII, VIII.
2. Maintenance of Junior Science Laboratory.
3. Development of skills like observation; use of environmental and local resources; improvising apparatus; organising science clubs, fairs, museum and exhibitions.
4. Field trips.

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## OP 4.4 PEDAGOGY OF SOCIAL SCIENCE

50 Marks

- Unit 1 Social Science and Social Studies : defining its scope and nature; rationale for a social studies programme at the elementary school.
- Unit 2 Developing concepts, skills and attitudes through the teaching of social studies. Understanding change and continuity, cause and effect, time perspective and chronology, empathy, spatial interaction—to be taught through the following (i) Society : personality, social structure, groups, community (ii) Civilization : history, culture, (iii) State: authority, citizen, (iv) Region : resource, space, (v) Market : exchange.
- Unit 3 Methods and Materials : inquiry and evidence based teaching : (i) identification of problems and questions (themes and issues), (ii) importance of empirical evidence, (iii) assessment of example as evidence.
- Unit 4: Application
- Teaching Methods : Application of the heuristic/discovery method in social science; Project— (i) secondary source (ii) field work. Integrating text based knowledge with the social context, personal/experiential knowledge as a base for critical thinking.

- (1) Critique a historical film, serial or a novel from the view point of authenticity.
- (2) An oral history project. Establish its reliability by comparing with data from other sources.
- (3) Map a locality and its position in the city, keeping in mind the distance and directional relationship to your school or college, mark out institutions and points of interest—e.g. historical monuments, Reserve bank, local stock exchange, Parliament House, etc.
- (4) Study the transport related needs of a community—analyze different vehicles people own and use, and their reflection on gender and socio-economic groups in society, assess the economic and environmental aspects of various forms of transport used.

## OL 4.1 COMPUTER EDUCATION

50 Marks

- Unit 1 Getting Started : hands on knowledge of how to use a computer and its associated peripherals ; operational aspects.

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Familiarity with selected general purpose software tools : paint box and graphic packages, data base systems and spreadsheets, word processing.

Unit 2 Software styles and theories of learning : historical perspective; traditional and innovative software; associated paradigms of learning – instructional, revelatory, conjectural, emancipatory; examples of drill and practice, tutorial, simulation, problem – solving, model exploration, adventure–game format programmes. Multimedia/hypertext. Recent trends in CAL.

Unit 3 Pedagogic and Practical issues in classroom use : choice and implementation of package programmes; modes of student guidance—interactive or self-paced learning ; discussion of instructional objective; modes of integrating with traditional teaching; creation of new learning environment and teaching strategies; criteria for design and evaluation; relevance to existing curricula and strategies for possible curriculum enhancement.

Unit 4 Logo : logo as a powerful education tool; child as a programmer (Seymour Papert); methodology for introducing Logo to the very young; Logo and development of problem solving and cognitive skills; use in teaching of geometry; grammar etc.

#### Practical

1. Introduction to a programming language (e.g. Basic): tabulation and graphing of data and function; string manipulation; menu-driven programming.
2. Project : production of simple CAL package. Documentation of programme (learning objectives, software usage, strategies for integration into classroom teaching, student's and teacher's guide. Evaluation through field trial and feedback).

### OL 4.2 SPECIAL EDUCATION

#### Nature and Needs of the Disabled

50 Marks

Unit 1 Nature, extent and prevalence of disability among children in Indian context.

Unit 2 Impact of disability on growth and development : physical, intellectual and social dimensions. Assessment of disability and implications for designing educational programmes.

Unit 3 Prevention of disability : major causes, critical preventive measures.

Unit 4 Changing trends in special education : reorganisation of learning situation, curriculum, family and community involvement. Sensitisation of teachers to the problems and needs of children with disability.

Unit 5 Simple equipment to be used at the elementary level : Braille slates; arithmetic slates; simple embossed maps; hearing aids; simple pure-tone audiometer; speech training equipment; calipers; wheel chairs; crutches; surgical shoes.

### O 2.1 ENGLISH I

100 Marks

Section A : Theme : Reading & Writing Skills 35 Marks

Text :

(Page references for extracts are from named editions. These may vary in different editions).

Panchantra : The Monkey and the Crocodile

Hans Christian Anderson : Rapunzel

Stephen Leacock : From Literary Lapses : My Financial Career (Penguin 1939, Pg. 7-10).

Carl Sagan : From Cosmos (Ballantine Books) from chapter 1, pg. 1-5. "The Cosmos is all that is ... to ...working out our destiny".

T.S. Eliot : Macavity (poem).

Wole Soyinka : Telephone Conversation (poem).

Anne Frank : The Diary of a Young Girl (Pocket Books, New York, 1958) Pg. 49-50. Letter dated Friday 20th November, 1942. From "None of us really knows how to take it all...." to "...about those other miseries".

Lord Byron : From Byron's letters and Journals Vol IV (ed Leslie Marchand) Pg. 326-327-Letter to Tom More October 31, 1815, extract from "Yesterday I dined out...to ...the first sprightly runnings of others."

Four advertisements from the Matrimonial Page of Times of India.

Philip Kotler : The Principles of Marketing (Prentice Hall, India) Pg. 159-160 from "Playboy magazine has passed...to ...factors that influence and motivate consumer behaviour."

Shakespeare : Julius Caesar-Act III Sc. 2 Ln 12-33 and Ln 74-107 (Speeches of Brutus and Mark Antony).

Charles Dickens : David Copperfield. (Penguin Classics) Pg. 312-314. From "We entered a low..." to "...Uriah's dinted nostrils."

#### Internal Assessment

35 Marks

Students must produce a minimum of 8 pieces of writing, of which the best 4 will be included in the internal assessment.

Section B : Teaching English as a Second Language 35 Marks

1. The differences between teaching English as a first language, as a second language and as a foreign language.



2. Common language errors which are likely to be encountered by the teachers of ESL.
3. Implications of teaching language through literature.
4. Teaching techniques and materials such as drama, audio-visual aids, puppetry etc.

### O 3.1 ENGLISH II

100 Marks

#### Approaches to Texts

This paper follows an approach-based structure. While introducing students to various ways of looking at a text, an emphasis is also laid on incorporating some significant writing in English, into the syllabus.

