

FIRST SEMESTER

CORE COURSE-1A BOTANY

Title: DIVERSITY OF MICROBES AND CRYPTOGRAMS(THALLOPHYTA)

Course Code– AUBSMI.1B

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Course Objectives:

- To make students understand about the various features of plant kingdom and algae.
- To make students aware about the various characteristics of Bacteria and Fungi.
- To impart knowledge about the different Plant diseases.

Outcomes:

- Students will learn about the general characters of Cryptogams.
- Students will learn the basic concept of Botany.
- Students will gain knowledge about the plant diseases.

Course Content:

Unit I:

Viruses and Bacteria: General account of viruses and mycoplasma, Bacteria-structure, nutrition. Reproduction and economic importance, General account of Cyanobacteria, Nostoc, Oscillatoria and economic importance,.

Unit II

Algae: General Characters, classification and economic importance, important features and life history of chlorophyceae: Spirogyra, Ulothrix, Xanthophyceae-Vaucheria, Phaeophyceae Ectocarpus, Sargassum, Rhodophyceae-Polysiphonia.

Unit III

Fungi: General characters, classification and economic importance; important features and life history of Mastigomycotina-Phytophthora Oomycotina-Albugo, Ascomycotina-, Penicillium, yeast, Basidiomycotina-Puccinia, Ustilago and Agaricus, Deuteromycotina-, Colletotrichum, Alternaria and General account of Lichens.

Unit IV

Plant diseases special studies about green ear disease, white rust, Stem rust, disease of Wheat, Smut disease, Citrus canker, Tobacco mosaic disease.

Recommended Texts:

1. Pandey S. N. & others. 1995, A Text Book of Botany Vol. I, Vikas Publications Delhi.
2. Gupta P. K. 1999. Genetics Rastogi Publications, Meerut.
3. Vashistha, B.R. 1989, Algae, S. Chand and Co. Delhi.
4. Vashistha, B.R. 1989, Fungi, S. Chand and Co. Delhi.

PRACTICAL SYLLABUS

Title: **DIVERSITY OF MICROBES AND CRYPTOGRAMS(THALLOPHYTA) LAB**

Course Code– AUBSMI.1BP

LIST OF EXPERIMENTS:

1. Microscopic preparations and study of the following algal material: Nostoc, Oscillatoria, Chlamydomonas, Volvox, Spirogyra, Oedogonium, Vaucheria, Chara, Ectocarpus Sargassum and Polysiphonia.
2. Staining of different types of Bacteria.
3. Study of some locally available plant diseases caused by Viruses. Mycoplasma, Bacteria and Fungi in field/laboratory.
4. TMV, Black stem rust of wheat, loose smut of wheat. Citrus canker.
5. Brown leaf spot of rice, Red rot of sugarcane, Early blight of potato, Wilt disease of potato, Tomato.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (20 MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-2A CHEMISTRY

Title: ORGANIC CHEMISTRY

Course Code— AUBSMI.2

Credits 05 (4L+0T+1P)

Contact hours per week: 06

Exam duration: 03:00 Hrs (Each T & P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Internal: 60 (Theory: 40 Practical: 20)

End Term Exam: 90 (Theory: 60 Practical: 30)

Course Objectives:

- To review the concept of isomerism and its types.
- To develop an understanding of chemistry of hydrocarbons and their halogenated derivatives.

Unit I Basics of Organic Chemistry

Organic Compounds: Classification, and Nomenclature, Hybridization, Shapes of molecules, Influence of hybridization on bond properties. Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment. Homolytic and Heterolytic fission with suitable examples. Electrophiles and Nucleophiles; Nucleophilicity and basicity; Types, shape and their relative stability of Carbonations, Carbanions, Free-radicals and Carbenes. Introduction to types of organic reactions and their mechanism: Addition, Elimination and Substitution reactions

Unit- II Stereochemistry of organic compounds:

Concepts of isomerism. Types of isomerism. Optical isomerism- elements of symmetry, molecular chirality, enantiomers, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso compounds, resolution of enantiomers. Relative and absolute configuration, sequence rules, D&L and R & S systems of nomenclature. Geometric isomerism; determination of configuration of geometric isomers, E & Z systems of nomenclature.

Unit- III Alkanes and Cycloalkanes:

IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids), physical properties and chemical reactions of alkanes. Mechanism of free radical halogenation of alkanes: Mechanism of free-radical, halogenation of alkanes: orientation, reactivity and selectivity.

Unit- IV Arenes and Aromaticity:

Nomenclature of benzene derivatives. The aryl group. Aromatic nucleus and side chain. Structure of benzene: Molecular formula and Kekule structure. Stability and carbon-carbon bond length of benzene, resonance structure, Aromaticity—the Hückel rule, aromatic ions. Aromatic electrophilic substitution reaction—general pattern of the mechanism, role of σ and π complex. Mechanism of nitration, halogenation, sulphonation and Friedel-Crafts reaction. Ortho and para ratio. Birch reduction.

Suggested Books:

1. Stereo Chemistry by P.S. Kalsi.
2. Organic Chemistry by Paula Yurkanis Bruice.
3. Reaction Mechanism by O. P. Aggarwal.

4. Organic Chemistry by F. A. Carey, Tata McGraw Hill.
5. Organic Chemistry by Robert T. Morrison & Robert N. Boyd, Prentice Hall of India Pvt. Ltd.
6. Stereo Chemistry of Organic Compounds by Ernest L Eliel, Tata McGraw-Hill.

PRACTICAL SYLLABUS

Title: **ORGANIC CHEMISTRY LAB**

Course Code– AUBSMI.2P

List of Experiments:

1. Qualitative Analysis.
2. Detection of elements.
3. Detection and identification of functional groups.
4. Determination of melting point.
5. Determination of boiling point.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-3A ZOOLOGY

Title: ANIMAL DIVERSITY PART-I (PROTOZOA TO ANNELIDA)

Course Code– AUBSMI.3B

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Objective:

The objective is to give students basic idea of the lower invertebrates through taxonomy of different phylum lower invertebrates and by educating them on the fundamental of structural organization, physiologies and life histories of different life forms fall in this category.

Outcome: As an outcome we are expecting the students will understand and learn the differences in the cellular organization of the organism at different levels and they will be able to write and draw the structure of various organisms.

Course Content:

Unit I Taxonomy:-

Classification of Protozoa. Porifera, Coelenterata, Platyhelminthes and Nematoda up to order with examples. Fundamentals of body organization emphasizing symmetry, metamerism, coelom and levels of structural organization.

Unit II Protozoa:-

Study of structural organization and life history of *Trypanosoma* and *Paramecium*. Study of locomotion, osmoregulation, nutrition and reproduction in protozoa. Parasitism, pathogenicity and control in protozoa with special reference to *Entamoeba*, *Giardia*, *Leishmania*, *Trichomonas* and *Plasmodium*.

Unit III Porifera: -

Habit, habitat, structure and function of *Sycon*. Types of canal system.

Coelenterata:-Habit, habitat, structure, function and life history of *Aurelia*. Polymorphism in coelenterata, coralreef. **Ctenophora** –Structural organization and affinities.

Unit IV Platyhelminthes:-

Structural organization and life history of *Fasciola* & *Taenia* Parasitic adaptations in Helminthes. Nematyhelminthes:- Study of structure and life history of *Ascaris* Nematode parasites and human diseases.

Classification of Annelida (up to sub class); metamerism and coelom in Annelida General account and types of Annelida (earthworm) structural organization, Physiology & life history of *Nereis*, Trochophore larva.

Recommended Texts:

1. Kotpal R.L, Invertebrates, Rastogi Publications, Meerut (2018).
2. Sabharwal, A. Invertebrates-I, Modern Publishers, New Delhi (2015).
3. Barrington, E.J.W. Invertebrate Structure and Functions. Houghton Mifflin Co. Boston. (1967).

* Latest editions of all the suggested books are recommended.

PRACTICAL SYLLABUS

Title: ANIMAL DIVERSITY PART-I (PROTOZOA TO ANNELIDA) LAB

Course Code– AUBSMI.3BP

LIST OF EXPERIMENTS:

General survey of Invertebrate (Spot & Slides)

(A) Protozoa:-

Entamoeba, *Polystomella*, *Monocystis*, *Euglena*, *Noctiluca*, *Leishmania*, *Nyctotherus*, *Paramecium*, *Vorticella*. **Porifera**- *Sycon*, *Hyalonema*, *Euplectella*, *Spongilla* and *Euspongia*. **Coelenterate**- *Obelia* colony (polyp & medusa) *Physalia*, *Porpita*, *Aurelia*, *Rhizostoma*, *Alcyonium*, *Corallium*, *Gorgonia*, *Pennatula*, *Madrepora*.

Platyhelminthes:- *Dugesia*, *Fasciola*, *Taenia*, *Schistosoma*. **Nematode**- *Filaria*, *Dracunculus*, *Wuchereria*, *Enterobius*.

Annelida: -

Nereis (Heroneries with parapodia) *Aphrodite*, *Arenicola*, *Pontobdella*, *Hirudinaria*, *Peripatus*.

(B) Study of TS/LS of organs & developmental stages.

(i) **Porifera**: - T.S. of *Sycon*. (ii) **Coelenterata**- Planula larva of jellyfish.

(iii) **Platyhelminthes**-

T.S. of *Fasciola*, scolex of *Taenia*, mature & gravid segment of *Taenia*, Hexacanth, bladder worm & cysticercus stage of *Taenia*, miracidium, sporocyst, redia, cercarial larva of *Fasciola*.

