

CBCS structure of B.Sc

DEPARTMENT OF PHYSICS

Dr. B. R. Ambedkar Open University

Year	Semester	Course Type	Name of the Course	No: Credits (Theory)	No: Credits (Practical)
I	I	CC-1	Mechanics	4	1
	II	CC-2	Waves & Oscillation	4	1
II	III	CC-3	Thermodynamics	4	1
	IV	CC-4	Optics	4	1
III	V	CC-5	Electricity & Magnetism	4	1
		DSE-1/DSE-2	1) Electronics-1: Basic Electronics 2) Material Science	4	1
	VI	CC-6	Modern Physics	4	1
		DSE-3/DSE-4	3) Electronics-2: Digital Electronics & Communications 4) Nano Science	4	1
		SEC-1	Basic skill in Electricals	2	
		SEC-2	Basic instrumentation skills	2	

PHYSICS SEMESTER-I
COURSE -1: MECHANICS

BLOCK-I: MECHANICS OF PARTICLES

- UNIT-1: Introduction to Vectors
- UNIT-2: Vector Calculus
- UNIT-3: Linear Momentum and Collisions
- UNIT-4: Kinematics

BLOCK-II: MECHANICS OF RIGID BODIES

- UNIT-5: Centre of Mass, Motion of Centre of Mass, Reduced Mass
- UNIT-6: Torque and Rotational Motion
- UNIT-7: Conservation of Angular Momentum

BLOCK-III: CENTRAL FORCES

- UNIT-8: Introduction to Central forces
- UNIT-9: Motion of Planets and Satellites Keplers Laws.
- UNIT-10: Gravitational Field and Gravitational Potential

BLOCK-IV: RELATIVITY

- UNIT-11: Special Theory of Relativity
- UNIT-12: Applications of special theory of Relativity

B.Sc Physics-Practicals

SEMESTER- I LAB-1: MECHANICS

1. Statistical Analysis of Errors.
2. Force constant of a Spiral spring by Statistic and Dynamic Methods.
3. Elastics constants of material of a Spiral Spring.
4. Moment of Inertia of a Fly Wheel.
5. 'Y' by uniform bending.
6. Viscosity of a Liquid.
7. Rigidity modulus by Torsional Pendulum.
8. Determination of surface tension of a liquid through capillary rise method.

SEMESTER-II
WAVES AND OSCILLATIONS

BLOCK-I: FUNDAMENTALS OF VIBRATIONS AND OSCILLATIONS

- UNIT-1: Simple Harmonic oscillation
- UNIT-2: Linear combination of SHM
- UNIT-3: Damped harmonic Oscillations
- UNIT-4: Forced Oscillations

BLOCK-II: WAVES IN ELASTIC MEDIA -I

- UNIT-5: Types of Progressive Waves
- UNIT-6: Doppler Effect

BLOCK-III: WAVES IN ELASTIC MEDIA -II

- UNIT-7: Vibrating Strings
- UNIT-8: Vibrations of Bars
- UNIT-9: Longitudinal Waves in Air

BLOCK-IV: COMPLEX VIBRATIONS & ULTRASONICS

- UNIT-10: Fourier Theorem
- UNIT-11: Fourier Analysis
- UNIT-12: Ultrasonic

SEMESTER-II

LAB -2: WAVES AND OSCILATIONS

1. Melde's Experiment.
2. Verification of Laws of transverse vibration of stretched string –Sonometer
3. Moment of inertia of a rectangular block-Bifilar suspension
4. Study of damping of an oscillating disc in Air and Water Logarithmic decrement.
5. Volume Resonator –determination of frequency of a tuning fork.
6. Study of Oscillations of a mass under different combination of springs-Series and Parallel.
7. Velocity of Transverse wave along a stretched string.
8. Study of coupled Oscillator –Resonance.
9. Observation of Lissajous figures from CRO-Frequency ratio Amplitude and phase difference of two waves.
10. Acceleration due to gravity -Compound Pendulum.

SEMESTER-III
THERMODYNAMICS

BLOCK-I: LAWS OF THERMODYNAMICS

UNIT-1: Kinetic Theory of Gases
UNIT-2: Zeroth law & First law of Thermodynamics
UNIT-3: Reversible and irreversible processes
UNIT-4: Carnot's cycle & Carnot's Theorem

BLOCK-II: LAWS OF THERMODYNAMICS

UNIT-5: Second Law of Thermodynamics
UNIT-6: Entropy

BLOCK-III: THERMODYNAMIC POTENTIALS

UNIT-7: Thermodynamic Potentials
UNIT-8: Maxwell's Thermodynamic equations & Applications

BLOCK-IV: QUANTUM THEORY OF RADIATION

UNIT-9: Low temperature Physics
UNIT-10: Black body Radiation

SEMESTER –III

LAB -3: THERMODYNAMICS

1. Co-efficient of thermal conductivity of a bad conductor by Lee's Method.
2. Measurement of Stefan's constant.
3. Specific heat of a Liquid by applying Newton's law of cooling correction.
4. Heating efficiency of electrical kettle with varying voltage.
5. Calibration of thermo couple.
6. Cooling Curve of a metallic body.
7. Resistance the Thermometer.
8. Thermal expansion of solids.
9. Study of conversion of mechanical energy to heat.
10. Determine the Specific of a solid (graphite rod).

SEMESTER-IV OPTICS

BLOCK-I: INTERFERENCE

- UNIT-1: Huygen's Principle and Young's Experiment of Light
UNIT-2: Applications of Interference

BLOCK-II DIFFRACTION

- UNIT-3: Fresnel and Fraunhofer Diffraction
UNIT-4: Fresnel Diffraction at a Straight Edge
UNIT-5: Diffraction Grating
UNIT-6: Resolving Power and Dispersion of A GRATING

BLOCK-III: POLARIZATION

- UNIT-7: Plane Polarisation, Polaroid, Polarization by Reflection
UNIT-8: Production and Analysis of Different Types of Polarized Light
UNIT-9: Rotary Polarization

BLOCK-IV: LASERS AND HOLOGRAPHY

- UNIT-10: Lasers
UNIT-11: Holography
UNIT-12: Introduction to Fibre Optics

SEMESTER –IV LAB – 4: OPTICS

1. Thickness of a wire using wedge method.
2. Determination of wavelength of light using Biprism.
3. Determination of Radius of curvature of a given convex lens by forming Newton's ring.
4. Resolving power of grating.
5. Study of optical rotation-Polari meter.
6. Dispersive power of a prism.
7. Determination of wavelength of light using diffraction grating minimum deviation method.
8. Wavelength of light using diffraction grating –normal incidence method.
9. Resolving power of a Telescope.
10. Refractive index of a liquid and glass (Boys Method)
11. Pulfrichrefractometer – determination of refractive index of liquid.
12. Wavelength of Laser Light using Diffraction Grating

SEMESTER-V

ELECTRICITY AND MAGNETISM

BLOCK-I: ELECTROSTATICS

UNIT-1: Electric Fields and Gauss Theorem

UNIT -2: Electric Potential

UNIT-3: Capacitance

UNIT-4: Parallel Plate Condenser

BLOCK-2: CURRENT ELECTRICITY

UNIT-5: Electrical Conductivity

UNIT-6: Kirchhoff's Laws

UNIT-7: Networks

BLOCK-3: MAGNETOSTATICS

UNIT-8: Ampere's Law

UNIT-9: Biot-Savart's Law

UNIT-10: Magnetic Fields and Magnetic Force on a Circuit, Torque

BLOCK-4: ELECTROMAGNETIC INDUCTION

UNIT-11: Self and Mutual Induction

UNIT-12: Faraday's Law and Lenz's Law

Electives:Electronics-1

(a) Basic Electronics or(b) Material Science

SEMESTER-V

LAB – 5: ELECTRICITY AND MAGNETISM

1. Determination of the Magnetic Moment of bar Magnet and the Horizontal component of earth's Magnetic field.
2. Determination of Internal resistance of a cell (Leclanche cell or Daniel) using a potentiometer.
3. Specific Resistance and Specific Conductance of a given wire by Meter Bridge.
4. Temperature Co-efficient of Resistance by Carey –Foster's Bridge.
5. Maximum power transfer Theorem.
6. Charge and Discharge of Condenser in C R Circuit.
7. Verification of Network Theorems. Thevenin's and Norton's Theorems.
8. LR and CR Circuits.
9. Power Factor of AC Circuit.
10. Design and Construction of Multi meter.

SEMESTER-VI

MODERN PHYSICS

BLOCK-1: SPECTROSCOPY

UNIT-1: Atomic Spectra

UNIT- 2: Molecular Spectra

BLOCK -2: ELEMENTS OF QUANTUM MECHANICS

UNIT -3: Photo Electric Effect and Matter Waves

UNIT -4: Schrodinger Waves Equations

UNIT-5: Applications of Schrodinger's Wave Equation

BLOCK-3: NUCLEAR PHYSICS

UNIT-6: Nuclear Structure

UNIT-7: Alpha and Beta Decays

UNIT-8: Radiation Detectors

BLOCK-IV: CRYSTAL STRUCTURE AND BONDING

UNIT-9: Crystal Structure

UNIT-10: X-Ray Diffraction

UNIT-11: Bonding in Crystals

UNIT-12: Occurrence of Super Conductivity

Electives: Electronics-2

(a) Digital Electronics& Communications or (b) Nano Science

SEMESTER –VI

LAB – 6: MODERN PHYSICS

1. e/m of an Electron by Thomson's Method.
2. Characteristics of Photocell.
3. Determination of Planck's constant.
4. V-I Characteristics of a Junction Diode.
5. V-I Characteristics of Zener Diode.
6. Temperature Characteristics of a Thermistor.
7. Energy gap of a Semiconductor.
8. Input and Output Characteristics of a Bipolar Junction Transistor (BJT).
9. L C R Parallel Resonance Circuit.
10. L C R Series Resonance Circuit.
11. Study of Diffraction Pattern Using Laser Source.

CBCS Structure
B.Sc - BOTANY (UG - Programme)
Dr. B. R. Ambedkar Open University

Year	Semester	Course Type	Name of the Course	No: Credits (Theory)	No: Credits (Practical)
I	I	CC-1	Microbial Diversity, Algae and Fungi	4	1
	II	CC-2	Bryophyta, Pteridophyta, Gymnosperms & Palaeobotany	4	1
II	III	CC-3	Plant Anatomy and Taxonomy	4	1
	IV	CC-4	Developmental Biology and Medicinal Botany	4	1
III	V	CC-5	Cell Biology And Genetics	4	1
		DSE-1 /DSE-2	Crop Production/ Plant Tissue Culture	4	1
	VI	CC-6	Plant Physiology and Ecology	4	1
		DSE-3 /DSE-4	Seed Technology/ Plant Disease management	4	1
		SEC-1	Biofertilizers Technology	2	
		SEC-2	Floriculture	2	

B.Sc- BOTANY SYLLABUS UNDER CBCS
CORE PAPER..I SEMESTER-I
Microbial Diversity, Algae and Fungi

BLOCK-I ORIGIN OF LIFE, MICROBIAL DIVERSITY

Unit -1: Origin of life

Unit-2: Geological Time Scale

Unit-3: Archaeobacteria, Actinomycetes, Chlamydiae and mycoplasma

BLOCK-II VIRUSES, BACTERIA & CYANOBACTERIA

Unit -4: Viruses

Unit-5: Bacteria

Unit-6: Cyanobacteria

BLOCK-III ALGAE & LICHENS

Unit-7: General account and classification of Algae

Unit-8: Life history of *Oedogonium*, *Sargassum* and *Polysiphonia*.

Unit-9: Lichens

BLOCK-IV FUNGI

Unit-10: General account and classification of Fungi

Unit-11: Life history of *Albugo*, *Penicillium*, *Neurospora*, *Puccinia*, *Agaricus*, *Cercospora*.

Unit-12: Crop diseases

B.Sc PRACTICAL-I, Microbial Diversity, Algae and Fungi

BLOCK I: MICROBIAL DIVERSITY AND ALGAE

Unit-1: Study of viruses and Bacteria using electron micrographs (photographs)

Unit-2: Gram staining of Bacteria

Unit-3: Study of symptoms of plant diseases caused by Viruses, Bacteria, Mycoplasmas, and Fungi

Unit-4: Vegetative and Reproductive structures of Cyanophyceae, Chlorophyceae Phaeophyceae Rhodophyceae

BLOCK II: FUNGI AND LICHENS

Unit-5: Vegetative and Reproductive structures of the following taxa

Albugo, *Mucor*, *Penicillium*, *Neurospora*, *Puccinia*, *Agaricus*, *Cercospora*.

Unit-6: Section cutting of diseased material infected by Fungi and identification of Pathogens as per theory syllabus

White rust on Crucifers, Rust on Wheat & Tikka disease of Groundnut

Unit-7: Lichens: Different types of thalli and their external morphology

Unit-8: Examination of important microbial, fungal and algal products- Protein capsules, Antibiotics, Mushrooms, Agar-agar etc.

**B.Sc- BOTANY SYLLABUS UNDER CBCS
CORE PAPER..II SEMESTER-II
Bryophyta, Pteridophyta, Gymnosperms & Palaeobotany**

BLOCK-I BRYOPHYTA

Unit-1: General account and classification of Bryophyta

Unit-2: Life history of *Marchantia*, *Anthoceros* and *Funaria*.

Unit-3: Evolution of sporophyte in Bryophytes.

BLOCK-II PTERIDOPHYTA

Unit-4: General account and classification of Pteridophyta

Unit-5: Life history of *Rhynia*, *Lycopodium*, *Equisetum* and *Marsilea*.

Unit-6: Stellar Evolution and Heterospory and seed habit in pteridophytes.

BLOCK-III GYMNOSPERMS

Unit-7: General account and classification of Gymnosperms

Unit-8: *Pinus*

Unit-9: *Gnetum*

BLOCK-IV PALAEOBOTANY

Unit-10: Palaeobotany: Fossils.

Unit-11: *Lyginopteris*

Unit-12: *Williamsonia*

B.Sc PRACTICAL-II

BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY

BLOCK I: BRYOPHYTA AND PTERIDOPHYTA

Unit-1: *Marchantia*, *Anthoceros*

Unit-2: *Funaria*

Unit-3: *Lycopodium*, *Equisetum*

Unit-4: *Marsilea*.

