

Mahatma Gandhi Kashi Vidyapith, Varanasi
M. Sc. (Zoology) Syllabus

M. Sc. Previous (w.e.f. 2013-14)

Semester I	Marks
Paper I – Comparative study of Lower non-chordates	100
Paper II – Biostatistics, Biosystematics and Bioinstrumentation	100
Paper III – Environmental Biology	100
Paper IV – Biochemistry	100
Practical Examination	100
Total	500

Semester II	Marks
Paper I – Comparative study of Higher non -chordates	100
Paper II – Animal Physiology	100
Paper III – Cytology and Genetics	100
Paper IV – Molecular Biology	100
Practical Examination	100
Total	500

M. Sc. Final (w.e.f. 2014-2015)

Semester III	Marks
Paper I – Comparative study of Proto-chordates and Lower vertebrates	100
Paper II – Development Biology	100
Paper III – Endocrinology	100
Paper IV – Special	100
A. Fish – Taxonomy and Morphology	
B. Entomology – Morphology, Physiology, Development and Ecology	
C. Cell Biology – Cytological Techniques	
Practical Examination	
Part – A. (General)	50
Part – B. (Special)	50
Total	500

Semester IV	Marks
Paper I – Comparative study of Higher vertebrates	100
Paper II – Animal Behaviour	100
Paper III – Special	100
A. Fish – Applied Ichthyology and Development	
B. Entomology – Evolution and Taxonomy	
C. Cell Biology – Ultrastructure and Morphodynamics of cell	
Paper IV – Special	100
A. Fish – Physiology and Ecology	
B. Entomology – Economic Entomology	
C. Cell Biology – Cell Regulation and Principles of Biotechnology	
Practical Examination	
Part – A. (General)	50
Part – B. (Special)	50
Total	500

M. Sc. (Zoology) Ist Semester
Paper I – Comparative study of Lower non-chordates

Unit 1

- Protozoa:**
- (i) Osmoregulation- contractile vacuoles and mechanism of osmoregulation,
 - (ii) Locomotion- locomotor organelles and methods of locomotion
 - (iii) Nutrition- Holozoic, Holophytic, Saprozoic and Myxotrophic nutrition
 - (iv) Reproduction- Asexual and sexual
 - (v) Protozoa and Diseases

Unit 2

- Porifera:**
- (i) Cellular Organization- Pinacoderm, Choanoderm, Mesenchyme
 - (ii) Skeleton- Spicules and spongin
 - (iii) Reproduction- Asexual and Sexual
 - (iv) Canal System- Types and functions of canal system

Unit 3

Coelenterata And Ctenophora

- (i) Origin of Metazoa
- (ii) Polymorphism- Basic forms and patterns, Importance of polymorphism
- (iii) Colony formation-
- (iv) Corals- coral polyp, coral skeleton, types of corals
- (v) General Organization and affinities of Ctenophora

Unit 4

Platyhelminthes and Aschelminthes

- (i) Parasitism in Platyhelminthes and Aschelminthes,
- (ii) Parasitic adaptations in Trematodes and Cestodes- Morphological and physiological adaptations
- (iii) Larval stages of Trematodes and Cestodes
- (iv) General organization and affinities of Rotifers

M. Sc. (Zoology) Ist Semester
Paper II - Biostatistics, Biosystematics and Bioinstrumentation

- Unit 1- Biostatistics** (i) Major Tendencies (Mean, Median, Mode),
(ii) Standard deviation,
(iii) Analysis of Variance

Unit 2- Biosystematics

- (i) Speciation- Dimensions and mechanism of speciation
- (ii) Species Concept- Species category and different species concept,
- (iii) Theories of Biological Classification.

Unit 3- Biological Techniques

- (i) Principles of Colorimetry and Spectrophotometry- Lambert Beer Law,
- (ii) Centrifugation- Principles and technique,
- (iii) Chromatography- Principles, types and applications
- (iv) Electrophoresis- Principles and applications

Unit 4- Microscopy

Principles and construction of -

- (i) Compound microscope
- (ii) Phase contrast microscope
- (iii) Electron microscope

M. Sc. (Zoology) Ist Semester
Paper III - Environmental Biology

Unit 1- Population Ecology

- (i) Characteristics of Population
- (ii) Population size and exponential growth
- (iii) Population dynamics, Competition
- (iv) Intra-specific and Inter-specific competition
- (v) Mutualism and Commensalism

Unit 2- Ecosystem

- (i) Nature of Ecosystem
- (ii) Production, Food webs and Energy flow through ecosystems
- (iii) Biogeochemical cycles
- (iv) Biomes

Unit 3- Environment

- (i) Environmental stresses
- (ii) Global warming
- (iii) Environmental contaminants- their uptake and biotransformation
- (iv) Bio-indicators and Biomarkers

Unit 4- Biodiversity Assessment, conservation and management of biodiversity

M. Sc. (Zoology) Ist Semester
Paper IV - Biochemistry

Unit1- Bioenergetics

- (i) Elementary thermodynamics- First law and second law of thermodynamics
- (ii) Cell as an open thermodynamic system
- (iii) Calculation of free energy change during biological oxidation-reduction reactions

Unit2- Enzymes

- (i) Mechanism of enzyme action, Activation energy
- (ii) Kinetics of enzyme action,
- (iii) Enzyme inhibition- Competitive and non-competitive inhibitors, Use of Lineweaver- Burk curve to predict the type of inhibition,
- (iv) Allosteric enzymes

