UNIVERSITY OF DEL...

SCHEME OF EXAMINATION

AND

COURSES OF READING

FOR

B.Sc. (HONOURS) EXAMINATION
ZOOLOGY

Part I 1977 Examination
Part II 1978 Examination
Part III 1979 Examination

Syllabi applicable for students seeking admission to the B.Sc. (Honours) Course in the academic year 1976-77.

Price :

B.Sc. (Honours) in Zoology

SCHEME OF EXAMINATION

PART I EXAMINATION, 1977.

	Duration (Hours)	Max. Marks
Part I (I Year) with/without additional Physics		
Paper I—General Zoology	3	75
Paper II—Embryology and Histology	3	75
Practical relating to Papers I and II	5	75

Note :—The Practical test shall be of five hours' duration conducted in one session. Laboratory records shall carry 25% of the marks allowed for the practical test. The practical test shall include viva voce.

PART II EXAMINATION—1978

Paper III—Non-Chordata	3	75
Paper IV—Animal Ecology and Zoogeography	3	75
Practical relating to Papers III and IV	4	50

Note :—The practical test shall be of five hours' duration conducted in one session. Laboratory records shall carry 25% of the marks alloted for the practical test. The practical test shall included viva-voce.

PART II EXAMINATION—1979

Paper V—Chordata	3	75
Paper VI—Physiology	3	75
Paper VII—Evolution and Genetics	3	75
Paper VIII—Cell Biology	3	75
Practical relating to Papers V and VIII	5	175
Total :		900

The Honours Examination for the Degree of Bachelor of Science shall include :

1. A qualifying test in English at the end of the first academic year.

(i)	English —(For candidates offering Additions Physics)		
	Paper A —Text	3	75
	Paper B —Grammar and Composition etc.	3	75
(ii)	English —One Paper (For candidates who are not offering Additional Physics).		
	(a) Applied Grammar & Composition	1	50
	(b) Prose Texts (of which one shall be a work of fiction).	3	50

2. Additional Physics at the end of First Year (For students offering additional Physics for B.Sc. (Hons.) Botany/Zoology or Group 'B').

Paper	I—Mathematic, Mechanics and Properties of Math., Heat and light.	3	50
Paper	II—Sound, Current, Electricity and Atomic Physics	3	50
Practical Test		5	50

Note :—10 marks for the Practical shall be reserved for the Laboratory Record of the candidate.

3. A qualifying test in History of Science and Scientific Method at the end of the second year—one paper (the teaching of this subject will be done in the second year).

4. *Subsidiary Subjects (Chemistry) I Year 1977*

Paper	I—Inorganic and Physical	3	50
Paper	II—Organic and Physical	3	50
Practical Test		5	40

Note :—20% of the marks in the Practical test shall be reserved for the class records of the candidates.

Subsidiary Subjects (Chemistry) II Year 1978

Paper	I—Inorganic and Physical	3	50
Paper	II—Organic and Physical	3	50
	Practical Test	6	60

Note :—20% of the marks in the Practical Test shall be reserved for the class records of the candidates.

5. *Subsidiary Subjects (Botany) : Part I Examination 1977*

Paper	I—General Botany	3	50
Paper	II—Morphology and Life History of Cryptogarms and Gymnosperms	3	50
	Practical on Papers I & II	4	50

Subsidiary Subjects (Botany) : Part II Examination 1978

Paper	III—Anatomy and Taxonomy of Angiosperms, Economic Botany :	3	50
Paper	IV—Physiology, Ecology and Genetics	3	50
	Practical on Papers III and IV	4	50

Note : The Practical Examination shall be of four hours' duration and shall carry 50 marks, out of which 10 marks shall be reserved for the Laboratory and Field Records of the candidates.

Part I Examination 1977

PAPER I GENERAL ZOOLOGY

Study of the following types :

Amoeba

Malarial parasite and control of malaria

Hydra

Earthworm

Cockroach

Life Histories :

Taenia solium
House fly
Anopheles

Rabbit : External characters, digestive, respiratory circulatory, excretory, nervous, reproductive and skeletal systems.