#### Components

Approaches to texts with which students should be familiar are :

Historical

Psychological

Marxist

Feminism

New Criticism : Structuralism, Deconstruction, Formalism

Students should be able to look at the texts in a variety of ways. They are required to study two plays, two novels and all the poems.

#### Texts :

Drama : Any two

Arthur Miller : All My Sons

Girish Karnad : Tughlaq

Henrik Ibsen : A Doll's House

Bertolt Brecht : The Good Person of Szechwan (Translated by John Willett)

Novels : Any two

V.S. Naipaul : A House for Mr. Biswas

J. Steinbeck : Of Mice and Men

Jane Austen : Pride and Prejudice

Margaret Atwood : The Handmaid's Tale

Poetry :

Shakespeare : Sonnet No. 130 : My mistress's eyes are nothing like the sun.

John Donne : The Sonnet Rising

Blake : London

Shelley : Song to the Men of England

Langston Hughes	:	I Too Sing America
Stephen Spender	:	An Elementary School Classroom in a Slum
Counice Cullen	:	Incident : Baltimore
Ted Hughes	:	The Jaguar
Gieve Patel	:	On Killing a Tree
A.K. Ramanujan	:	Of Mothers among other things (in Selected Poems)

#### 02.2 हिन्दी प्रथम

100 अंक

#### भाषा एवं साहित्य (गद्य भाग)

खण्ड-एक

1. भाषा : क. भाषा की परिभाषा, भाषा एवं मानवजीवन

ख. भाषा और भाषा वैविध्य

-भाषा का मौखिक और लिखित रूप

-क्षेत्रीय/प्रादेशिक बोली, समाज, शैली एवं जनसंघार माध्यम के स्तर पर भाषा के विविध रूप

-मानक भाषा की संकल्पना एवं मानकभाषा हिन्दी का विकास (व्यक्ति, शब्द भंडार, व्याकरण, अर्थ, लिपि और वर्तनी के स्तर पर)

-भाषाई अशुद्धि

ग. हिन्दी भाषा का प्रायोगिक पक्ष

क. निबंध और पत्र लेखन

ख. मुद्रावरे और लोककविता

ग. अपठित

खण्ड-दो

#### हिन्दी गद्य साहित्य

2. नाटक : अंधेर नागरी-भारतेन्दु हरिश्चन्द्र

3. कहानियां : 1. उसने कहा था - चंद्रधर शर्मा गुप्तेरी

2. बड़े भाई साहब - प्रेमचन्द

3. ताई - विश्वंभरनाथ शर्मा 'कौशिक'

4. तीसरी कसम - फणीश्वरनाथ रेणु

5. पाजेब - जैनेन्द्र

6. एक और जिन्दागी - मोहन राकेश
  7. ब्रह्मराक्षस का शिष्य - मुक्तिबोध
  8. उसकी दुनिया - निर्मल वर्मा
  9. जुलेल का खेल - भीष्म साहनी
  10. मकर संक्रान्ति - अशोक अग्रवाल
  11. शीगवाला - सुभद्रा कुमारी चौहान
4. हिन्दी निबंध एवं अन्य प्रमुख नाव विधाएँ :
1. ईश्वर भी क्या ठटोल है - बालकृष्ण भट्ट
  2. नेहूँ और गुलाब - रामवृक्ष बेनीपुरी
  3. नाबून क्यों बढ़ते हैं - हजारी प्रसाद द्विवेदी
  4. सदाचार का ताबीज (व्याय) - हरिशंकर परसाई
  5. भोर का तारा (एकांकी) - जगदीश चंद्र माथुर
  6. लक्ष्मी का स्वागत (एकांकी) - उपेन्द्रनाथ अशक
  7. मेरी लिखत माजा (यात्रावृत्त) - राहुल सांकृत्यायन
  8. भाई जगन्नाथ (संस्मरण) - श्री राम शर्मा
  9. घीसा (रेखाचित्र) - महादेवी वर्मा
  10. क्या लिखूँ - पदुमलाल पुरालाल बख्शी

### 03.2 हिन्दी द्वितीय

100 अंक

(काव्य एवं उपन्यास)

- हिन्दी साहित्य की ऐतिहासिक पृष्ठभूमि
  - हिन्दी काव्य यात्रा : भक्तिकाल से आधुनिक काल
  - काव्यांग परिचय
  - उपन्यास
1. हिन्दी साहित्य की ऐतिहासिक पृष्ठभूमि : आदिकाल से आधुनिक काल तक सभी प्रमुख धाराओं का संक्षिप्त परिचय, प्रवृत्तियों/विचारधाराएँ
  2. हिन्दी काव्य साहित्य :
    - क. मध्यकालीन काव्य : निम्नलिखित कवियों की कुछ प्रतिनिधि रचनाएँ :
      1. कबीर
      2. सूरदास
      3. तुलसीदास
      4. मीरा
      5. बिहारी

ख. आधुनिक काव्य : निम्नलिखित कवियों की कुछ प्रतिनिधि रचनाएँ :

1. हरिश्चौष
2. मैथिलीशरण गुप्त
3. निराला
4. महादेवी वर्मा
5. बच्चन
6. सुमित्रानंदन पंत
7. दिनकर
8. बालकृष्णशर्मा नवीन
9. अज्ञेय
10. मुक्तिबोध
11. रघुबीर सहाय

3. रस, छन्द एवं अलंकार : संक्षिप्त परिचय
  - क. रस के अंग-स्थायी भाव, विभाव, अनुभाव आदि
  - ख. रस के भेद-लक्षण एवं उदाहरण
  - ग. अलंकार-अनुशास, यमक, रत्नेष, चक्रोक्ति, उपमा, रूपक, दृष्टान्त, उल्लेख, व्यतिरेक, व्याजस्तुति, विभावना, विशेषोक्ति, अन्योक्ति, विशेषाभास, अर्थान्तरन्यास
  - घ. छन्द-दोहा, सोरठा, चौपाई, रोला, हरिगीतिका, मतगणद, सवेधा घनाक्षरी, वशस्थ, दुर्लभलिखित मंदक्रान्ता
4. उपन्यास : मैला औरल-रणीश्वर नाथ 'रेणु'

### 02.3 MATHEMATICS — I

100 Marks

#### PART-I : SYMBOLIC LOGIC AND SET THEORY

- Unit 1 Statements : negation, conjunction, disjunction; implication, converse and contra-positive; necessary and sufficient conditions; types of proofs, mathematical induction and deduction, truth tables, switching circuits.
- Unit 2 Sets, Operations on sets, distributive laws, De Morgan's laws, power set, Cartesian Product.
- Unit 3 Relations : equivalence relations and equivalence classes, partitions of a set; partial order relations (in particular divisibility and set inclusion), chains and lattices.
- Unit 4 Mappings, injective, surjective and bijective mappings; inverse of a mapping, composite of mappings.
- Unit 5 Denumerable and non-denumerable sets, cardinality.
- Unit 6 Permutations and combinations.



