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2/7/11

**DEVI AHILYA VISHWAVIDYALAYA
INDORE**

**Syllabus for B.Sc. (Biochemistry) Semester Ist and IInd (2011-2012)
Semester Ist**

Unit 1.

Introduction to Biochemistry, Water as a biological solvent.
Carbohydrates: Structure, occurrence and biological importance of monosaccharides and disaccharides Stereoisomerism and optical isomerism of sugars. Ring structure, epimers, anomers and mutarotation. Important reactions of sugars. Important derivatives of monosaccharides.
Structure, occurrence and biological importance of oligosaccharides and polysaccharides. e.g. Cellulose, glycogen and starch, chitin, agar. Mucopolysachharides.

Unit 2

Fatty acids: Classification, structure and properties of saturated and unsaturated fatty acids. Essential fatty acids. Triacylglycerols, properties and characterization of fats – hydrolysis, saponification, halogenation, Acetyl number, Rancidity of fats, Reichert-Meissel number. Reaction of glycerol.
Glycerophospholipids (lecithins, cephalins, phosphatidyl serine, phosphatidyl inositol, plasmalogens), sphingomyelins, glycolipids- cerebrosides, sulfolipids, gangliosides. Cholesterol and Bile acids.

Unit 3

Amino acids: Structure and classification of amino acids, stereoisomerism, zwitter ion in aqueous solutions, physical and chemical properties, titration of amino acids, Isoelectric pH, Essential amino acids.
Peptides: Peptide bond, Determination of the amino acid sequence of a polypeptide chain, chemical and enzymatic cleavage of a polypeptide chains and separation of peptides.
Classification of proteins, behaviour of proteins in solutions, salting in and salting out of proteins, Denaturation and renaturation of proteins.

Unit 4

Protein structure: Levels of structure in protein architecture, primary structure of proteins, secondary structure of proteins – helix and pleted sheets, tertiary structure of proteins, forces and bonds stabilizing the structure proteins. Structure of fibrous proteins (keratins and collagen), globular proteins (hemoglobin and myoglobin).
Composition of DNA and RNA. Features of DNA double helix. Denaturation and annealing of DNA, Secondary and tertiary structure of DNA, Watson Crick model, A, B and Z type of DNA.
Different types of RNA and their role, Secondary and tertiary structure of RNA.

Unit 5.

Important Metalloporphyrins occurring in nature. Bile pigments- chemical nature and their physiological significance.
Hormones: Structure and biological functions of Insulin, Glucagon, Epinephrine, Thyroxine,
Structure, properties and role of fat soluble and water soluble vitamins, Coenzyme functions of vitamins.

R. J. D. S.
M. Anand Kumar

2011-12

LIST OF PRACTICALS FOR SEMESTER I

1. Qualitative tests for-carbohydrates, proteins, amino acids and lipids.
2. Determination of saponification value and iodine number of fats.
3. Estimation of ascorbic acid.
4. Titration curve for amino acids and determination of pK value.
5. Sorenson-formol titration for amino acid estimation
6. Isolation and assay of glycogen from rat

Scheme of examination

1. Identification of given sample (10 marks).
2. Quantitative estimation of given sample (20 marks)
3. Viva (10 marks)
4. Record (10 marks)

R. Indre ~~Wain~~ Bharaagar

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2011-12

B.Sc. (Biochemistry) Semester II

Unit 1.

Weak acids and bases, pH, buffers, Henderson-Hasselbalch equation, physiological buffers. Measurement of pH – Glass and reference electrodes, types of electrodes, complications of pH measurement (dependence of pH on ionic strength, electrode contamination and sodium error). Sedimentation- sedimentation velocity, preparative and analytical ultracentrifugation techniques, determination of molecular weight by hydrodynamic methods. Differential and density gradient centrifugation.

Unit 2.

General principle of chromatographic separation. Technique and applications of: Column adsorption and column partition chromatography, Paper chromatography, Thin-layer Chromatography. Technique and applications of: Ion-exchange chromatography, Gas chromatography, Molecular-sieve chromatography.