Elements of physiology with reference to a vertebrate : digestion and absorption of food ; excretion ; respiration; physiology of the transmission of nerve impulse, 2 and Physiology of endocrine glands.

General Survey of Animal Kingdom :

Characters of Non-chordata upto classes and chordata upto orders with following examples :

Amoeba, *Entamoeba*, *Paramecium*, Malarial, Parasite, a sponge, Jelly fish, *Hydra*, Sea Anemone, a coral, *Taenia*, Liver fluke, *Ascaris* (male & female) Earthworm, *Nereis*, Leech Prawn, Centipede, Bedbug, *Pila*, Cuttle-fish, Star-fish, Sea-urchin, Amphioxus, Shark, *Labeo*, Toad, Salamandar, Wall lizard, *Draco*, Tortoise, *Archaeopteryx*, Two Birds, Bat and Hedgehog. Elementary knowledge of cell structure and function; (cell membrane, endoplasmic reticulum, nucleus, nucleolus, chromosomes, mitochondria, golgi bodies, Lysosomes). Mitosis, Meiosis, General structure and function.

Mondel's Law of Heredity

Evolution : Lamarckism, *Darwinism*, DeVries's theory of mutation.

Paper II—EMBRYOLOGY AND HISTOLOGY

Part A—Embryology :

Gametogenesis, Fertilization, types of eggs, irregular cleavage in flatforms, spiral cleavage in annelida. Cleavage in sea urchin. Patterns of cleavages in chordates. Development upto gastrulation in *Branchiostoma*, frog and chick. Fate maps of *Branchiostoma*, frog and chick. Physiological control of metamorphesis in frog.

Formation and fate of extraembryonic membranes in chick. Early cleavage in Rabbit. Formation of amnion, allantois and types of placenta in mammals, Organizers, Regeneration, Genetic control of development. Organogenesis of central nervous system, sense organs, heart and kidney of vertebrate embryos.

Part B—Histolygy :

Histology of the following tissues and organs of a mammal.

Epithelium, connective tissues : blood, lymphoid tissue, bone, cartilage, muscular tissue and nervous tissue, skin, oesophagus, stomach, intestine, rectum, liver, lung, pancreas, spleen, kidney, spinal cord, ovary and testis.

Practical Test in Paper I and II

Dissections :

Frog—Arterial, venous, cranial nerves (V, VII, IX and X) and Urinogenital systems.

Skeleton : Skull of rabbit. Study of disarticulated bones of appendicular and axial skeleton of Rabbit.

Life Histories : *Taenia*, House fly, *Anopheles*.

Temporary Mounts : Septal and pharyngeal nephridia and ovary of earthworm, salivary apparatus, mouth parts, testis and ovary of Cockroach. Hyoid apparatus of frog.

Histology Preparations—Temporary preparation of nerve cells, striped muscle fibres and squamous epithelium.

Permanent Slides : T. S. and L. S. of *Hydra*, T.S. earthworm through pharynx, gizzard, seminal vesicles and typhlosole. V.S. of skin, T.S. of oesophagus, stomach, intestine, rectum, liver, pancreas, spleen, kidney, spinal cord, ovary, lung, testis, bone and cartilage of a mammal. Study of mitosis from prepared slides.

Embryology :

Stages in the development of frog (whole embryos of the following stages : blastula, gastrula, neurula, external

gills, stages in metamorphosis of frog); stages in the development of chick (whole embryos up to 72 hrs. of incubation); Vertical and transverse sections of neurula and external gill of frog embryos. T. S. chick embryos showing development of amnion, study of whole chick embryos (about 5 days) to show yolk sac and allantois.

General Survey :

Study and sketching of the following :

(i) *Amoeba*, *Entamoeba*, *Paramecium*, Malarial Parasite, a *sponge*, *Jelly fish*, *Hydra* Sea anemone, a coral, *Teania* *Liver fluke*, *Ascaris* (male and female), Earthworm, *Nereis*, Leech, Prawn, Centipede, Bed bug, Cockroach, Louse, Scorption, Fresh water mussel, *Pila*, Cuttle fish, Star fish, Sea-urchin, Amphioxus, Shark, *Labeo*, Toad. Salamander, Wall lizard, *Draco*, Krait, Viper, Sea-snake, a non-poisonous snake. Tortoise, *Archaeopteryx*, two birds, Bat, Hedgehog.