Unit 3- Biomolecules & Metabolic Pathways

- (i) **Carbohydrates-** Classification, structure, general properties and biological significance
- (ii) **Lipids-** Classification, structure, general properties and biological significance
- (iii) **Metabolic pathways-** Glycogenesis and Glycogenolysis, Gluconeogenesis, HMP shunt, Oxidative phosphorylation, Beta oxidation of fatty acids

Unit 4-

- (i) Classification and significance of Vitamins,
- (ii) Biology of Cancer- Neoplasia, Metastasis, Phases of cancer, Oncogenes and carcinogens
- (iii) Biology of Ageing

**M. Sc. (Zoology) Ist Semester
Paper V – Practical Examination**

Particulars	Marks
Major Dissection-	20
Preparation-	10
Spotting (10) -	20
Environmental Biology exercise-	10
Biochemistry exercise-	20
Biostatistics exercise-	10
Class record, collection and viva	10
TOTAL	100

- Major Dissections:** Dissection of circulatory system and reproductive system of earthworm, Digestive system and Reproductive system of leech and other available lower non-chordates.
- Preparations:** Slide preparation of *Euglena* and *Paramecium*, sponge gemmules, *Obelia* colony and other available materials from lower non-chordates.
- Museum study:** General survey and classification of lower non-chordates
Protozoa- Prepared slides of *Paramecium* (conjugation and binary fission), *Euglena*, *Vorticella*, *Ceratium*, *Noctiluca*.
Porifera- Museums of *Euplectella*, *Spongilla*, *Euspongia*
 Prepared slides of T.S. Sycon, L.S. Sycon, Spicules of sponges.
Coelenterata- Museums of *Physalia*, *Corralium*, *Madrepora*, *Fungia*, *Pennatula*, *Metridium*, *Vellela*, *Porpita*, *Tubipora*, *Gorgonia*,
 Prepared slides of Hydra, *Obelia*,
Helminths- Museums of *Taenia solium*, *Cysticercus larva of Taenia solium*, *Schistosoma*, *Ascaris male*, *Ascaris female*, *Ancylostoma*,
Prepared slides – Miracidium larva, Redia larva, Cercaria larva, Scolex of *Taenia solium*, Mature proglottid and gravid proglottid of *T. solium*, T.S of Mature proglottid and gravid proglottid of *T. solium*, T.S. through body of male *Ascaris*, T.S. through body of female *Ascaris*
- Environmental Biology exercise-**
 Study of different structural adaptations to ecological conditions
 Study of micro and macro fauna of soil by froth-floatation method
 Comparative study of physico-chemical eco-factors in different localities- temperature, pH,
 Estimation of CO₂, O₂, carbonate in freshwater
 Study of plankton in a water body
 Study of biological effects of certain pollutants.
- Biochemistry exercise-**Chromatographic separation of amino acids
 Isolation and colorimetric determination of glycogen in animal tissues.
 Kinetic assay of salivary amylase and study of the effects of time and temperature on urease activity
- Biostatistics exercise-** Experiments on probability
 Sampling of data for frequency diagram and calculation of mean, median and mode and standard deviation

M. Sc. (Zoology) IInd Semester

Paper I- Comparative study of Higher Non-chordates

- Unit 1- Annelida** Segmental organs, Filter feeding, Adaptive radiation in Polychaetes, Coelom and Metamerism.
- Unit 2- Arthropoda** Larval forms of crustacean, Parasitism in crustacean, Respiration in Arthropods, General organization of Onychophora.
- Unit 3- Mollusca** Respiration, Nervous system and Torsion in Gastropods.
- Unit 4- Echinodermata** Water vascular system, Larval forms and Affinities.

Paper II - Animal Physiology

- Unit1- Physiology of Digestion.** Digestion and Absorption of Proteins, Carbohydrates and lipids .
- Physiology of Respiration.** Gaseous exchange in terrestrial and aquatic animals, Respiratory pigments.
- Unit 2- Physiology of Circulation** Patterns of Circulation among different animals, Physiological categories of Heart, Haemodynamics.
- Physiology of Excretion** Excretory products, Biosynthesis of Urea, Structure and functional mechanism of nephron.
- Unit 3- Physiology of Nerve Conduction** Ionic basis of resting and Action potential, Synaptic transmission
- Physiology of Muscle Contraction** Structure and Mechanism of Contraction of skeletal muscles
- Unit 4- Concept of Homeostasis**
- Physiology of Defense Mechanism** Immunity, Types of Immune response, Immune cells, Antigen and antibody reaction, Antibody diversity

M. Sc. (Zoology) IInd Semester

Paper III - Cytology and Genetics

- Unit 1-** A Brief introduction of Bacteriophages, Animal viruses, and Retroviruses, Structure of *E. coli*; Plasmids
- Unit 2-** Fluid mosaic model and functions of Plasma membrane, Membrane transport of small molecules, Energy transduction in mitochondria, Cell cycle and its control mechanism.
- Unit 3-** Mendel's laws and their chromosomal basis, Linkage and Crossing over, Genetic interaction, Sex-determination, Sex-linked inheritance,
- Unit 4-** Numerical and Structural chromosomal aberrations, Mutation, Genetic Drift, Hardy-Weinberg Law

Paper IV - Molecular Biology

Unit 1- Gene Action

Chromosomal organization of genes, DNA Replication, Transcription, Genetic code

Unit 2- Intracellular Protein Trafficking

Protein Architecture, Protein synthesis on free/bound polysomes, Uptake into ER, Trafficking mechanism of proteins

Unit 3- Regulation of Gene Action

Regulation of Gene action in prokaryotes and eukaryotes, Operon model- lac operon and Trp operon

Unit 4- Cell Signalling

Types of Cell Signaling, Second messenger system, Cell surface Receptors.