Unit 3

Technique and applications of: Affinity chromatography, Hydrophobic chromatography, HPLC. Basic principle and types of electrophoresis. Electrophoretic mobility. Factors affecting electrophoretic migration, Technique and uses of agarose electrophoresis, PAGE and SDS-PAGE, Two-dimensional electrophoresis and its importance. Isoelectric focussing.

Unit 4

Beer-Lambert law and its limitations, Light absorption and transmission, Extinction coefficient, Basic design of photoelectric colorimeter and spectrophotometer. Applications of uv-visible spectroscopic techniques. Flame Photometry. Atomic absorption spectrophotometry, Circular Dichroism and Optical Rotatory Dispersion, Principle and application of NMR and ESR techniques.

Unit 5

Characteristics of radioisotopes, units of radioactivity measurements, techniques used to measure radioactivity (gas ionization and scintillation counting), Autoradiography. Isotopes commonly used in biochemical studies – ³²P, ³⁵S, ¹⁴C and ³H, Isotopic labelling of biomolecules. Biological hazards of radiation and safety measures in handling radioisotopes. Biological applications of Radioisotopes.

R. Jindal

M. N. Bhatnagar

2011-12

LIST OF PRACTICALS FOR SEMESTER II

1. Preparation of standard buffers and determination of pH.
2. Verification of Beer-Lambert's Law.
3. Estimation of carbohydrate by anthrone method.
4. Estimation of blood glucose by Folin-Wu method.
5. Estimation of amino acids by ninhydrin method.
6. Separation of amino acids and sugars using paper and thin layer chromatography.

S. J. S. / Main / R. K. R. / R. K. R.

Devi Ahilya Vishva Vidyalaya

B.Sc. Syllabus 2011-12

(Industrial Microbiology - as one subject)

&
microbiology - common

B.Sc. I Year

Semester I

General Microbiology

70 marks

Practicals

50 marks

Semester II

Microbial Physiology and Biochemistry

70 marks

Practicals

50 marks

B.Sc. II Year

Semester III

Immunology and Bacterial Genetics

70 marks

Practicals

50 marks

Semester IV

Environmental Microbiology

70 marks

Practicals

50 marks

B.Sc. III Year

Semester V

Fermentation Technology

70 marks

Practicals

50 marks

Internship

100 marks

Semester VI

Food and Pharmaceutical Microbiology

70 marks

Practicals

50 marks

B.Sc. Part - I

Semester - I

2011-12

General Microbiology

CCE: 30 Marks + Semester End Exam: 70 Marks = Total: 100 Marks

Unit-I

History and Scope of Microbiology

- Contributions of Pioneers- Anton von Leeuwenhoek, Robert Koch, Edward Jenner, Louis Pasteur, Paul Ehrlich, Alexander Fleming, Joseph Lister
- Branches of Microbiology and its development
- Spontaneous generation v/s Biogenesis
- Place of microbes in Living World
- Beneficial and harmful microbes
- Microbes in extreme environments

Unit-II

Tools and Techniques in Microbiology

- Microscopy- Bright field, dark field, Fluorescence, Phase Contrast and Electron microscope.
- Colorimetry, Centrifugation, Electrophoresis
- Hot air oven, Autoclave, Laminar Air Flow
- Stains and Staining Techniques- Dyes: Classification and types;
- Types of staining- Simple (Monochrome, Negative), Differential (Gram & Acid Fast) and Special staining (Spore, Granules, Flagella, Spirochaetes)
- Wet mount and Hanging drop preparation

Unit -III

Taxonomy and Morphology of Bacteria

- Classification systems of prokaryotes
- Bacterial nomenclature
- Size, shape & arrangement of bacterial cells
- Cell wall of Gram positive and negative bacteria (Protoplast & Spheroplast)
- Structures external to the cell wall- flagella, pili, capsule, sheath, prosthecae
- Structures internal to the cell wall- cell membrane, nuclear material, Spores, cytoplasmic inclusions, magnetosomes, plasmids