(ii) Dissected specimens of rats showing Arterial, Venous and Reproductive systems.

B.Sc. (Hons.) Part II (2nd Year) 1978

Paper III—NONCHORDATA

Protozoa : Study of the following types :

Entamoeba histolytica, *Paramecium*, *Euglena*, *Trypanosoma*, *Volvox*, *Monocystis*, *Vorticella*, Classification upto orders.

Locomotion;
Nutrition;
Reproduction, and
Parasitism in Protozoa

Introduction to Metazoans : Phylogenetic inter-relationships of Protozoa and Origin of Metazoa.

Porifera : Study of the following types :

Leucosolenia, *Grantia* or *Sycon*
Classification upto orders.

Skeleton; Canal system; Reproduction
Phylogenetic position of Porifera.

Coelenterata : Study of the following types :

Obelia, Aurelia, Sea-anemone
Classification udto orders.
Polymorphism in Hydrozoa.
Corals and Coral reefs.

Ctenophora

Platyhelminthes :

Study of the following types :

Planaria, Fasciola, Taenia
Classification upto orders.
Evolution of Parasitism and Economic importance of helminths.

Namathelminthes :

Study of the following types :

Ascaris

Classfication upto orders. Nematoda and diseases.

Annelida :

Study of *Leech* as a type.
Classification upto orders.

Trochophore larva and its affinities, Adaptive radiation in polychaetes, Excretion and coelome in Annelida.

Onychophora :

Study of the following types :

Peripatus; Affinities.

Arthropods :

Study of the following types :

Palaemon, Scorpion

Classification upto orders.

Comparative study of Larval forms in crustacea, Parasitic crustacea, Metamorphosis in insects and its physiological control.

Mouth parts, Economic importance of insects. Social life in insects. Respiration and phylogeny of Arthropods.

Mollusca :

Study of the following types :

Lamellidens, Pila, Sepia

Classification upto orders

Comparative study of Foot, Shell, Nervous system, Respiratory system. Economic importance and origin of Mollusca. Torsion in gastropoda.

Echinodermata :

Study of the following types :

Starfish, Brittle Star, *Salmacis*, Holothurian, *Antedon*

Classification upto orders.

Comparative study of exoskeleton, water vascular systems. Nervous system.

Symmetry, Larval forms and Affinities of Echinodermata.

Paper IV—ANIMAL ECOLOGY & ZOOGEOGRAPHY

The Scope of Animal Ecology

Concepts of Ecosystem : Principal steps and components; Biogeochemical cycles; influence of environmental factors like temperature, light and humidity on animals. Limiting factors (combined concepts of Liebig's Law of the minimum and Shelford's Law of tolerance).

Concepts of Habitat and Ecological Niche.

Biological Energetics :

Energy flow in an ecosystem, Food chains, food webs and Trophic levels. Trophic structures and ecological pyramids.

Concepts of productivity. Ecological efficiency.

Population Ecology :

Group properties of population : Density and Population regulation; natality, mortality, age distribution, sex ratio, population

dispersal, Population growth and maintenance. Biotic potential versus environmental resistance. Intraspecific and Inter-specific relationships, competition, predation, parasitism, antibiosis, commensalism, co-operation and mutualism.

Community Ecology :

Major Biomes and their communities : Fresh water, marine and terrestrial. Ecological succession, climax community. Community stratification and periodicity. Ecotone and Edge effect.

Wild Life of India : Conservation and its principles.

Environmental Pollution : Agents of Pollution of Air, Water and Land. Effect of Pollution on the ecosystem.

Prevention of pollution.

Zoogeography : Principles and theories of continental distribution of animals. Zoogeographical realisms.