## PART-II : ELEMENTARY ALGEBRA

- Unit 1 Various representations of complex numbers, Algebra of complex numbers; De Moivre's theorem and its applications.
- Unit 2 Theory of polynomial equations : relations between the roots and coefficients.
- Unit 3 Definitions and operations on matrices over R and C, special types of matrices; determinant of square matrix, properties of determinants; adjoint and inverse of a square matrix, rank of a matrix.
- Unit 4 Systems of linear equations; characteristic equation, characteristic roots, Cayley Hamilton theorem.

## PART-III : VECTORS AND ANALYTIC GEOMETRY

- Unit 1 Vectors, scalar and vector products; triple products, position vector and applications of vectors to geometry, gradient, divergence and curl.
- Unit 2 Straight lines in two dimensions, pair of straight lines; circles and system of circles.
- Unit 3 Conics, parabola, ellipse and hyperbola in standard forms, elementary properties.
- Unit 4 Sketching of conics.
- Unit 5 Planes and straight lines in three dimensions—direction ratios and direction cosines, equations of planes, straight lines and spheres—Cartesian and vector representations. Basic properties of spheres.
- Unit 6 Cones, reciprocal cones; right circular cones; cylinders and right circular cylinders.

## PART-IV : REAL ANALYSIS

- Unit 1 Topological structure of R, neighbourhoods, open and closed sets, limit points, bounded sets.
- Unit 2 Sequences and their convergence, monotonic sequences; the number e. Infinite series of positive terms, comparison and ratio tests for convergence of an infinite series.
- Unit 3 Limits, continuity and derivability of functions; mean value theorems and Taylor's expansions : power series expansions of elementary functions. Indeterminate forms and L, Hospital rule.

## PART-V : DIFFERENTIAL CALCULUS

- Unit 1 Successive differentiation and Leibnitz rule; partial derivatives and Euler's theorem on homogeneous functions.
- Unit 2 Monotone functions and inequalities, convexity and concavity of functions; maxima, minima with applications to mensuration, dynamics and economics.
- Unit 3 Tangents and normals, curvature, asymptotes and singular points : curve sketching.

- Unit 4 Functions of two variables; partial derivatives; maxima and minima of two variables; Lagrange's method for constrained optimization (Lagrange's method of indeterminate multiplier).

## 03.3 MATHEMATICS II

100 Marks

### PART-I : ALGEBRAIC STRUCTURES

- Unit 1 Binary operations ; commutative and associative operations; identity element and inverse of an element.
- Unit 2 Groups, subgroups; cosets and Lagrange's theorem, normal subgroups and quotient groups, homomorphisms, isomorphisms and fundamental theorem; permutation group.
- Unit 3 Rings, integral domains and fields, subrings, ideals and quotient rings; ring homomorphisms, isomorphisms and embeddings.
- Unit 4 Vector spaces, subspaces; quotient spaces; linear dependence and independence, basis and dimension; study of R as a vector space.
- Unit 5 Linear transformation, associated matrix, rank and determinant of a linear transformation; minimal polynomial.

### PART-II : INTEGRAL CALCULUS AND DIFFERENTIAL EQUATIONS

- Unit 1 Integration by substitution and by parts; integration of rational, irrational and trigonometric functions, reduction formulae.
- Unit 2 Definite integrals and their properties; integral as the limit of a sum and Riemann's approach; area under a curve.
- Unit 3 Simple differential equations; differential equations of first order, linear differential equations with constant coefficients. Applications of differential equations to natural and social sciences.—Radioactive decay, Newton's law of cooling, population growth and compound growth.

### PART-III : STATISTICAL METHODS

- Unit 1 Measures of central tendency, dispersion, moments, skewness and kurtosis.
- Unit 2 Correlation and linear regression.
- Unit 3 Sampling techniques based on  $z$ ,  $t$ ,  $F$  and  $\chi^2$  tests.

### PART-IV : PROBABILITY AND PROBABILITY DISTRIBUTIONS

- Unit 1 Approaches to probability; laws of probability, Bayes theorem and its applications.
- Unit 2 Random variables, probability distributions and mathematical expectation, EMV criterion in business.
- Unit 3 Binomial and Poisson distributions.
- Unit 4 Continuous random variables and normal distribution.

## 02.4 PHYSICS I

100 Marks

Unit 1 Mechanics: scalars & vectors. Addition of vectors. Newton's laws of motion, forces and pseudo-forces, work-energy theorem, conservative forces. Conservation of energy, conservation of linear momentum, centre of mass, particle collisions (in 2 dimensions). Rotational motion, torque and angular momentum. Conservation of angular momentum. Law of gravitation, inertial and gravitational masses, motion of planets and satellites. Kepler's laws.

Unit 2 Oscillations : free oscillations with one degree of freedom, damped oscillations, forced oscillations, resonance and Q factor; combination of two harmonic motions.

Unit 3 Wave optics : wave equation, travelling and standing waves, superposition of waves, phase and group velocity. Coherent sources and interference. Young's double slit experiment, interference in thin films. Description of diffraction by a single slit, double slit and diffraction grating. Polarised and unpolarised light, linear and circular polarisation, polarisation by reflection.

Unit 4 Electricity, magnetism and electromagnetic theory : review of laws of electricity and magnetism — conservation of charge, Coulomb's/Gauss, Law, non-existence of magnetic monopoles, Ampere's law, Faraday's law. Displacement current, Maxwell's equations (in integral form).