**M. Sc. (Zoology) IInd Semester
Paper V – Practical Examination**

Particulars	Marks
Major Dissection-	20
Minor Dissection-	10
Preparation-	05
Spotting (10) -	20
Physiology exercise-	10
Molecular Biology exercise-	10
Cytology and Genetics exercise-	10
Class record and collection-	08
Comprehensive viva -	07
TOTAL	100

Major Dissection- Nervous system of Pila, Unio, Sepia, and other available materials of higher non-chordates

Minor Dissection- Nervous system of Prawn, Other minor dissections of available higher non-chordates

Preparation- Hastate plate of prawn, parapodia of Neries, Mouth parts and salivary glands of cockroach, Mouth parts of other insects, and of other available materials.

Museum and prepared slides study- General survey and classification of higher non-chordates

Annelida- Nereies, Heteroneries, Aphrodite, Chaetopterus, Arenicola, Terebella, Pheretima, Eutyphoeus, Dero, Branchellion, Bonellia, Sipunculus and other available museums

T.S. Nereies through body segments, Parapodium of Nereies, etc.

Arthropoda- Museums and slides of major representatives of different classes of phylum Arthropoda

Mollusca- Museums and slides of major representatives of Mollusca

Echinodermata- Museums and slides of major representatives of Echinodermata.

Physiology exercise- Total counts of erythrocytes, total leucocyte counts and differential leucocyte counts of fish, frog, bird and rat.

Estimation of hemoglobin content in fish, frog, bird and rat

Rate of Oxygen consumption of aquatic animals and effects of different stresses upon it.

Determination of respiratory quotient of an air breathing animal

Study of functional properties of the cardiac muscles of frog using acetylcholine and adrenalin

Recordings of Electro cardiogram of frog.

Molecular Biology exercise- Isolation and colorimetric determination of protein from fat bodies of cockroach and liver

Isolation and colorimetric determination of DNA from fat bodies of cockroach and liver.

Cytology and Genetics exercise-

Demonstration of mitochondria in human buccal epithelium by supravital staining

Study of mitosis in onion root tip and meiosis in testis of grasshopper with acetocarmine squash method

Study of salivary gland chromosomes of Drosophila and Chironomos

Study of the pattern of different hereditary traits in human beings.

M.Sc. FINAL YEAR
M. Sc. (Zoology) IIIrd Semester
Paper I - Comparative study of Proto-chordates and Lower vertebrates
(Protochordates, Fish, Amphibia)

Unit I

- (i) General organization and affinities of Protochordates
- (ii) Origin of Chordates
- (iii) Origin of Tetrapods

Unit II

- (i) General plan of Digestive system in fish and amphibia
- (ii) General plan of circulation in fish and amphibia

Unit III

- (i) Respiratory system in fish and amphibia
- (ii) Skeletal system in fish and amphibia

Unit IV

- (i) Evolution and organization of Urinogenital system in fish and amphibia
- (ii) Lateral line system in fish

Paper II - Developmental Biology

Unit 1. Gonads and Gametogenesis

- (i) Sex differentiation in vertebrates
- (ii) Comparative account of differentiation of gonads in mammals,
- (iii) Spermatogenesis in vertebrates
- (iv) Endocrinology of ovary, oogenesis and vitellogenesis in vertebrates, superovulation.

Unit 2. Fertilization and Embryogenesis

- (i) Mechanism of Fertilization: in vivo and in vitro,
- (ii) Patterns of Cleavage
- (iii) Patterns of Gastrulation in frog and chick.

Unit 3. Organogenesis

- (i) Development of Brain in vertebrates
- (ii) Development of Eye in vertebrates.

Unit 4

- (i) Hormones and Reproduction- Seasonal and continuous breeders
- (ii) Differentiation of cells during embryonic development
- (iii) Mechanism of Induction during Organogenesis, Primary organizer

M. Sc. (Zoology) IIIrd Semester
Paper III: Endocrinology

Unit 1

- (i) Hormones as messengers and their types
- (ii) Structure and functioning of Pituitary, Pancreas, Adrenal Glands

Unit 2

- (i) Phylogeny of Thyroid gland
- (ii) Structure and functioning of Thyroid, Parathyroid, and Gonads

Unit 3

- (i) Nature of action of peptide and steroid hormones
- (ii) Biosynthesis and secretion of Hormones

Unit 4

- (i) Neuroendocrine system and neurosecretion
- (ii) Hormones and Behaviour

Paper IV: Special Paper
Fishery Biology
IV-A: Taxonomy & Morphology

Unit 1. Taxonomy

- (i) Classification of fish up to orders as proposed by L. S. Berg(1940)
- (ii) Systematic/Taxonomic study of freshwater fish with Special reference to identification of local forms(up to their families)

- 1- Order- Clupeiformes. Families- *Clupeidae* *Notopteroidea*.
- 2- Order- Beloniformes. Families – *Belonidae* *Hemiramphidae*
- 3- Order – Masacembeliformes .Family - *Mastacembelidae*.
- 4- Order – Mugiliformes. Family - *Mugilidae*

Unit 2. Identification of Fish

Study and preparation of identification key of the fish of following order with suitable diagrams, fin formula, local and biological names,

- 1- Ophiocephaliformes
- 2- Cypriniformes
- 3- Perciformes

Unit 3

Study of differentiating characters of pair of fish from the orders of Fresh water fish given in to (Ophiocephaliformes, Cypriniformes Perciformes) with special reference to fin formula, suitable diagrams, local and biological names.