2011-12

Unit-IV

Eucaryotes, Acaryotes and Bacteria with unusual properties

- General characters and economic importance of – Fungi (Yeast & Moulds), Algae and Protozoans
- Introduction to acellular forms of life- Viruses, Virioids, Prions
- Structure of Bacterial Viruses
- Classification and cultivation of Viruses
- Multiplication of Bacterial Viruses
- Bacteria with unusual properties- Rickettsia, Chlamydia, Mycoplasma, Archaeobacteria, Cyanobacteria, Actinomycetes

Unit- V

Control of Microorganisms

- Fundamentals of control
- Physical methods of control- Temperature, radiation, dessication, osmotic pressure and filtration
- Chemical methods of control- Phenol, alcohol, halogens, heavy metals, dyes, detergents, quaternary ammonium compounds, aldehydes and gaseous chemosterilizers
- Evaluation of antimicrobial potency of disinfectants and antiseptics- Tube dilution method, Agar diffusion method, Phenol coefficient

Practicals

1. Principles, working knowledge of Instruments like Autoclave, pH meter, Incubator, Hot air oven, Centrifuge, Microscope, Refrigerator, Colony counter, Laminar Air Flow.
2. Neutralization, cleaning and sterilization of glassware.
3. Measurement of microorganisms.
4. Preparation of culture media like Nutrient Agar and its uses.
5. Preparation of stains.
6. Motility of bacteria by Hanging drop method.
7. Staining procedures I- Simple staining – Monochrome staining and Negative staining.
8. Staining procedures II- Differential staining - Gram Staining and Acid Fast Staining.
9. Staining procedures III- Special / Structural staining - Cell wall staining, Capsule staining, Metachromatic Granule staining, Endospore staining, Spirochete staining.
10. Identification of some common fungi.



2011-12

Examination Scheme

- Ex.1 Perform Gram Staining of given bacterial culture. [12]
- Ex.2 Perform Structural / Special Staining (Cell wall staining, Capsule staining, Metachromatic Granule staining, Endospore staining, Spirochete staining). [10]
- Ex.3 Perform wet mount of given fungal strain. [10]
- Ex.4 Spotting. [8]
- Ex. 5 Viva-Voce. [5]
- Ex. 6 Practical Record. [5]

References

Microbiology	-	Pelczar, Chan
Microbiology	-	Prescott, Harley and Klein
Alcamo's Fundamentals of Microbiology	-	Pommerville
Elementary Microbiology	-	H.A. Modi
The Microbial World	-	Roger Stanier
Fundamentals of Microbiology	-	Frobisher Hinsdill
Fundamental Principles of Bacteriology	-	A.J. Salle
Textbook of Microbiology	-	R.C. Dubey
Microbiology- A Human Perspective	-	Nester, Roberts
Foundations in Microbiology	-	Kathleen Talaro
General Microbiology (Vol I, II, III)	-	Powar & Daginawala
Microbial Physiology	-	Moat & Foster
General Microbiology	-	Hans G. Schlegel
Microbiology - a practical approach	-	Bhavesh Patel and Nandini Phanse

2011-12

B.Sc. Part - I

Semester - II

Microbial Physiology and Biochemistry

CCE: 30 Marks + Semester End Exam: 70 Marks = Total: 100 Marks

Unit-I Cultivation and Preservation of Bacteria

- Nutrition and nutritional types of bacteria
- Bacteriological media and its types
- Cultivation of aerobic and anaerobic microbes
- Pure culture and cultural characteristics
- Maintenance and preservation of cultures

Unit-II Bacterial growth

- Mathematical expression of bacterial growth
- Growth curve of bacteria
- Batch, continuous, synchronous and diauxic growth
- Factors affecting microbial growth
- Quantitative measurement of bacterial growth by cell mass, cell number and cell activity products

Unit -III Enzymes

- General characters, classification and nomenclature of enzymes
- Factors affecting enzyme activity
- Mechanism of enzyme action
- Regulation of enzyme activity
- Applications of enzymes

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Unit-IV

Basic Biochemistry

- Bonds of life- covalent, ionic and hydrogen bonds
- General properties, classification and functions of – Carbohydrates, Lipids, Amino acids, Proteins, Nucleic acids