BLOCK II: GYMNOSPERMS AND PALEOBOTANY

Unit-5: *Pinus*

Unit-6: *Gnetum*

Unit-7: *Lyginopteris*

Unit-8: *Ptilophylam*

B.Sc – BOTANY SYLLABUS UNDER CBCS
CORE PAPER.. III SEMESTER-III THEORY

Plant Anatomy and Taxonomy

BLOCK-I ANATOMY

Unit-1: Meristems and Tissues

Unit-2: Leaf internal structure

Unit-3: Primary structure of Stem and Root - Dicots and Monocots

BLOCK-II SECONDARY GROWTH & WOOD ANATOMY

Unit-4: Secondary growth

Unit-5: Anatomy of Stem & Root

Unit-6: Wood Structure

BLOCK-III PLANT TAXONOMY

Unit-7: Principles of Plant taxonomy & Nomenclature

Unit-8 : Systems of Classification

Unit-9: Recent trends in Plant Taxonomy

BLOCK – IV SYSTEMATIC TAXONOMY

Unit-10: Salient features & Economic Importance of Polypetalae

Unit-11: Salient features & Economic Importance of gamopetalae

Unit-12: Salient features & Economic Importance of Monochlamydae and monocotyledons

B.SC PRACTICAL- III
PLANT ANATOMY AND TAXONOMY

BLOCK I: ANATOMY

Unit-1: Tissues and Reserve Products

Unit-2: Stomatal types

Unit-3: Preparation of double stained Permanent slides

Unit-4: Section cutting

BLOCK II: TAXONOMY: SYSTEMATIC STUDY

Unit-5: Families of Polypetalae

Unit-6: Families of Gamopetalae

Unit-7: Families of Monochlamydae and monocotyledons

Unit-8: Demonstration of Herbarium techniques.

**B.Sc- BOTANY SYLLABUS UNDER CBCS
CORE PAPER..IV SEMSTER-IV
Developmental Biology and Medicinal Botany**

BLOCK-I DEVELOPMENTAL BIOLOGY

- Unit-1: Microsporogenesis and Male gametophyte development
- Unit-2: Megasporogenesis and Female gametophyte development
- Unit-3: Pollination.

BLOCK-II EMBRYOLOGY AND PALYNOLOGY

- Unit-4: Endosperm
- Unit-5: Embryo
- Unit-6: Palynology

BLOCK-III ETHNOMEDICINE& COMMON MEDICINAL PLANTS

- Unit-7: Ethnomedicine
- Unit-8: Traditional Medicine
- Unit-9: Plants in primary health care

BLOCK-IV MODERN MEDICINE

- Unit-10: Traditional Medicines vs Modern medicines
- Unit-11: Pharmacognosy
- Unit-12: Plant crude drugs

B.SC PRACTICAL- IV

DEVELOPMENTAL BIOLOGY&MEDICINAL BOTANY

BLOCK.I DEVELOPMENTAL BIOLOGY

- Unit-1: structure of pollen grains
- Unit-2: Pollen viability test: Evans blue-Hibiscus
- Unit-3: Ovule types
- Unit-4: Dicot and Monocot embryo

BLOCK-II MEDICINAL BOTANY

- Unit-5: Identification, medicinal value active principle
- Unit-6: Ethno medicinal value
- Unit-7: Pharmacognosy, powdery analysis
- Unit-8: Organoleptic (sectional study)

**B.Sc- BOTANY SYLLABUS UNDER CBCS
CORE PAPER..V SEMSTER-V
CELL BIOLOGY AND GENETICS**

BLOCK-I CELL BIOLOGY

Unit-1: Plant cell Wall

Unit-2: Nucleus

Unit-3: Nucleic Acids

BLOCK-II CHROMOSOMES AND CELL DIVISION

Unit-4: Chromosomes

Unit-5: Extra nuclear genome

Unit-6: Cell division

BLOCK-III GENETICS - LINKAGE & CROSSING OVER

Unit-7: Mendel principles

Unit-8: Linkage and crossing over

Unit-9: Genetic code and Protein synthesis

**BLOCK-IV MUTATIONS, GENE ORGANIZATION, AND EXPRESSION AND BIO
INFORMATICS**

Unit-10: Mutations

Unit-11: Gene organization

Unit-12: Genetic Engineering

**B.SC PRACTICAL- V
CELL BIOLOGY AND GENETICS**

BLOCK:I CYTOLOGY

Unit-1: Mitosis

Unit-2: Meiosis

Unit-3: Cell organelles

Unit-4: Types of chromosomes

BLOCK-II: GENETICS

Unit-5: Monohybrid cross,

Unit-6: Dihybrid cross

Unit-7: Incomplete dominance and Interaction of genes

Unit-8: Construction of linkage maps

**B.Sc- BOTANY SYLLABUS UNDER CBCS
CORE PAPER..VI SEMSTER-VI
PLANT PHYSIOLOGY AND ECOLOGY**

BLOCK-I PLANT PHYSIOLOGY AND PLANT BIOCHEMISTRY

Unit-1: Water-plant Relations

Unit-2: Mineral Nutrition

Unit-3: Enzymes

BLOCK-II PHOTOSYNTHESIS

Unit-4: Photosynthesis

Unit-5: Carbon assimilation of pathways

Unit-6: Translocation of solutes

BLOCK-III(PLANT RESPIRATION METABOLISM AND NITROGEN METABOLISM)

Unit-7: Respiration

Unit-8: Nitrogen metabolism and Nitrogen fixation

Unit-9: Phyto hormones and physiology of flowering

\BLOCK-IV ECOLOGY

Unit-10: Ecosystem

Unit-11: Ecological successions

Unit-12: Environmental pollution

**B.SC PRACTICAL-VI
PLANT PHYSIOLOGY AND ECOLOGY**

BLOCK- PLANT PHYSIOLOGY

Unit-1: Plasmolysis

Unit-2: Separation of chlorophyll pigments

Unit-3: Determination of catalase activity using potato tubers by titration method

Unit-4: Evolution of oxygen during photosynthesis

Unit-5: Plant growth measurement by lever auxanometer

BLOCK-II: ECOLOGY

Unit -6: Hydrophytes

Unit-7: Xerophytes

Unit-8: Determination of PH of soil sample

**B.SC BOTANY SYLLABUS UNDER CBCS
FOR V. SEMESTER
ELECTIVE PAPER-V-A
CROP PRODUCTION**

BLOCK-I: SOIL AND SOIL FERTILITY

Unit-1: Agricultural meteorology

Unit-2: Soils

Unit-3: Manures and Fertilizers

BLOCK-II: TILLAGE AND WEED CONTROL

Unit-4: Tilt and Tillage

Unit-5: Weeds and weed control

Unit-6: Cropping systems

BLOCK-III: CROP PRODUCTION-1

Unit-7: Cereals and Millets

Unit-8: Oil seed crops

Unit-9: Pulses

BLOCK-IV CROP PRODUCTION-2

Unit-10: Cash crops

Unit-11: Spices

Unit-12: Fruits&Nuts

**B.SC BOTANY PRACTICAL-V-A
CROP PRODUCTION**

BLOCK-I: PESTICIDES

Unit-1: Bacteriocides

Unit-2: Fungicides

Unit-3: Insecticides

Unit-4: Herbicides

BLOCK-II:FOOD GRAINS,OILS&PULSES,FIBRES,FTUITS&NUTS

Unit-5: Cereals and Millets

Unit-6: Pulses

Unit-7: Oils and Fibres

Unit-8: Fruits & Nuts

**B.SC BOTANY SYLLABUS UNDER CBCS
FOR V. SEMESTER
ELECTIVE PAPER-V-B
PLANT TISSUE CULTURE**

BLOCK-I: PLANT TISSUE CULTURE-INTRODUCTION&APPLICATIONS

- Unit-1: Tissue culture
- Unit-2: Applications of tissue culture
- Unit-3: Clonal propagation

BLOCK-II: INVITRO CULTURE

- Unit-4: Invitro morphogenesis
- Unit-5: Types of culture
- Unit-6: Organ culture

BLOCK-III: GENE CLONING& r- DNA TECHNOLOGY

- Unit-7: Basic aspects-Enzymes used-restriction endonucleases,ligases & polymerases
- Unit-8: Gene cloning vectors
- Unit-9: Methods of gene transfer

BLOOCK-IV: TRANSGENIC PLANTS- THEIR ROLE IN CROP IMPROVEMENT:

- Unit-10: Pathogen free plants
- Unit-11:Improved growth
- Unit-12: Edible vaccine

**B.SC BOTANY PRACTICAL-VA
PLANT TISSUE CULTURE**

BLOCK-I: MAJOR EXPERIMENTS

- Unit-1: Preparation of plant tissue culture medium
- Unit-2: Induction of callus culture medium
- Unit-3: Plant micropropagation-carrot
- Unit-4: Producton of synthetic seeds/Encapsulation of embryo

BLOCK-II: MINOR EXPERIMENTS

- Unit-5: Callus Micropropagation-single shoot
- Unit-6: Micropropagation/Multiple shoots
- Unit-7: Anther culture
- Unit-8: PCR-Demonstration

**B.SC BOTANY SYLLABUS UNDER CBCS
FOR VI.SEMISTER
ELECTIVE PAPER-VI-A
SEED TECHNOLOGY**

BLOCK-I: SEED STORAGE

Unit-1:Seed structure and types. Seed dormancy: Causes and methods of breaking dormancy.

Unit-2:Seed storage

Unit-3:Physico and bio chemical changes during seed storage.

BLOCK-II: SEED VIABILITY AND CULURAL PRACTICES (SEEDS)

Unit-4:Seed viability

Unit-5:Cultural practices and harvesting.

Unit-6:Seed treatment to control seed borne disease

BLOCK-III: STRUCTURE OF POLLEN AND OVULE, SEED DEVELOP MENT

Unit-7: Structure of pollen and ovule

Unit-8:Principles of hybrid seed production

Unit-9: Seed development in cultivated plants

BLOCK-IV: SEED PRODUCTION, CERTIFICATIN AND SEED BANKS

Unit-10: Seed production technology

Unit-11: Seed certification

Unit-12: Seed banks

**B.SC PRACRICAL -VI-A
SEED TECHNOLOGY**

BLOCK-I: MAJOR EXPERIMENTS

Unit-1: Testing of seed viability

Unit-2: Estimation of amylase activity of germinating seeds (Qualitatively).

Unit-3: Seed dressing using fungicides to control plant disease.

Unit-4: seed dressing using Bio fertilizers (BGA) to enrich nutrient supply.

BLOCK-II: MINOR EXPERIMENTS

Unit-5: Emasculation, bagging of flower for hybrid seed production.

Unit-6: Dissection of Dicot embryo(bean) and Monocot embryo(maize)

Unit-7: Pollen viability test using Evan's blue staining. (*Hibiscus*).

Unit-8: Harvesting and importance of seeds

**B.SC BOTANY SYLLABUS UNDER CBCS
FOR VI.SEMESTER**

ELECTIVE PAPER-VI-B

PLANT DISEASE MANAGEMENT

BLOCK-I: PLANT PATHOLOGY

Unit-1: Introduction to plant pathology, concept, history, progress, scope

Unit-2: Plant diseases (Cereals, Pulses & Vegetables)

Unit-3: Plant diseases (Cash crops and fruit plants)

Unit-4: Disease with insects and pests.

BLOCK-II FUNGICIDES AND INSECTICIDES

Unit-5: Fungicides-I

Unit-6: Fungicides-II

Unit-7: Insecticides.

BLOCK-III: PLANT DISEASE CONTROL-BIOCONTROL

Unit-8: Bio control:-Definition, history, properties and scope

Unit-9: Bio control agents:-Types, characters, identification

**BLOCK-IV: DISEASE MANAGEMENT THROUGH GENETIC
MECHANISMS**

Unit-10: Breeding for Resistance

Unit-11: Brief account of transgenics

Unit-12: Patents

**B.Sc BOTANY SYLLABUS UNDER CBCS
SKILLED ENHANCEMENT COURSE
BIOFERTILIZERS**

BLOCK-I BIOFERTILIZERS-TYPES OF BIOINOCULANTS

Unit-1: Nitrogen fixing biofertilizers.

Unit-2: Phosphate Solubilizing Biofertilizers

Unit-3: Phosphate Mobilizing Bio fertilizers

Unit-4: Biofertilizers for micronutrients and Plant growth promoting rhizobacteria (PGPR)

BLOCK-II BIOFERTILIZER TECHNOLOGY

Unit-5: Large Scale Production

Unit-6: Biofertilizers – Sustainable Agriculture

Unit-7: -: Biofertilizers- Low cost technologies.

Unit-8: Bio fertilizers-Microbial Technology

Syllabus

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U.G. I year Semester-I - (B.Sc/B.A./B.Com) CBCS

Ability Enhancement Compulsory Course- Environmental Studies

BLOCK-I

Unit-1 Introduction to Environmental Studies.

Definition, Scope and Importance, Atmosphere, Hydrosphere, Lithosphere, Biosphere, Natural Resources: Water, Minerals, Bioresources, Land and Soil, Public Awareness, Need for Public Awareness and Ethics.

Unit-2 Ecosystem

Structure of Ecosystem: Abiotic Components. Biotic Components: Producers, Consumers, Decomposers, Food Chains, Food Webs, Ecological Pyramids, Functions of an Ecosystem, Biogeochemical Cycles, Energy Flow in the Ecosystem.

Unit-3 Biodiversity

Definition of Biodiversity, Genetic- Species- and Ecosystem Diversity, Hot-Spots of Biodiversity, Threats to Biodiversity, Conservation of Biodiversity (In-situ & Ex-situ), Extinction of Species – Red Data Book.

Unit-4 Resources-Management

Renewable and Non-Renewable Resources, Forest, Mineral and Green Energy (Solar Energy, Wind Energy, Geothermal Energy and Bio-Energy) Resources.

BLOCK-II

Unit-5 Environmental Pollution, Causes, Effects and Control Measures.

Causes, Effects and Control Measures of Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Thermal Pollution, Radioactive Pollution and Solid Waste Management.

Unit-6 Global Environmental Issues

Global Warming, Ozone Layer Depletion, Acid Rain and Climate Change, Water Conservation, Watershed Management, Population Explosion, Food Security, Human Rights, Women and Child Welfare.

Unit-7 Disaster Management

Types of Disasters, Impact of Disasters on Environment, Infrastructure and Development. Basic Principles of Disaster Mitigation and Management.