Electromagnetic waves. Light as an electromagnetic phenomenon. Transmission lines. Optical fibres.

Unit 5 Equilibrium statistical mechanics : review of laws of Thermodynamics. Classical statistics : Maxwell—Boltzmann distribution. Quantum statistics : Fermi—Dirac and Bose—Einstein distributions and their properties.

**PRACTICAL** At least two from each group :

### GROUP I MECHANICS

1. Study of damped harmonic oscillator — Q factor.
2. Coupled pendulums.
3. Moment of inertia of irregular bodies.
4. Experiments with a loaded vertical spring.

### GROUP II OPTICS

1. Wavelength of sodium light by Newton's rings.
2. Use of spectrometer—determination of  $\mu$  of glass prism.
3. Diffraction grating—determination of  $\mu$  of sodium light.
4. Polarimeter—specific rotation of cane sugar solution.

### GROUP III ELECTRICITY AND MAGNETISM

1. Study of LCR circuit.

2. Determination of resistance and its variation with temperature of Carey Foster's bridge.
3. Determination of L by Anderson's bridge.
4. Determination of high resistance by leakage method.

## 03.4 PHYSICS II

100 Marks

Unit 1 Introduction to quantum physics: review of classical physics and its inadequacies. Particle behaviour of light-photoelectric effect, X-rays, Compton effect; wave behaviour of matter; de Broglie's hypothesis, wave function; wave and group velocity, uncertainty principle and applications. Energy levels; Franck-Hertz experiment; correspondence principle.

Unit 2 Quantum mechanics: Schrodinger's equation in one dimension; time-independent Schrodinger equation; transmission through a barrier, particle in a box. Qualitative discussion of hydrogen—like atom, spin, exclusion principle.

Unit 3 Solid state physics: free electron theory of metals : band theory of solids-Bloch's theorem, Kronig-Penney model (without derivations); metals, insulators, semiconductors; Fermi energy; intrinsic and extrinsic semiconductors; solid state devices-p-n junction, diodes, solar cell; bi-junction transistor.

Unit 4 Special theory of relativity: Michelson—Morley experiment; Einstein's postulates; Lorentz transformation; time dilation and length contraction; relativistic addition of velocities. Relativistic mass; mass-energy relation.

Unit 5 Nuclear Physics: nuclear masses and sizes; constituents of the nucleus, binding energy. Radioactive decay, half-life, radioactive series; application—carbon dating; qualitative description of alpha, beta and gamma decay. Nuclear fission, chain reaction; nuclear fusion; source of energy in stars, elementary particles and fundamental interactions.

Unit 6 The Universe: our galaxy; expansion of the universe—Hubble's Law; Newtonian cosmology; microwave background radiation (description).

### PRACTICAL:

(In experiments 1-3, the theory should be done in conjunction with the lab). In addition to the usual laboratory examination, the final examination should have a written component which tests the student's understanding of the theory.

1. Study of power supply.
  2. Study of transistor and its use as amplifier.
  3. Study of op. amp. and simple applications.
- B. Project: (About 20-25 laboratory hours duration)



## 02.5 CHEMISTRY I

100 Marks

Theory = 70 Practical = 30

### PART I : INORGANIC

**Unit 1** Multi electron system : Pauli's exclusion principle, Hund's rule of maximum multiplicity. Aufbau principle and its limitations; energy level diagrams.

**Unit 2** Periodic Table: modern periodic table, periodicity in properties of elements, atomic, ionic and covalent radii, ionization energy, electron affinity, screening effect, electro negativity, metallic and non-metallic character.

**Unit 3** Chemical bonds and molecules: shapes of simple molecules, bond energy, bond length, types of bonding, lattice energy, Born-Haber cycle, Fajan's rule, dipole moment, metallic bond, hydrogen bond, resonance and hybridization.

### PART II ORGANIC

The following topics are to be dealt with keeping in mind the introduction to the basic principles as applied to carbon compounds, illustrated with suitable examples.

**Unit 1** (a) Criteria of purity and purification of organic compounds:

- (i) melting point and boiling point
- (ii) Crystallisation, sublimation, distillation (simple, steam, fractional, under reduced pressure)
- (iii) Chromatography - paper and thin layer.

(b) Tetrahedral Concept: Catenation, hybridisation— $sp$ ,  $sp^2$  and  $sp^3$ , nomenclature (IUPAC notation).

**Unit 2** Concepts in organic reaction mechanism :

- (a) Covalent bond, homolysis, heterolysis, free radicals, ionic species, carbanion, carbocation, electrophile and nucleophile.
- (b) Inductive, electromeric and mesomeric (resonance effect).
- (c) Aromatic character—Huckel's rule applied to the hydrocarbons (e.g. : benzene, polynuclear and heterocyclic compounds).

**Unit 3** Isomerism

- (a) Structural Isomerism (chain, positional & functional).
- (b) Stereoisomerism (i) geometrical (cis and trans) (ii) optical (symmetric and asymmetric carbon atom), optical activity, racemic mixture and resolution.

### PART-III : PHYSICAL

**Unit 1** (a) Gases: characteristics of gases, ideal gases, gas laws, deviation from ideal behaviour, Van der Waal's equation (no derivation but explanation regarding a & b), critical phenomenon (no derivation) and liquefaction of gases.

(b) Liquids: difference between gases and liquids on the basis of their molecular structure, vapour pressure of liquids, relationship between vapour pressure and boiling point, surface tension, viscosity, their experimental determination and applications.

**Unit 2** (a) Chemical Kinetics and Chemical equilibrium: rate of a reaction, law of mass action, effect of temperature, concentration and catalyst (qualitative treatment). What is chemical equilibrium, equilibrium law and factors influencing equilibrium states.

(b) Photochemistry: absorption of light, Lambert-Beer's Law, Laws of Photochemistry, phosphorescence and fluorescence.

**Unit 3** Ionic equilibria and conductance: Ostwald's Dilution Law, ionic product of water, pH value, theory of acid-base indicators, buffer solutions, buffer range and capacity, equivalent and molar conductance, Kohlrausch's law of independent migration of ions, variation of conductance with concentration for weak and strong electrolytes. Hydrolysis of salts (only qualitative treatment). Applications of conductance for determining solubility product of water etc., conductometric titrations.