Unit 4

Morphology

- (i) Specialized organs (electric organs, poison glands ,sound producing organs , light producing organs and sense organs)
- (ii) Endocrine glands (Pineal, hypophysis, thyroid, adrenal, ultimobranchial body, corpuscles of stannous and urophysis).

M. Sc. (Zoology) IIIrd Semester
IV B: Entomology
Morphology, Physiology, Development and Ecology

Unit 1

Morphology

Structure and nature of integument.
Morphology of head (antennae and mouth parts),
thorax (legs, wings, venation and coupling mechanism)
and abdomen (external genitalia).
Nervous system and sense organs.
Bioluminescence.

Unit 2

Physiology

Anatomy of digestive system and nutritional physiology
(nutritional requirement, feeding behaviour and food
utilization).
Circulatory system and components of hemolymph.
Excretory organs and physiology of excretion.
Respiratory organs, physiology of respiration and
respiratory adaptations of aquatic and endoparasitic insects.
Reproductive organs and different modes of development.

Unit 3

Development

Postembryonic development, different type of larvae and
pupae and hormones control of diapause

Unit 4

Ecology

Role of temperature, humidity and light in development and
metamorphosis.
Origin and evolution of apterygotes and pterygotes and their
Interrelationships.

IV C: Cell Biology

Cytological Techniques

Unit I

Elementary principles of phase, interference, polarization, electron and
Scanning electron microscope.

Unit II

Theory and application of freeze – drying, X-ray diffraction, radio autography,
Fluorescent antibody techniques and differential centrifugation.
Methods of tissue culture.

Unit III

Theoretical basis of colorimetric and biochemical estimations of nucleic
acid, proteins.

Unit IV

Chemical basis of fixation and cytochemical localization of proteins, lipids,
glycogen, RNA, DNA, phosphatases, esterases and oxidases.
Biosynthesis of proteins and Nucleic Acids

M. Sc. (Zoology) IIIrd Semester
Paper V – PRACTICAL EXAMINATION
PART A: GENERAL

Major Dissection-	10
Minor Dissection-	05
Microtomy-	05
Developmental biology-	05
Endocrinology-	05
Spotting (05)-	10
Class record, collection and viva	10
Total-	50

Major Dissection-

Dissection of cranial nerves of major representative types of fish and amphibian.

Neck nerves of a mammal

Afferent and efferent branchial arteries of scoliodon

Minor Dissection- Eye muscles of scoliodon, internal ear, urinogenital system of scoliodon,

Preparation- Placoid scale of scoliodon, Ampulla of Lorenzini; T.S. through liver, intestine, skin etc of frog, Microtomy of tissues

Museum study- Study of museums and slides of representative types of Protochordates, Cyclostomata, fishes and amphibia

Developmental Biology- Study of life stages of frog, mounting of eggs and embryo of frog, incubation and mounting of chick embryo, study of prepared slides of embryo of frog, chick and mammal, window formation.

Endocrinology- Study of prepared slides of different endocrine glands of fish and frog, dissection of vertebrate types to demonstrate different endocrine organs,

PART B- SPECIAL

(A) Fishery Biology

Major Dissection-	10
Preparation-	05
Identification of two fish-	10
Spotting (05)-	10
Seminar-	05
Class record, collection and Viva-	10
Total -	50

(B) Entomology

Dissection major-	10
Dissection minor	05
Physiology exercise-	05
Identification of two insects	10
Seminar-	05
Spotting (5)	10
Class record, collection and viva	05
Total-	50

(C) Cell Biology

Cytological localization-	10
Vital staining	10
Microtomy	10
Seminar	05
Spotting (5)	10
Class record and viva	05
Total	50

M.Sc. FINAL YEAR
M. Sc. (Zoology) IVth Semester
Paper I - Comparative Study of Higher vertebrates
(Reptiles, Birds and Mammals)

Unit 1. Reptiles and Birds

- (i) Origin and evolution of Reptiles,
- (ii) Extinct reptiles,
- (iii) Origin of Birds,
- (iv) Flightless birds

Unit 2. Mammals

- (i) Origin of Mammals,
- (ii) Structural peculiarities and phylogenetic relations of Prototheria and Metatheria,
- (iii) Dentition in mammals,
- (iv) Aquatic mammals

Unit 3. Circulation and Respiration

- (i) General plan of circulation in reptiles, birds and mammals
- (ii) General plan of respiration in reptiles, birds and mammals

Unit 4. Urinogenital system

- (i) General plan of urinogenital system in reptiles and birds

Paper II - Animal Behaviour

Unit 1. Learning and Communication

- (i) Innate and Learning behavior
- (ii) Communication (chemical, visual, audio) among animals