Unit-8 Environmental Legislation and Sustainable Development

Environment Protection Acts: Air, Water, Forest, Wild Life and Biodiversity. Issues involved in Enforcement of Environmental Legislation. Environmental Treaties, Community Participation, Role of Information Technology in Environment and Human Health. Sustainable Development.



UG CHEMISTRY CBCS SYLLABUS

DEPARTMENT OF CHEMISTRY

FACULTY OF SCIENCE

DR B R AMBEDKAR OPEN

UNIVERSITY

HYDERABAD-33

Year	Semester	Course Type	Name of the Course	No of Credits for Theory(T) + Practical (P)
I	I	DSC – 1	Inorganic, Organic & Physical Chemistry – 1(Theory) Semi Micro qualitative analysis (Practical)	4 + 1
	II	DSC – 2	Inorganic, organic & Physical Chemistry-2(Theory) Volumetric analysis (Quantitative Analysis - I) (Practical)	4 + 1
II	III	DSC – 3	Inorganic, organic & Physical Chemistry-3(Theory) Preparation of Organic Compounds. (Practical)	4 + 1
	IV	DSC – 4	Inorganic, organic & Physical Chemistry – 4 (Theory) Inorganic Preparations & Quantitative Analysis – I I (Practical)	4 + 1
III	V	DSC - 5	Inorganic, organic & Physical Chemistry-5 (Theory) Systematic Qualitative analysis of organic compounds (Practical)	4 + 1
		DSE – 1 or DSE – 2	Agro Chemicals and Nano materials (Theory) Agro Chemicals and Nano materials. (Practical) (or) Green Chemistry, Organic chemistry, Environmental Chemistry (Theory) Green Chemistry, Organic chemistry, Environmental Chemistry. (Practical)	4 + 1 or 4 + 1
	VI	DSC – 6	Inorganic, Organic & Physical Chemistry-6 (Theory) Physical Chemistry (Practical)	4 + 1
		DSE – 3 or DSE – 4	Drug Chemistry and Enzymes (Theory) Drugs synthesis(Practical) (or) Polymer Chemistry, Separation Techniques and Chromatography. (Theory) Polymer preparations, Separation Techniques and Chromatography(Practical)	4 + 1 or 4 + 1
		SEC–1	Instrumentation Skills in chemistry (Theory)	2
		SEC –2	Cosmetic chemicals (Theory)	2

First year Chemistry
Semester-1

Theory: Chemistry-1: Inorganic, Organic & Physical Chemistry-1 (core)

Block-1: Inorganic Chemistry – 1

- Unit-1: Chemistry of Group-IA Elements
- Unit-2: Chemistry of Group-IIA Elements
- Unit-3: Principles of Semi-micro analysis

Block-2: Organic chemistry -1

- Unit-4: Structural theory of organic chemistry
- Unit-5: Alkanes and Cyclo Alkanes
- Unit-6: Alkenes, and Dienes.

Block-3: Physical Chemistry-1

- Unit – 7: Atomic Structure-1
- Unit – 8: Atomic Structure-2
- Unit – 9: Gaseous state

Block -4: General Chemistry -1

- Unit – 10: Periodic table
- Unit – 11: Concept of Chemical Bonding and theories of chemical bonding (VBT).
- Unit – 12: Molecular Orbital Theory

Practical: Chemistry-1: Semi Micro qualitative analysis

Block – 1: General principles and procedure in semi Micro analysis

- Unit – 1: Introduction to semi micro analysis
- Unit – 2: Reactions and identification of Anions.
- Unit – 3: Reactions and identification of Cations-1.
- Unit – 4: Reactions and identification of Cations-2.

Block – 2: Semi micro analysis of mixture of salts.

- Unit – 5: Systematic Qualitative semi micro analysis
- Unit – 6: Model analysis of a known binary salt mixture-1.
- Unit – 7: Model analysis of a known binary salt mixture-2
- Unit – 8: Analysis of the given unknown binary salt mixture.

First year Chemistry

Semester-2

Chemistry-2: Inorganic, organic & Physical Chemistry-2 (core)

Block-1: Inorganic Chemistry -2.

Unit – 1: Chemistry of Group- IIIA Elements

Unit – 2: Chemistry of Group IVA elements

Unit – 3: Chemistry of Group VA elements

Unit – 4: Principles of Titrimetry and Gravimetry.

Block-2: Organic chemistry -2

Unit – 5: Alkynes

Unit – 6: Benzene –its Aromaticity

Unit – 7: Arenes

Block-3: Organic chemistry -3

Unit – 8: Halogen derivatives

Unit – 9: Hydroxy Compounds

Unit – 10: Ethers and Epoxides.

Block-4: Physical Chemistry-2.

Unit – 11: Liquid state.

Unit – 12: Solid state

Unit – 13: Phase Rule

Practical:Chemistry-2:Volumetric analysis(Quantitative Analysis- I)

Block – 1: **Acidimetry and Alkalimetry -1**

Unit – 1: Common apparatus used in volumetric analysis.

Unit – 2: Estimation of Carbonate in Washing Soda and Baking Soda.

Unit – 3: Estimation of the amount of Acetic acid from commercial vinegar solution by standard Sodium hydroxide solution..

Block – 2: **Permanganometry and Dichrometry**

Unit – 4: Estimation of Fe(II) using $K_2Cr_2O_7$

Unit – 5: Estimation of Fe(II) using $KMnO_4$ with sodium oxalate as primary standard.

Unit – 6: Determination of Cu(II) using $\text{Na}_2\text{S}_2\text{O}_3$ with $\text{K}_2\text{Cr}_2\text{O}_7$ as primary Standard.

Second year

Semester-3

Chemistry-3: Inorganic, organic & Physical Chemistry-3 (core)

Block - 1: Inorganic Chemistry - 3.

Unit – 1: Chemistry of Group VIA elements

Unit – 2: Chemistry of Group VIIA elements

Unit – 3: Compounds of Zero (VIII A) Group elements.

Block - 2: Organic Chemistry -4.

Unit – 4: Aldehydes & Ketones (Carbonyl compounds).

Unit – 5: Carboxylic acids and its derivatives.

Unit – 6: Carbanion as intermediates in synthesis.

Block-3: Physical Chemistry-3.

Unit – 7: Solutions

Unit – 8: Colligative properties – I

Unit – 9: Colligative properties – II

Block – 4: General Chemistry – 2.

Unit – 10: Nuclear Chemistry

Unit – 11: Colloids, Emulsions

Unit – 12: Adsorption

Semester-3

Practical: Chemistry-3: Preparation of Organic Compounds.

Block - 1: Preparation of organic compounds - 1.

Unit – 1A: Determination of Melting point and boiling point.

Unit – 1B: Preparation of Acetanilide.

Unit – 2: Preparation of Aspirin.

Unit – 3: Preparation of Benzylidene aniline.

Block - 1: Preparation of organic compounds - 2.

Unit – 4: Preparation of β -Naphthyl methyl ether.

Unit – 5: Preparation of p-bromoacetanilide

Unit – 6: Preparation of Nitrobenzene

Second year

Semester-4

Chemistry-4: Inorganic, organic & Physical Chemistry – 4 (core)

Block-1: Inorganic Chemistry-4

- Unit – 1: d – block elements
- Unit –2: f – block elements
- Unit – 3: Co-ordination Compounds-I
- Unit – 4: Co-ordination Compounds-II

Block-2: Organic Chemistry - 5.

- Unit – 5: Nitro Compounds (Nitro alkanes, Alkyl nitrites &Aromatic Nitro Hydrocarbons).
- Unit – 6: Nitro Compounds – (Amine, Nitriles and Isonitriles)
- Unit – 7: Stereochemistry of Carbon compounds.

Block-3: Organic Chemistry - 6.

- Unit – 8: Conformational Analysis
- Unit – 9: Carbohydrates – I
- Unit –10: Carbohydrates - II

Block-4: Physical Chemistry-4

- Unit – 11: Thermodynamics-I
- Unit – 12: Electro Chemistry-I
- Unit – 13: Chemical Kinetics

Practical:Chemistry-4:Inorganic Preparations & Quantitative Analysis – II

Block – 1: Inorganic Preparations

- Unit – 1: Preparation Potash Alum
- Unit – 2: Preparation Copper-ammonia Complex
- Unit – 3: Nickel- DMG complex

Block – 2: Quantitative Analysis – 2.

Iodometry

- Unit – 4: Estimation of copper by sodium thiosulphate

Complexometry

Unit – 5: Estimation of Magnesium, Calcium, Nickel by standard EDTA.

Gravimetry

Unit – 6: Estimation of Barium as BaCrO_4 .

Third year

Semester-5

Chemistry-5: Inorganic, organic & Physical Chemistry-5 (core)

Block – 1: Inorganic Chemistry-5

- Unit – 1: Bonding in Metals
- Unit – 2: Principles of Metallurgy
- Unit – 3: Organometallics compounds
- Unit – 4: Metal ions in biological system

Block – 2: Organic Chemistry-7

- Unit – 5: Heterocyclic compounds.
- Unit – 6: Aminoacids and proteins.
- Unit – 7: Vitamins and Hormones.

Block – 3: Physical Chemistry -5

- Unit – 8: Thermodynamics-II.
- Unit – 9: Electro Chemistry-II
- Unit – 10: Photochemistry.

Block – 4: General Chemistry -3

- Unit – 11: UV-Visible spectroscopy.
- Unit – 12: IR-Spectroscopy.
- Unit – 13: Evaluation of Analytical Data.

Practical: Chemistry-5: Systematic Qualitative analysis of organic compounds

Block -1: Systematic qualitative analysis procedure for identification of Organic compounds.

- Unit – 1: Preliminary examination, solubility and Detection of Acidic functional groups (Carboxylic acid and phenols).
- Unit – 2: Detection of basic functional groups (Amines).
- Unit – 3: Detection of Neutral and some miscellaneous functional groups. (Aldehydes, ketone, esters, amides, nitro hydrocarbons, hydrocarbons, carbohydrates and urea)

Block -2: Identification of functional groups..

- Unit – 4: Identification of known organic compound (Carboxylic acid)
- Unit – 5A: Identification of unknown organic compounds-1

Unit – 5B: Identification of unknown organic compounds-2

Unit – 6A: Identification of unknown organic compounds-3

Unit – 6B: Identification of unknown organic compounds-4

Third year

Semester-5

Chemistry – 6A: Agro Chemicals and Nano materials (Elective)

Block – 1: Agrochemicals-1

Unit – 1: Historical aspects of plant nutrients.

Unit – 2: Brief survey of plant disease control chemicals.

Unit – 3: Different forms of Pesticides.

Block – 2: Agrochemicals-2

Unit – 4: Insecticides

Unit – 5: Fungicides

Unit – 6: Herbicides and Rodenticides.

Block – 3: Agrochemicals-3

Unit – 7: Plant growth hormones

Unit – 8: Bio pesticides

Unit – 9: Environmental effects of pesticides.

Block – 4: Nanomaterials.

Unit – 10: Introduction to Nanostructured Materials.

Unit – 11: Synthesis and Characterization of Nanomaterials.

Unit – 12: Carbon Nano structures and applications of Nanomaterials.

Practical: Chemistry – 6A: Agro Chemicals and Nano materials

Block – 1: Agro Chemicals

Unit – 1: Preparation of Agro chemical-1

Unit – 2: Preparation of Agro chemical-2

Unit – 3: Preparation of Agro chemical-3

Block – 1: Nano materials

Unit – 4: Preparation of Nano materials -1

Unit – 5: Preparation of Nano materials -2

Unit – 6: Preparation of Nano materials -3

Semester-5

Chemistry – 6B: Green Chemistry, Organic chemistry, Environmental Chemistry (Elective)

Block – 1: Green Chemistry

Unit – 1: Introduction to Green Chemistry.

Unit – 2: Principles of Green Chemistry.

Unit – 3: Green Synthesis – Some Reactions and Applications of Green Chemistry.

Block – 2: Organic Chemistry-8.

Unit – 4: Introduction to Pericyclic reactions

Unit – 5: introduction to Asymmetric synthesis.

Unit – 6: Structure elucidation of organic compounds by Chemical methods.

Block – 3: Environmental Chemistry -1

Unit – 7: Atmosphere and its components

Unit – 8: Air Pollution

Unit – 9: Water Pollution

Block – 4: Environmental Chemistry -2

Unit – 10: Soil and Sound Pollution.

Unit – 11: Chemical toxicology

Unit – 12: The state of global environment

Practical: Chemistry – 6B: Green Chemistry, Organic chemistry, Environmental Chemistry.

Block – 1: Green synthesis.

Unit – 1: Microwave assisted synthesis - 1

Unit – 2: Microwave assisted synthesis - 2

Unit – 3: Sonic assisted synthesis

Block – 2: **Water and Soil analysis**

Unit – 4: Water analysis. (TDS, PH & Conductivity)

Unit – 5: Water analysis. (Hardness, Alkalinity)

Unit – 6: Soil analysis. (Water holding capacity, Soil PH, Density, total organic Matter accumulated)

Semester-6

Chemistry – 7: Inorganic, Organic & Physical Chemistry-6 (Core)

Block-1: Inorganic Chemistry -6

Unit – 1: Metal Carbonyls and Nitrosyls

Unit – 2: Non- aqueous Solvents

Unit – 3: Hard and Soft acids and bases

Block-2: Organic chemistry-9

Unit – 4: Alkaloids.

Unit – 5: Terpenes & Terpenoids.

Unit – 6: Introduction to Synthetic strategies

Block-3: Physical chemistry-6

Unit – 7: Introduction and Classification of Catalysis.

Unit – 8: Heterogeneous catalysis.

Unit – 9: Homogeneous catalysis.

Block – 4: General Chemistry-4

Unit – 10: Mass Spectroscopy.

Unit – 11: ^1H -NMR Spectroscopy

Unit – 12: Symmetry of molecules.

Practical: Chemistry – 7: Physical Chemistry

Block – 1: Kinetics and Distribution.

Unit – 1: Kinetic study of catalysed reaction.

13. Kinetics of Acid Catalysed Hydrolysis of methyl acetate.

2. Kinetic study of catalytic decomposition of hydrogen peroxide)

Unit – 2: Kinetics of reaction between potassium persulphate and potassium iodide.(second order reaction).

Unit – 3: Determination of distribution and partition coefficient.

11. Determination of partition coefficient of benzoic acid between benzene and water.

2. Estimation of amount of HCl in the given solution using standard NaOH solution by conductometrically)

Block – 2: Instrumental methods.