Practical test in paper III and IV

Protozoa :

Examination of different protozoa cultures—*Paramecium, Amoeba, Spirostomum, Blepharisma.*

Examination of pond water for observation of Euglena, *Volvox, Vorticella.*

Mounts of *Monocystis* and rectal ciliates of frog. Study of the following from slides :

Pelomyxa, Amoeba, Entamoeba Arcella, Difflugia Globigerina, Actinophrys, Elphidium radiolarian ooze. Forminiferan ooze, Noctiluca, *Ceratium, Euglena, Chlamydomonas, Volvox, Leishmania, Trypanasoma, Giardia, Trichomonas, Trichonympha, Gregarina, Balantidium Vorticella, Spirostomum. Stentor, Paramecium* (fission and conjugation stages).

Porifera :

Mounts of spicules, gemmules, spongin fibres. Microscopic slides of sections of sponges. Study of the

following from slides or specimens : *Leucosolenia, Sycon,* (or *Grantia*) *Spongilla* and other assorted sponges.

Coelenterata :

Study of the following from specimens and slides :

Hydra, Tubularia, Hydractinia, Obelia, Campanularia Sertularia Plumularia, Aglaophenia, Velella, Porpita, Physalia, Halistemma, Millepora, Aurelia, Ephyra Strobilating *Scyphystoma,* Sea anemone, *Tubipora, Alcyonium, Gorgonia, Corallium, Zoanthus, Adamsia, Fungia, Acropora, Favia, Ctenophore.* Mounts of Obelia and *Hydra.*

Platyhelminthes :

Study of the life history stages of the following based on specimens and slides :

Planarian, Liver-fluke and *Taenia,* Sections of liver fluke and *Taenia.*

Study of the following from specimens and slides :

Polystomum, Fasciolopsis buski.

Nemathelminthes :

Study of the following from specimens and slides :

Oxyuris, Ancylostoma, Enterobius, Dracunculus. Ascaris— Entire and Transverse sections.

Annelida :

Dissections of Leech.

Mounts of Jaws. Salivary glands of Leech and parapodia of *Nereis.*

Study of the following from specimens and slides :

Aphrodite, Heteronereis, Chaetopterus, Serpula, Spirorbis, Arenicola, Sabella, Terebella, Tubifix, Eutyphoeus, Tomopteris, Pontobdella, Glossiphonia.

Slides : Sections of Leech.

Arthropoda

Dissections of and mounts from Prawn.

Study of the following from specimens and slides :

Branchipus, Apus, Daphnia, Cypris, Cyclops, Argulus, Sacculina, Gammarus, Onsicus, Squilla, Lepas, Balanus Eupagutes, Carb, Lobster, Shrimp. Crustacean larvae, Contepede, Millipee, *Lepisma*, Spring-tail, Grasshopper, Locust, Mantis. *Gryllus, Gryllotalpa, Forficula*, Termite (different casts). May-fly, Dragon-fly, Damsel-fly, Bed-bug, Aphids, *Dysdercus*, Water-scorpion, body-louse, Thrips, Butterfly, Moth, Silk moth, Ladybird beetle, Blister, beetle, Rice weevil, Honey Bee, Wasp, Housefly, *Culex, Anopheles, Aedes, Drosophila*, Sand fly, Rat-flea. Mouth parts of cockroach, butterfly, honeybee, housefly and *Dysdercus Buthus, Palamnaeus*, spiders, ticks and mites.

Mollusca :

Dissections of and mounts from *Lamellidens, Pila, Sepia*,

Study of the following from specimens and slides :

Chiton, Patella, Buccinium, Triton, Doris, Limnaea, Helix, Limax, Dentalium, Mytilus, Pecten, Ostrea, Pinna, Cardium, Teredo, Sepia, Loligo, Octopus, Nautilus.

Echinodermata :

Study of the following from specimens and slides :

Pentaceros, Astropecten, Astrophyton, Clypeaster, Echinocardium, Spatanus, Cucumaria, Molpadida, Synapta, Antedon. Enchinoderm larvae.

Demonstration of external morphology and anatomy of Starfish, Sea-urchin and Sea-cucumber.

Mounting of Pedicellaria and Aristotle's Lantern.

B.Sc. (Honours) (Part III)—3rd year Examination 1979

Paper V—CHORDATA

Origin of chordates and General characters of Chordata.

Classification, morphology, bionomics, distribution, development, life-history and interrelations of Hemichordata, Urochordata, and Cephalochordata.