Unit- V

Bioenergetics & Metabolism

- Principles of Bioenergetics
- Modes of energy production- Photophosphorylation, Substrate level phosphorylation, Oxidative phosphorylation
- Catabolism- Carbohydrates-(Aerobic & Anaerobic)
- Proteins- (Proteolysis, Transamination, Deamination)
- Fats/Lipids- (Beta Oxidation)
- Bacterial Photosynthesis

Practicals

1. Isolation of microorganisms by streak plate method.
2. Isolation of microorganisms by pour plate method.
3. Growth of microorganisms on agar slants and agar stabs
4. Growth of microorganisms in broth.
5. Qualitative detection of carbohydrates, proteins and lipids.
6. Effect of environment on bacterial growth
 - a. Temperature
 - b. Osmotic pressure
 - c. pH
7. The lethal action of Ultraviolet light on growth.
8. The oligodynamic action of heavy metals on bacterial growth.
9. Comparative evaluation of antimicrobial agents.

2011-12

Examination Scheme

- Ex.1 Perform isolation of microorganisms by streak plate / pour plate method. [12]
- Ex.2 Study the effect of
 - a. Environmental condition on bacterial growth – Temperature or pH
 - b. Lethal action of Ultra-Violet light on bacterial growth.
 - c. Oligodynamic action of heavy metals on bacterial growth. [10]
- Ex.3 Perform the qualitative analysis of given biomolecules – Carbohydrates, Proteins and Lipids. [10]
- Ex.4 Spotting. [8]
- Ex. 5 Viva-Voce. [5]
- Ex. 6 Practical Record. [5]

References

Microbiology	-	Pelczar, Chan
Microbiology	-	Prescott, Harley and Klein
Alcamo's Fundamentals of Microbiology	-	Pommerville
Elementary Microbiology	-	H.A. Modi
The Microbial World	-	Roger Stanier
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General Microbiology (Vol I, II, III)	-	Powar & Daginawala
Microbial Physiology	-	Moat & Foster
Fundamentals of Biochemistry	-	J.L. Jain
General Microbiology	-	Hans G. Schlegel
Microbiology – a practical approach	-	Bhavesh Patel and Nandini Phanse

Devi Ahilya Vishwavidyalaya, Indore

**Syllabus for B.Sc. (2011 Onwards)
Subject: Life Science (As one Subject)**

CCE: 30 marks; Semester end examination: 70 marks; Total: 100 marks

Semester I

Biochemistry and Cell biology
Practicals: 50 marks

Semester II

Environmental biology, Genetics and evolution
Practicals: 50 marks

Semester III

Morphology, Developmental biology and Physiology of Angiosperms
Practicals: 50 marks

Semester IV

Morphology, Developmental biology and Physiology of Mammals
Practicals: 50 marks

Semester V

Microbiology, Immunology and Animal Cell culture
Practicals: 50 marks

Semester VI

Molecular biology, Genetic engineering and Plant tissue culture
Practicals: 50 marks

Devi Ahilya Vishwavidyalaya, Indore
Syllabus for B.Sc. (2011 Onwards)
Subject: Life Science (As one Subject)
B. Sc. I Year
Semester I

Biochemistry and Cell Biology

CCE: 30 marks; Semester end examination: 70 marks; Total: 100 marks

Unit I

Carbohydrates: Classification, Structure and function
Lipids: Structure and function
Vitamins: Structure and function

Unit II

Proteins: Classification, Structure and function
Nucleic acids: Structure and function
Enzymes: Types and Factors affecting enzyme activity

Unit III

Structure of Prokaryotic and Eukaryotic Cell.
Structure and function (Outline) of Plasma membrane, Endoplasmic reticulum, Golgi apparatus, Lysosomes, Ribosomes, Microtubule, microfilaments and intermediate filaments.

Unit IV

Structure and function (Outline) of following organelles: Mitochondria, Chloroplast, Nucleus. Structure of Chromosomes, Polytene and Lampbrush Chromosome. Cell cycle and cell division (Mitosis and Meiosis).

Unit V

Elementary idea of techniques
Microscopy: Light (Bright field, dark field), Phase contrast, Fluorescence, Electron (SEM and TEM)
Chromatography: Paper, Thin layer, Ion exchange, Gel filtration
Spectroscopy: Beer Lambert's Law, UV and Visible spectroscopy
Electrophoresis: Agarose Gel, SDS PAGE, Native PAGE.