### PRACTICAL-I

#### (A) PROJECT WORK :

Each student shall prepare a project which innovative & application oriented as approved by the teacher.

#### (B) LABORATORY WORK :

(a) Integrated experiments involving the following aspects such as laboratory techniques, qualitative and quantitative analysis; (b) some physical experiments; using simple compounds such as benzoic acid, copper sulphate and salicylic acid (any 2 of them) and subjecting them to various processes, e.g.

(a) Integrated Experiments :

(i) Benzoic acid: isolating benzoic acid by hydrolysis of sodium benzoate, purifying it by hot water, crystallization, testing its criteria of purity by melting point determination. Finally studying solubility curve and determining  $V_H$ .

(ii) Copper Sulphate: preparation of cuprammonium sulphate, studying paper chromatography of both the initial & the final product using colorimetry of various concentrations of copper sulphate to verify Lambert-Beer's Law.

(iii) Salicylic Acid: purification by sublimation, preparation of aspirin (by acetylation), melting point determination, paper chromatography of both salicylic acid & aspirin respectively, complex formation with iron namely (Fe salicylate complex). Using colorimetry to verify Lambert-Beer's Law.

(b) Physical Experiments:

(i) Determination of surface tension of (i) Pure liquids (ii) Binary mixtures of liquids by Stalagmometer.

- (ii) Measurement of Viscosities of (i) Pure liquids (ii) Binary mixtures of liquids by O. viscometer.
- (iii) Measurement of pH by pH papers/pH meter of buffer solutions (acid & alkaline).
- (iv) To study the kinetics of the reaction between  $\text{Na}_2\text{S}_2\text{O}_3$  and HCl using initial rate method.

### 03.5 CHEMISTRY II

100 Marks

Theory = 70 Practical = 30

#### PART - I : INORGANIC

##### Unit 1

Elementary idea of Bronsted-Lowry and Lewis concept of acids and bases: difference between strong and weak acids and bases in terms of equilibrium constants; applications of Arrhenius theory of ionization to weak, mono and polybasic acids; effect of solvent on the strengths of acids and bases—levelling effect of solvent.

##### Unit 2

Comparative study of elements of zero, s and p block : an elementary idea of general group trends, electronic configuration, atomic radii, inert pair effect, ionization potential, electron affinity and electronegativity; a brief knowledge of transition and inner transition elements.

##### Unit 3

Study of some common useful inorganic compounds.

- |                            |                         |
|----------------------------|-------------------------|
| (a) Sodium chloride        | (b) Sodium hydroxide    |
| (c) Sodium carbonate       | (d) Sodium bicarbonate  |
| (e) Basic lead carbonate   | (f) Sodium thiosulphate |
| (g) Copper sulphate        | (h) Hydrogen peroxide   |
| (i) Silver nitrate         | (j) Red lead            |
| (k) Zinc oxide             | (l) Bleaching powder    |
| (m) Potassium permanganate | (n) Potash alum         |
| (o) Gypsum salt            | (p) Plaster of Paris    |

#### PART-II : ORGANIC

##### Unit 1

Functional Group: difference between a functional group and a substituent. Preparation, physical and chemical properties of compounds containing :

- (a) halo alkanes and halo arenes.
- (b) alcohols and phenols.
- (c) aliphatic carbonyl compounds.

##### Unit 2

(a) Synthetic & natural polymers : classification of polymers—natural and synthetic polymers, [general preparation of polymers such as Teflon, PVC (poly vinyl chloride), polystyrene, Nylon 6,6, terylene, resins]

- (b) Brief knowledge of the difference between (i) soaps and detergents (ii) insecticides and pesticides
- (c) Chemistry in Action : chemicals in medicines—analgesics, antipyretics, antibiotics and disinfectants.

##### Unit 3

Environment and pollution : definition, causes, impact, TLV (Threshold limit value), unit (ppm), synergism and antagonism, various types of pollution (elementary knowledge), environmental segments as atmosphere, lithosphere, biosphere, hydrosphere etc. special stress on depletion of ozone layer & its effects, photochemical smog, green house effect, Acid rain and Black rain.

#### PART - III : PHYSICAL

##### Unit 1

Solutions : types of solution.

- (a) Solution of solid in liquid—solubility, effect of temperature on solubility.
- (b) Solution of gas in liquid—Henry's law.
- (c) Solution of liquid in liquid – (i) miscible liquids, Raoult's law, ideal solution and non-ideal solution, fractional distillation (ii) partially miscible liquids, critical solution temperatures (iii) immiscible liquids, steam distillation.
- (d) Solution of non volatile solutes—colligative properties, lowering of vapour pressure, elevation of boiling point, depression in the freezing point, osmotic pressure and reverse osmosis (only qualitative treatment with no derivations).

##### Unit 2

Distribution law : partition coefficient, definition, limitations, factors affecting the partition coefficient and applications such as solvent extraction.

##### Unit 3

Thermodynamics : exothermic, endothermic reactions, systems, surroundings, types of systems, states of a system, state functions, process, types of process, reversible and irreversible, extensive and intensive properties, energy, work, heat capacity, first law of thermodynamics, heat of a reaction at constant pressure and constant volume, Hess's law, Born-Haber Cycle, bond energy and bond dissociation energy. Heat of neutralisation and heat of solution.

#### PRACTICAL-II

##### INORGANIC

1. Determination of percentage of  $\text{Na}_2\text{CO}_3$  in a sample of washing soda.
2. Analysis of a given sample of water for pH, conductance etc. and determination of its hardness complexometrically.

##### ORGANIC

1. Detection of extra elements (N, S, Cl, Br, I) in organic compounds, not more than two such elements may be present in a compound.
2. Detection of functional groups in monofunctional organic compounds (only qualitative treatment).
3. Abnormal constituents of urine (sugar, ketobodies, proteins etc.).



## PHYSICAL

1. Determination of CST for phenol-water system.
2. Determination of heat of neutralisation of HCl/NaOH.
3. To study any simple distribution system and determine the value of partition coefficient.

## OTHER EXPERIMENTS :

1. Stains such as acid, blood, betel, iodine, paint, marking ink etc. and their removal.
2. Preparation of a toilet soap/washing soap.
3. Preparation of red ink/blue ink.