Subphylum Vertebrata. General characters and classification upto orders of Cyclostomata, Chondrichthys, Choanichthys, and Actinopterygii, Osteichthys.

Fishes : Scales, Migration & Respiration.

General characters and classification of amphibia.

General characters and classification of Chelonia, Crocodilia, Lacertilia, Ophidia and Rhynchocephalia. Affinities of Sphenodon. Extinct reptiles.

General characters and classification of birds, palate, mechanism of flight, and migration of birds. General characters and classification of mammals. Dentition in mammals.

Comparative anatomy of the following systems in vertebrates :

Integument ; degestive, respiratory, vascular, excretory, skeletal, reproductive and nervous system and sense organs. Parental care in vertebrates.

Paper VI—PHYSIOLOGY

Elements of cell physiology : Solutions, colloids, osmotic pressure, hydrogenion concentration, buffers.

Permeability of membranes.

Chemical composition of protoplasm : Chemistry of carbohydrates, proteins, lipids and nucleic acids.

Nature, function and classification of enzymes, Coenzymes. Biological oxidations.

Intermediary metabolism of carbobydrates, proteins and lipids

Physiology of the following systems with reference to mammals. Digestion and absorbtion.

Respiration.

Circulation :

Blood—composition and functions of blood and lymph; blood groups ; RH factor ; origin and development of blood cells ; Haemopoietic factor ; blood pigment, blood coagulation.

The Heart—Structure ; cardiac cycle, origin, conduction and nervous and chemical regulation of heart. Electro-cardiogram,

Peripheral circulation—Blood pressure ; capillary pressure ; circulatory rate ; nervous and chemical regulation of blood pressure.

Structure of mammalian kidney and physiology of excretion.

Structure of muscle and physiology of muscular contraction.

Strucrure of myelinated and nonmyelinated nerve fibres.

Nerve impulse—Origin and transmission.

Structure and function of sensory organs concerned with vision, sound perception, taste, smell and touch in mammals.

Nutrition with special reference to Man.

Structure and Physiology of mammalian endocrine glands.

Physiology of reproduction in mammals.

Paper VII—EVOLUTION AND GENETICS

Part A : Evolution

Origin of life. History of evolutionary thought from Greeks to Charles Darwin. Lamarck and his works. Darwin and his works. Sources and nature of organic variations. Natural selection. Hardy-weinberg law, Sewall—Wright effect, stabilizing, balancing, directional and disruptive forms of selection. Selection in micro-organisms; cryptic and warning coluration, mimcry;

correlated responses to selection. Isolating mechanisms and their role in evolution. Island life. Concept of species and subspecies. Concapt of micro, macro and mega-evolution. Principles of Zoological nomenclature and international code.

Fossils. Geological record. Dating fo rocks. Outline of geological eras. Origin of amphibia, aves and mammals. Phylogeny of horse, elephant, camel. Origin and evolution of man.

Principles and theories of continental distribution of animals. Zoogeographical reslms of the world.

Part B : *Genetics*

History of Genetics.

Mendelian laws of Inheritance.

Recombination, Linkage, linkage maps.

Multiple alleles ; Interaction of genes. Pleiotropy.

Quantity characters.

Mutation—Natural and induced, Mutation and evolution.

Meiosis, Chromosome number and form, Polyploidy, Structural rearrangements and speciation.

Cytoplasmic inheritance. Developmental genetics.

Biochemical genetics.

Elements of human genetics—normal and abnormal karyotypes; Single gene differences ; genes and diseases.

Paper VIII—CELL BIOLOGY

History of Cytology :

Chemistry or cellular constituents—Inorganic constituents, proteins, carbohydrates, lipids and nucleic acids.

Modern techniques in the study of Cell structure and function—fixation and staining, Cytochemistry ; phase-contrast, polarization and flourscence microscopy, principles and application of electronmicroscopy ; radioactive

tracer techniques and autoradiography ; cell fractionation and isolation of cellular constituents.

Structure and function of Cytoplamic Constituents—Plasma membrane, mitochondria, Golgi bodies, endoplasmic reticulum and ribosomes and lysosomes.