(iv) **Annelida**- T.S. through different region of leech.

(C) Dissection Through chart / model / Photograph / CD. – *Hirudinaria* –

Morphology, general anatomy, digestion, nervous & excretory and reproductive system.

Earthworm – Anatomy, morphology, digestive and nervous system.

(D) Mounting-(Permanent)

Protozoa – *Euglena*, *Paramecium*, *Polystomella* Porifera- Spicules, fibres, gemmule Coelenterata- *Obelia* medusa.

Platyhelminthes – *Taenia* (proglotid) Annelida – *Nereis* (parapodia).

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20 MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

ABILITY ENHANCEMENT COMPULSORY COURSE-1A (AECC-1A) ENGLISH

**Title: COMMUNICATIVE ENGLISH-1
(Proficiency in English)
Course Code: AUBSMI.4**

**Credits: 2 (2L+0T+0P)
Contact hours per week: 02
Exam duration: 1:50 Hrs**

**Max. Marks: 50
Internal: 20
End Term Exam: 30**

Objectives: Students will develop proficiency in English which will equip them to:

- ❖ understand the demands of audience, subject, situation and purpose and the use of language for effective communication.
- ❖ analyse language in context to gain an understanding of grammar, vocabulary, spelling, punctuation and speech.
- ❖ examine authentic literary and non-literary texts and develop insight and appreciation.
- ❖ gain an understanding of study and reference skills.
- ❖ plan, draft, edit and present a piece of writing.

COURSE CONTENT:

Unit I: Descriptive Grammar

1. Tenses:

- a) Simple Present: Habitual action, General truths, Future time, Verbs of state, Verbs of perception, Verbs of sensation, Narration, Use of simple present for demonstration and commentaries, Present perfect, present perfect continuous, Present continuous also indicative of future action.
- b) Simple past: Past time reference, Present time reference, Future time reference, Past continuous, Past perfect, past, perfect continuous.

2. Function of Auxiliaries; Modals; Question form

Articles, Preposition, Phrasal verbs, Synonyms, Antonyms.

Clauses: Noun Clause; Reported Speech and Change of Voice.

Unit II: Skills in Communication

- 1. Negotiating a point of view – learning to talk persuasively so as to get across one's perspective.
- 2. Debating on an issue – agreeing / disagreeing.

References:

- 1. Block, C.C. (1997). Teaching the Language Arts, 2nd Ed. Allyn and Bacon
- 2. McKay. et. al. (1995). The Communication Skills Book, 2nd Ed. New Harbinger Publications.
- 3. Hornby, A.S. (2001). Oxford Advanced Learner's Dictionary, OUP
- 4. Thomsan, A.J. & Martinet. (2002). A Practical English Grammar. OUP
- 5. McKay. et al. (1995). The Communication Skills Book, 2nd Ed. New Harbinger Publications.
- 6. Stone Douglas (1999). Difficult conversations: How to discuss what Matters Most, New York.: Penguin Books.

GENERIC ELECTIVE-1A (GE-1A)
ENVIRONMENTAL SCIENCE/ EDUCATION

Title: ENVIRONMENTAL SCIENCE/ EDUCATION-1
Course Code: AUBSMI.5

Credits: 02 (2L+0T+0P)
Contact hours per week: 02
Exam duration: 1:50 Hrs

Max. Marks: 50
Internal: 20
End Term Exam: 30

Objective: To create awareness among students about environment protection.

Course Content

Unit-I

Environmental studies: Definitions and scope of Environmental Studies. Multidisciplinary nature of Environmental studies. Concept of sustainability & sustainable development.

Ecology and Environment: Concept of an Ecosystem-its structure and functions, Energy Flow in an Ecosystem, Food Chain, Food Web, Ecological Pyramid & Ecological succession,

Unit II

Natural Resources: Renewable & Non-Renewable resources; Land resources and land use change; land degradation, Soil erosion & Deforestation.

Biodiversity: Definition: genetic, species and ecosystem diversity, Conservation, Importance and Factors Responsible for Loss of Biodiversity, Bio-geographical Classification of India.

Text Books:

1. "Environmental Chemistry", De, A. K., New Age Publishers Pvt. Ltd.
2. "Introduction to Environmental Engineering and Science", Masters, G.M. Prentice Hall India Pvt. Ltd.
3. "Fundamentals of Ecology", Odum, E. P., W. B. Saunders Co.

Reference Books:

1. "Biodiversity and Conservation", Bryant, P. J., Hypertext Book.
2. "Textbook of Environment Studies", Tewari, Khulbe & Tewari, I. K. Publication.

SECOND SEMESTER

CORE COURSE-1B BOTANY

Title: **DIVERSITY OF MICROBES AND CRYPTOGRAMS(BRYOPHYTA, PTERIDOPHYTA AND PALEOBOTANY)**

Course Code– AUBSMII.1B

Credits 05 (4L+0T+1P)

Contact hours per week: 06

Exam duration: 03:00 Hrs (Each T & P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Internal: 60 (Theory: 40 Practical: 20)

End Term Exam: 90 (Theory: 60 Practical: 30)

Course objectives:

- To make students capable of differentiation between different classes of Bryophyta.
- To impart knowledge about advancement of characters in Pteridophyta with respect to Bryophyta.
- To make students well versed with the Geological timescale.

Outcomes:

- Students will learn about the general characters of Bryophyta.
- Students will learn the general characters of Pteridophyta
- Students will learn the basic concept of fossil Bryophyta through Geological time scale.

Course Content:

Unit I

Bryophyta: General characteristics and classification of bryophyta, alternation of generation.

Unit II

Structure, reproduction and economic importance of Hepaticopsida. Riccia, Marchantia, Anthocerotopsida - Anthoceros, Bryopsida-Sphagnum, Funaria.

Unit III

Pteridophyta: The first vascular land plant, classification of Pteridophyta, important characteristics of Psilopsida, Lycopsida, Sphenopsida, and Pteropsida, types of stele. General characters of Selaginella, Equisetum, Adiantum and Marsilea.

Unit IV

Gymnosperm:-General characteristics, classification, General characteristics of Cycas, Pinus, Ephedra.

Recommended Texts:

1. Pandey S. N. & others. 1995, A Text Book of Botany Vol. I, Vikas Publications Delhi.
2. Pandey S.N. & others. 1995, A Text Book of Botany Vol. II, Vikas Publications Delhi.

PRACTICAL SYLLABUS

Title: DIVERSITY OF MICROBES AND CRYPTOGRAMS
(BRYOPHYTA, PTERIDOPHYTA AND PALEOBOTANY) LAB

Course Code– AUBSMII.1BP

LIST OF EXPERIMENTS:

1. Study of External morphology and microscopic preparations of following bryophytes: Riccia, Marchantia, Anthoceros, Sphagnum and Polytrichum.
2. Microscopic temporary, double stained preparations and study of stem/cone/sporocarp of Lycopodium, Selaginella, Equisetum, Adiantum and Marsilea.
3. Study of External morphology and microscopic preparations of following gymnosperm: Cycas, Pinus and Ephedra.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment (10 MARKS)	File work (10 MARKS)	Viva (10 MARKS)	Total (30 MARKS)
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CORE COURSE-2B CHEMISTRY

Title: INORGANIC CHEMISTRY

Course Code– AUBSMII.2

Credits 05 (4L+0T+1P)

Contact hours per week: 06

Exam duration: 03:00 Hrs (Each T & P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Internal: 60 (Theory: 40 Practical: 20)

End Term Exam: 90 (Theory: 60 Practical: 30)

Objectives :

- To understand and appreciate the development of various atomic theories.
- To develop an understanding of principles of Atomic structure.
- To justify the need for quantum mechanical structure of atoms.
- To develop an understanding of the periodic trends, preparation and uses of s- and p-block elements and their compounds in terms of structure and bonding.
- To understand the nature of bonding and to predict the shapes of molecules.
- To construct MO energy level diagrams and predict the properties of molecules.

Course Content:

Unit-I Atomic Structure:

Dual nature of matter; de Broglie concept. Heisenberg's uncertainty principle; its significance. Atomic orbitals, Schrödinger wave equation (no derivation); significance of ψ and ψ^2 . Quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p and d orbitals. Aufbau's principle and its Limitations Pauli's exclusion principle. Hund's rule of maximum multiplicity. Electronic configuration of elements (s, p block and first series of d-block elements). Effective nuclear charge.

Unit-II Periodic Properties:

Atomic and ionic radii, ionization potential, electron affinity, electronegativity - definition, methods of determination/ evaluation, trends of variation in periodic table and their application in prediction and explaining the chemical behavior of elements and compounds.

Unit-III Chemical Bonding:

Covalent bond-valence bond theory and its limitations; various types of hybridization and shapes of different inorganic molecules and ions. Valence shell electron pair repulsion theory (VSEPR) and shapes of NH_3 , H_2O , H_3O^+ , SF_4 , ClF_3 and other simple molecules/ ions. Molecular orbital theory as applied to diatomic homonuclear/ heteronuclear (CO and NO) inorganic molecules, difference between VB and MO theories.

Unit-IV s-Block and p-Block elements:

s-Block elements: General discussion with respect to all periodic and chemical properties, diagonal relationship, salient features of hydrides, solvation and complexation tendencies, Role of alkali and alkaline earth metal ions in bio-systems.

p-Block elements: General discussion and comparative study (all periodic and chemical properties including diagonal relationship) of groups 13 to 17 elements; chemistry of elements-hydrides, oxides & oxy-acids, and halides. Diborane – properties & structure, borohydrides, carbides, fluorocarbons, inter-halogen compounds, polyhalides and basic properties of iodine.