Unit 2. Reproductive Behaviour

- (i) Courtship and mating behaviour,
- (ii) Parental care in fish and amphibians

Unit 3. Migratory Behaviour

- (i) Migration in fish
- (ii) Migration in birds

Unit 4. Orientation and Social Behaviour

- (i) Orientation in animals,
- (ii) Social behavior in insects

M. Sc. (Zoology) IVth Semester

Special Papers

(A) Fishery Biology

Paper III-A: Applied Ichthyology and development

Unit 1

- (i) Fisheries of India; Brief study of Marine, fresh water, estuarine and cold water fishery.
- (ii) Fish Farming- Type of fish farming, fish ponds, construction of fish ponds, physico chemical and biological characteristics of ponds
- (iii) Fertilization and management of fishery pond (spawning, hatcheries, reusing, stocking), transport, mortality of fish fry
- (iv) Composite culture and cage culture

Unit 2

- (i) Principle and importance of fish preservation, traditional and advanced methods of fish preservation : sun-drying, salting, pickling, smoking, chilling, frying and canning etc.
- (ii) Fish products like oil, fish sauce, fish glue etc.

Unit 3

- (i) Application of genetics in aquaculture – sex manipulation, chromosomal manipulation, gene engineering.
- (ii) Transgenic fish
- (iii) Production of monosex and sterile fish and their Significance in aquaculture.
- (iv) Induced breeding

Unit 4

Development :

- (i) Gastrulation.
- (ii) Neurulation .
- (iii) Organ formation.
- (iv) Larval development.
- (v) Metamorphosis.

Paper IV A Physiology and Ecology

Unit 1

1. Nutrition - Alimentary canal, associated glands
Food and feeding habits, digestion
2. Excretion - Kidney structure and modifications, nitrogenous and excretory products, urine formation.
3. Osmoregulation - Definition, osmoregulation in freshwater, marine and migratory fishes.

Unit 2

4. Respiration - Structure and function of gills.
Fish blood, process of respiration in a typical fish, accessory respiratory organs.
5. Circulatory System - Heart structure and function, Blood vessels, Arterial and venous system.

Unit 3

6. Reproduction - Gonads structure, spermatogenesis, Oogenesis, gonadal steroids, endocrine control of reproduction.
7. Common enemies and symptoms, etiology and treatment of disease of food fishes.

Unit 4

Ecology :

- Abiotic factors : Density; Pressure; Temperature; salt content in water; Light; Sound; Electric currents; Bottom deposits; Particles suspended in water.
- (i) Biotic factors : interspecific interrelationship among fishes and with other organisms; Intraspecific into relationship among fishes.
 - (ii) Pollutants affecting fishery water with special reference to oil spills, domestic pollutants, industrial water, radioactive wastes and sewage fed fisheries.
 - (iii) Plankton in relation to fish production.

**M. Sc. (Zoology) IVth Semester
Special Papers
(B) ENTOMOLOGY**

PAPER III B

Evolution and Taxonomy

Unit I

Origin and evolution of apterygotes and pterygotes and their interrelationships

Unit II

Thysanura : Machilidae; Lepismatidae
Dictyoptera : Blattidae; Manitidae
Orthoptera : Tettigoniidae; Acrididae; Gryllidae;
Gryllotalpidae
Isoptera : Termitidae; Kalotermitidae
Siphunculata : Pediculidae; Haematopinidae
Hemiptera : Cicadidae; Jassidae; Lacciferidae Coccidae;
Cimidae; Pyrrhocoridae Belostomatidae

Unit III

Lepidoptera : Pyralidae; Saturniidae; Bombycidae; Pieridae;
Papilionidae; Lymantriidae
Diptera : Culicidae; Simuliidae; Chironomidae; Tabanidae;
Drosophilidae Tachinidae; Muscidae; Hippoboscidae.

Unit IV

Hymenoptera : Ichneumonidae; Aphidiidae; Formicidae;
Vespidae; Apidae; Bombycidae
Coleopteran : Cicindellidae; Carabidae; Hydrophilidae;
Scarabeidae; Lampyridae; Tenebrionidae;
Meloidae; Chrysomelidae; Curulionidae.

**PAPER IV B
Economic Entomology**

Unit 1

Pests of stored grains : *Sitophilus oryzae*; *Tribolium castaneum*;
challosobruchus chinensis; *Corcyra cephalonica*
Pests of cotton : *Dysdercus spp*; *Earias vitella*; *Pectinophora*
Gosaypiella
Pests of cereal – crops ; *heliolithis armigera*; *Chilozonellus*; *Leptocorysa*
Varicornis; *Hieroglyphus spp*.

Unit 2

Pests of fruits : *idiocerus atkinsoni*; *Dacus cucurbitae*; *Papilio*
Demoleus
Pests of oil-seeds : *Bagrada cruciferarum*; *Athalia proxima*; *Lipaphis*
Erysimi

Unit 3

Different methods of insect management : Cultural; Mechanical; Biological
chemical.
Integrated pest management (IPM).
Properties, formulations, methods of application and mode of action of
insecticides.
Physiology of insect resistance to insecticides.

Unit 4

Life – history of beneficial insects.
Life – history and biology of silk – worm and its products.
Life – history and biology of honey – bee and its products.
Life – history and biology of lac – insect and its products.