List of Practicals

- 1) Qualitative tests for carbohydrates, lipids and proteins.
- 2) Quantitative estimation of starch and protein.
- 3) Effect of temperature, pH and concentration on enzyme activity.
- 4) Chloroplast isolation from spinach leaves and demonstration of Hill's activity
- 5) Study different stages of mitosis and meiosis.
- 6) Study of special types of chromosomes.
- 7) Paper chromatography.
- 8) Thin layer chromatography.
- 9) Demonstration of Gel electrophoresis

2011-12

Scheme of Practical Examination

I Semester

MM: 50

Time duration: 4 hrs.

- | | |
|---------------------|----------|
| 1. Major exercise | 12 Marks |
| 2. Major exercise | 12 Marks |
| 3. Minor exercise | 06 Marks |
| 4. Spotting | 05 Marks |
| 5. Viva-voce | 05 Marks |
| 6. Practical record | 05 Marks |
| 7. Project | 05 Marks |

Devi Ahilya Vishwavidyalaya, Indore
Syllabus for B.Sc. (2011 Onwards)
Subject: Life Science (As one Subject)
B. Sc. I Year
Semester II

Environmental Biology, Genetics and Evolution

CCE: 30 marks; Semester end examination: 70 marks; Total: 100 marks

Unit I

Ecosystem concept- structure and function, ecological pyramids, energy flow in ecosystem. Food chain, food web and trophic levels. Ecological factors (Light, temperature, positive biotic interactions and negative biotic interactions)
Ecological Adaptation of plants and animals (aquatic and desert)
Ecological succession: Hydrosere and Xerosere

Unit II

Sources, nature and biological effects of air and water pollutants
Ozone layer depletion, acid rain and global warming (Green house effect)
Biogeochemical cycles: Nitrogen, Carbon, Sulphur, Phosphorus
Biofertilizers: Rhizobium, azotobacter, azolla, nostoc, PSM and VAM
Biopesticides: Bacillus thuringiensis and its importance

Unit III

Mendelian Laws of inheritance, Incomplete dominance, codominance, epistasis, Complementary ratio and supplementary ratio, Cytoplasmic inheritance; plastid and kappa particle.
Linkage and Crossing over (Coupling and repulsion hypothesis) Mechanism of crossing over and its importance.
Mechanism of sex determination (Chromosomal theory), sex linked inheritance

Unit IV

Structural and numerical chromosomal aberrations.
Chromosome related disorders: Klinefelter's syndrome, Turners syndrome, Down's syndrome and Cri-du-chat syndrome
Mutations- Spontaneous and induced
Chemical and physical mutagens
Molecular basis and its significance

Unit V

Theories of Organic evolution: Lamarckism and Neo Lamarckism, Darwinism and Neo Darwinism, Germplasm theory, Mutation theory
Gene pool, Random genetic drift, Hardy Weinberg law
Isolation and types of isolating mechanisms (Pre mating and post mating)
Instantaneous and Gradual speciation

2011-12

List of Practicals

- 1) Determine the frequency, density and abundance of vegetation in a community by quadrat method.
- 2) Study ecological adaptations in hydrophytes and xerophytes.
- 3) Soil analysis (pH, temperature, moisture content, presence of inorganic radicals, etc).
- 4) Water analysis (Dissolved oxygen, Carbon dioxide, pH etc.)
- 5) Working out the laws of inheritance.
- 6) Study of chromosomal aberrations using charts.
- 7) Study of Biogeochemical cycles using charts.

Scheme of Practical Examination

II Semester

MM: 50

1. Major exercise
2. Major exercise
3. Minor exercise
4. Spotting
5. Viva-voce
6. Practical record
7. Project

Time duration: 4 hrs.