## 02.6 BIOLOGY I

100 Marks

### Unit 1 Diversity of life

1. Five kingdoms of life : basis of classification : Monera, Protista, Fungi, Plantae and Animalae.
2. Virus : structure, reproduction and its relation to man.
3. Monera : structure, reproduction and its relation to man. e.g. Bacteria and Cyanobacteria.
4. Protista : structure, reproduction and its relation to man, e.g. Clamydomonas, Paramoecium.
5. Fungi : structure, reproduction and its relation to man, e.g. Aspergillus, mushroom.
6. Plantae
  - a. Structure and reproduction in Algae (e.g. Sargassum), Bryophyta (e.g. Riccia & Moss) and Pteridophyta (e.g. Pinus)
  - b. Angiosperm : Structure and reproduction, modifications (stems, roots and leaves).
7. Animalae
  - a. Non Chordata
    1. Porifera : Structure and reproduction, e.g. Sycon
    2. Cnidaria : morphology and reproduction, e.g. Coral
    3. Platyhelminthes : morphology, reproduction and its relation to man, e.g. tapeworm.
    4. Aschelminthes : morphology and reproduction, e.g. Ascaris
    5. Annelida : morphology and reproduction, e.g. earthworm.

### Unit 2 Origin of Life

Brief history, chemical evolution of first cell, Heterotrophs and Autotrophs, advent of oxygen.

### Unit 3 Evolution

Modern theory of evolution, examples of Natural Selection e.g. colouration, mimicry, industrial melanism, insecticidal resistance, mineral tolerance, human evolution, species and modes of speciation.

### Practicals

1. Specimens study  
Paramoecium, Ascaris, Pila, Sea Urchin, Sargassum (alga)
2. Study photographs  
(e.m.) T-phage, TMV (Tobacco Mosaic Virus)  
(e.m.) bacteria
3. Temporary mounts  
Sponge : Gemmules and spicules  
Cockroach : mouth parts, trachea  
Earthworm : Sepal and Pharyngeal nephridia
4. Slides of bacteria from pond water and curd
5. Structure and movement of Euglena from pond water and Chamydomonas from rain water puddles.
6. Mushroom : Section cutting, study coloured photographs, grow Aspergillus and examine microscopically.
7. Riccia and moss : study details
8. Fern : Section cutting (true and false indusium)
9. Pinus : Section cutting
10. Any two families : Solanaceae, Graminae (Arecaceae)
11. Study of any angiosperm, slides of T.S. anther and L.S. ovule.

## 03.6 BIOLOGY II

100 Marks

### Unit 1 Structure and Function

1. Plants : types of tissues (xylem, phloem, stomata) in relation to processes-transpiration, ascent of sap, photosynthesis (ATP generation), cellular respiration, growth and development.
2. Animals : study of digestion, respiration, circulation, excretion, transmission of nerve impulse, hormonal regulation.

### Unit 2 Cell Biology and Genetics

1. Interaction of genes : epistasis, co-dominance, polygenic inheritance, multiple alleles. Linkage, crossing over and genetic maps.
2. Techniques in Cell Biology : microscopy, fractionation, tissue culture and somatic cell hybridization, DNA technology.
3. Nucleus and Nuclear acids : structure of chromosomes - prokaryotes and eukaryotes DNA replication, protein synthesis, genetic control, gene mutation and chromosomal aberrations.

### Unit 3 Developmental Biology

Development of human embryo.

### Unit 4 Environmental Science

1. Biomes, flow of energy : food chains and pyramids
2. Pollution : Water, air, soil, noise pollution
3. Biosphere and its future : Population explosion, Nuclear winter, acid rain, Green house effect.

### Practicals

1. Working out dihybrid ratios with seeds.
2. Epistasis
3. Experiment on transpiration.
4. Oxygen evolution in photosynthesis.
5. Anaerobic-germinate seeds (Hg level).
6. Grow seeds and measure and record growth pattern.
7. Effect of IAA on decapitated plant.
8. Effect of salt concentrations on PBC.
9. Qualitative estimations of proteins, carbohydrates (sugars & starch) and fats.
10. Abnormal constituents of urine.
11. Chick embryology : 18 hrs, 24 hrs, 33 hrs, 72 hrs.
12. Slides of frog blastula, gastrula, Neurula stages.
13. Study of a quadrat (Ecology)
14. Water analysis.

## HISTORY I AND II (02.7 and 03.7)

### THE RATIONALE :

The purpose of these two courses is to make the students aware of the processes of historical inquiry and to persuade them to look for inter-connections between structures and processes in history.

The courses make no effort to provide students with an exhaustive survey of all the phases of Indian history or the history of any other particular country. Such efforts at comprehensive surveys are inevitably elusive and often tiring.

The focus therefore is on general problems and issues of historical inquiry. History I, looks at societal forms the specificities of different systems and their transformations, the long term trends and processes in history. History II, shifts the focus away from large systems and trends and probes the connection between culture, identity and power; and through these issues it looks at the history of colonialism and modes of resistance.

The courses will develop around a set of readings – preferably essays. While the focus in paper II will be on India, the discussion and the readings will refer to the history of other countries. Students will be expected to read around 500 to 700 pages for each course. In History I, eight to ten lecture hours will be devoted to each unit and in History II, ten to twelve hours may be spent in discussing the themes of each unit.

## 02.7 HISTORY I TRANSFORMATIONS IN HISTORY

100 Marks

Unit 1 1. Understanding History : the conceptual basis of history as a discipline, the question of historical objectivity and truth.

2. Interpreting Sources : the nature of historical source (archaeological, numismatics, epigraphic, literary, written/oral), problems of interpretation.

These lectures will attempt to understand the problematic nature of historical interpretation and the limits to historical imagination imposed by the nature of sources.

Unit 2 3. Hunting Gathering : paleolithic, mesolithic, neolithic.

4. Domestication of Plants and Animals : pastoralism, shifting cultivation, settled agriculture.

These lectures will discuss the basis and characteristics (social, economic, cultural) of different societal forms.

Unit 3 5. Emergence of States : monarchies, republics. A case study of Ganasanghas/Magadha/Pallavas/Satavahans.