Suggested Books:

1. Concise inorganic Chemistry 4th Edn. By J.D.Lee .ELBS.

- Huheey, J.E. Inorganic Chemistry, Prentice Hall 1993.
- Cotton, F.A. and Wilkinson, G, Advanced Inorganic Chemistry, Wiley, VCH, 1999.
- Greenwood, N.N. and Earnshaw, Chemistry of the Elements, Butterworth-Heinemann. 1997.
- Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications 1962.
- Douglas, B.E. and Mc Daniel, D.H., Concepts & Models of Inorganic Chemistry, Oxford 1970.
- Shriver & Atkins, Inorganic Chemistry, Third Edition, Oxford Press 1994.
- H.W. Porterfield, Inorganic Chemistry, Second Edition, Academic Press, 2005.

PRACTICAL SYLLABUS
Title: INORGANIC CHEMISTRY LAB
Course Code– AUBSMII.2P

List of Experiments:

- Qualitative analysis.
- Analysis of mixtures.
- Dry tests or Preliminary tests.
- Wet and Confirmatory tests for acid radicals.
- Systematic wet analysis for basic radicals.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

Reference text:

- Vogel, A.I. *A Textbook of Quantitative Inorganic Analysis*, ELBS.

*Latest editions of all the suggested books are recommended.

CORE COURSE-3B ZOOLOGY

Title: ANIMAL DIVERSITY: HIGHER NON-CHORDATA

Course Code– AUBSMII.3B

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Objective: The objective is to give students the exposure of some higher invertebrate phylum like Arthropoda, Mollusca and Echinodermata and the life histories of the organism fall in this category. To make them understand about the structure and function of the cells and differences.

Outcome: The outcome will be in terms of understanding the body organization of different life forms in higher invertebrates and they will be able to explain the differences in the taxonomic characters of different phylum. Students can draw and write about the structure and functions of the cells.

Course Content:

UNIT-I

Taxonomy: General Characters and Classification of Arthropoda, Mollusca and Echinodermata up to order, Mouthparts of insects, economic importance of insects.

UNIT-II

Arthropoda: Habit, habitat, morphology, physiology, reproduction, development of *Palaemon* (Prawn). *Pariplaneta* (cockroach).

UNIT-III

Mollusca: Habit, habitat, morphology, physiology, reproduction, development of *Pila* (Applesnail).

Unit-IV

Echinodermata: Habit, habitat, morphology, physiology, reproduction, and development of *Asterias* (Star fish).

Recommended books:

1. Kotpal R. L, Invertebrates, Rastogi Publications, Meerut (2009).
2. Sabharwal, A. Invertebrates-II, Modern Publishers, New Delhi (2015).
3. Barrington, E.J.W. Invertebrate Structure and Functions. Houghton Mifflin Co. Boston. (1967).

PRACTICAL SYLLABUS

Title: ANIMAL DIVERSITY: HIGHER NON-CHORDATA LAB

Course Code– AUBSMII.3BP

LIST OF EXPERIMENTS:

Observation of the following slides/spotters/models

Arthropoda: *Palaemon*, *Lepas*, *Crab*, *Lobster*, *Squilla*, *Balanus*, *Apis*, *Lepisma*, *Apis*, *Limulus*, *Scolopendra*, *Periplaneta*.

Mollusca: *Lamellidense*, *Pila*, *Chiton*, *Teredo*, *Doris*, *Aplysia*, *Detalium*, *Nautilus*, *Sepia*.

Echinodermata: *Pentaceros*, *Echinis*, *Ophiothrix*, *Holothuria*, *Antidon*.

Slides:

Mouth parts of *Anopheles* (male and female), *Culex* (male and female), *Cyclops*, *Dephnia*, *Zoea* larva. Cell structure.

Activity: Preparation of onion root tip for the stages of mitosis.

Rexene Charts

1. Prawn nervous system.
2. Prawn digestive system.
3. *Pila* nervous system.
4. *Unio* nervous system.
5. Starfish water vascular system.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20 MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

ABILITY ENHANCEMENT COMPULSORY COURSE-1B
(AECC-1B) ENGLISH

Title: COMMUNICATIVE ENGLISH-2

(Proficiency in English)

Course Code: AUBSMIL.4

Credits 2 (2L+0T+0P)

Contact hours per week: 2

Exam duration: 1:50 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Objectives : Students develop proficiency in English which equips them to:

- ❖ understand the demands of audience, subject, situation and purpose and the use of language for effective communication.
- ❖ analyse language in context to gain an understanding of grammar, vocabulary, spelling, punctuation and speech.
- ❖ examine authentic literary and non-literary texts and develop insight and appreciation.
- ❖ gain an understanding of study and reference skills.
- ❖ plan, draft, edit and present a piece of writing.

COURSE CONTENT:

Unit I: Study, Reference Skills and Skills of Communication

Note making; Note- taking; Summary writing. Comprehension Skills Extracts from literary, scientific and educational journals.

Advanced Writing Skills, writing advertisement copy; Writing a project proposal and Writing Resume, sending an application. Listening effectively; Talking about one self (likes, dislikes, interests, beliefs, personality traits, ambitions); Expressing an opinion about personal belief on a current issue. (Ability to speak fluently for 3-4 minutes. Focus would be on organized, logical, sequential presentation of thought through spontaneous speech).

Unit II: Writing for Functional Purposes; Creative Skills in Writing and Basic Phonetics

Letter-writing (Professional / Personal)

Writing dialogues, poems and essays

Sounds of English language, intonation and transcription using IPA.

Suggested Activities:

Politeness competitions- students with partners take turns in using a given number of utterances for negotiation / requests/complaints/small talk.

Students introduce themselves though using symbols/ metaphors.

Students collect newspaper/magazine cuttings on topical and/ or cultural issues of interest-write and share their opinion with peers.

References:

1. Chan. et al. (1997) Professional Writing Skills, San Anselma, CA
2. Fiderer, A. (1994) Teaching Writing: A Workshop Approach. Scholastic.
3. Block, C.C. (1997). Teaching the Language Arts, 2nd Ed. Allyn and Bacon
4. Mckay. et al. (1995). The Communication Skills Book, 2nd Ed. New Harbinger Publications.
5. Merriam, E. (1964). It Doesn't Always Have to Rhyme. Atheneum.

6. Hyland, Ken (2004) Second Language Writing. University of Michigan Press.
7. Graves, D (1992). Explore Poetry: The reading /writing teacher's companion. Heinemann
8. Stone Douglas (1999). Difficult conversations: How to discuss what Matters Most, New York.: Penguin Books.
9. Gabor Don (2001). How to start a Conversation and Make Friends, New York: Fireside.
10. Block, C.C. (1997). Teaching the Language Arts, 2nd Ed. Allyn and Bacon
11. McKay. et al. (1995). The Communication Skills Book, 2nd Ed. New Harbinger Publications.
12. Hornby, A.S. (2001). Oxford Advanced Learner's Dictionary, OUP

GENERIC ELECTIVE-1B (GE-1B)
ENVIRONMENTAL SCIENCE/ EDUCATION

Title: ENVIRONMENTAL SCIENCE/ EDUCATION-2

Course Code–AUBSMII.5

Credits 2 (2L+0T+0P)

Contact hours per week: 2

Exam duration: 1:50 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

Objective: To create awareness among students about environment protection.

Course Content

Unit I

Environmental Pollutions: Types, Causes, Effects & control; Air, Water, soil & noise pollution, Nuclear hazards & human health risks, Solid waste Management; Control measures of urban & industrial wastes, pollution case studies

Climate change & Global Warming (Green house Effect), Ozone Layer-Its Depletion and Control Measures, Photochemical Smog, Acid Rain: Environment protection Act; air prevention & control of pollution act, Water Prevention & Control of Pollution Act,

Unit II

Human Communities & Environment:

Human population growth; impacts on environment, human health & welfare, Disaster Management; Earthquake, Floods & Droughts, Cyclones & Landslides, Environmental Ethics; Role of Indian & other religions & culture in environmental conservation, Environmental communication & public awareness; Case studies.

Text Books:

1. “Environmental Chemistry”, De, A.K., New Age Publishers Pvt. Ltd.
2. “Introduction to Environmental Engineering and Science”, Masters, G. M. Prentice Hall India Pvt. Ltd.
3. “Fundamentals of Ecology”, Odum, E. P., W. B. Saunders Co.

Reference Books:

1. “Biodiversity and Conservation”, Bryant, P. J., Hyper text Book
2. “Textbook of Environment Studies”, Tewari, Khulbe & Tewari, I .K. Publication.

1. A study of educational, social & cultural functions of any informal agency of education.
2. Prepare a report of educational problems of learners in any school.
3. Prepare a report of problem of SC/ST/Backward/ Minority group of children in the rural & urban area of Himachal Pradesh.

Suggested Readings

1. Bower, G H and Hilgard E R (1981) Theories of learning, Englewood Cliffs, New Jersey: Prentice Hall Inc.
2. Chauhan S.S. (1995) Advanced Educational Psychology, New Delhi: Vikas Publishing House Pvt. Ltd.
3. Mangal S.K. 2005) Advanced Educational Psychology, New Delhi. Prentice Hall of India.
4. Dandapani S. (2005). Advanced Educational Psychology, New Delhi: Anmol Publications.
5. NCERT (2005) National Curriculum Framework, New Delhi.
6. NCTE (2009) National Curriculum Framework for Teacher Education, New Delhi.