**M. Sc. (Zoology) IVth Semester
Special Papers (C) Cell Biology
Paper III C**

Ultrastructure and Morphodynamics of Cell

Unit 1

- (i) Morphodynamics of Cell.
- (ii) Ultrastructure and functions of the following :
Cell membrane, Nuclear membrane

Unit 2. Cellular Organelles: Ultrastructure and Functions

- (i) Mitochondria.
- (ii) Golgi complex.
- (iii) Endoplasmic reticulum.
- (iv) Ribosomes.
- (v) Lysosomes.

Unit 3. The Chromosomes

- (i) Morphodynamics of chromosomes and the achromatic apparatus
In cell division.
- (ii) Mechanism of chiasma formation.

Unit 4. Cell Physiology

- (i) Physiology of a dividing cell.
- (ii) Chromosomal changes caused by ultraviolet and ionizing radiations
- (iii) Carcinogenesis : Cytopathology; Possible somatic and viral causes

Paper-IV C

Cell Regulation and Principles of Biotechnology

Unit 1

1. Regulation of cellular function; Hormone action: Hormone receptor Interaction; Membrane receptors; Steroid thyroid and epinephrine receptors; Second messengers (cyclic AMP: Cyclic GMP); Interferon.

Unit 2

2. Genetic code
3. Genetic recombination, transformation, conjugation and transduction

Unit 3

4. Application of genetic engineering and its prospects
5. Microbes and human welfare

Unit 4

6. Thermodynamic principles and steady-state conditions of living Organisms
Organization and methods to study metabolism
7. Degradation of glucose and nucleotides in animals.
8. Energy metabolism and high energy compounds.
Redox potentials
Mitochondrial electron transport chain
Oxidative phosphorylation
9.0 Nature of enzymes
9.1 Classification and nomenclature of enzymes.
9.2 Kinetic analysis of enzyme catalyzed reactions

M.Sc. FINAL YEAR
M. Sc. (Zoology) IVth Semester
Paper V – PRACTICAL EXAMINATION

GENERAL

Dissection major	10
Dissection minor	05
Preparation	05
Animal Behaviour Exercise	05
Spotting (5)	10
Class record and collection-	08
Viva-voce -	07
Total-	50

SPECIAL

(A) Fishery Biology

Dissection major-	10
Dissection minor-	05
Preparation-	05
Ecology exercise-	05
Seminar	05
Spotting-(5)	10
Class record, collection and viva-voce-	10
Total-	50

(B) Entomology

Dissection major-	10
Dissection minor-	05
Preparation-	05
Physiology exercise-	05
Seminar	05
Spotting (5)	10
Class record, collection and Viva	10
Total	50

(C) Cell Biology

Quantitative estimation-	10
Cytological preparation-	10
Microbial exercise-	05
Seminar-	05
Spotting (5)	10
Class record and Viva -	10
Total	50

Department of English & Other Foreign Languages
Mahatma Gandhi KashiVidyapith, Varanasi.

Syllabus for M.A. in English

(w.e.f.2013-2014)

M.A. Course in English shall have four semesters. Each semester shall have four papers. In all, there shall be sixteen papers. Each paper shall carry 100 marks.

Semester I

Paper -I English Literature from Chaucer to Shakespeare

Unit –I Social and Literary Scene (14th- 16th centuries)

*Francis Bacon : Of Truth
: Of Death
: Of Superstition

Unit-II Poetry

* Geoffrey Chaucer : Prologue to *The Canterbury Tales*
*Edmund Spenser: *Faerie Queene*(Bk-1)

Unit -III Drama

* Christopher Marlowe : *Dr. Faustus*
* Ben Jonson: *Everyman in His Humour*

Unit -IV

*William Shakespeare : *Hamlet*
: *The Tempest*
: Sonnet Nos. 54&130

Structure of the Question Paper

1. From the starred texts there will be four passages with internal choices for explanation of four marks each. $4 \times 4 = 16$
2. There will be six short-answer questions to be answered in 150 words, of four marks each. $6 \times 4 = 24$
3. There will be four long answer questions with internal choices of 15 marks each. $4 \times 15 = 60$

Paper -II

English Literature from Donne to Blake

Unit-1 Social and Literary Scene
(17th- 18th Centuries)

John Dryden: *Absalom and Achitophel*

Alexander Pope: *The Rape of the Lock*

Unit-II Poetry

- John Milton: *Paradise Lost* Book-1
- John Donne: 'The Canonization'
'The Ecstasie'
- Andrew Marvell: 'The Garden'
- William Blake: 'The Chimney Sweeper'

Unit-III Drama

- R.B. Sheridan: *The School for Scandal*
- William Congreve: *The Way of the World*

Unit -IV Prose and Fiction

- *Joseph Addison: 'The Aim of Spectator'
- Henry Fielding: *Tom Jones*

Structure of the Question Paper

1. From the starred texts there will be four passages with internal choices for explanation of four marks each. 4×4=16
2. There will be six short-answer questions to be answered in 150 words, of four marks each. 6×4 =24
3. There will be four long answer questions with internal choices of 15 marks each. 4×15= 60

Paper-III

English Literature from Wordsworth to Hardy

Unit-I Social and Literary Scene
(19th Century)
Matthew Arnold: Culture and Anarchy