6. The concept of Empire : a case study of Magadha.

These lectures will discuss the forms of early states and the processes of their emergence; they will analyze how states evolve into empires and how they collapse.



No effort will be made to discuss all possible historical instances mentioned above : only one from a basket of cases will be considered.

- Unit 4
7. Feudalism : the debate on feudalism; the European case and the Indian experience.
  8. The Medieval State : the absolutist state in Europe; the Mughal State in India: regional state forms in the eighteenth century.
- Unit 5
9. Renaissance and the process of secularization : transformation of religion and the emergence of the ideals of rationality and reason.
  10. Industrialization and Imperialism : industrialisation and the transformation of the economy; the specificities of imperialism in the industrial age.
- Unit 6
11. The Democratic Revolutions : the French case, end of the ancient regime; the nature and the legacy of the revolution.
  12. The Socialist Revolutions : the Russian case : the ideals of socialism and the nature of the revolution.
  13. Nationalism and the Nation State : the lectures will discuss some of the different ideologies and movements of modern times; they will analyze the difference between European nationalism and nationalism in the colonial context and the link and the opposition between different articulation of nationalism will be discussed.

### 03.7 HISTORY II

#### CULTURE, POWER AND COLONIALISM

100 Marks

- Unit 1 Colonialism and Underdevelopment
- The relationship between colonialism and underdevelopment and the variety of ways in which colonial power asserts itself will be discussed.
- Unit 2 Education and Society
- This theme will discuss the history of different forms of pedagogy (in pathshahas, tols, madarasas, schools etc.) and the structures of formal and informal education in colonial and pre-colonial India.
- Unit 3 Language and Identity
- The significance of language in the formation and assertion of identities and the link between language and power will be discussed. The conflicts between languages, the histories of their transformations and the processes of their interaction will be touched upon.
- Unit 4 Science, Knowledge and Power
- The different frameworks of scientific knowledge, the conflicts between forms of indigenous and western knowledge and the link

between colonial hegemony and the domination of western science will be discussed with specific reference to medicine and scientific forestry.

- Unit 5 Art, Society and Politics
- The lectures will trace the shifting forms of art/architectural styles in India and their links with questions of identity and power.
- Unit 6 Religion, Politics and Society
- The lectures will discuss the history of different forms of patronage of religions; the conflicts between heterodox and orthodox sects; and the relation between religion and politics.
- Unit 7 Resistance and Domination
- The lectures will discuss a variety of forms of resistance to domination : silent protests/open rebellion, everyday resistance/ political movements, cultural/political resistance, passive/active resistance.

### 02.8 POLITICAL SCIENCE I

100 Marks

#### POLITICAL STUDIES : CONCEPTS IN THEORY AND PRACTICE

- Unit 1 Introduction to the study of Politics
1. Perspectives on :
    - a. Power relations, conflicts and conflict resolution;
    - b. Social change and Social movements.
  2. Methods of the study of politics :
    - a. Ethics and philosophy—Aristotle and Hegel;
    - b. Institutions and legality—Mill;
    - c. Materialist interpretation of history—Marx and Mao;
    - d. Behaviouralism;
    - e. Comparative politics—Almond, Frank & Wallerstein.
- Unit 2 Important theoretical concepts
- Rights, liberty, equality and justice—in the light of the following :
- a. conflict between nature and law in ancient and modern thought;
  - b. human rights;
  - c. the feminist critique of theories of justice and rights.
- Unit 3 Society, community and politics
- a. polis and the nature of the state in Greek antiquity;
  - b. monarchy and changing notions of the state;

- c. civil society and the modern nation-state;
- d. the state in post-colonial societies.

#### Unit 4 Nationalism

1. In Europe :
  - a. emerging identities in the nineteenth century;
  - b. the rise of fascism in the 1920s and 1930s;
  - c. the debates of the second International on the right of nationalities to self-determination;
  - d. new trends in nationalism in the 1980s and 1990s.
2. In the colonies, emerging from different anticolonial struggles :
  - a. Peaceful transfer of power—India, Nigeria;
  - b. Violent revolutionary struggles—Angola, Algeria;
  - c. Political visions—Gandhi, Fanon, Cabral, examples from South-East Asia.

#### Unit 5

- Imperialism
  - a. the industrial revolution and imperialism;
  - b. the new world economic order in the age of Bretton Woods and Comecon; the imperialism of aid and development;
  - c. its character after the 1950s—Latin America, Vietnam and South Africa.

### 03.8 POLITICAL SCIENCE II

100 Marks

#### SOME NEW ISSUES IN POLITICS

Introduction : A Reappraisal of the Concerns of Politics.

1. From institutional and state-centered conceptions of politics to politics as a study of relations of power in society.
2. The entry of hitherto marginal groups and issues into the political mainstream
3. The transformation of the global balance of power in the late twentieth century.

#### Unit 1 Gender

1. The challenge of political theory from the concept of gender.
2. Major issues in feminist politics : women's access to employment, property and other resources—capitalist development in post colonial societies and their impact on women—issues relating to body politics (sexual violence, access to abortion, intrusive and harmful contraceptive method purveyed in the south by multinational companies)—sexism in legal discourse—feminism and the labour movement.

3. The Indian Women's movement : central issues, ideological differences within the movement, relationship with other social movements.

#### Unit 2 Environment and Development

1. The challenge to the dominant development paradigms from the perspective of the environment : critique of Post-Enlightenment rationality and instrumental reason (Frankfurt school, Gandhi and postmodernist thought).
2. The debates on appropriate technology, sustainable development, traditional systems/practices of medicine, indigenous systems of management of water, soil, forests.
3. The ecology movement—history and context of emergence of western movements (e.g. Greenpeace, Friends of the Earth, CND) and non-western movements (Chipko, Silent Valley, NBA and other examples from Latin America and South-East Asia). Relationship of these movements with the State, mainstream political parties and other social movements (e.g. trade unions, women's and civil rights movements)
4. The contradictions of the dominant international economic order and the agenda of the environment—the use of environment concerns by the industrialized North as a weapon against the South.