THIRD SEMESTER
CORE COURSE-1C BOTANY

Title: **PLANT TAXONOMY AND EMBRYOLOGY**
Course Code– AUBSMIII.1B

Credits 05 (4L+0T+1P)

Contact hours per week: 06

Exam duration: 03:00 Hrs (Each T & P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Internal: 60 (Theory: 40 Practical: 20)

End Term Exam: 90 (Theory: 60 Practical: 30)

Course Objectives:

- To make students understand about the Botanical gardens and Herbarium.
- To make students aware about the different classification of Angiosperms.
- To impart knowledge about general characteristics of members of Angiosperm family.

Outcomes:

- Students will earn the systematic position of flowering plants.
- Students will be able to do identification of plants using scientific classification.
- Students will earn to describe the general leaf, flower and fruit characteristics of members of the Angiosperm family.

Course Content:

Unit I: Introduction To Plant Taxonomy

- Fundamental components of taxonomy (identification, nomenclature, classification).
- Taxonomic resources: Herbarium-functions & important herbaria, Botanical gardens, Flora.
- Botanical Nomenclature-Principles and rules of ICBN (ranks and names; principle of priority, binomial system; type method, author citation, valid publication).

Unit II: Classification

- Types of classification-Artificial, Natural and Phylogenetic.
- Bentham & Hooker's system of classification-merits and demerits.
- Engler & Prantle's system of classification-merits and demerits.

Unit III

- Systematic study and economic importance of the following families: Annonaceae, Brassicaceae, Rutaceae, Curcubitaceae, and Apiaceae.
- Systematic study and economic importance of plants belonging to the following families: Asteraceae, Asclepiadaceae, Lamiaceae, Ephorbiaceae, Arecaceae, and Poaceae.

Unit IV: Embryology

- Anther structure, microsporogenesis and development of male gametophyte.
- Ovule structure and types; Megasporogenesis, development of Monosporic, Bisporic and Tetrasporic types (*Peperomia*, *Drusa*, *Adoxa*) of embryosacs.
- Pollination and Fertilization (outline) Endosperm development and types.
- Development of Dicot and Monocot embryos, Polyembryony.

Recommended Texts:

- Porter, C. L.: Taxonomy of flowering Plants, Eurasia Publishing house, New Delhi.
- Lawrence, G. H. M. (1953): Taxonomy of Vascular Plants, Oxford & IBH Publishers, New Delhi.

- Bhojwani, S. S. & Bhatnagar, S. P. (2000): The Embryology of Angiosperms (4th Edition). Vikas Publishing House (P) Ltd., UBS Publisher's Distributors, New Delhi.
 - Maheswari, P. (1963): Recent Advances in the Embryology of Angiosperms (Ed.), International Society of Plant Morphologists- University of Delhi.
 - Maheswari, P. (1985): An Introduction to the Embryology of Angiosperms Tata McGraw Hill Publishing Co., Ltd., New Delhi.
- Latest editions of all the suggested books are recommended.

PRACTICAL SYLLABUS

Title: PLANT TAXONOMY AND EMBRYOLOGY LAB

Course Code– AUBSMIII.1BP

LIST OF EXPERIMENTS:

1. Systematic study of locally available plants belonging to the families prescribed in theory syllabus.
2. Demonstration of herbarium techniques.
3. Structure of pollen grains using whole mounts (*Hibiscus*, *Acacia*, Grass).
4. Demonstration of Pollen viability test using *in-vitro* germination (*Catharanthus*).
5. Study of ovule types and developmental stages of embryo sac using permanent slides/Photographs.
6. Structure of endosperm (nuclear and cellular); Developmental stages of dicot using permanent slides /Photographs.
7. Field visits .Study of local flora and submission of Field Note Book.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (20 MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-2C CHEMISTRY

Title: PHYSICAL CHEMISTRY

Course Code– AUBSMIII.2

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Unit-I Gaseous States: Postulates of kinetic theory of gases, deviation from ideal behavior, vander Waal's equation of states, relationship between critical constants and Vander Waals constants, reduced equation of state. Molecular velocities: Root mean square, average and most probable velocities, qualitative discussion of the Maxwell's distribution of molecular velocities.

Liquid State: Intermolecular forces, structure of liquids (a qualitative description) Structural differences between solids, liquids and gases. Physical properties of liquids including their methods of determination: surface tension, viscosity and refractive index.

Unit-II Solid State: Definition of space lattice, unit cell, crystal planes, Miller indices, Law of crystallography – (i) law of constancy of interfacial angles (ii) law of rationality of indices (iii) law of symmetry. Symmetry elements in crystals, X-ray diffraction by crystals, Derivation of Bragg's equation. Determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method).

Unit-III Chemical Kinetics: Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates mathematical characteristics of simple reaction – zero order, first order, second order, pseudo order, half life determination of the order of reaction – differential method, method of half life period and isolation methods concept of activation energy.

Unit-IV Thermodynamics: Definition of thermodynamic terms, system, surrounding etc. types of systems, intensive and extensive properties, thermodynamic process, concept of heat and work, First law of thermodynamics, definition of internal energy and enthalpy. Heat capacity – heat capacities at constant volume and at constant pressure and their relationship, Joule – Thomson coefficient and inversion temperature, Standard enthalpy of formation – Hess's law of heat summation and its application, Enthalpy of neutralization, bond dissociation energy and its calculation from thermochemical data, Kirchoff's equation.

Suggested Books:

1. Physical Chemistry by S.C. Khetarpal, G.S. Sharma and R.K. Kalia.
2. A text Book of Physical Chemistry by K.K. Sharma and I.K. Sharma.
3. Physical Chemistry by P.N. Kapil and S.K. Guglani.
4. A text book of Biophysical Chemistry by U.N. Das.
5. Surface Chemistry by Adison, L.I. Osipow.
6. Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry 8th Ed., Oxford University Press (2006).
7. Ball, D. W. Physical Chemistry Thomson Press, India (2007).
8. Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).

PRACTICAL SYLLABUS
Title: PHYSICAL CHEMISTRY LAB
Course Code– AUBSMIII.2P

List of Experiments:

1. Measurement of density.
2. Measurement of surface tension.
3. Measurement of viscosity.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (20 MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

Reference text:

1. Vogel, A.I.A *Textbook of Quantitative Inorganic Analysis*, ELBS.

*Latest editions of all the suggested books are recommended.

CORE COURSE-3C ZOOLOGY

Title: CHORDATA

Course Code– AUBSMIII.3B

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Objective: The objective is to give an idea of the Chordata and their five classes. To teach the students about the chordate animals like fishes, amphibians, aves, reptiles and mammals and some of their behavior and difference in structures and life histories.

Outcome: Upon the completion of this semester the students are expected to explain taxonomy of different classes and their difference. The physiology, structure and life histories of animals fall in this category.

Course Content:

UNIT I

Urochordata: Classification and detailed study (Habit, Morphology, anatomy, Physiology,) of *Herdmaina*.

Cephalochordata: Classification and detailed study of *Branchiostoma* (Amphioxus).

UNIT II

Pisces: General characters and classification of Pisces (upto orders with examples) Parental care in fishes.

Amphibia: General characters and classification of amphibians (upto orders with examples) Parental care in amphibians.

UNIT III

Reptilia:

General characters and classification of Reptilia (upto orders with examples) Identification of Poisonous and non-poisonous snakes. Biting mechanism of poisonous snakes.

Unit IV

Aves: General characters and classification of Aves (upto orders with examples) Characters of Archaeopteryx, Flight adaptation in Birds.

Mammals: General characters and classification of Mammalia upto orders. Dentition in Mammals.

Recommended books:

1. Kotpal R.L, Vertebrates, Rastogi Publications, Meerut (2018).
2. Kent, G. C. and Carr, R. K. (2001), Comparative Anatomy of the Vertebrates 9th edition, McGraw Hill Higher Education, New York.

PRACTICAL SYLLABUS

Title: CHORDATA LAB

CourseCode:AUBSMIII.3BP

LIST OF EXPERIMENTS:

Study of Specimens:

Urochordata– Herdmania, salpa doliolum.

Cephalochordata– Amphioxus.

Cyclostomata –petromyzon, myxine.

Pisces–*Pristis*, *torpedo*, *notopterus*, *exocoetus*, *clarius*, *ophiocephalus*, *catla*, *rohu*, *mrigal*

Amphibia–*Ichthyophis*, *bufo*, salamander, *uraeotyphlus*, *necturus*, *hyla*, *rhacophorus*.

Study of permanent slide:

Balanoglossus sections through proboscis, collar, branchiogenital and hepatic region
Amphioxus– oral hood, whole mount section through pharyngeal, intestinal & caudal region, Temporary unstained preparation of placoid, cycloid and ctenoid scales.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (20 MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

ABILITY ENHANCEMENT COMPULSORY COURSE-2A (AECC-2A) HINDI

Title: GENERAL HINDI-1

Course Code: AUBSMIII.4

Credits: 02 (2L+0T+0P)

Contact hours per week: 02

Exam duration: 1:50 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

उद्देश्य-

- ❖ छात्रों में भाषा को समझने तथा मूल्यांकन करने की दृष्टि बढ़ाना
- ❖ शब्द संरचना प्रक्रिया के प्रति छात्रों का ध्यानाकर्षण कराना
- ❖ छात्रों को प्रयोजनमूलक हिन्दी की व्यापकता से अवगत करवाना
- ❖ हिन्दी भाषा की व्यावहारिक उपयोगिता का परिचय देना

इकाई-1 हिंदी ध्वनियों का स्वरूप

स्वर और व्यंजन

संज्ञा, सर्वनाम, क्रिया, विशेषण, क्रिया विशेषण

वाक्य संरचना

इकाई-2 हिंदी शब्द संरचना

पर्यायवाची, समानार्थक, विलोमार्थक, अनेकार्थक, अनेक शब्दों के स्थान पर एक शब्द, समुहार्थक शब्दों के प्रयोग, निकातार्थी शब्दों के सूक्ष्म अर्थ-भेद, समानार्थक शब्दों के भेद, उपसर्ग, प्रत्यय

FOURTH SEMESTER
CORE COURSE-1D BOTANY

Title: PLANT PHYSIOLOGY AND METABOLISM

Course Code– AUBSMIV.1B

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Course Objectives:

- To make students capable of understanding basic physical processes occurring in plants.
- To impart Knowledge about plant growth regulators related to growth and development.
- To make student learn about the Mineral nutrition in plants.