Unit-II Poetry

- *William Wordsworth: *The Prelude* Book-1
- S.T. Coleridge: 'The Rime of the Ancient Mariner'
- John Keats: 'Ode on a Grecian Urn'
- *Alfred Tennyson: 'Lotos - Eaters'
- Robert Browning: 'Rabbi Ben Ezra'
- *Matthew Arnold: 'Thyrsis'

Unit -III Prose

Charles Lamb: 'New Year's Eve'
Hazlitt: 'A Familiar Style'

Unit-IV Fiction

Jane Austen : *Emma*
Charles Dickens : *Great Expectations*
Thomas Hardy : *Tess of the D'Urbervilles*

Structure of the Question Paper

1. From the starred texts there will be four passages with internal choices for explanation of four marks each. 4×4=16
2. There will be six short-answer questions to be answered in 150 words, of four marks each. 6×4 =24
3. There will be four long answer questions with internal choices of 15 marks each. 4×15= 60

Paper –IV

Elementary Linguistics and the Structure of English

Unit-I

Nature of Language: Definition; Properties
Definition & Scope of Linguistics
Branches of Linguistics
Historical Background to Modern English: Old English; Middle English;
Early Modern English.

Unit-II

Phonetics: Written and Spoken Symbol
Transcription of English Word in Common Use
Phonemes: English Vowels and Consonants
Stress and Intonation

Unit-III

Morphology: Morpheme & Words
Processes of Word Formation

Unit-IV

Syntax: Phrase Structure—Noun, Adjective & Verb
Basic Structure Patterns

Structure of the Question Paper

1. There will be ten short-answer questions to be answered in 150 words, of four marks each. $10 \times 4 = 40$
2. There will be four long answer questions with internal choices of 15 marks each. $4 \times 15 = 60$

Semester II

Paper -V Twentieth Century Literature

Unit-I Social and Literary Scene

Albert Camus: *The Myth of Sisyphus* Chapter I & IV

Jean Paul Sartre: Existentialism and Human Emotions

Unit-II **Poetry**

- W.B. Yeats: 'Byzantium', 'Sailing to Byzantium', 'A Prayer for My Daughter'
- T.S. Eliot: 'The Waste Land'
- Philip Larkin: 'Next Please', 'High Windows'
- Ted Hughes: 'Hawk Roosting', 'Thought Fox'

Unit-III **Drama**

*G.B. Shaw: *St. Joan*

*Samuel Becket: *Waiting for Godot*

Unit -IV **Fiction**

Joseph Conrad: *Heart of Darkness*

Virginia Woolf: *Mrs. Dalloway*

Structure of the Question Paper

1. From the starred texts there will be four passages with internal choices for explanation of four marks each. $4 \times 4 = 16$
2. There will be six short-answer questions to be answered in 150 words, of four marks each. $6 \times 4 = 24$
3. There will be four long answer questions with internal choices of 15 marks each. $4 \times 15 = 60$

Unit-I

Poetry

- Emily Dickinson: 'Hope is the Thing with Feathers',
'How Beautiful is the Little Stone'
- Robert Frost: 'The Birches', 'The Onset'
- Margaret Atwood: 'Progressive Insanities of a Pioneer'
- A.L. Purdy: 'The Country North to Belleville',
'Wilderness Gothic'

Unit-III

Drama

- Eugene O'Neill: *The Hairy Ape*
- George Ryga: *The Ecstasy of Rita Joe*

Unit-III

Non-Fictional Prose

- Emerson: The American Scholar
- H.G. Vassanji: Am I a Canadian Writer?

Unit-IV

Fiction

- Toni Morrison: *Beloved*
- Michael Ondaatje: *The English Patient*

Structure of the Question Paper

1. From the starred texts there will be four passages with internal choices for explanation of four marks each. 4×4=16
2. There will be six short-answer questions to be answered in 150 words, of four marks each. 6×4 =24
3. There will be four long answer questions with internal choices of 15 marks each. 4×15= 60

Unit-I

Poetry

- Toru Dutt: 'Our Casuarina Tree'
- Nissim Ezekiel: 'Background Casually'
- Kamala Das: 'Introduction'
- A.K. Ramanujan: 'Small-Scale Reflections on a Great House'
- JayantMahapatra: 'Hunger'
- Shiv K. Kumar: 'Border-Guards'

Unit-II

Non-Fictional Prose

Mahatma Gandhi: *Hind Swaraj*

Nirad C. Chaudhary: *A Passage to England*

Unit-III

Drama

- GirishKarnad: *Tughlaq*
- Mahesh Dattani: *Final Solutions*

Unit-IV

Fiction

Raja Rao: *The Serpent and the Rope*

AmitavGhosh: *Shadow Lines*

Structure of the Question Paper

1. From the starred texts there will be four passages with internal choices for explanation of four marks each. 4×4=16
2. There will be six short-answer questions to be answered in 150 words, of four marks each. 6×4 =24
3. There will be four long answer questions with internal choices of 15 marks each. 4×15= 60

Paper –X

Contemporary Literary Theories

Unit-I

Northrop Frye: ‘Myth, Fiction and Displacement’

Raymond Williams: ‘Romantic Artist from Culture and Society’