#### Unit 3 The changing character of socialism

1. The main features of socialist thought upto the 1980s.
2. Characteristics of socialist countries upto the 1980s.
3. Challenges after the 1980s.
  - a. the collapse of the Soviet Union and Eastern Europe
  - b. features of the crisis—response from within socialism
  - c. impact on post-colonial societies/third world.

#### Unit 4 The changing character of capitalism

1. From laissez-faire to welfare state.
2. Capitalism in the 1980s : Thatcherism and Reaganomics.
3. Transnational companies and their role in post-colonial countries.

### 02.9 GEOGRAPHY I

#### PHYSICAL GEOGRAPHY

100 Marks

#### Unit 1 Understanding basic concepts : location, area, flows/network, space and environment ; scope of physical geography.

#### Unit 2 Lithosphere : geological time scale; internal structure of earth; rocks and their types; folds and faults; earth quakes and volcanoes; plate tectonics—tectonics, theory of plate tectonics, movement of major



plates and their consequences; development of landforms and role of different agencies.

Unit 3 Atmosphere : structure and composition of atmosphere; insolation factors and spatial distribution; pressure-factors and spatial distribution; general circulation of atmosphere-world wind belts, monsoons and cyclones: classification of climate-Koppen's classification.

Unit 4 Hydrosphere : temperature, salinity and density of ocean water-factors influencing their spatial variation in oceans; movements in ocean waters-waves, currents and tides; major ocean currents.

Unit 5 Soils and vegetation : soil-formation, classification and general distribution of major soil types; vegetation-factors, classification of vegetation and a general distribution of major vegetation types; inter-relationship of climate, soils and vegetation in (a) semi-arid, (b) temperate and (c) equatorial region.

Unit 6 Understanding Maps and Diagrams (Practical) : (a) scales; (b) cardinal points; reading and measuring; and (c) projection-properties and types; topographical maps : identification numbers and interpretation of physical features; weather maps; conventional symbols and interpretation of weather maps; instruments used to measure temperature, pressure, humidity and precipitation; identification of rocks.

Unit 7 Project work : techniques of report writing; a report on geographic study of any region-mountain, desert, coastal or plain.

### 03.9 GEOGRAPHY II HUMAN GEOGRAPHY

100 Marks

Unit 1 Human Geography : major paradigms in changing trends.

Unit 2 Resource Geography : definition and classification of resources; land resource and land use classification; water resources-ground water and surface water; energy resources-conventional (fuelwood, coal, petroleum and hydro) and non conventional (solar, wind and geo thermal); biotic-forests and fisheries.

Unit 3 Agricultural Geography : types of farming; study of the following agricultural types- (a) shifting agriculture, (b) subsistence, (c) commercial, (d) plantation and (e) dairy farming; study of the following crops- (a) wheat, (b) rice, (c) cotton and (d) sugarcane; world agricultural problems.

Unit 4 Industrial Geography : factors affecting industrial location; major industries : (a) mineral based (petro-chemicals and iron and steel); (b) agro-based (c) consumer based (automobiles and electronics); patterns and trends of industrialization.

Unit 5 Population Geography : demographic variables-fertility, mortality and migration; population growth and demographic transition model; causes and consequences of international migrations; population resource relationship-over, under and optimum population. Population policies : types-pronatalist and antinatalist.

Unit 6 Settlement Geography : classification of settlements-rural and urban; rural settlements-factors and types of rural settlements; urban settlements-origin, classification criteria and world urbanisation pattern; city and its region.

Unit 7 Transport Geography : world pattern of rail, road, air and water ways.

Unit 8 Understanding Maps and Diagrams (Practical) : use of thematic maps (dot, choropleth and isopleth method); located statistical diagrams (bar diagram, pie chart and line graphs).

Unit 9 Project work : a report based on local study of the geographical characteristics related to any theme mentioned in different units in paper II. (Resources, Agriculture, Industrial and Others).

### 02.10 ECONOMICS I

100 Marks

Unit 1 Role of price mechanism : market demand & market supply.

Unit 2 Law of demand, Demand curve : Marshallian utility analysis and indifference curve approach. Elasticity of demand, Revenue curves - TR, MR, AR.

Unit 3 Production : factors of production & their combinations : law of returns : economics & diseconomics of scale : cost curves. Constituents of cost, wages, rent, profits, interest, concept of opportunity cost.

Unit 4 Objectives of a firm-profit maximisation, sales maximisation, cost minimisation, other non profit objectives . Market equilibrium conditions under perfect competition and imperfect competition (details of monopoly, oligopoly, monopolistic competition not required) objectives of non profit organisations.

Unit 5 International trade : principle of comparative advantage, terms of trade.

Unit 6 National product : structure and concept, circular nature of income flows ; methods of estimation; income, product and expenditure; problems of estimation.

Unit 7 National income estimation in India : composition of GDP; significance of various aggregates and their interrelationships.

Unit 8 Difference between microeconomics and macroeconomics. Determination of aggregate demand and aggregate supply to the resultant equilibrium income and employment. The concept of multiplier.

03.10 ECONOMICS II

100 Marks

- Unit 1 Problems of economic development : role of capital and technology; nature and causes of economic backwardness; key issues in economic transition - capital formation, unemployment, growth and income distribution. Colonialism and underdevelopment in the Indian context.
- Unit 2 Objectives of planning; strategy of growth in a mixed economy; role of public sector. Assessment of performance under Five Year Plan Trends of NY & PCY. Mobilisation of financial resources for plans.
- Unit 3 Resource allocation across sectors: agriculture, industry, services, foreign trade : between 1951 and the current Five Year Plan. Critical assessment of the policies and achievements of various sectors.
- Unit 4 Demographic indicators of development-quantitative and qualitative\* dimensions; quality of life Index (performance in education, health, child labour, participation of women in the work force, etc.)
- \* Poverty, problem of unemployment : reclassification of groups (educated & uneducated unemployment, employed in the informal sector, disguised unemployment).
- Unit 5 Univariate frequency distributions : measures of location and of dispersion. Elementary discussion on bivariate frequency distributions, association of attributes. Correlation, regression and factor analysis.
- Unit 6 Index numbers of agricultural and industrial production (wholesale & consumer prices ; meaning and uses) Indices of human development with special reference to educational development.
- Unit 7 Time series : objectives, components of time series, calculation of trend-linear and non-linear trends.