Unit – 4: Conductometric titrations.

11. Estimation of amount of HCl in the given solution using standard NaOH solution by conductometrically.

12. Estimation of acetic acid in the given solution by using standard NaOH solution by conductometrically.

Unit – 5: Potentiometric titrations.

12. Estimation of amount of HCl in the given solution using standard NaOH solution by potentiometrically.

13. Estimation of amount of Fe^{+2} in the given solution using potassium permanganate solution by potentiometrically.

Unit – 6: Colorimetric titrations. (Verification of Lambert-Beers law and estimation of KMnO_4 in the solution)

Semester-6

Chemistry – 8A: Drug Chemistry and Enzymes (Elective)

Block – 1: Elementary aspects of drugs

Unit - 1: Terminology of drugs.

Unit – 2: Nomenclature and Classification of drugs

Unit – 3: Analgesics.

Block-2: Drugs Action-1.

Unit – 4: Hypnotics, Sedatives & Tranquilisers.

Unit – 5: Antimalarial.

Unit – 6: Antibacterial.

Block-3: Drugs Action -2.

Unit – 7: Antibiotics

Unit – 8: Cardiovascular drugs & CNS stimulants

Unit – 9: Antihelminthics

Unit -10: Anti HIV-AIDS Drugs.

Block-4: Enzymes and role of Enzymes in drug action

Unit – 11: Introduction to enzymes, Mechanism and factors affecting on enzyme

action

Unit – 12: Enzyme Inhibition

Unit – 13: Drug action receptor theory.

Practical: Chemistry – 8A: Drugs synthesis

Block – 1; Synthesis of drugs -1

Unit – 1: Synthesis of Chloroquine phosphate.

Unit – 2: Synthesis of Isatin.

Unit – 3: Synthesis of 2- amino – 5-phenyl-1,3,4-oxadiazole.

Block – 2; Synthesis of drugs -2

Unit – 4: Synthesis of Magnesium Carbonate

Unit – 5: Synthesis of Picric Acid

Unit – 6: Synthesis of Milk of Magnesia.

Semester-6

Chemistry – 8B: Polymer Chemistry, Separation Techniques and Chromatography (Elective)

Block – 1: Polymer Chemistry.

Unit – 1: Introduction, Classification and type of Polymers

Unit – 2: Crystallisation and Crystallinity of Polymers.

Unit – 3: Molecular weight determination of Polymers.

Unit – 4: Preparation and applications of Polymers.

Block – 2: Separation Techniques.

Unit – 5: Solvent Extraction.

Unit – 6: Quantitative and Qualitative Aspects of Solvent extraction.

Unit – 7: Distillation techniques.

Block – 3: Chromatography-1

Unit – 8: Introduction and Classification to Chromatography.

Unit – 9: Paper Chromatography and Thin layer Chromatography

Unit – 10: Column Chromatography.

Block – 4: Chromatography - 2

Unit – 11: GLC

Unit – 12: HPLC

Unit – 13: Ion exchange Chromatography.

Practical: Chemistry – 8B: polymer preparations, Separation Techniques and Chromatography

Block – 1: Polymer chemistry and separation techniques.

Unit – 1: preparation of Nylon 6/66.

Unit – 2-: Solvent extraction of organic mixture.

Unit – 3: solvent extraction of inorganic mixture.

Block – 2: Chromatography.

Unit – 4: Detection of number compounds and suitable solvent for
Separation of mixture by thin layer chromatography.

Unit – 5: monitoring of a chemical reaction by thin layer chromatography.

Unit – 6: Demonstration of Column Chromatography

SEC– 1 : Instrumentation skills in chemistry

SEC – 2: Cosmetic Chemicalsiples

CBCS Structure
B.Sc - Mathematics (UG - Programme)
Dr. B. R. Ambedkar Open University

Year	Semester	Course Type	Name of the Course	No. of Credits Theory	No. of Credits Practical
I	I	CC - 1	Differential Calculus	4	1
	II	CC - 2	Differential Equations	4	1
II	III	CC - 3	Real Analysis	4	1
	IV	CC - 4	Algebra	4	1
III	V	CC - 5	Linear Algebra	4	1
		DSE-1/DSE-2	Three Dimensional Geometry / Discrete Mathematical Structure	4	1
	VI	CC - 6	Numerical Methods	4	1
		DSE-3/DSE-4	Vector Calculus / Linear Programming	4	1
		SEC - 1	Probability and Statistics	2	
		SEC - 2	Graph Theory	2	

Note: As per the resolution of the Curriculum Development Committee the pattern of Theory and Practicals in Mathematics should be adopted similar to other Science subjects. Accordingly fee may be charged.

Mathematics

CC - 1 (Common Core Course - 1): Theory – “Differential Calculus”

Block - I : Limits and Continuity

- Unit - 1 : Limits and Continuity
- Unit - 2 : Differentiability of a Function
- Unit - 3 : Methods of Differentiation

Block - II : Successive and Partial Differentiation

- Unit - 4 : Successive Differentiation - Leibnitz's Theorem
- Unit - 5 : Partial Differentiation - Euler's Theorem on Homogeneous Functions
- Unit - 6 : Mean Value Theorems

Block - III : Applications of Differentiation

- Unit - 7 : Taylor's Theorem with Lagrange's and Cauchy's forms of Remainder
- Unit - 8 : Indeterminate Forms : L - Hospital's Rule
- Unit - 9 : Applications of Differentiation - I
(Errors , Approximations, Tangent and Normal)

Block - IV : Curvature and Curve Tracing

- Unit -10 : Applications of Differentiation - II
(Curvature, Maxima and Minima)
- Unit -11 : Asymptotes and Singular Points
- Unit -12 : Curve Tracing

Core Course -1: Practical – “Differential Calculus”

Block - I : Limits, Continuity and Differentiability ; Partial Differentiation

- Unit - 1 : Limits and Continuity
- Unit - 2 : Differentiability of a Function
- Unit - 3 : Leibnitz's Theorem and Mean Value Theorems
- Unit - 4 : Partial Differentiation

Block - II : Applications of Differentiation and Curve Tracing

- Unit - 5 : Taylor's Theorem
- Unit - 6 : Indeterminate Forms : L - Hospital's Rule
- Unit - 7 : Applications of Differentiation
- Unit - 8 : Curve Tracing

Mathematics

CC - 2 (Common Core Course - 2): Theory - “Differential Equations”

Block – I : Integration

- Unit - 1 : Methods of Integration - I
- Unit - 2 : Methods of Integration - II
- Unit - 3 : Applications of Integration - Areas

Block - II : Differential Equations of First Order

- Unit - 4 : Introduction and Formation of Differential Equations
- Unit - 5 : Differential Equations of First Order and First Degree
(Variables Separable ; Homogeneous and Non - Homogeneous
Equations ; Linear and Bernoulli's Equations)
- Unit - 6 : Exact Differential Equations

Block - III : Differential Equations of First Order and Higher Degree

- Unit - 7 : Differential Equations of First Order and of Degree Higher
(Orthogonal Trajectories)
- Unit - 8 : Simultaneous Equations and Total Differential Equations
- Unit - 9 : Homogeneous Linear Differential Equations of Second & Higher Order
with Constant Coefficients

Block -IV: Non - Homogeneous Equations of Second and Higher Order

- Unit - 10 : Non - Homogeneous Linear Differential Equations of Second & Higher
Order with Constant Coefficients
- Unit - 11 : Linear Differential Equations with Variable Coefficients
- Unit - 12 : Partial Differential Equations - Classification - Lagrange's Method of Solving

Core Course -2 : Practical - “Differential Equations”

Block - I : Integration and Differential Equations of First Order

- Unit - 1 : Methods of Integration
- Unit - 2 : Applications of Integration – Areas
- Unit - 3 : Differential Equations of First Order and First Degree
(Variables Separable ; Homogeneous and Non - Homogeneous Equations)
- Unit - 4 : Linear , Bernoulli's and Exact Differential Equations

Block - II : Differential Equations of First and Higher Order

- Unit - 5 : Differential Equations of First Order and of Higher Degree
- Unit - 6 : Linear Differential Equations of Second and Higher Order with Constant
Coefficients
- Unit - 7 : Linear Differential Equations with Variable Coefficients
- Unit - 8 : Partial Differential Equations - Classification - Lagrange's Method of Solving

Mathematics

CC - 3 (Common Core Course - 3): Theory - “Real Analysis”

Block - I : Real Numbers and Sequences

Unit - 1 : Real Numbers System - Its Completeness

Unit - 2 : Limit Point of a Set , Open and Closed Sets in \mathbb{R}

Unit - 3 : Real Sequences and their Convergence

Block - II : Infinite Series

Unit - 4 : Convergence of Infinite Series of Positive Terms

Unit - 5 : Tests of Convergence

Unit - 6 : Alternating Series

Block – III : Riemann Integration

Unit - 7 : Riemann Integrability - Conditions

Unit - 8 : Mean Value Theorems of Integral Calculus

Unit - 9 : Fundamental Theorem of Integral Calculus - Integration by Parts

Block - IV : Sequences and Series of Functions

Unit - 10 : Point Wise and Uniform Convergence

Unit - 11 : Series of Functions

Unit - 12 : Power Series

Core Course - 3: Practical - “Real Numbers and Sequences”

Block - I : Sequences and Series

Unit - 1 : Limit Point of a Set , Open and Closed Sets in \mathbb{R}

Unit - 2 : Real Sequences and their Convergence

Unit - 3 : Convergence of Infinite Series of Positive Terms

Unit - 4 : Tests of Convergence and Alternating Series

Block – II : Riemann Integration and Sequences, Series of Functions

Unit - 5 : Riemann Integrability - Conditions

Unit - 6 : Mean Value Theorems and Fundamental Theorem of Integral Calculus

Unit - 7 : Point Wise and Uniform Convergence

Unit - 8 : Series of Functions and Power Series

Mathematics

CC - 4 (Common Core Course - 4): Theory - “Algebra”

Block - I : Groups and Subgroups

Unit - 1 : Sets , Relations and Functions

Unit - 2 : Groups and Examples

Unit - 3 : Subgroups

Block - II : Quotient Groups

Unit - 4 : Cosets and Lagrange’s Theorem for Finite Groups

Unit - 5 : Normal Subgroups and Quotient Groups

Unit - 6 : Homomorphisms and Cyclic Groups

Block - III : Rings - I

Unit - 7 : Rings - Definition and Examples

Unit - 8 : Integral Domains and Fields

Unit - 9 : Subrings and Ideals

Block - IV : Rings - II

Unit - 10 : Quotient Rings

Unit - 11 : Homomorphisms

Unit - 12 : Polynomial Rings

Core Course - IV: Practical - “Algebra”

Block - I : Groups and Quotient Groups

Unit - 1 : Groups and Subgroups

Unit - 2 : Cosets And Lagrange’s Theorem for Finite Groups

Unit - 3 : Normal Subgroups and Quotient Groups

Unit - 4 : Homomorphisms and Cyclic Groups

Block - II : Rings

Unit - 5 : Rings , Integral Domains and Fields

Unit - 6 : Sub rings and Ideals

Unit - 7 : Quotient Rings and Homomorphisms

Unit - 8 : Polynomial Rings

Mathematics

CC - 5 (Common Core Course - 5): Theory - “Linear Algebra”

Block - I : Vector Spaces

- Unit - 1 : Vector Spaces and Subspaces
- Unit - 2 : Basis and Dimension
- Unit - 3 : Quotient Spaces - Isomorphisms

Block - II : Linear Transformations

- Unit - 4 : Linear Transformations
- Unit - 5: Rank and Nullity of a Linear Transformation
- Unit - 6 : Matrix of a Linear Transformation

Block - III : Matrices - Characteristic Values and Characteristic Vectors

- Unit - 7 : Characteristic Values and Characteristic Vectors
- Unit - 8 : Cayley - Hamilton Theorem and Its Applications
- Unit - 9 : Elementary Transformations and Reduction to Normal Form

Block - IV : Quadratic Forms and Inner Product Spaces

- Unit - 10 : Quadratic Forms
- Unit - 11 : Inner Product Spaces
- Unit - 12 : Orthogonality and Gram-Schmidt Orthogonalisation

Core Course - 5: Practical - “Linear Algebra ”

Block - I : Vector Spaces and Linear Transformations

- Unit - 1 : Vector Spaces and Subspaces
- Unit - 2 : Basis and Dimension
- Unit - 3 : Quotient Spaces - Isomorphisms
- Unit - 4 : Rank , Nullity and Matrix of a Linear Transformation

Block - II : Characteristic Values and Characteristic Vectors ; Quadratic Forms and Inner Product Spaces

- Unit - 5 : Characteristic Values and Characteristic Vectors ; Cayley - Hamilton Theorem
- Unit - 6 : Elementary Transformations and Reduction to Normal Form
- Unit - 7 : Quadratic Forms and Inner Product Spaces
- Unit - 8 : Orthogonality and Gram-Schmidt Orthogonalisation

Mathematics

CC - 6 (Common Core Course - 6): Theory - “Numerical Methods”

Block - I : Methods of Solving Equations

Unit - 1 : Algebraic and Transcendental Equations

Unit - 2 : System of Linear Equations

Unit - 3 : Inverse of a Matrix by Numerical Methods

Block - II : Interpolation - I

Unit - 4 : Finite Difference Operators

Unit - 5 : Newton’s Forward and Backward Difference Methods

Unit - 6 : Central Difference Methods

Block - III : Interpolation - II

Unit - 7 : Lagrange’s Method

Unit - 8 : Newton’s Divided Difference Method

Unit - 9 : Inverse Interpolation

Block - IV : Numerical Differentiation and Integration

Unit - 10 : Numerical Differentiation

Unit - 11 : Numerical Integration

Unit - 12 : Asymptotic Expansions

Core Course - 6 : Practical - “Numerical Methods”

Block - I : Interpolation

Unit - 1 : Finite Difference Operators

Unit - 2 : Newton’s Forward and Backward Difference Methods

Unit - 3 : Central Difference Methods

Unit - 4 : Lagrange’s Method , Newton’s Divided Difference Method
and Inverse Interpolation

Block - II : Methods of Solving Equations; Numerical Differentiation and Integration

Unit - 5 : Algebraic and Transcendental Equations

Unit - 6 : System of Linear Equations

Unit - 7 : Numerical Differentiation and Integration

Unit - 8 : Asymptotic Expansions

Mathematics

DSE - 1 (Discipline Specific Elective - 1): Theory - “Three Dimensional Geometry”