Structure of the nucleus—Nuclear membrane ; Enchromatin and heterochromatln, nuceleolus; chromosomes; Polytene and lampbrush chromosomes.

Study of cell division—Cell cycle; mitotic spindle; chromosome movement in mitosis and meiosis.

Gene structure and function – Watson—Crick model of DNA, replication of DNA; Genetic code; transcription and translation; Protein synthesis; regulatory mechanisms.

Cell differentiation :

Sex—chromosomes and Sex determination.

Parthenogenesis.

Practicals relating to Paper V to VIII
Chordata

Lower Chordata :

Specimens : *Branchistoma, Balanoglossus, Herdmania, Salpa Doliolum, Botrylus, Ciona, Pyrosoma.*

Sections : Amphioxus through different regions.

Slides : Sections through *Balanoglossus,* Ascidian; Velum Oral hood of Amphioxus. Branchial wall of Ascidians, Amphioxus. Preparation of spicules of *Herdmania.*

Fishes : Dissection : *Scoliodon* Viscera, afferent branchaial arteries, efferent branchaial arteries, cranial nerves, eye muscles and their innervation, internal ear, brain. Study of hand cut sections of Scoliodon through various regions. Permanent mounts : *Scoliodon* : Amupullae of Lorenzinii.

Placoid scales. Cycloid and ctenoid scales from a bony fish.

Dissection : *Mystus* : Vascular system. Weberian, ossicles, Air bladder.

Museum specimens. A cyclostome. Chimaera, Pristis, *Sphyrna*, Embryo of shark with yolk-sac. Egg case of shark, *Zygaena*. *Rhynobatus*, *Myliobatus*, *Echinis*, string-ray, electric ray. *Ophiocephalus*, *Clarias* *Heteropneustes* *Mystus*. *Wallago*. pipe fish, sea horse, Eel, Puffer fish, Coffer fish, Flat fish, *Ribbon fish*, *Catla*, *Labeo*, *Notopterus*, *Belone*, *Hemirhamphus*, *Amphipnous*, *Anabas*, Butter-fly *fish*, *Diodon*, *Lophius*, *Antennarious*, Flying fish, Hill stream fish.

Skeleton of *Scoliodon* and *Labeo*.

Accessory branchail organs in *Anabas*, *Clarias* and *Heteropneustes*, (to be studies from dissected specimens).

Amphibia :

Museum specimens : *Hyla*, Toad, *Rhacophorus*, Salamander, *Ureotyphlus*, *Ichthyophis*. Different genera of frogs from India.

Reptilia :

Anatomy of Lizard, snake and a chelonian to be studied from dissected specimens.

Skeleton : Varanus, snake, tortoise, skulls of cobra, python, and Crocodile.

Museum specimens : *Calotes*, *Gecko*, *Hemidactylus*, *Uromastix*, *Varanus*, *Mabuia*, *Chamaeleon* *Draco*, *Limbless* lizard, Phython, *Erix*, Cobra, Viper, Krait, Rat snake, Water snake, Tree snake, Sea snake, *Lessymys*, *Trionix*, *Chelone*, *Testudo*, Crocodile, *Gavialis*.

Aves :

Dissection of pigeon : Flight muscles, Arteries, Veins, Brain. Perching mechanism.

Temporary Mount : Pecten from eye of pigeon. Barbs & barbules.

Museum Specimens : Assorted nest types and skins of common birds from Delhi region.

Skeleton : Skeleton of fowl. Different types of palate in birds. Feather types.

Mammals :

Dissection : Rat : neck region, arteries, veins, urinogenital system, ear ossicles, brain.

Study of disarticulated skull of Dog.

Museum specimens : Shrew, Frugivorous bat, Insectivorous bat, *Loris*, Hedgehog, Porpoise,

Skull of the following mammals ;

Cow, horse, camel, goat, *loris*, langur, *macaque*, cat, shrew, squirrel, hedgehog, mongoose, bat and man.

Physiology Practical

Diffusion and dialysis. Effects of isotonic, hypotonic and hypertonic saline solution on erythrocytes. Study of Haemolysis ; Haemolytic effects of acid and alkali. Enumeration of red blood corpuscles in animals with the help of haemocytometer.

Estimation of haemoglobin in mammalian blood.