Learning Outcomes:

- Students will learn about the physical processes occurring in plants.
- Students will learn the function of different plant growth regulators.

Course Content:

Unit 1: Plant-water relations

Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation.

Unit 2: Mineral nutrition and Translocation

Essential elements, macro and micronutrients ;Criteria of essentiality of elements; Role of essential elements, Transportations across cell membrane, active and passive transport, carriers, channels and pumps.

Translocation in phloem.: Composition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading

Unit 3: Photosynthesis and Respiration

Photosynthetic Pigments (Chl_a, xanthophylls, carotene); Photosystem I and II, reaction center, Electron transport and C₃, C₄ and CAM pathways of carbon fixation.

Respiration: glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation.

Unit 4: Enzymes and Nitrogen metabolism

Structure and properties; Mechanism of enzyme catalysis and enzyme inhibition.

Nitrogen metabolism: Biological nitrogen fixation; Nitrate and ammonia assimilation.

Plant growth regulators and Plant response to light and temperature

Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene.

Plant response to light and temperature: Photoperiodism (SDP, LDP, Dayneutral plants); Phytochrome (discovery and structure), red and far red light responses on photomorphogenesis; Vernalization.

Recommended books:

1. Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.
2. Bajracharya, D., (1999). Experiments in Plant Physiology-A Laboratory Manual. Narosa Publishing House, New Delhi.

3. Taiz, L., Zeiger, E., Møller, I.M. and Murphy, A. (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.

PRACTICAL SYLLABUS

Title: PLANT PHYSIOLOGY AND METABOLISM LAB

Course Code– AUBSMIV.1BP

LIST OF EXPERIMENTS:

1. To prepare a temporary mount of onion bulb peel and study structure of its cells.
2. To determine the stomatal index (S.I) on abaxial and adaxial surface of the leaf.
3. To demonstrate the stomatal transpiration by four leaves method.
4. Study the cells of onion and spirogyra.
5. To demonstrate the phenomenon of osmosis through plasma membrane of a plant material by using Potato osmoscope.
6. To determine the water absorption and transpiration ratio by absorb transpirometer.
7. To demonstrate the growth of plant by Arc auxanometer.
8. To study the rate of transpiration by Ganong's photometer method.
9. To separate the chloroplast pigments by paper chromatography.
10. To demonstrate the phenomenon of imbibition pressure by using dry seeds.
11. To study the germination of gram seeds.
12. Separation of amino acids by paper chromatography.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20 MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment (10 MARKS)	File work (10 MARKS)	Viva (10 MARKS)	Total (30 MARKS)
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CORE COURSE-2D CHEMISTRY

Title: ORGANIC & INORGANIC CHEMISTRY

Course Code– AUBSMIV.2

Credits 05 (4L+0T+1P)

Contact hours per week: 06

Exam duration: 03:00 Hrs (Each T & P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Internal: 60 (Theory: 40 Practical: 20)

End Term Exam: 90 (Theory: 60 Practical: 30)

Unit - I

Cycloalkanes: Nomenclature, methods of formation, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strainless rings.

Aldehydes and Ketones: Nomenclature and structure of Carbonyl group, Synthesis of Aldehydes and Ketones with particular reference to the synthesis of Aldehydes from acid chlorides, Synthesis of Aldehydes and Ketones using 1,3 dithianes, Synthesis of Ketones from Nitriles and from Carboxylic acids.

Aldol, Perkin and Knoevenagel Condensations, Wittig reaction, Mannich reaction. Cannizzaro reaction, Clemmensen, Wolff-kishner, LiAlH_4 and NaBH_4 reduction.

Unit-II

Alcohols: Classification and nomenclature

Monohydric alcohols- nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding, Acidic nature, reactions of alcohols.

Phenols: Nomenclature structure and bonding, preparation of phenols, physical properties and acidic character. Comparative acidic strength of alcohols and phenols, mechanism of Fries rearrangement, Claisen rearrangement, Gatterman synthesis and Reimer-Tiemann synthesis.

Unit- III

Non-Aqueous Solvents: Introduction to non-aqueous solvents, their classification, effect of physical properties of the solvents on the role of solvent in chemical reactions, solvent system concept of acids and bases, studies of NH_3HF , H_2SO_4 and SO_2 as non-aqueous solvents, failure of solvent system concept and coordination model of non-aqueous solvents.

Unit-IV

Structures of diamond and graphite, Inorganic compounds of carbon (CO , CO_2 , CS_2 , CCl_4 , HCN , SiC), composition and theory of setting of cement, Catenation, silicate minerals, silanes, silicone polymers, comparison of C and Si. Allotropy of P. Oxides and oxy-acids of both N and P. hydrides of N and P (NH_3 , N_2H_4 , NH_2OH , NH_3 , P_2H_4 and PH_3). Ammonium sulphate and calcium ammonium nitrate (CAN) manufacture and uses. Oxides and oxyacids of S, hydrides and halides of sulphur. Oxides and oxyacids of halogens, hydrides of halogens.

Suggested Books:

1. Reaction and Mechanism by Singh & Mukherjee.
2. Organic Chemistry (Reaction and Mechanism) by P.S. Kalsi.
3. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
5. Organic Chemistry by Paula Yurkanis Bruice.
6. Organic Chemistry by Baeyer and Walter.
7. Concise inorganic Chemistry 4th Edn. By J.D.Lee.
8. Inorganic Chemistry by J.E.Huheey.
9. Advanced Inorganic Chemistry by Cotton And Wilkinson.
10. Chemistry of Elements by Greenwood & Earnshaw.
11. Theoretical Inorganic Chemistry By Day & Selbin.

PRACTICALSYLLABUS

Title: **ORGANIC & INORGANIC CHEMISTRY LAB**

Course Code– AUBSMIV.2P

List of Experiments:

1. Estimation of Barium and Sulphate ions.
2. Estimation of Iron.
3. Inorganic preparation of Prussian Blue $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$.
4. Inorganic preparation of Tetra-amine copper (II), Sulphate-Tetra ammonium Cupric sulphate $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4\cdot\text{H}_2\text{O}$.
5. Inorganic preparation of Chrome alums $\text{K}_2\text{SO}_4\cdot\text{Cr}_2(\text{SO}_4)_3\cdot24\text{H}_2\text{O}$.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-3D ZOOLOGY

Title: EVOLUTION AND DEVELOPMENTAL BIOLOGY

Course Code– AUBSMIV.3B

Credits 05 (4L+0T+1P)

Contact hours per week: 06

Exam duration: 03:00 Hrs (Each T & P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Internal: 60 (Theory: 40 Practical: 20)

End Term Exam: 90 (Theory: 60 Practical: 30)

Objectives: To educate the students on the concept and theories of the evolution and embryology. The development of chick and placentation.

Outcomes: As an outcome the student will be able to explain and write the different theories given to explain the evolution during the time period like Darwinism and Lamarckism and can understand the developmental biology.

Course Content:

Unit –1

Concept of evolution. Evidences of natural selection, Theory of evolution (including Neo-Lamarckism, Darwin – Wallace theory of natural selection, Neo-Darwinism modern synthetic theory.

Unit-2

Gametogenesis: spermatogenesis and oogenesis, vitellogenesis egg membrane, Fertilization, Parthenogenesis.

Unit-3

Types of animal eggs: structure of eggs. Types and patterns of cleavage.

Unit -4

Process of blastulation and gastrulation. Development of chick up to the formation of primitive streak and extra embryonic membrane. Development of extra embryonic membrane in mammals. Placentation and types of placenta.

Recommended books:

1. Gilbert, S.F. (2006), development biology, VIII edition, sinauer associates Inc publishers, Sunderland, Massachusetts, USA.
2. Balinsky, B.I. (2008) an introduction to embryology, international Thomson computer press.
3. Kalthoff, (2000) Analysis of biological development, II edition, mc graw hill professional.
4. Verma P.S. & V.K. Aggrawal, chordate embryology, s. Chand & co.
5. Berril & crop development biology. Mc Graw hill book company, m,c, New York.
6. Jain P.C. 1998, elements of development biology. Vishal publication, New Delhi

PRACTICAL SYLLABUS

Title: EVOLUTION AND DEVELOPMENTAL BIOLOGY LAB

Course Code– AUBSMIV.3BP

LIST OF EXPERIMENTS:

1. **Reptiles**– study of chameleon, *varanus*, pharynosoma, *draco*, tortoise, cobra, Krait, Russell's viper, sea snake, testuda.
1. *Hemidactylus*, *uromastix*, *ophiosaurus*, *hydrophis*, crocodiles.
2. **Birds**– study of owl, woodpecker, kingfisher, kite, duck, parrot, study of dozen birds of Delhi.
3. **Mammals**– study of squirrel, mongoose, bat, loris, rabbit.