Block - I : The Plane

- Unit - 1 : Three Dimensional Space
- Unit - 2 : Direction Cosines and Ratios
- Unit - 3 : Equations of a Plane

Block - II : The Line

- Unit - 4 : Equations of a Line
- Unit - 5 : Plane and Straight Line
- Unit - 6 : Skew Lines and Shortest Distance

Block - III : The Sphere

- Unit - 7 : Equation of a Sphere - Different Forms
- Unit - 8 : Tangent , Normal and Polar Planes to a Sphere
- Unit - 9 : System of Spheres

Block - IV : Cone and Cylinder

- Unit - 10 : Cone
- Unit - 11 : The Right Circular Cone
- Unit - 12 : Cylinder

Discipline Specific Elective - 1: Practical - “Three Dimensional Geometry”

Block - I : The Plane and The Line

- Unit - 1 : Direction Cosines And Ratios
- Unit - 2 : Equations of a Plane
- Unit - 3 : Equations of a Line
- Unit - 4 : Skew Lines and Shortest Distance

Block - II : The Sphere , Cone and Cylinder

- Unit - 5 : Equation of a Sphere
- Unit - 6 : Tangent , Normal and Polar Planes to a Sphere
- Unit - 7 : Cone and the Right Circular Cone
- Unit - 8 : Cylinder

Mathematics

DSE - 2 (Discipline Specific Elective - 2): Theory - “Discrete Mathematical Structure”

Block - I : Logic

- Unit - 1 : Statements , Truth Tables , Connectives and Implications
- Unit - 2 : Equivalence and Normal Forms
- Unit - 3 : Inference for Statement Calculus

Block - II : Counting Principles

- Unit - 4 : Permutations and Combinations
- Unit - 5 : Generating Functions
- Unit - 6 : Recurrence Relations

Block - III : Graphs

- Unit - 7 : Graphs : Definition , Types of Graphs
- Unit - 8 : Planner Graphs
- Unit - 9 : Trees

Block - IV : Net Works

- Unit - 10 : Spanning Trees
(Minimal Spanning Trees)
- Unit - 11 : Traversability
- Unit - 12 : Maximal Flows and Minimal Flows

Discipline Specific Elective - 2: Practical - “Discrete Mathematical Structure”

Block - I : Logic and Counting Principles

- Unit - 1 : Statements , Truth Tables , Connectives and Implications
- Unit - 2 : Equivalence , Normal Forms and Inferences
- Unit - 3 : Permutations and Combinations
- Unit - 4 : Generating Functions and Recurrence Relations

Block - II : Graphs and Net Works

- Unit - 5 : Graphs and Planner Graphs
- Unit - 6 : Trees and Spanning Trees
(Minimal Spanning Trees)
- Unit - 7 : Traversability
- Unit - 8 : Maximal Flows and Minimal Flows

Mathematics

DSE - 3 (Discipline Specific Elective - 3): Theory - “Vector Calculus”

Block - I : Vectors

Unit - 1 : Algebra of Vectors

Unit - 2 : Applications of Vector Algebra

Unit - 3 : Vector Operators - Gradient , Divergence and Curl

Block - II : Vector Differentiation and Line Integral

Unit - 4 : Differential of a Vector Function

Unit - 5 : Algebra of Differential Operators

Unit - 6 : Line Integral

Block - III : Vector Integration

Unit - 7 : Surface and Volume Integrals

Unit - 8 : Gauss and Stoke's Theorems

Unit - 9 : Green's Theorem and Its Applications

Block - IV : Multiple Integrals

Unit - 10 : Double Integrals

Unit - 11 : Triple Integrals

Unit - 12 : Change of Order of Integration

Discipline Specific Elective - 3: Practical - “Vector Calculus”

Block - I : Vectors and Vector Differentiation

Unit - 1 : Algebra of Vectors and its Applications

Unit - 2 : Vector Operators - Gradient , Divergence and Curl

Unit - 3 : Algebra of Differential Operators

Unit - 4 : Line Integral

Block - II : Vector Integration and Multiple Integrals

Unit - 5 : Surface and Volume Integrals

Unit - 6 : Gauss , Stoke's and Green's Theorems and their Applications

Unit - 7 : Double Integrals

Unit - 8 : Triple Integrals

Mathematics

DSE - 4 (Discipline Specific Elective - 4): Theory - “Linear Programming”

Block - I : Linear Programming Problem (Lpp)

Unit - 1 : Formation of Linear Programming Problem

Unit - 2 : Graphical Method of Solving Lpp

Unit - 3 : Simplex Method of Solving Lpp - Basic Simplex Method

Block - II : Other Simplex Methods

Unit - 4 : Degeneracy in Lpp

Unit - 5 : Big - M Method

Unit - 6 : Two - Phase Simplex Method

Block - III : Duality in Linear Programming Problem

Unit - 7 : Primal and Dual Lpps

Unit - 8 : Relation Ship Between Primal and Dual Lpps

Unit - 9 : Solution by Dual Simplex Method

Block - IV : Transportation and Assignment Problems

Unit - 10 : Formulation of a Transportation Problem - Method of Finding Basic Feasible Solutions

Unit - 11 : Optimal Solution for a Transportation Problem

Unit - 12 : Assignment Problem - Hungarian Method - Travelling Salesman Problem

Discipline Specific Elective - 4: Practical - “Linear Programming”

Block - I : Linear Programming Problem and Simplex Methods

Unit - 1 : Formation of Linear Programming Problem and Graphical Method of Solving Lpp

Unit - 2 : Basic Simplex Method of Solving Lpp

Unit - 3 : Degeneracy in Lpp

Unit - 4 : Big - M and Two - Phase Simplex Method

Block - II : Duality in LPP ; Transportation and Assignment Problems

Unit - 5 : Primal and Dual Lpps

Unit - 6 : Solution by Dual Simplex Method

Unit - 7 : The Transportation Problem

Unit - 8 : The Assignment Problem

Mathematics

SEC - 1 (Skill Enhancement Course - 1): Theory - “Probability & Statistics”

Block - I : Dispersion , Correlation and Regression

Unit - 1 : Measures of Central Tendency

Unit - 2 : Measures of Dispersion

Unit - 3 : Correlation and Regression

Block - II : Probability and Distributions

Unit - 4 : Probability

(Definitions, Axioms , Addition Theorem, Conditional Probability,
Multiplication Theorem , Applications)

Unit - 5 : Random Variables

(Discrete and Continuous Random Variables , Probability Mass / Density
Functions , Mathematical Expectations)

Unit - 6 : Probability Distributions

(Discrete Distributions : Uniform, Binomial , Poisson ; Continuous Distributions :
Uniform, Normal , Exponential)

Mathematics

SEC - 2 (Skill Enhancement Course - 2): Theory - “Graph Theory”

Block - I : Graphs

Unit 1 : Graphs – Definitions and Basic Properties

Unit 2 : Isomorphism of Graphs

Unit 3 : Paths and Circuits

Block - II : Cycles , Algorithms

Unit 4 : Eulerian Circuits

Unit 5 : Hamilton Cycles

Unit 6: The Adjacency Matrix - Shortest Path Algorithm

ZOOLOGY
CBCS
SYLLABUS

**PROPOSED CURRICULUM FOR ZOOLOGY
IN UNDERGRADUATE DEGREE PROGRAMME
UNDER CHOICE BASED CREDIT SYSTEM - 2016-2017**

year	Semister	Paper	Title of the paper	No.of credits		
I	I	Core-1; Theory	Animal diversity - invertebrates	4		
		Core-1; Practical	Animal diversity - invertebrates	1		
	II	Core-II; Theory	Animal diversity - vertebrates	4		
		Core-II ; Practical	Animal diversity - vertebrates	1		
II	III	Core-III; Theory	Ecology, zoogeography and developmental biology	4		
		Core-III; Practical	Ecology, zoogeography and developmental biology	1		
	IV	Core-IV; Theory	Cell and molecular biology, genetics and evolution	4		
		Core-IV; Practical	Cell and molecular biology, genetics and evolution	1		
III	V	Core-V; Theory	Physiology& biochemistry	4		
		Core-V; Practical	Physiology& biochemistry	1		
		Elective-VA; Theory	Principles in aquaculture	4		
		Elective-VA; Practical	Principles in aquaculture	1		
		Elective-VB; Theory	Sericulture	4		
		Elective-VB; Practical	Sericulture	1		
	VI	Core-VI; Theory	Immunology and animal biotechnology	4		
		Core-VI; Practical	Immunology and animal biotechnology	1		
		Elective-VIA; Theory	Fish genetics and seed production technology	4		
		Elective-VIA; Practical	Fish genetics and seed production technology	1		
		Elective-VIB; Theory	Silkworm breeding and seed production technology	4		
		Elective-VIB; Practical	Silkworm breeding and seed production technology	1		
		Skilled Enhancement Course			Ornamental fish culture/ Butterfly conservation	2

B.Sc ZOOLOGY SYLLABUS UNDER CBCS

I ..SEMISTER

CORE PAPER..I

ANIMAL DIVERSITY - INVERTEBRATES

BLOCK – I PROTOZOA, PORIFERA, CNIDARIA

- Unit –1 : Introduction to Animal Kingdom
- Unit –2 : Protozoa – General Characters and Classification up to classes .
Type study – *Elphidium*; Protozoan Diseases
- Unit –3 : Porifera – General Characters and Classification up to classes .
Type study – *Sycon* – Canal System in Porifera
- Unit –4 : Cnidaria – General Characters and Classification up to classes .
Type study – *Aurelia* ; Polymorphism in Cnidaria

BLOCK – II PLATYHELMINTHES, ASCHELMINTHES

- Unit –5 : Platyhelminthes – General Characters and Classification up to classes.
Important Trematode and Cestode parasites. Type study – *Fasciola hepatica*,
Taenia solium.
- Unit –6 : Aschelminthes – General Characters and Classification up to classes .
Types study – *Ascaris Lumbricoides*. Parasitic adaptations of
Helminthes

BLOCK – III ANNELIDA, ARTHROPODA

- Unit –7 : Annelida – General Characters and Classification up to classes .
Type study – *Hirudinaria granulose*. Metamerism, Nephridia and
Coelomoducts
- Unit –8 : Arthropoda – General Characters and Classification up to classes .
Onychophora (*Peripatus*) – Affinities.
- Unit- 9 : Type study *Palaemon*.

BLOCK – IV MOLLUSCA, ECHINODERMATA, HEMICHORDATA

- Unit –10 : Mollusca – General Characters and Classification up to classes:
Type study – *Pila globosa*. Economic Importance of Mollusca.
- Unit –11 : Echinodermata – General Characters and Classification up to classes.
Type study – *Asterias*. Echinoderm larvae and its significance.
- Unit –12 : Hemichordata – General Characters and Classification up to classes.
Type study and Affinities – *Balanoglossus*

**B.Sc PRACTICAL SYLLABUS FOR I SEMESTER
ZOOLOGY- CORE PAPER..I
ANIMAL DIVERSITY - INVERTEBRATES
LABORATORY MANUAL & RECORD**

BLOCK – I STUDY OF MUSEUM SLIDES/SPECIMENS/MODELS

(Classification up to orders)

- Unit-1 : Protozoa: *Entamoeba histolytica* , *Euglena*, *Trypanosoma*, *Polystomella*,
Paramoecium, *Paramoecium Binary fission and Conjugation*, *Vorticella* ,
Plasmodium vivax
- Unit-2 : Porifera: *Sycon*, *Spongilla*, *Euplectella*, *Hylonema*, *Euspongia*, *Sycon - T.S & L.S*,
Spicules.
- Unit - 3: Coelenterata: *Obelia – Colony & Medusa*, *Aurelia*, *Physalia*, *Porpita*, *Velella*,
Corallium, *Gorgonia*, *Pennatula*, *Adamsia*
- Unit- 4 : Platyhelminthes: *Planaria*, *Fasciola hepatica*, *Fasciola larval forms – Miracidium*,
Redia, *Cercaria*, *Echinococcus granulosus*, *Schistosoma haematobium*
- Unit- 5 : Nematelminthes: *Ascaris(Male & Female)*, *Drancunculus*, *Ancylostoma*,
Wuchereria
- Unit- 6 : Annelida: *Nereis*, *Hetero neries*, *Aphrodite*, *Chaetopteurs*, *Hirudinaria*,
Trochophore larva
- Unit- 7 : Arthropoda: *Lepas*, *Belanus*, *Cancer*, *Palaemon*, *Scorpion*, *Scolopendra*,
Sacculina, *Limulus*, *Peripatus*, *Larvae - Nauplius*, *Mysis*, *Zoea*, *Mouth parts of
male & female Anopheles and Culex*, *Mouthparts of Housefly and Butterfly*.
- Unit-8: Mollusca: *Chiton*, *Pila*, *Unio*, *Pteredo*, *Murex*, *Sepia*, *Loligo*, *Octopus*, *Nautilus*,
Glochidium larva
- Uniy-9: Echinodermata: *Asterias*, *Ophiothrix*, *Echinus*, *Clypeaster*, *Cucumaria*, *Antedon*,
Bipinnaria larva
- Unit-10 : Hemichordata: *Balanoglossus*, *Tornaria larva*

BLOCK – II DISSECTIONS

- Unit –11 : Prawn Nervous System
- Unit –12 : Prawn Appendages, Mounting of statocyst

Unit- 13 : Insect Mouth Par

1. Laboratory Record work shall be submitted at the time of practical examination.
2. An “Animal album” containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.
3. Computer aided techniques should be adopted – show virtual dissections

B.Sc ZOOLOGY SYLLABUS UNDER CBCS

II ..SEMISTER

CORE PAPER..II

ANIMAL DIVERSITY- VERTEBRATES

BLOCK – I PROTOCHORDATA---UROCHORDATA, CEPHALOCHORDATA

- Unit –1 : Vertebrata- General Characters and Classification up to order level .
Unit –2 : Urochordata – Type study – *Herdmania* – Retrogressive Metamorphosis.
Unit- 3 : Cephalochordata- Salient features and Affinities- Type study *Amphioxus*.

BLOCK – II CYCLOSTOMATA AND PICES

- Unit –4 : Cyclostomata – General Characters and Affinities.
Unit –5 : Pisces – General Characters and Classification up to order level;
Unit –6 : *Scoliodon* – Type study.