Differential count of white blood corpuscles.

Preparation of haemochromogen crystals.

Preparation of hemin crystals.

Coagulation of blood.

Colour reaction and general tests for the identification of carbohydrates, proteins and lipids.

Detection of the abnormal constituents of urine.

Demonstration of reflex action and reflex time in frog.

Demonstration of the action of salivary amylase, pepsin, trypsin, pancreatic lipase and catalase. Effects of pH, temperature and inhibitor on the enzymatic action of salvary amylase. Simple muscle twitch with mechanical, thermal and chemical stimulation

of gastrocnemius muscle; sciatic nerve preparation of frog. Recording the simple muscle twitch.

Perfusion of the excised heart of frog. Recording the frog's heart beats *in situ* and with perfused heart. Demonstration by the teacher of the effect of acetylcholine/atropine/epinephrine/adrenalin on the heart beat. Measurement of dissolved oxygen content in water by winkler's method and study of the rate of oxygen consumption in fish or any other aquatic organism. Dissection of endocrine glands in Rat.

Study of sections of pituitary, thyroid adrenal, pancreas, testis and ovary from the prepared slides.

Cell Biology Practical

Compound Microscope : Demonstration of parts and its principles

Mitosis in onion root tip (Temporary and permanent preparation).

Meiosis in grasshopper testis from temporary and permanent preparations.

Gametogenesis in Rat feulgen squash Preparation.

Chromosomes : Salivary gland ; human, frog, rat, mantid *Ascaris* (Slides or photographs).

Sex-chromatin from the buccal epithelium of human female. Cytochemical demonstration of (a) Nucleic acids using Feulgen and Methylgreen-pyronin stains (b) Proteins using Fast green and Bromophenol blue stains on tissue sections. (c) PAS reaction. Microtomy.

ENGLISH

Syllabus for the Qualifying Subject in Engli..., for the Examination, 1977

Paper I ... . 100 Mar.

1. Applied Grammar and Composition .. 50 Marks
2. Prose Texts (of which one shall be a work of fiction) 50 Marks

Detailed Course of Reading :—

1. Applied Grammar and Composition :

(a) Grammar 20 Marks

(i) Simple Sentence Structure—Statement, Question. Imperative and Negative.

(ii) Subject—Predicate agreement.

(iii) Use of parts of speech with special emphasis on articles, prepositions and adverbs.

(iv) Uses of tenses—simple present, simple past, simple future, perfect tense and continuous tense.

(b) Composition 30 Marks

(i) Short Composition

(ii) Letter Writing

(iii) Comprehension.

2. Text—50 marks—one general question on each of the two prescribed texts carrying 25 marks each.

1. Pride and Prejudice by Jane Austen.
2. Mirror of English Prose—Published by Department of English, S. Chand & Co.

Syllabus for History of Science and Scientific Method Examination, 1977

What is Science ? Origins of Science. Science in antiquity. Alchemy. Bacon and the Experimental Method, Copernicus and the plants, Galileo and Kepler. Newton and his laws of Gravitation. The nature of combustion. Development of scientific instruments : Microscope, Telescope, Air Pump, Thermometer, Barometer and Pendulum Clock. Dalton and the Atomic Theory, Kinetic Theory. Harvey's discovery of the circulation of blood. The Germ Theory of Disease and its influence on public health. Medicine and Surgery. Darwin and the Evolution Theory. Cell Theory, Reproduction. Mendel's Laws of Heredity. Wohler and the synthesis of organic substances. Theory of Electrolytic Dissociation, Enzymes. Harmones and Vitamins. Photosynthesis. The development of steam oil, electric and atomic power. The impact of Science on Modern Life.

The following books are suggested for the study :—

1. The Origin and Growth of Physical Science, Vol. I & II by Hurd and Kipling (Penguin).
2. History of Biology by Singer (Publishers—Bailliere Tindall Co., London).
3. Science : Past and Present by Sherwood Taylor.
4. A Short History of Science by Sedgwish and Taylor.
5. Science in the 29th Century by Singer.
6. The Science of Life by Taylor, (G. Rattary) (Published by Thames and Hudson, London, 1963).