Developmental biology

1. **Frog**– study of developmental stages & section through permanent slides cleavage, stage, blastula, gastrula, neurula, tadpole.
2. **Chick**– study of developmental stage primitive streak, -21h, 24h, 28h, 33h, 36h, 48h, 72h.
3. Section of testis and ovary (mammalian).
4. Slides of mammalian sperm and ovum.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (20 MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

ABILITY ENHANCEMENT COMPULSORY COURSE-2B (AECC-2B) HINDI

Title: GENERAL HINDI-2

Course Code: AUBSMIV.4

Credits: 02 (2L+0T+0P)

Contact hours per week: 02

Exam duration: 1:50 Hrs

Max. Marks: 50

Internal: 20

End Term Exam: 30

उद्देश्य-

1. छात्रों में भाषा को समझने तथा मूल्यांकन करने की दृष्टि बढ़ाना
2. शब्द संरचना प्रक्रिया के प्रति छात्रों का ध्यानाकर्षण कराना
3. छात्रों को प्रयोजनमूलक हिन्दी की व्यापकता से अवगत करवाना
4. हिन्दी भाषा की व्यवहारिक उपयोगिता का परिचय देना

इकाई-1 वर्तनी, विराम चिन्ह एवं संशोधन

- ❖ वर्तनी सम्बन्धी अशुद्धियाँ, मात्राओं की अशुद्धियाँ
- ❖ वर्तनी सम्बन्धी अशुद्धियों के कारण, वर्तनी सम्बन्धी अशुद्धियों के सुधारने के उपाय
- ❖ विराम चिन्ह- पूर्णविराम, प्रश्नवाचक चिन्ह, सम्बोधन या आश्चर्य चिन्ह, निर्देशक चिन्ह, अवतरण चिन्ह

इकाई -2 लेखन सम्बन्धी कोशल

- ❖ लिखित भाषा शिक्षण के उद्देश्य
- ❖ लेखन की विभिन्न विधियों, लेखन के दोष
- ❖ निबंध लेखन, कहानी लेखन
- ❖ राष्ट्रीय - अंतराष्ट्रीय तात्कालिक घटनाक्रमों पर लेखन
- ❖ औपचारिक पत्राचार / अनौपचारिक पत्राचार
- ❖ राष्ट्रीय - अंतराष्ट्रीय तात्कालिक घटनाक्रमों पर लेखन

FIFTH SEMESTER

CORE COURSE-1E BOTANY

Title: ECONOMIC BOTANY AND PLANT BIOTECHNOLOGY

Course Code– AUBSMV.1B

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Course Objectives:

- To make students capable of understanding the centres of origin of different crops.
- To impart knowledge about economic importance of some cash crops.
- To make student learn about the techniques in plant biotechnology.

Outcomes:

- Students will learn about the centres of origin of different crops.
- Students will learn the origin and plant parts used in some important cash crops.
- Students will learn the latest techniques in plant biotechnology.

Course Content:

Unit-I: Origin of Cultivated Plants:

Concept of centres of origin and diversity of cultivated plants, Vavilovian centres. Cereals : Rice -Origin, morphology, uses Legumes : General account with special reference to Gram and soybean.

Unit II: Spices and Beverages:

General account with special reference to clove and black pepper (Botanical name, family, part used, morphology and uses) Beverages: Tea (morphology, processing, uses).

Fat and Fibre yielding plants: General description with special reference to groundnut Fibre Yielding Plants: General description with special reference to Cotton (Botanical name, family, part used, morphology and uses).

Unit III: Introduction to Biotechnology

Plant tissue culture: Micropropagation; haploid production through androgenesis and gynogenesis; brief account of embryo and endosperm culture with their applications

Unit IV Recombinant DNA Techniques

Blotting techniques: Northern, Southern and Western Blotting, DNA Finger printing ; Molecular DNA markers i.e. RAPD, RFLP, SNPs; DNA sequencing, PCR.

Hybridoma and monoclonal antibodies, ELISA and Immuno detection. Molecular diagnosis of human disease, Humane Therapy.

Recommended Texts:

1. Kochhar, S. L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi. 4th edition.
2. Bhojwani, S. S. and Razdan, M. K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
3. Glick, B. R., Pasternak, J. J. (2003). Molecular Biotechnology-Principles and Applications of recombinant DNA. ASM Press, Washington.

PRACTICAL SYLLABUS

Title: ECONOMIC BOTANY AND PLANT BIOTECHNOLOGY LAB

Course Code– AUBSMV.1BP

LIST OF EXPERIMENTS:

1. Study of economically important plants: Wheat, Gram, Soybean, Blackpepper, Clove Tea, Cotton, Groundnut through specimens, sections and microchemical tests.
2. Familiarization with basic equipments in tissue culture.
3. Study through photographs: Antherculture, somatic embryogenesis, endosperm and embryo culture; micropropagation.
4. Study of molecular techniques: PCR, Blotting techniques, AGE and PAGE.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE &VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment (10 MARKS)	File work (10 MARKS)	Viva (10 MARKS)	Total (30 MARKS)
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CORE COURSE-2E CHEMISTRY

Title: PHYSICAL AND INORGANIC CHEMISTRY

Course Code– AUBSMV.2

Credits 05 (4L+0T+1P)

Contact hours per week: 06

Exam duration: 03:00 Hrs (Each T & P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Internal: 60 (Theory: 40 Practical: 20)

End Term Exam: 90 (Theory: 60 Practical: 30)

Unit I

Second law of thermodynamics: Need for the law, Different statements of the law, Carnot cycle and its efficiency, Carnot theorem, Thermodynamics scale of temperature.

Third law of thermodynamics: Concept of entropy, variation of entropy with T and V, T and P, P and V_2 , Nernst heat theorem, Evaluation of absolute entropy from heat capacity data, Entropy of real gaseous and application of third law.

Free energy and work Function: Gibb's function (G) and Helmholtz function (A) as thermodynamic state function, Maxwell relations, Standard free energies, Gibb's Helmholtz equation and its applications.

Unit II

Electrochemistry: Electrical transport-conduction in metals and in electrolyte solutions, Specific and molar conductivity variations of conductivity with concentration, Kohlrausch law, Arrhenius theory of electrolyte dissociation and its limitations, Weak and strong electrolytes, Transport number.

Electrolytic and Galvanic cells: Derivation of cell EMF, EMF of cell and its measurement, Electrode potential, Standard Hydrogen electrode, Standard electrode potential, Sign conversions.

Definitions of pH and pKa values, determination of pH using Hydrogen, Buffers mechanism of buffer action, Henderson-Hassel equation, Hydrolysis of salts.

Unit-III

Metal-Ligand bonding in Transition Metal Complexes: Electrostatic crystal field splitting of d-orbitals in octahedral, Tetrahedral, square planar and tetragonally distorted octahedral stereochemistry, Factors affecting the crystal field parameters, CFSE, Spectrochemical series, Origin of diamagnetism, paramagnetism, ferromagnetism and antiferromagnetism, Types of magnetic behaviour shown by transition elements and compounds, Gouy's method for measuring magnetic susceptibility, Origin of colour in transition metal complexes, Explanation of colour in $[\text{Ti}(\text{H}_2\text{O})_6]\text{Cl}_3$ and $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ and lack of colour in CuSO_4 and Cu_2SO_4 in terms of d-orbital splitting.

Unit-IV

Organometallic Compounds and π -acid Complexes: Definition type and classification of organometallic compounds, EAN and nomenclature, Ionic metal carbon bonding, Metal carbon multiple bonding, Preparation and reaction of ferrocene, Nature of bonding in Metal olefin and metal alkyne complexes. Formation of reaction in Carbonyl compounds of transition elements, Bonding in linear carbonyls (simple spectral evidence), structure of mono and polynuclear carbonyls.

Suggested Books:

1. Physical Chemistry by S. C. Khetarpal, G.S, Sharma and R. K. Kalia.
2. Physical Chemistry by P. N. Kapil and S. K. Guglani.
3. Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).
4. Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry 8th Ed., Oxford University Press (2006).
5. Ball, D. W. Physical Chemistry Thomson Press, India (2007).
6. Concise inorganic Chemistry 4th Edn. By J. D. Lee.
7. Inorganic Chemistry by J. E. Huheey.
8. Advanced Inorganic Chemistry by Cotton And Wilkinson.
9. Chemistry of Elements by Greenwood & Earnshaw.
10. Theoretical Inorganic Chemistry By Day & Selbin.

PRACTICAL SYLLABUS**Title: PHYSICAL AND INORGANIC CHEMISTRY LAB****Course Code– AUBSMV.2P****List of Experiments:**

1. Thermodynamic: Heat of neutralization, Heat of solution.
2. Preparation of buffer solution and the determination of the pH values by the use of indicator.
3. KMnO_4 Titration.
4. Iodine Titration.
5. EDTA Titration.

Evaluation Scheme of Practical Examination:**Internal Evaluation (20 marks)**

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PER FORMANCE & VIVA DURING THE SEMESTER (20MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05MARKS)	VIVA (05MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-3E ZOOLOGY

Title: CELL BIOLOGY AND GENETICS

Course Code– AUBSMV.3B

Credits 05 (4L+0T+1P)

Contact hours per week: 06

Exam duration: 03:00 Hrs (Each T & P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Internal: 60 (Theory: 40 Practical: 20)

End Term Exam: 90 (Theory: 60 Practical: 30)

Objectives:

The objective of this semester is to educate students on cell biology and genetics. Structure and function of cell and other cell organelles will be taught to them. Knowledge on Mendel's principles on genetics, Structure of chromosomes, DNA and RNA will be given to them.