BLOCK – III AMPHIBIA AND REPTILIA

- Unit –7 : Amphibia – General Characters, Classification up to order level;
Parental Care in Amphibia.
Unit –8 : Reptilia – General Characters and Classification up to order level;
Dinosaurs- Temporal fosse in reptiles and its evolutionary importance ;
Distinguished characters of Poisonous and Non poisonous snakes.
Unit –9 : *Calotes* – Type study.

BLOCK – IV AVES AND MAMMALIA

- Unit –10 : Aves – General Characters and Classification up to order level, Flight Adaptations and Migration in Birds.
Unit –11 : Pigeon- Type study
Unit –12 : Mammalia – General Characters and Classification up to order level, Aquatic adaptation in Mammals, rabbit- Type study

**B.Sc PRACTICAL SYLLABUS FOR II SEMISTER
ZOOLOGY- CORE PAPER..II
ANIMAL DIVERSITY- VERTEBRATES
LABORATORY MANUAL & RECORD**

BLOCK-I : VERTEBRATES - Study of museum slides / specimens / models (Classification of animals up to orders)

Unit- 1 : Introduction to Chordata – Introductory class

Unit- 2 : Protochordata: *Amphioxus*, *Amphioxus* T.S. through pharynx

Unit- 3 : Cyclostomata: *Petromyzon*, *Myxine*, *Ammocoetus* larva

Unit- 4 : Pisces: *Pristis*, *Torpedo*, *Protopterus*, *Ophiocephalus*, *Pleuronectes*, *Hippocampus*, *Exocoetus*, *Anabus*, *Echieneis*, *Labeo*, *Catla*, *Clarius*, *Auguilla*, scales: Placoid, Cycloid, Ctenoid

Unit- 5 : Amphibia: *Ichthyophis*, *Amblystoma*, *Axolotal* larva, *Bufo*, *Hyla*, *Rana*, *Rachophous*,

Unit- 6 : Reptilia : *Chelone*, *Testudo*, *Trionyx*, *Sphenodon*, *Gecko*, *Draco*, *Varanus*, *Chamaeleon*, *Python*, *Ptyas*, *Bungarus*, *Naja*, *Vipera russeli*, *Enhydrina*, *Crocodylus*.

Unit- 7 : Aves: *Archaeopteryx*, *Bubo*, *Psittacula*, *Eudynamus*, *Dendrocorpus*, *Alcedo*, *Columba*, *Corvus*, *Pavo*, Collection and study of different types of feathers: Quill, Contour, Filoplume, Down

Unit-8 : Mammalia: *Ornithorhynchus*, *Macropus*, *Erinaceus*, *Pteropus*, *Loris*, *Manis*, *Funambulus*.

**BLOCK- II : BLOCK – II HISTOLOGICAL SLIDES & COMPARATIVE
OSTEOLOGY**

Unit-9 : Study of Histological Slides of Mammal- T.S. of Liver, Pancreas, Kidney, Stomach, Intestine, Lungs Artery, Vein, Bone T.S., Spinal cord.

Unit- 10 : Rabbit – Axial skeleton system (bones of Skull and Vertebral Column)

Unit –11 : Appendicular Skeleton:
Pectoral Girdle and Pelvic Girdles of *Varanus*, Fowl & Rabbit

Unit –12 : Appendicular Skeleton:
Forelimb Skeleton and Hindlimb Skeleton of *Varanus*, Fowl & Rabbit

BLOCK III: DISSECTIONS

Unit- 13 :Dissections of *Labeo*/*Tilapia*:

1. Digestive system.
2. Brain, Weberian ossicles
3. V, VII, IX, X cranial nerves

B.Sc ZOOLOGY SYLLABUS UNDER CBCS

III ..SEMISTER

CORE PAPER..III

ECOLOGY, ZOOGEOGRAPHY AND DEVELOPMENTAL BIOLOGY

BLOCK – I ECOLOGY

Unit –1 : Ecosystem structure and functions, Types of Ecosystems –Aquatic and Terrestrial.

Unit –2 :Biogeochemical cycles - Nitrogen, Carbon, Phosphorus and Water.

Unit –3 :Energy Flow in Ecosystem, Tropic levels, Food chains, Food web and Ecological Pyramids

Unit –4 :Animal Associations - Mutualism, commensalism, parasitism, competition, predation. Community Structure and dynamics and Ecological Succession.

Unit –5 :Ecological Adaptations

Unit- 6 :Wildlife conservation - National parks and Sanctuaries of India, Endangered species. Biodiversity and hotspots of Biodiversity in India.

BLCOK – II ZOOGEOGRAPHY

Unit –7 :Zoogeographical regions – Palaearctic, Nearctic, Neotropical, Oriental, Australian and Ethiopian regions - their Climatic and faunal peculiarities

Unit –8 :Wallace line and Discontinuous distribution. Continental drift

BLOCK – III DEVELOPMENTAL BIOLOGY

Unit –9 : Types of Eggs, Fertilization and Development upto Gastrulation

Unit –10 : Organogenesis

Unit –11 : Foetal Membranes in Chick

Unit –12 : Placentation in Mammals

B.Sc PRACTICAL SYLLABUS FOR II SEMISTER

ZOOLOGY- CORE PAPER..III

ECOLOGY, ZOOGEOGRAPHY AND DEVELOPMENTAL BIOLOGY

LABORATORY MANUAL & RECORD

Unit – I: Determination of pH of Soil and Water

Unit –2: Estimation of salinity (chlorides) of water in given samples.

Unit – 3: Estimation of Carbonates in the given water samples.

Unit- 4 : Estimation of Bicarbonates in the given water samples.

Unit – 5: Estimation of dissolved oxygen of pond water, sewage water and effluents.

Unit – 6: Identification of Zooplankton from a nearby water body.

Unit – 7: Study of Pond Ecosystem / local polluted site - Report submission

Unit – 8: Study of at least 3 endangered or threatened wild animals of India through photographs / specimens / models

Unit – 9: Field visit to Zoo Park to study the management, behavior and enumeration of wild animals.

Unit – 10: Identification of Zoogeographical realms from the Map and identify specific fauna of respective regions.

Unit – I1: Observe the response of invertebrates in different lightening conditions.

Computer aided techniques should be adopted as per UGC guide lines.

**B.Sc ZOOLOGY SYLLABUS UNDER CBCS
FOR IV ..SEMISTER**

**CORE PAPER - IV
CELL AND MOLECULAR BIOLOGY, GENETICS AND EVOLUTION**

BLOCK – I CELL BIOLOGY

- Unit –1 : Introduction to Cell Biology and Ultra Structure of the Animal Cell, Structure and Functions of the Cell Organelles – Plasma Membrane, Endoplasmic Reticulum, Golgi Complex and Lysosomes
- Unit –2 : Structure and Functions of the Cell Organelles – Mitochondria, Centrioles and Ribosomes, Nucleus and Chromosomes
- Unit –3 : Cell Division, Gametogenesis and Parthenogenesis

BLOCK – II : MOLECULAR BIOLOGY

- Unit – 4: Nucleic Acids - DNA (Deoxyribo Nucleic Acid) – Structure; RNA (Ribo Nucleic Acid) - Structure, types :DNA Replication
- Unit – 5 : Protein Synthesis – Transcription and Translation
- Unit – 6 : Gene Expression – Genetic Code; operon concept

BLOCK – III Genetics

- Unit – 7: Mendals laws of Inheritance and Non-Medelian Inheritance, Linkage and Crossing over; Sex determination and sex-linked inheritance
- Unit – 8 : Mutations: Chromosomal Mutations- Deletion, Duplication, Inversion, Translocation, Aneuploidy and Polyploidy. Gene mutations- Induced versus Spontaneous mutations.
- Unit -9 : Inborn errors of metabolism. One gene one enzyme, one gene one polypeptide theory.

BLOCK---V EVOLUTION

- Unit -10 : Origin of Life and Introduction to Evolutionary Theories: Lamarckism and Neo-Lamarckism, Darwinism and NeoDarwinism, Modern synthetic theory.
- Unit -11 : Direct Evidences of Evolution : Types of fossils, dating of fossils; Evolution of Man / Evolution of Horse
- Unit -12 : Species Concept : Isolation – Pre-mating and post mating isolating mechanisms; Speciation: Methods of speciation - Allopatric and sympatric.

**B.Sc ZOOLOGY PRACTICAL SYLLABUS UNDER CBCS
FOR IV ..SEMISTER**

**CORE PAPER - IV
CELL AND MOLECULAR BIOLOGY, GENETICS AND EVOLUTION**

LABORATORY MANUAL & RECORD

BLOCK – 1: CYTOLOGY

- Unit -1: Preparation and Identification of slides of Mitotic divisions with onion root tips
Unit -2: Preparation and Identification of different stages of Meiosis in Grasshopper Testes
Unit -3: Identification and study of the following slides i). Different stages of Mitosis and Meiosis ii) Lamp brush and Polytene chromosomes

BLOCK II: GENETICS

- Unit -4: Problems on Genetics - Mendelian inheritance, Linkage and crossing over, Sex linked inheritance

BLOCK – III: EVOLUTION

- Unit -5: Museum Study of Fossil animals: Peripatus, Coelacanth Fish, Dipnoi fishes, Sphenodon, Archeopteryx.
Unit -6: Study of homology and analogy from suitable specimens and pictures
Unit- 7 : Phylogeny of man/horse with diagrams /cut outs.
Unit -8: Macroevolution using Darwin finches (with diagrams / cut outs of beaks with different species)

Laboratory Record work shall be submitted at the time of practical examination

An “Album” containing photographs, cut outs, with appropriate write-up about Genetics and Evolution. Computer aided techniques should be adopted as per UGC guide lines.

**B.Sc ZOOLOGY SYLLABUS UNDER CBCS
FOR V ..SEMISTER**

CORE PAPER - V

PHYSIOLOGY & BIOCHEMISTRY

BLOCK – I PHYSIOLOGY-I

Unit..1- Digestion

Digestion definition and extra and intracellular digestion.
Digestion of Carbohydrates, Proteins, Lipids and Cellulose.
Absorption and Assimilation of digested food.
Role of Gastrointestinal hormones in digestion

Unit..2- Respiration

Definition of Respiration and Respiratory mechanisms – External, Internal and cellular.
Respiratory Pigments
Transport of oxygen, Oxygen dissociation curves. Bohr's effect.
Transport of CO₂ – Chloride shift.
Regulation of respiration – nervous and chemical

Unit 3 -- Circulation

Types of circulation - Open and Closed circulation
Structure of Mammalian Heart, Types of hearts – Neurogenic and Myogenic.
Heart function – Conduction and regulation of heart beat.
Regulation of Heart rate – Tachycardia and Bradycardia
Blood Clotting mechanism

BLOCK – II PHYSIOLOGY-II

Unit –4 --Excretion

Classification of Animals on the basis of excretory products- Ammonotelic, Uricotelic, Ureotelic
Structure and function of Nephron; Urine formation, Counter current mechanism.

Unit-5--- Muscle Contraction

Types of Muscles
Ultra structure of skeletal muscle fibre
Sliding Filament theory, muscle contraction mechanism and energetics.

Unit-6--- Nerve Impulse

Structure of Neuron
Nerve impulse - Resting potential and Action potential and Conduction of Nerve impulse

Synapse, types of synapses and Synaptic transmission.

BLOCK..III- ENDOCRINE SYSTEM

Unit-7- Endocrine glands

Structure, secretions and functions of Pituitary, Thyroid, Parathyroid, Adrenal glands and Pancreas

Unit-8- Hormone action and concept of Secondary messengers

Male and Female Hormones, Hormonal control of Menstrual cycle in humans.

Unit- 9 - Osmoregulation –

Water and ionic regulation by freshwater, brackish water and marine animals

Unit-10 –Enzymes

Definition, Classification, Inhibition and Regulation Biochemistry

BLOCK – IV BIOCHEMISTRY- BIOMOLECULES AND METABOLISM

Unit-11--Carbohydrates

Classification and function of Carbohydrates

Carbohydrate metabolism - Glycolysis, Krebs cycle, , Electron transport and oxidative phosphorelation.

Unit- 12- Proteins & Lipids

Classification of proteins based on functions and Chemical nature

Protein Metabolism - Transamination, Deamination and Urea Cycle.

Lipids- Classification of Lipids, Lipid Metabolism - Fatty acid synthesis and Fatty acid oxidation.

**B.Sc ZOOLOGY PRACTICAL SYLLABUS UNDER CBCS
FOR V ..SEMISTER**

**CORE PAPER - V
PHYSIOLOGY AND BIOCHEMISTRY**

LABORATORY MANUAL & RECORD

- Unit –1 :Qualitative tests for identification of Carbohydrates.
Unit - 2 : Qualitative tests for identification of Proteins.
Unit – 3 : Qualitative tests for identification of Lipids.
Unit –4 : Qualitative tests for identification of Minerals and Enzymes
Unit –3 : Qualitative tests for identification of Nitrogenous excretory products
(ammonia, urea and uric acid)
Unit –4 : Effect of pH and Temperature on salivary amylase activity.
Unit- 5 : Study of permanent histological sections of Mammalian Endocrine glands –
pituitary, thyroid, pancreas, adrenal gland.
Unit –6 : Estimation of Haemoglobin by Sahlis method.
Unit -7: . Estimation of total protein by Lowry’s method.
Unit -8 : Estimation of unit Oxygen consumption of fish with reference to body weight.

Laboratory Record work shall be submitted at the time of practical examination•
Computer aided techniques should be adopted as per UGC guide lines.

**B.Sc ZOOLOGY SYLLABUS UNDER CBCS
FOR VI ..SEMISTER**

CORE PAPER - VI

IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

BLOCK 1 : IMMUNOLOGY

Unit- 1: Basic concepts of immunology

Cells of immune system

Unit-2 : Cells and organs of Immune system

Haematopoiesis.

Cells of the immune system and organs (Primary and Secondary lymphoid organs) of immune system.

Types of Immunity – Innate and acquired.

Unit- 3 : Antigens

Basic properties of antigens.

B and T cell epitopes, haptens, adjuvants.

Unit- 4 : Antibodies

Structure, function and types of an antibody.

Monoclonal antibodies and their production.

Antigen-antibody interactions as tools for research and diagnosis.

T-Cell and B-Cell activation.

Unit- 5 : Working of an immune system.

Structure and functions of major histocompatibility complex.

Basic properties and functions of Cytokines, Interferons and complement proteins.

Humoral and Cell mediated immunity.

Unit- 6 : Immune system in health and disease

Types of hyper sensitivity.