- 12 Marks
- 12 Marks
- 06 Marks
- 05 Marks
- 05 Marks
- 05 Marks
- 05 Marks

Syllabus
B.Sc. (Biotechnology)

wef 2011-12

Subject- Biotechnology (as one subject)
30 Marks CCE + 70 Marks End Semester = 100marks each paper

B.Sc. I Year wef 2011-12

Semester I

Paper I: Biochemistry and Analytical Techniques 70 marks
Practicals 50 marks

Semester II

Paper II: Cell Biology & Metabolism 70 marks
Practicals 50 marks

B.Sc. II Year wef 2012-13

Semester III

Paper III: Molecular Biology 70 marks
Practicals 50 marks

Semester IV

Paper IV: Microbial Biotechnology 70 marks
Practicals 50 marks

B.Sc. III Year wef 2013-14

Semester V

Paper V: Immunology and Animal Biotechnology 70 marks
Practicals 50 marks
Internship 100 marks

Semester VI

Paper I: Plant and Environmental Biotechnology 50 marks
Practicals 50 marks

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B.Sc. I YEAR (BIOTECHNOLOGY)

Semester I

Paper I: Biochemistry and Analytical Techniques

2011-12

MM: 70

Unit I

Carbohydrates: Introduction and biological importance.

Structure and properties of - Aldose, Ketose; open chain and ring structure pyranose and furanose, Monosaccharide sugars (glyceraldehydes, Di hydroxy acetone, erythrose, ribose, glucose, fructose, concept of reducing and non reducing sugars), Disaccharide (maltose, sucrose, lactose), Oligosaccharide (raffinose) and Polysaccharide (starch, amylose and amylopectin, glycogen, peptidoglycan, cellulose, proteoglycan matrix)

Lipids: Introduction, Classes, Fatty acids [saturated, unsaturated, branched, even chain and odd chain, essential fatty acids, Physical properties, Chemical properties, Saponification value, acid value, iodine number, rancidity]. Structure and function of phospholipids, Sphingolipids and cholesterol.

Unit II

Amino acids: Structural and nutritional classification, properties of amino acids. Acid base behavior, Zwitterions, Color reaction of amino acids (Ninhydrin test).

Protein structure: Peptide bond, outline of primary, secondary, tertiary and quaternary structure of proteins and their examples. Structural and functional proteins. Forces stabilizing secondary, tertiary and quaternary structure with examples.

Unit III

Enzymes: Outlines of enzyme classification. Active site, energy of activation, transition state hypothesis, lock and key hypothesis, induced fit hypothesis. Concept of Km, Michaelis Menten equation. Enzyme activation, various types of enzyme inhibition and identification using double reciprocal plot. Introduction to Allosteric enzymes. Definition of holoenzyme, apoenzyme, coenzyme, cofactor, prosthetic group and their examples. Concept of ribozyme, multiple forms, isozymes and abzymes.

Watson Crick model of DNA structure. Types of DNA (A, B, Z and differences in their structure and occurrence) and RNA (hn RNA, m RNA, r RNA, t RNA).

Unit IV

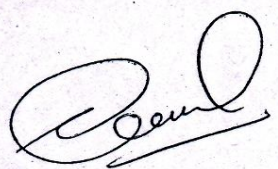
Light Microscopy and Electron microscopy.

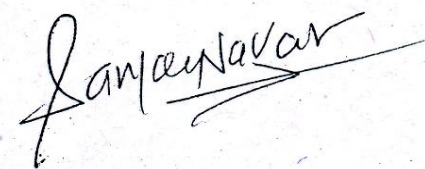
Colorimetry and UV- Visible Spectrophotometry,

Electrophoresis Techniques and applications: Agar gel, Starch gel, PAGE (native and denature) and Agarose gel electrophoresis.

Unit V

Concept and types of Chromatography; Paper chromatography, Thin layer chromatography, Gas chromatography, Gel filtration chromatography, Ion exchange chromatography. Affinity chromatography and HPLC.