Outcomes:

After completion of this semester the student will be able to explain the genetics and how the trait transfers from one generation to another. They can also be able to draw and explain the structure of cell and cell organelles.

Course Content:

Unit I: Structure and function of cell, Ultrastructure of Plasma membrane

Structure and function of cell organelles with special emphasis on mitochondria, golgi bodies, nucleus, ribosome and endoplasmic reticulum.

Unit II

Structure of Chromosomes, Watson & Crick Model of DNA, Differences between DNA & RNA Cell Division: Mitosis and Meiosis.

Unit III

Mendel's principles of heredity on chromosomal basis, Monohybrid cross, test cross, dihybrid cross, back cross, incomplete dominance, Multiple Alleles, Blood group inheritance.

Unit IV

Linkage and crossing over, interaction of genes. Role of DNA in heredity. Sex determination, sex differentiation, Sex-linked characters, Genetic diseases and abnormalities, chromosomal aberrations.

Recommended Texts:

1. DeRobertis, E.D.P. and DeRobertis, E.M.F. 2006 Cell and molecular Biology 8th edition lippincott willians and Wilkins, Philadelphia.
2. Gupta P.K. Genetics Rastogi publication Meerut.
3. Verma P.S. and V.K. Agarwal, Concept of cell Biology S Chand Publications.
4. Lodish et al :-molecular cell Biology (scientific American book).
5. Veer Bala Rastogi Introduction to Cell biology, Rastogi publication Meerut.
6. Gene VI, Benjamin Lewin, Oxford University Press, U.K.
7. Latest editions of all the suggested books are recommended.

PRACTICAL SYLLABUS

Title: CELL BIOLOGY AND GENETICS LAB

Course Code– AUBSMV.3BP

LIST OF EXPERIMENTS:

1. Microscopy – Theoretical knowledge of light and electron microscope.
2. Study of structure of cell organelles through electron microscope.
3. Study of mitosis and meiosis from permanent slides
4. Preparation and study of slides for mitosis using squash technique (onion root tip).
5. Study of Hardy-Weinberg law using simulations (seed).
6. Osteology – study of skeleton of fowl Axial skeleton, Appendicular skeleton.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (20 MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

SIXTH SEMESTER

CORE COURSE-1F BOTANY

Title: ENVIRONMENTAL BIOTECHNOLOGY

Course Code– AUBSMVI.1B

Credits 05 (4L+0T+1P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Contact hours per week: 06

Internal: 60 (Theory: 40 Practical: 20)

Exam duration: 03:00 Hrs (Each T & P) End Term Exam: 90 (Theory: 60 Practical: 30)

Course Objectives:

- To make students capable of understanding current environmental issues.
- To impart knowledge about role of Microbiology in treatment of waste.
- To make student learn about role of common people in Environment protection.

Learning Outcomes:

- Students will learn about the current environmental issues.
- Students will learn the role of different microorganisms in treatment of waste.
- Students will learn how the public participation can help in protection environment.

Course Content:

Unit I

Environment

Basic concepts and issues, global environmental problems-ozone depletion, UV-B, green house effect and acid rain, their impact and approaches for management.

Environmental pollution-types of pollution, sources of pollution, measurement of pollution, methods of measurement of pollution, fate of pollutants in the environment, Bioconcentration, bio/geomagnification.

Unit II Microbiology of wastewater treatment and Xenobiotic compounds

Aerobic process-activated sludge, oxidation ponds, trickling filter, rotating drums, oxidation ditch. Anaerobic process-anaerobic digestion, anaerobic filters, upflow anaerobic sludge blanket reactors. Xeno biotic compounds: Bioremediation of xenobiotics in environment-ecological consideration, decay behavior and degradative plasmids, techniques in bioremediation, degradation of pesticides and hydrocarbons.

Unit III Role of immobilized cells/enzymes in treatment of toxic compounds

Biopesticides, bioreactors, bioleaching, biomining, biosensors, bio techniques for air pollution.

Unit IV Sustainable Development

Economics and Environment: Economic growth and quality of life, Economics of Pollution control, WTO and Environment, Corporate Social Responsibility, Environmental awareness and Education; Environmental Ethics. Public Participation for Environmental Protection.

Environmental movement and people's participation with special references to Gandhamardan, Chilika and Narmada Bachao Andolan, Chipko and Silent valley Movement; Women and Environmental Protection, Role of NGO in bringing environmental awareness and education in the society.

Reference Books:

1. Waste water engineering treatment, disposal and reuse, Metcalf and Eddy

Inc.,

Tata McGraw Hill, New Delhi.

2. Environmental Chemistry, A. K. De, Wiley Eastern Ltd, New Delhi.

3. Introduction to Biodeterioration, D. Allsopp and K. J. Seal, ELBS/ Edward Arnold.

4. Bioremediation, Baaker, KH and Herson D.S., 1994. Mc. Graw Hill Inc, New York.

5. Environmental Molecular Biology, Paul. A, Rochelle, 2001. Horizon Press.

6. Environmental Protection and Laws by Jadhav and Bhosale, V. M. Himalaya publ. House.

7. Biodiversity Assessment and Conservation by P. C. Trivedi.

Latest editions of all the suggested books are recommended.

PRACTICAL SYLLABUS

Title: ENVIRONMENTAL BIOTECHNOLOGY LAB

Course Code– AUBSMVI.1BP

LIST OF EXPERIMENTS:

1. Water/Soil analysis-DO, salinity, pH, total hardness, alkalinity, acidity.
2. Gravimetric analysis-Total solid, dissolved solid, suspended solid in an effluent.
3. Isolation and pure culture of microbial strains from air, water and soil sample.
4. Colony counting on nutrient agar media.
5. Measurement and optimization of microbial growth and kinetics.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (20 MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-2F CHEMISTRY

Title: PHYSICAL AND ORGANIC CHEMISTRY

Course Code– AUBSMVL2

Credits 05 (4L+0T+1P)

Contact hours per week: 06

Exam duration: 03:00 Hrs (Each T & P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Internal: 60 (Theory: 40 Practical: 20)

End Term Exam: 90 (Theory: 60 Practical: 30)

Unit-I

Spectroscopy: Regions of spectrum, Born-Oppenheimer approximation, degree of freedom.

Rotational spectrum: Diatomic Molecules, Energy level of rigid rotor, selection rules, Spectral intensity, Maxwell-Boltzmann distribution, Qualitative description of non-rigid rotor, Isotope effect.

Vibrational spectrum: Infrared spectrum, Energy levels of simple harmonic oscillator, Selection rules, Pure vibrational spectrum, Intensity, Determination of force constant and qualitative relation of force constant and bond energies, Effect of an harmonic motion and isotope on the spectrum, Idea of vibrational frequencies of different functional groups.

Electronic spectrum: Concept of potential energy curve for bonding and antibonding molecular orbital, qualitative description of selection rules and Franck-Condon principle.

Unit-II

Photochemistry: Interaction of radiation with matter, Difference between thermal and photo chemical processes.

Laws of photo chemistry: Grothus-Draper law, Stark-Einstein law, Jablonsky diagram depicting various processes occurring in the excited states, Fluorescence, Phosphorescence, Photosensitized reactions-energy transfer processes.

Physical properties and molecular structure: Polarization-Clausius-Mossotti equation, Orientation of dipoles in an electric field, Magnetic properties, Paramagnetism, Diamagnetism and Ferromagnetism.

Unit-III Spectroscopy: Ultraviolet (UV) absorption spectroscopy-absorption laws (Beer-Lambert law), Presentation and analysis of UV spectra, Types of electronic transition, Effect of conjugation, Concept of Chromophore and Auxochrome. Bathochromic, Hypsochromic and Hypochromic shift. Infra-red (IR) absorption spectroscopy, Hook's law, selection rules, Position of IR bands, Measurement of IR spectrum, Finger print region, Characteristic absorption of various functional groups and interpretation of IR spectra of simple organic compound.

Nuclear magnetic resonance (NMR) spectroscopy, Proton magnetic resonance (^1H NMR) spectroscopy, Nuclear shielding and deshielding, Chemical shift, Spin-spin splitting and coupling constant. Interpretation of PMR spectra of simple organic molecules such as ethanol, acetaldehyde, 1,1,2-tribromomethane.

Unit-IV Photo chemistry and Heterocyclic Compounds

Scope and importance, Photochemical and Thermochemical reactions, Jablonski diagram.

Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine, Nucleophilic substitution reactions in pyridine derivatives, Comparison of basicity of pyridine, piperidine and pyrrole. Reactions of indole, quinoline and isoquinoline with special reference to

Fisher indole synthesis and Bischler-Napieralski synthesis, Mechanism of electrophilic substitution reaction of indole quinoline and iso quinoline.

Suggested Books:

1. Physical Chemistry by S. C. Khetarpal, G.S, Sharma and R.K. Kalia.
2. A text Book of Physical Chemistry by K. K. Sharma and I. K. Sharma.
3. Physical Chemistry by P. N. Kapil and S. K. Guglani.
4. Surface Chemistry by Adison, L. I. Osipow.
5. Organic Chemistry by Paula Yurkanis Bruice.
6. Organic Chemistry by F. A. Carey, Tata McGraw Hill.
7. Organic Chemistry by Robert T. Morrison & Robert N. Boyd, Prentice Hall of India Pvt. Ltd.