Concepts of autoimmunity and immunodeficiency.

Unit- 7 : Vaccines

Introduction to Vaccines and types of Vaccines.

BLOCK – II. ANIMAL BIOTECHNOLOGY

Unit- 8 : Concept and Scope of Animal Biotechnology.

Unit- 9 : Molecular Techniques in Gene manipulations

Cloning vectors - Plasmids, Cosmids, Lambda bacteriophage, YAC,

Cloning- Cloning methods (Cell, Animal and Gene cloning)

Unit-10 : Animal Cell culture & Stem cells

Equipment and materials for animal cell culture.

Applications of cell culture techniques. Stem cells- Types and their applications

Unit-12 : Transgenesis – Methods of Transgenesis

Production of Transgenic animals

Application of Transgenic animals in Biotechnology.

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**B.Sc ZOOLOGY PRACTICAL SYLLABUS UNDER CBCS
FOR VI ..SEMISTER**

**CORE PAPER - VI
IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY**

LABORATORY MANUAL & RECORD

BLOCK - 1. IMMUNOLOGY

Unit – 1 : Identification of Blood groups

Unit – 2 : Histological study of spleen, thymus and lymph nodes (through prepared slides)

Unit – 3 : Enumeration of RBC & WBC from a given blood sample

Unit – 4 : Enumeration of Differential count of WBC from a given blood sample

Unit – 5 : Demonstration of a. ELISA b. Immuno-electrophoresis

Unit – 6 : Identification of Autoimmune disease through charts.

BLOCK – II: Animal Biotechnology

Unit – 7 : Study the following techniques through photographs / virtual lab

a. Southern blotting b. Western blotting c. DNA sequencing (Sanger's method) d. DNA
finger printing.

e. Identification of Vectors f. Identification of Transgenic animals

Unit – 8 : PCR demonstration /virtual lab Laboratory

Record work shall be submitted at the time of practical examination

Computer aided techniques should be adopted as per UGC guide lines.

**B.Sc ZOOLOGY SYLLABUS UNDER CBCS
FOR V ..SEMISTER**

**ELECTIVE - VA
PRINCIPLES IN AQUACULTURE**

BLOCK – I FISHERY SCIENCE – 1

- Unit –1 : Introduction to Fishery Science; Fish Biology; Organ Systems of Bony Fish
Unit –2 : Taxonomy and Identification of Edible Fishes, Prawns,
Crabs and Molluscs
Unit –3 : Life History and Identification of Eggs, Larvae and
Juveniles of Cultivated Fishes and Prawns

BLOCK – II FISHERY SCIENCE – II

- Unit –4 : Migration of Fishes
Unit –5 : Post Harvest Technology – Preservation Processing
And Transportation; Products and By-Products
Unit –6 : Craft and Gear

BLOCK – III AQUACULTURE – I

- Unit –7 : Introduction to Aquaculture; Aquaculture Systems – Fresh water Aquaculture
Systems, Integrated Aquaculture
Unit –8 : Coastal Aquaculture and Mariculture Systems
Pearl, Oyster, Shrimp and Seaweed Culture
Unit –9 : Preparation of Farm Pond and Management

BLOCK – IV AQUACULTURE – II

- Unit –10 : Seed Procurement ; Seed Production
Unit –11 : Fish Nutrition and Health Monitoring-Nutritional
Requirements and Supplementary Feeding
Unit –12 : Fish Diseases and Institutes

**B.Sc ZOOLOGY SYLLABUS UNDER CBCS
FOR V ..SEMISTER**

**ELECTIVE - VA
PRINCIPLES IN AQUACULTURE**

LABORATORY MANUAL & RECORD

BLOCK – I FISHERY SCIENCE

- Unit –1 : Identification of Fish Species-Morphology
Unit –2 : Study of Cultivable Carps & Fresh water Prawns
Air Breathing Fishes, Weed
Fishes & Predatory Fishes

BLOCK – II DISSECTIONS

- Unit –3 : Dissection of the Reproductive System of Carp to
Study its Morphology and Histology
Unit –4 : Collection and Preservation of Pituitary Gland

BLOCK – III AQUACULTURE LABORATORY TECHNIQUES

- Unit –5 : Preparation of Pelleted Feed
Unit –6 : Determination of Dissolved O₂ in H₂O
Unit –7 : Estimation of Total Hardness of Water
Unit –8 : Determination of Soil pH
Unit –9 : Determination of Total Nitrogen in Soil
Unit –10 : Study of Planktonic Organisms and Food Cycles in
Fresh Water Ponds
Unit –11 : Study of Aquatic Weeds; Study of Predatory Insects

BLOCK – IV .. FISH PATHOLOGY

- Unit –12 : Identification of Diseases caused by Micro-Organisms
and Parasites
Unit –13 : Determination of Health condition of Fish

**B.Sc ZOOLOGY SYLLABUS UNDER CBCS
FOR V ..SEMISTER**

**ELECTIVE - VB
SERICULTURE**

BLOCK – I GENERAL SERICULTURE & MULBERRY

- Unit –1 : History of Sericulture in India; Financial Assistance from Government Agencies
Types of Silkworms and Distribution
- Unit –2 : Systematic Position and Propagation of Mulberry:
Harvesting, Preservation and Nutritive Value of Mulberry
- Unit –3 : Mulberry Breeding, Hybrid Vigour, Diseases, Pests,
Drought resistance-improved mulberry Varieties
- Unit –4 : The Factors Influencing the Growth of Mulberry
(Climate factors, Edaphic and Physiographic factors); Irrigation – Manuring
and Pruning
- Unit –5 : Pests and Diseases of Mulberry – Prevention and control
of Crop Production

BLOCK – II SILKWORM BIOLOGY AND DISEASES

- Unit –6 : Systematic Position –Morphology and Life History of Bombyx mori
Digestive, Circulatory, Respiratory, Excretory Systems, Reproduction and
Development
- Unit –7 : Silkworm Nutrition; Silk Gland
- Unit –8 : Pests and Diseases of Silkworm

BLOCK – III REARING TECHNOLOGY & REELING TECHNOLOGY

- Unit –9 : Grainage Activity and Egg Production
- Unit –10 : Rearing Requirements and Activities; Silkworm Rearing
- Unit –11 : Moulting, Growth Studies; Cocoon Production
- Unit –12 : Raw Materials and Conditioning
Reeling Methods and Operation. Raw Silk Production and Weaving –
Sericulture By – Products

**B.Sc ZOOLOGY SYLLABUS UNDER CBCS
FOR V ..SEMISTER**

**ELECTIVE - VB
SERICULTURE**

LABORATORY MANUAL & RECORD

BLOCK – I 1MULBERRY AND BIOLOGY OF SILKWORM

Unit –1 : Taxonomy of Mulberry and Non-Mulberry varieties; Identification and Control of Pests and Diseases of Mulberry Plants

Unit -2: Analysis of Soil parameters: pH, Nitrate, Potassium and Organic Carbon.

Unit –3 : Mulberry Cultivation

Unit –4 : Identification of Different Stages of Silkworm Life History

Unit –5 : Dissection of Silkworm Larvae

BLOCK – II REARING TECHNOLOGY and REELING TECHNOLOGY

Unit –6 : Grainage and Seed Cocoons

Grainage Activities

Unit –7 : Identification of Diseased Worms and Pests

Unit –8 : Model Rearing House and Equipment and Disinfection

Unit –9 : Rearing

Unit –10 : Mounting and Cocoon Harvesting

Unit –11 : Cocoon Testing

Unit –12 : Cocoon Cooking and Reeling

Re-reeling-Fibre quality

**B.Sc ZOOLOGY SYLLABUS UNDER CBCS
FOR VI ..SEMISTER**

ELECTIVE - VIA

FISH GENETICS AND SEED PRODUCTION TECHNOLOGY

BLOCK I: FISH GENETICS

- Unit -1: **Fundamentals of Fish Genetics**, Structure, Composition and Properties of DNA and RNA; Replication, Transcription and Translation in Prokaryotes and Eukaryotes.
- Unit- 2: Chromosomal types and composition in fish. Chromosomal manipulation in fish, Hybridization. Polyploidy, androgenesis and gynogenesis.
- Unit -3: **Transgenic fish production.**
- Unit -4: **Cryopreservation of gametes.**
- Unit – 5: **Production of monosex and sterile fishes** and their significance in aquaculture.

BLOCK II: SEED PRODUCTION TECHNOLOGY

- Unit- 6: **Induced breeding** of IMC and Exotic carps using pituitary gland and other ovulating agents.
- Unit -7: **Bundh breeding-** types and problems.
- Unit -8: **Riverine seed production techniques.**
- Unit -9: **Fish Seed;** Different stages of seed- Spawn, Fry and Fingerlings.
- Unit -10: **Endocrine glands** in fish with special emphasis on pituitary, role of gonadotropin in fish breeding. Brood stock maintenance and breeding of Carps and other cultivable fishes (IMC, Common carp, Chinese carps, milk fish, Grey mullet, sea bass). Transportation of fish seed and brood fish.
- Unit -11: **Hatchery technology-** Components and general design of hatcheries. Different carp hatcheries.
- Unit -12: **Design of shrimp hatcheries.** Seed production and nursery rearing of *Penaeus monodon* and *Macrobrachium rosenbergii*. Various components, equipments and infrastructure facilities required.

**B.Sc ZOOLOGY SYLLABUS UNDER CBCS
FOR VI ..SEMISTER**

**ELECTIVE - VIA
FISH GENETICS AND SEED PRODUCTION TECHNOLOGY**

LABORATORY MANUAL & RECORD

BLOCK..1; FISH GENETICS

Unit-1: Microscope training.

Unit -2: Karyotyping (Fish chromosomes/ Human chromosomes)

Unit -3: Histological study of fish endocrine glands (Pituitary, Liver, Stomach, Intestine, Kidney, Testis, Ovary):

(i) Staining and identification of supplied histological slide.

(ii) Submission of permanent histological slide.

BLOCK..2; SEED PRODUCTION TECHNOLOGY

Unit -4: Dissection and collection of fish pituitary gland, preservation.

Unit -5: Pituitary extract preparation, doses determination and injection to the brood fishes.

Unit -6: Identification of ovary maturation stages in carp.

Unit -7: Estimation of gonad volume, fecundity, gonadosomatic index.

Unit -8: Identification of aquatic insect, aquatic weeds, fish seeds of cultivable fish species, fish food organisms.

Unit -9: Estimation of Nucleic acid- DNA/RNA, experiment of eye stalk ablation.

Unit -10: Submission of field note book. (Atleast three field study tours covering fresh water, brakish water, hatchery and mariculture centre).

**B.Sc ZOOLOGY SYLLABUS UNDER CBCS
FOR VI ..SEMISTER**

ELECTIVE - VI B

SILKWORM BREEDING AND SEED PRODUCTION TECHNOLOGY

BLOCK...1 .. SILKWORM BREEDING

Unit-1 ; **Introduction to silkworm breeding**- inbreeding and out breeding concepts- objectives of silkworm breeding-techniques- different types of breeding methods- line breeding, cross breeding and mutation breeding.

Unit-2 ; **Selection: Methods**- individual and mass selection- fixation of characters- evolution of new breeds- race authorization.

Unit-3 ; **Heterosis and hybrid vigour**-exploitation of heterosis in silkworm- concept of single, double and polyhybrids.

BLOCK...1 .. SILKWORM SEED PRODUCTION:

Unit-4 ; **Silkworm seed, Grainages** ; A general account of silkworm seed, grainages, Silkworm seed organisation; Basic seed multiplication centres-P4, P3, P2 and P1; maintenance of seed crops. Seed cocoon markets- Seed Legislation Act.

Unit-5 ; Pupal examination, certification of seed cocoon lots- price fixation for seed cocoons.

Unit-6 ; **Seed production grainages**- types of grainages- organisation and functions of grainages- plan for model grainage- grainage equipments and their use - Disinfection and hygiene in seed production units. Seed production plan.

Unit-7 ; **Seed cocoons** ; Procurement and transportation of seed cocoons- processing and preservation of seed cocoons- sex separation in seed cocoons.

Unit-8 ; **Moth** emergence and synchronisation; sex separation in moth; effect of improper synchronisation on egg hatching and quality-safe duration.

Unit-9 ; Coupling and decoupling; oviposition; method of egg production; refrigeration of male moths; mother moth examinations- individual and mass methods- dry moth examination; environmental conditions for grainage activity.

Unit-10 ; **Egg disinfection**- handling of multivoltine eggs-preservation of eggs to postpone hatching- ideal embryonic stages for cold storage- maximum duration of cold storage. Handling of bivoltine eggs for early hatching- physical and chemical methods- hot and cold acid treatment.

Unit-11 ; **Hatching** ; Postponement of hatching; hibernation schedule for 3, 4, 6 and 10 month's duration.

Unit-12 ; Preparation of loose egg- advantages- handling of loose eggs; Incubation of eggs.

CBCS structure of B.Sc Geology
Dr.B.R.Ambedkar Open University

Year	Semester	Course type	Name of the Course	No: Credits (Theory)	NO: of Credits (Practical)
I	I	CC-1	General Geology	4	1
	II	CC-2	Crystallography and Mineralogy	4	1
II	III	CC-3	Igneous Petrology	4	1
	IV	CC-4	Sedimentary and Metamorphic petrology	4	1
III	v	CC-5	Structural Geology and Economic Geology	4	1
		DSE-1/DSE2	Mineral Exploration and Mineral Economics/ Hydrogeology	4	1
	VI	CC-6	Indian Geology and Palaeontology	4	1
		DSE-3/DSE4	Environmental Geology/ Mining Geology and Ore Dressing	4	1
		SEC-1	Photo Geology, Remote sensing and GIS	2	
		SEC-2	Geochemistry	2	

Geology

CC-I (Common core-I) Theory- General Geology

Block-I General Geology

Unit-1 Introduction, Scope and development of Geology

Unit-2 Solar System-Origin, mass, density and atmosphere

Unit-3 Earth -origin, age, size, internal structure.