Unit-II

Victor Shklovsky: From *Art as Technique*

M.M. Bakhtin: “Discourse in the Novel” from *The Dialogic Imagination*

Unit-III

Louis Althusser: From *Ideology and the State*

Wolfgang Iser: From *The Reading Process*

Unit-IV

Roland Barthes: “The Death of the Author”

Homi K. Bhabha: “How Newness Enters the World: Postmodern Space, Postcolonial Times and the Trials of Cultural Translation”, in *The Location of Culture* (London: Routledge, 1994), pp.212-235

Note:- These essays are available in *The English Critical Tradition*, Vol. II edited by S. Ramaswamy and V.S. Seturaman (Macmillan, 1986), *Literary Criticism: A Reading* edited by B. Das and J.M. Mohanty (OUP, 1999) and Patricia Waugh & Philip Rice (eds.) *Modern Literary Theory* Second Edition, Edwin Arnold, London, 1992

Structure of the Question Paper

1. There will be ten short-answer questions to be answered in 150 words, of four marks each. 10×4=40
2. There will be four long -answer questions with internal choices of 15 marks each. 4×15= 60

Paper-XI

Translation: Theory and Practice

Unit-I

The Concept of Translation

Some Definitions of Translation – eastern and western

Social Significance of Translation

Unit-II

Theories of Translation

Concept of Equivalence

Unit-III

Problems of Translation

Socio-Cultural Dimensions of Translation

Machine Translation—Merits &Demerits

Unit-IV

Translation of given passages from Hindi into English and Vice-Versa

Structure of the Question Paper

1. There will be ten short-answer questions to be answered in 150 words, of four marks each. $10 \times 4 = 40$
2. There will be four long answer questions with internal choices of 15 marks each. $4 \times 15 = 60$

Paper –XII Post-Colonial Theory and Literature

Unit-I

B. Ashcroft, G. Griffiths & H. Tiffin: “Cutting the Ground: Critical Models of Post-Colonial Literatures” from *The Empire Writes Back* (London & New York, Rutledge, 1989)

Edward Said: Crisis in Orientalism

Aijaz Ahmad: “Language of Class, Ideology of Immigration” from *In Theory* (Bombay, OUP, 1992)

Unit-II

NgugiwaThiongo: Decolonising the Mind

Chinua Achebe: Colonialist Criticism

Unit-III

ShrilalShukla: *RaagDarbari*

Prem Chand: *Karmabhumi*

Unit-IV

Salman Rushdie: *Midnight’s Children*

ShashiTharoor: *The Great Indian Novel*

Structure of the Question Paper

1. There will be ten short-answer questions to be answered in 150 words, of four marks each. $10 \times 4 = 40$
2. There will be four long answer questions with internal choices of 15 marks each. $4 \times 15 = 60$

SemesterIV

Paper- XIII

African and Caribbean Literature

Unit-I

The following poems from *An Anthology of Commonwealth Poetry* edited by C.D. Narsimhaih, Macmillan, 1990 for detailed study

*Denis Brutus: 'You Laughed and Laughed and Laughed'

*Gabriel Okara: 'The Mystic Drum'

*Wole Soyinka: 'Dedication'

*Derek Walcott: 'A Far Cry from Africa'

*Mervyn Morris: 'Literary Evening, Jamaica'

Unit-II

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

George Lamming: *The Pleasures of Exile*

Unit-III

Chinua Achebe: *Things Fall Apart*

J. M. Coetzee: *Disgrace*

Unit-IV

□ Wole Soyinka: *A Dance of Forests*

August Wilson: *Fences*

Structure of the Question Paper

1. From the starred texts there will be four passages with internal choices for explanation of four marks each. $4 \times 4 = 16$
2. There will be six short-answer questions to be answered in 150 words, of four marks each. $6 \times 4 = 24$
3. There will be four long answer questions with internal choices of 15 marks each. $4 \times 15 = 60$

Paper –XIV

Indian Literature in Translation

Unit-I

General acquaintance with great Indian epics-The *Ramayana* and the *Mahabharata*

Kalidas: *Shakuntla*

Jaishankar Prasad: *Kamayani*

Unit-II

Rabindranath Tagore: *The Post Office*

Mohan Rakesh: *AdheAdhure*

Unit-III

Amrita Pritam: *Revenue Stamp*

Mahasweta Devi: *Draupadi*

Unit-IV

Qurrat-ul-AinHaider: *River of Fire*

U.R.Ananthmurthy: *Samskara*

Structure of the Question Paper

1. There will be ten short-answer questions to be answered in 150 words, of four marks each. $10 \times 4 = 40$
2. There will be four long- answer questions with internal choices of 15 marks each. $4 \times 15 = 60$

Paper-XV

Women Writing

Unit-I

Bharati Mukherjee: *Jasmine*
ShashiDeshpande: *That Long Silence*

Unit-II

BapsiSidhwa: *The Crow Eaters*
Monica Ali: *Brick Lane*

Unit-III

YasmineGooneratne: *A Change of Skies*
Manjushree Thapa: *The Tutor of History*

Unit-IV

Arundhati Roy: *The God of Small Things*
Kiran Desai: *The Inheritance of Loss*

Structure of the Question Paper

1. There will be ten short-answer questions to be answered in 150 words, of four marks each. $10 \times 4 = 40$
2. There will be four long- answer questions with internal choices of 15 marks each. $4 \times 15 = 60$

Paper-XVI

Objective Type Questions: 50 Marks

Viva-Voce: 50 Marks