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2011-12

EXPERIMENTS

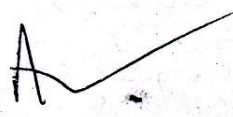
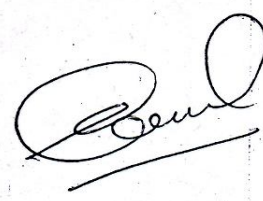
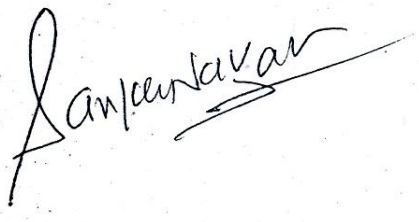
1. Principles and working knowledge of instruments like Colorimeter, pH meter, Centrifuge, Spectrophotometer, Microscope etc.
2. Qualitative analysis of Carbohydrates, Proteins and Lipids.
3. Quantitative estimation of Protein by Folin-Lowry unitary method.
4. Quantitative estimation of sugar by Nelson Somogy's unitary method.
5. Quantitative estimation of sugar by DNS method.
6. Analyzing the enzyme activity.
7. Study the effect of pH on enzyme activity.
8. Study the effect of temperature on enzyme activity.

EXAMINATION SCHEME

- | | |
|--|------|
| 1. Quantitative analysis of by Proteins /Carbohydrates by unitary method | (12) |
| 2. Qualitative detection of carbohydrates, proteins and lipids. | (10) |
| 3. Study the effect of pH/temperature on enzyme activity | (10) |
| 4. Spotting | (08) |
| 5. Viva- Voce | (05) |
| 6. Practical Record | (05) |

RECOMMENDED BOOKS

1. Principles of Biochemistry, Author- Lehniger
2. Fundamentals of Biochemistry, Author- J. L. Jain
3. Biochemistry, Author- Voet and Voet.
4. Textbook of Biochemistry- S.P. Singh.
5. Biochemistry, Author- Stryer.
6. Introduction to protein structure, Authors- Branden and Tooze.
7. Principles of Biochemistry, Authors – Zubey, Parson and Vance.
8. Experiments in Biotechnology, Nighojkar and Nighojkar.

B.Sc. I YEAR (BIOTECHNOLOGY)
Semester II
Paper II: Cell Biology & Metabolism

2011-12

MM: 70

Unit I

Discovery of Cell and Cell Theory; Cell, tissue, organ and organism and different levels of organization of otherwise genetically similar cells.
Comparison of prokaryotic and eukaryotic cells.
Cell division and Cell cycle. Anomalies in Cell Division.

Unit II

Cell synchrony and its applications.
Cell-cell interactions. Cell-Signaling.
Cell locomotion.
Cell senescence and death.
Cell differentiation.

Unit III

Structure and function of prokaryotic and eukaryotic Cell wall and Plasma membrane;
Modification of plasma membrane and intracellular junctions; Cytoskeleton; Protoplasm;
Mitochondria; Chloroplast; ER; Golgi complex; Lysosome, Endosome and Microbodies; Ribosome; Centriole;
Nucleus; Chemical components of a cell.


Unit IV

Carbohydrate Metabolism – Aerobic & Anaerobic glycolysis, sequence of reactions and energy yield in glycolysis, and citric acid cycle, regulation in glycolysis, glycogenesis, glycogenolysis, Pentose-phosphate pathway, Oxidative Phosphorylation and ETC.

Unit V

Amino acid Metabolism – Amino acid breakdown (transamination, deamination, Urea cycle) diseases associated with defects in amino acid metabolism. An overview of biosynthesis of essential & non-essential amino acids.

Lipid Metabolism – beta oxidation of saturated fatty acids, oxidation of unsaturated fatty acids, oxidation of odd chain fatty acids, energy yield, ketone bodies.

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2011-12

EXPERIMENTS

- 1 To study the plant cell structure using various plant material.
- 2 Study the different stages of mitosis and meiosis.
- 3 Study of permanent slides like cell division, prokaryotic and eukaryotic cells, Muscles and Nerve cells, T.S. of stomatal cells
- 4 To study the animal cell structure using cheek cells.
- 5 Isolation of starch from potato.
- 6 Histochemical localization of lignin.
- 7 Observe various stages of mitosis in onion root tip.
- 8 Separation of amino acids by thin layer chromatography.