Block-II Orogeny

Unit-4 Mountains

Unit-5 Earthquakes

Unit-6 Volcanoes

Block-III External processes-1

Unit-7 Rock weathering

Unit-8 Rivers

Unit-9 Groundwater

Block-IV External processes-2

Unit-10 Glaciers

Unit-11 Lakes and Seas

Unit-12 Wind

Core Course - I Practical General Geology

Block - I Physical Geology-1

Unit-1 Internal Constitution of Earth

Unit-2 Earthquakes

Unit-3 Volcanoes

Unit-4 Fluvial Land forms

Block - II Physical Geology-2

Unit-5 Landforms --Groundwater

Unit-6 Landforms -- Glaciers

Unit-7 Land forms - Seas and Oceans

Unit-8 Landforms-- Wind

CC-II (Common core-II) Theory-Crystallography and Mineralogy

Block-I Crystallography

Unit-1 Introduction to Crystallography and classification of crystals

Unit-2 Isometric (Cubic), Tetragonal and Hexagonal Systems

Unit-3 Orthorhombic, Monoclinic and Triclinic systems

Block-II Mineralogy

Unit-4 Introduction to mineralogy

Unit-5 Classification of minerals

Unit-6 Physical and Chemical properties of minerals

Block-III Mineral families

Unit-7 Neso, Soro, and Cyclo silicates

Unit-8 Ino, Phyllo and Tecto silicates

Unit-9 Other groups of minerals

Block-IV Optical Mineralogy

Unit-10 Scope and development of Optical mineralogy

Unit-11 Description of polarizing Microscope

Unit-12 Optical Properties of Minerals

Core Course - II Practical - Crystallography and Mineralogy

Block - I - Crystallography

Unit - 1 Concepts of Crystallography

Unit - 2 Identification of Crystal Models of Isometric (Cubic) System

Unit - 3 Identification of Crystal Models of Tetragonal and Hexagonal Systems

Unit - 4 Identification of Crystal Models of Orthorhombic, Monoclinic and Triclinic Systems

Block - II - Mineralogy

Unit - 5 Physical Properties of Minerals

Unit - 6 Megascopic Identification of minerals: Olivine, Garnet, Tourmaline, Beryl, Hypersthene, Enstatite, Augite, Diopside, Anthophyllite, Tremolite, Actinolite, Hornblende, Muscovite, Biotite, Orthoclase, Microcline, Plagioclase, Sodalite, Leucite, Quartz, Chalcedony, Opal, Beryl, Natrolite, Kyanite, Calcite, Corundum, Barytes, Talc, Apatite, Gypsum

Unit-7 Description of Polarizing Microscope

Unit-8 Microscopic identification of minerals: Olivine, Garnet, Hypersthene, Augite, Hornblende, Muscovite, Biotite, Orthoclase, Microcline, Plagioclase, Sodalite, Calcite, Apatite, Quartz.

Core Course-III: Theory- Igneous Petrology

Block-I Igneous Rocks

Unit-1 Introduction to Petrology and Classification of Rocks

Unit-2 Origin and types of Magmas

Unit-3 Composition and constitution of magmas

Block-II Igneous Rocks Properties

Unit-4 Forms of Igneous rocks

Unit-5 Structures of igneous rocks

Unit-6 Textures and Microstructures of Igneous rocks

Block-III Igneous Processes

Unit-7 Crystallization of magmas

Unit-8 Concept of rock series, system, phase and components

Unit-9 Rock Associations

Block-IV Igneous rocks: Origin and Classification

Unit-10 Origin of Igneous Rocks

Unit-11 Classification of igneous Rocks

Unit-12 Description of igneous rocks

Core Course-III Practical -Igneous Petrology

Block -I Igneous Rocks-1

Unit-1 Textures of Igneous Rocks

Unit-2 Structure of Igneous Rocks

Unit-3 Megascopic Identification of Plutonic Rocks

Unit-4 Megascopic Identification of Hypobysal Rocks

Block -II Igneous Rocks-2

Unit-5 Megascopic Identification of Volcanic Rocks

Unit-6 Microscopic Identification of Plutonic Rocks

Unit-7 Microscopic Identification of Hypobysal Rocks

Unit-8 Microscopic Identification of Volcanic Rocks

Core Course-IV: Theory-Sedimentary and metamorphic petrology

Block-I Sedimentary Rocks-1

Unit-1 Formation of Sedimentary rocks

Unit-2 Classification of Clastic rocks

Unit-3 Classification of Non Clastic rocks

Block-II Sedimentary Rocks-2

Unit-4 Sedimentary Textures

Unit-5 Sedimentary Structures

Unit-6 Description of Sedimentary rocks

Block-III Metamorphic Rocks

Unit-7 Metamorphism-Agents and kinds

Unit-8 Textures and Structures of Metamorphic Rocks

Unit-9 Types and Classification of Metamorphic Rocks

Block- IV Types of Metamorphism

Unit-10 Cataclastic and thermal Metamorphisms

Unit-11 Dynamothermal and Plutonic Metamorphisms

Unit-12 Description of metamorphic Rocks

Core Course-IV Practical- Sedimentary and metamorphic Petrology

Block-1 Sedimentary Rocks

Unit-1 Textures of sedimentary rocks

Unit-2 Structures of sedimentary rocks

Unit-3 Megascopic identification of Sedimentary Rocks

Unit-4 Microscopic identification of Sedimentary Rocks

Block -II Metamorphic Rocks

Unit-5 Textures of metamorphic rocks

Unit-6 Structures of metamorphic rocks

Unit-7 Megascopic Identification of Metamorphic Rocks

Unit-8 Microscopic Identification of Metamorphic Rocks

Core Course-V: Theory - Structural Geology and Economic Geology

Block - I Structural Geology

Unit-1 Introduction to Structural Geology

Unit-2 Primary Structures

Unit-3 Unconformities and Joints

Block - II Structures

Unit-4 Folds

Unit-5 Faults & Minor structures

Unit-6 Field Geology

Block-III Economic Geology-Ore formations

Unit-7 Introduction to Economic Geology

Unit-8 Magmatic Processes

Unit-9 Secondary, Organic and Metamorphic processes

Block-IV Description of Mineral deposits

Unit-10 Metallic minerals

Unit-11 Non-metallic minerals

Unit-12 Fuels and Radio- active minerals

Core Course-V Practical- Economic Geology and Structural Geology

Block - I Structural Geology

Unit -1 Topographic and Geological maps

Unit-2 Mapping of Conformable Beds, folds and Faults

Unit-3 Geological problems- Thickness of Beds, Dip of Beds

Unit-4 Borehole Problems

Block-I1 Economic geology

Unit- 5 Identification of Ferrous and non-ferrous minerals

Unit - 6 - Identification of metallic Minerals- Haematite, Magnetite, Pyrolusite, Psilomelane, Chromite, Azurite, Malachite, Chalcopyrite, Pyrite, Galena, Sphalerite, Bauxite, Ilmanite.

Unit - 7 -Identification of Non- Metallic Minerals- Flourite, Graphite, Sillimanite, Corundum, Muscovite, Asbestos, Gypsum, Barytes.

Unit - 8 - Identification of Other Minerals- Beryl, Talc, Kyanite, Coal, Magnesite, calcite, Apatite.

Core Course-VI: Theory -Indian Geology and Palaeontology

Block-I Indian Geology-I

Unit-1 Principles of stratigraphy, geological time scale

Unit-2 Physiographic divisions of India

Unit-3 Azoic- Proterozoic groups

Block-II Indian Geology-II

Unit-4 Paleozoic- Mesozoic groups

Unit-5 Tertiary and Quaternary formations

Unit-6 Geology of Andhra Pradesh and Telangana

Block-III Palaeontology -I

Unit-7 Introduction to palaeontology

Unit-8 Conditions and kinds of fossilization & uses of fossils

Unit-9 Classification of Organisms

Block-IV Palaeontology -II

Unit-10 Foraminifera and Corals

Unit-11 Gastropods, Cephalopods and Pelecypods

Unit-12 Brachiopods, Echinodermata, Trilobites and Graptolites

Core Course - VI Practical - Palaeontology

Block - III- Palaeontology-I

Unit - 1 Study of Fossils

Unit -2 Identification of Fossils of Foraminifera and Corals

Unit - 3 Identification of Fossils of Gastropods,

Unit- 4 Identification of Fossils of Brachiopods,

Block IV Palaeontology - II

Unit-5 Identification of Fossils of Cephalopods

Unit-6 Identification of Fossils of Pelecypods

Unit -7 Identification of Fossils of Trilobites,

Unit- 8 Identification of Fossils of Echinoids and Graptolites.

Discipline Specific Elective-1 Mineral Exploration and Mineral Economics

Block-I Mineral Exploration-1

Unit-1 Principles and strategies of mineral exploration

Unit-2 Geological exploration I- Physiographic and Mineralogical Guides

Unit-3 Geological exploration II - Stratigraphic, lithological and Structural guides

Block-II Mineral Exploration-2

Unit-4 Geophysical Methods

Unit-5 Geochemical and Geobotanical Methods

Unit-6 Drilling Methods, sampling and estimation of ore deposits

Block-III Mineral Economics-1

Unit-7 Principles of Mineral Economics

Unit-8 Methods of mineral dressing

Unit-9 Classification of Minerals: Essential, Strategic and Critical

Block-IV Mineral Economics-2

Unit-10 National Mineral Policy

Unit-11 Conservation and Substitution

Unit-12 Growth of Mineral Industry- Mineral Legislation

DSE-1 Practicals- Mineral Exploration

Block-I Exploration Methods

Unit - 1 Geological Exploration methods

Unit - 2 Geochemical Exploration methods-contouring

Unit - 3 Geophysical Exploration Methods- 1 : Electrical Resistivity

Unit - 4 Geophysical Exploration Methods -2 : Gravity

Block - II: Estimation of Ore Reserves: I

Unit - 5 Basic Concepts of ore reserve estimation

Unit - 6 Estimation of ore reserves - Uniform spacing of Samples - Square

Quadrant method of Samples - Extended and Included methods

Unit - 7 Estimation of ore reserves - Uniform spacing of Samples -
Rectangular

Method of Samples - Extended and Included methods

Unit - 8 Estimation of ore reserves - Uniform spacing of Samples -
Rectangular Polygon method

Discipline Specific Elective-2 - Hydrogeology

Block-I Hydrogeology: Concepts

Unit-1 Hydrological cycle,

Unit-2 Aquifers –Properties, classification, Distribution of groundwater

Unit-3 Darcy's law and its validity

Block-2 Groundwater Exploration

Unit-4 Geological Exploration

Unit-5 Geophysical Exploration

Unit-6 Remote sensing and GIS for groundwater studies

Block-3 Groundwater pollution

Unit-7 Groundwater – Quality

Unit-8 Groundwater – Pollution

Unit-9 Sea water intrusion

Block-IV Applied aspects

Unit-10 Groundwater management

Unit-11 Watershed management

Unit-12 Groundwater modeling

DSE-2 Practicals - Hydrogeology

Block-I Groundwater Exploration

Unit-1 Water Balance Studies

Unit-2 Electrical methods

Unit-3 Well Inventory

Unit-4 Remote sensing and GIS Exploration methods

Block-II Groundwater Quality

Unit-5 Physical and Biological parameters

Unit-6 Chemical parameters

Unit-7 Groundwater suitability maps

Unit-8 Watershed maps

Discipline Specific Elective-3 - Environmental Geology

Block -I Environmental geology - Concepts

Unit-1 Principles of Environmental geology

Unit-2 Earth and its spheres, Earth's materials

Unit-3 Thermal environments of Earth's surface

Block-II Geological Hazards

Unit-4 Volcanos, Earthquakes and Tsunamis

Unit-5 landslides and subsidence

Unit-6 Floods, cyclones and drought

Block-III Resource and Environmental issues

Unit-7 Energy resources-Environmental Issues

Unit-8 Mineral Resources- Environmental issues

Unit-9 Water resources-Environmental Issues

Block-IV Global Environmental Issues

Unit-10 Global Warming-Climate Change

Unit-11 Ozone layer depletion

Unit-12 Acid Rain

DSE-2 Practical - Environmental geology

Block-I Environment Geology-I

Unit-1 Study of seismic maps

Unit-2 Air pollution studies

Unit-3 Noise pollution Studies

Unit-4 Soil pollution Studies

Block-II Environment Geology-II

Unit-5 Physical parameters

Unit-6 Chemical parameters

Unit-7 Industrial Effluents

Unit-8 Water suitability maps

Discipline Specific Elective-4 Mining Geology and Ore Dressing

Block-I Mining Geology -I

Unit-1 Introduction to mining

Unit-2 Methods of breaking the rocks

Unit-3 Drainage and pumping

Block-II Mining Geology - II

Unit-4 Mining methods

Unit-5 Coal mining

Unit-6 Mining- Environmental issues

Block-III Ore Dressing-I

Unit-7 Introduction to ore dressing

Unit-8 Crushing, Grinding and Sizing methods

Unit-9 Classification and Concentration methods

Block-III Ore Dressing-II

Unit-10 Gravity and Flotation

Unit-11 Magnetic and Electrostatic Separation

Unit-12 Flow sheets for important ores.

DSE-2 Practical's - Mining Geology Ore dressing

Block-I Estimation of ores-1

Unit-1 Mining Problems-1

Unit-2 Mining Problems-2

Unit-3 Estimation of ore reserves – Semi regular spacing of samples – Extended – Included methods

Unit- 4 Estimation of ore reserves – Irregular spacing of samples – Triangular and Polygon methods.

Block-II Estimation of ores-2

Unit – 5 Estimation of average Assay value in vein deposits – Regular spacing of Samples

Unit –6 Estimation of average assay value in vein deposits – irregular spacing of **Samples**.

Unit – 7 Estimation of Reserves in Block of ore

Unit – 8 Estimation of ore Tonnage and tonnage factor

Skill Enhancement Course-1 Photo geology, Remote sensing (RS) and GIS

Block - I Photo Geology and Remote sensing

Unit-1 Concepts of Photo Geology and Geometry of Aerial Photographs

Unit-2 Introduction to remote sensing

Unit-3 Remote sensing Platforms and sensors

Unit-4 RS data analysis

Block-II GIS and GPS

Unit-5 Geographic Information System (GIS)

Unit-6 GIS data analysis

Unit-7 Global position Systems (GPS)

Unit-8 Integration of RS, GIS and GPS

Skill Enhancement Course-2 Geochemistry

Block - I Geochemistry-1

Unit-1 Basic Concepts of Geochemistry

Unit-2 Periodic table

Unit-3 Composition of Planets, Meteorites and Earth

Unit-4 Analytical Techniques -I

Block - II Geochemistry-2

Unit-5 Geochemical Cycles

Unit-6 Geochemical classification and Distribution of elements

Unit-7 Water quality

Unit-8 Analytical Techniques -II