PRACTICAL SYLLABUS

Title: PHYSICAL AND ORGANIC CHEMISTRY LAB

Course Code– AUBSMVI.2P

List of Experiments:

1. Determination of molecular weight by Rast's method.
2. Study of Hydrolysis of Methyl Acetate in the presence of HCL acid at room temperature.
3. Identification of Sugar (Glucose, Fructose, Sucrose, Lactose) by paper Chromatography.
4. Qualitative analysis of Ions (Cu^{++} , Cd^{++} , Ni^{++} , and Co^{++}) by paper Chromatography.

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (20 MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20 MARKS)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

CORE COURSE-3F ZOOLOGY

Title: MAMMALIAN PHYSIOLOGY

Course Code– AUBSMVI.3B

Credits 05 (4L+0T+1P)

Contact hours per week: 06

Exam duration: 03:00 Hrs (Each T & P)

Max. Marks: 150 (Theory: 100 Practical: 50)

Internal: 60 (Theory: 40 Practical: 20)

End Term Exam: 90 (Theory: 60 Practical: 30)

Objectives:

In this semester the students will be provided the knowledge of different physiologies. They will also learn the mechanism of different organs functions in the body of animals. Each physiology will comprise the structure of central organ and their functions and what are their importance in the life of animal.

Outcomes: One can expect to learn the process of physiology like digestion, respiration, excretion and blood circulation etc. They will be able to draw and write all about they had learnt.

Course Content:

Unit-1

Biochemistry: structure and metabolism of carbohydrate, protein and lipids.

Unit-2

Nutrition and digestion: Histology and function of gastrointestinal tract and its associated glands.

Digestion and absorption of proteins, carbohydrates & lipids.

Respiration: Mechanism and regulation of breathing. Transport of oxygen and carbon dioxide.

Unit-3

Blood and circulation :Composition, structure and functions of blood. Coagulations of blood – blood group and Rh factor. Cardiac cycle, heart beat & its regulation. Blood pressure and Electrocardiogram.

Unit-4

Excretion Structure of uriniferous tubule mechanism of urine formation, Nervous system: - conduction of nerve impulse, reflex action. Endocrinology :Structure and function of major endocrine glands – (Pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, etc.)

Reference Books:

1. Human physiology– Chatterjee A.G. vol.-I&II.
2. Parameswaran, Anantakrishnan and Ananta subramanyam, 1975, outline of Animal physiology. 3-Tortora G.J. & Grabowski, S (2006).
3. Hall, J. E., Guyton and Hall Text Book of Medical Physiology, 12th edition, Saunders Company (2010).

PRACTICAL SYLLABUS

Title: CELL BIOLOGY AND GENETICS LAB

Course Code– AUBSV.3BP

LIST OF EXPERIMENTS:

Experiments to be performed by candidates:

- 1- Test for amylase on starch.
- 2- Preparation of haemincrystals.
- 3- Determination of Hb% in blood sample.
- 4- RBC count by haemocytometer in blood.
- 5- Test for sugar, proteins and lipids.

Experiments for demonstration and comments:

1. Osmosis
2. Muscle twitch by stimulating it with mechanical, chemical and thermal stimuli.
3. Reflex action
4. Respiration
5. Recording of blood pressure using a sphygmomanometer

Prepared slides:

Study of Histological slides of mammals–

1. T.S. salivary gland, T.S. pancreas, T.S. liver, T.S. Intestine.
6. T.S. kidney, T.S. lungs, T.S. stomach
7. Pituitary, gland, thyroid gland
8. Medulated and non-medulated nerve fibre
- 5- Smooth & striated muscle

Evaluation Scheme of Practical Examination:

Internal Evaluation (20 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (20 MARKS)				TOTAL
EXPERIMENT (05 MARKS)	FILE WORK (05 MARKS)	ATTENDANCE (05 MARKS)	VIVA (05 MARKS)	INTERNAL (20)

External Evaluation (30 Marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

Experiment	File work	Viva	Total
(10 MARKS)	(10 MARKS)	(10 MARKS)	(30 MARKS)

Teaching Methods. New Delhi: P.H.I.

Sharma, R.C.(1998): Modern Science of Teaching, New Delhi: Dhanpat Rai and Sons,.

Vaidya, Narendra (1996): Science of teaching for 21st Century, New Delhi: Deep and Deep Publishers.

PROFESSIONAL EDUCATION-12 (PE-12)

Title: TEACHING OF LIFE SCIENCES-1
Course Code– AUBSEVI.6A

Credits: 02 (1L+1T+0P)
Contact hours per week: 02
Exam duration: 1:30 Hrs

Max. Marks: 50
Internal: 20
End Term Exam: 30

Course objective:

The student teachers will be able to:

1. Understand various objectives of teaching life sciences and to write the same in behavioral terms.
2. Understand and apply various methods of teaching life sciences.
3. Understand, analyze and improve present curriculum of life sciences operative at school level.
4. Understand the importance and appropriate use of different audio visual aids and improvised apparatus in Indian conditions with reference to concepts to be taught.

Unit 1. Foundations of Teaching of Life Science.

- Meaning, nature and scope of Life Science, Historical development of Life Sciences in secondary school curriculum.
- Aims and Objectives of Teaching Life Sciences at secondary stage; Writing instructional Objectives in behavioral terms. Formulation and classification of Instructional Objectives for teaching of Life Sciences with reference to cognitive, affective and psychomotor domains.
- Life Science Curriculum at School stage; concept, scope and principles of curriculum construction, approaches of curriculum construction such as concentric approach, topical approach and unit approach.
- Process of Evaluation of Life Science Curriculum at School level (HPBSE and CBSE).

Unit2: Teaching Methods, Approaches and Techniques.

- Teaching methods in Life Science: lecture method, lecture-cum demonstration method, project method, heuristic method, laboratory method.
- Approaches in Life Science: Inductive-deductive approach, problem solving approach, computer assisted instructions and web based instructions.
- Visualizing, organizing and contextualizing learning situations through:
 - a. Field Trips.
 - b. Biological Associations, Science Fairs and Exhibitions.
 - c. Botanical Garden.
 - d. Museum.
 - e. Aquarium and Vivarium.
 - f. Biology Clubs.
 - g. Science Excursions.
 - h. Concept Mapping.
- Facilitating Life Science Learning: issues in practice; collective learning, peer learning; dealing students in heterogeneous classes.

Activity (Any one of the Following)

The students teacher will perform the following experiments and record them in the practical journal/ file.

1. To prepare a temporary mount of a leaf peel to show stomata.
2. To show experimentally that carbon dioxide is given out during respiration.

Prepare a report on critical analysis of life sciences curriculum prescribed by HPBSE/CBSE for secondary school stage.

Suggested Readings:

Bhandula, N. Chandha, Sharma, P.C. (1989): Teaching of Science, Ludhiana: Prakash Brothers.

Gupta V. K. (1994): Life Science Education Today. Chandigarh: Arun Publishing House. Kohli, V. K. (2006): How to Teaching Science. Ambala: Vivek Publishers,.

Sood, J. K. (1987): Teaching of life Science. A Book of methods. Chandigarh: Kohli Publishers.

Venkataish, S. (2002); Science Education in 21st century, New Delhi: Anmol Publications.

Yadav, K.: Teaching of Life Science, New Delhi: Anmol Publications.

Manal S. K. (2005): Teaching of Life Science India: Arya Publication,. Sharma, P. (2007): Teaching of Life Science, New Delhi: APH Publishing Corporation.

PROFESSIONAL EDUCATION SCHOOL INTERNSHIP-1 (PESI-1)

Title: SCHOOL INTERNSHIP-1

(Preliminary School Engagement)

Course Code– AUBSEVI.7

Credits: NIL

Duration: 04 Weeks

Grading: Four Point

Evaluation: Internal

Objectives:

- ❖ To familiarize the student teachers to school environment, its structure, functions and processes.
- ❖ To provide field experience of assessment practices including record maintenance and report cards followed in schools at elementary and secondary levels.
- ❖ To familiarize student teachers with classroom processes and skills employed in teaching-learning process.
- ❖ To familiarize the student teachers with different types of schools existing in the community.
- ❖ Understand learners coming from diverse backgrounds.
- ❖ Analyze the availability of physical and learning facilities which function as the curriculum resources at secondary level.
- ❖ Analyze the relevance of principles of curriculum organization and transaction to actual implementation process of curriculum in schools.

Course Content:

The school internship shall be of one month (4 weeks) duration during this semester of the course. These four weeks shall include an initial phase of one week meant for orientation of student-teachers about the school, its management structure, functioning and organization of co-curricular activities. The second 10 week of practice teaching will include study of maintenance of various school records (eg. CCE records, admission-withdrawal registers, attendance records, stock registers etc.). The student-teachers will prepare separate reports on school management, its functioning and maintenance of different records by both the school authorities. The third and fourth weeks will include observation of senior teachers of the school by the student teachers. The candidates will prepare twenty observation lessons (10 in each teaching subject) and get them verified from the concerned senior teacher. Feedback will be provided to the candidates on his/her performance by the school teachers and teacher educator of the institution concerned in which the student is studying.

The student-teachers will prepare and submit following reports / lessons which will be graded by the concerned teacher educator / institution on a four points letter grading scale i.e. A, B, C and D (excellent, very good, good and satisfactory).

1. Report on school organization and management structure.
2. Report on Maintenance of various school records.
3. 20 Observation Lessons (10 per teaching Subject) of School Teachers.

Evaluation: All assessments are internal