Scheme of Practical Examination

1. Observe different stages of mitosis in the given sample.	12
2. Study of plant/animal cell structure.	10
3. Perform thin layer chromatography for the given sample.	10
4. Spotting	08
5. Viva.	05
6. Practical Record.	05

RECOMMENDED BOOKS

1. Molecular biology of the cell, Alberts.
2. Molecular cell biology, Lodish Scientific American Books, Inc.
3. Cell in Development and Inheritance, EB Wilson.
4. Cell Biology, P.S. Verma and Agrawal.
5. Experiments in Biotechnology, Nighojkar and Nighojkar.

A

Paul

Sampayan

Syllabus of B.Sc. (Bioinformatics)

Subject- Bioinformatics (as one subject)

B.Sc. I Year *wef. 2011-12*

Semester I

Paper I: Basic of Bioinformatics 70 marks
Practicals 50 marks

Semester II

Paper II: Mathematics I 70 marks
Practicals 50 marks

B.Sc. II Year *wef 2012-13*

Semester III

Paper III: Structural Bioinformatics 70 marks
Practicals 50 marks

Semester IV

Paper IV: Mathematics II 70 marks
Practicals 50 marks

B.Sc. III Year *wef 2013-14*

Semester V

Paper I: Computer graphics, Machine learning and Bioperl 70 marks
Practicals 50 marks

Semester VI

Paper I: Informatics in omics and application 70 marks
Practicals 50 marks

30 Marks 2CCE + 70 Marks End Semester Examination = 100 Marks for Each Paper

Paul
Sampath
04/7/11

2011-12

B.Sc. BIOINFORMATICS

**I year
SEMESTER-I**

Paper I –Basic of Bioinformatics

Max. marks-70

Unit I Introduction to bioinformatics and data generation

What is bioinformatics and its relation with molecular biology. Examples of related tools(FASTA, BLAST, BLAT, RASMOL), databases(GENBANK, Pubmed, PDB) and software(RASMOL,Ligand Explorer).

Data generation; Generation of large scale molecular biology data. (Through Genome sequencing, Protein sequencing, Gel electrophoresis, NMR Spectroscopy, X-Ray Diffraction, and microarray).

Applications of Bioinformatics.

Unit II Biological Database and its Types

Introduction to data types and Source. Population and sample, Classification and Presentation of Data. Quality of data, private and public data sources.

General Introduction of Biological Databases;

- Nucleic acid databases (NCBI, DDBJ, and EMBL).
- Protein databases (Primary, Composite, and Secondary).
- Specialized Genome databases: (SGD, TIGR, and ACeDB).
- Structure databases (CATH, SCOP, and PDBsum)

Unit III Data storage and retrieval and Interoperability

Flat files, relational, object oriented databases and controlled vocabularies. File Format (Genbank, DDBJ, FASTA, PDB, SwissProt).

Introduction to Metadata and search; Indices, Boolean, Fuzzy, Neighboring search.

The challenges of data exchange and integration. Ontologies, interchange languages and standardization efforts.

General Introduction to XML, UMLS, CORBA, PYTHON and OMG/LIFESCIENCE.

Unit IV Sequence Alignments and Visualization

Introduction to Sequence alignments and Dynamic Programming;

Local alignment and Global alignment (algorithm and example),

Pairwise alignment (BLAST and FASTA Algorithm) and multiple sequence alignment (Clustal W algorithm).

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Methods for presenting large quantities of biological data: sequence viewers (Artemis, SeqVISTA), 3D structure viewers (Rasmol, SPDBv, Chime, Cn3D, PyMol), Anatomical visualization.

Unit V Gene Expression and Representation of patterns and relationship

General introduction to Gene expression in prokaryotes and eukaryotes, transcription factors binding sites. SNP, EST, STS.

Introduction to Regular Expression, Hierarchies, and Graphical models (including Markov chain and Bayes notes).

Genetic variability and connections to clinical data.

A Paul Sanjayavar

2011-12

B.Sc. BIOINFORMATICS

**I year
SEMESTER-II**

Paper II - Mathematics I

Max. marks-70

Unit I

Sets, Types of Sets, Subsets, Complement of Sets, union and Intersection of Sets, Difference of Sets, Demorgan's Law, Cartesian product of Sets.

Basics of Probability, Permutation and Combination.

Unit II

Measure of central tendency and dispersion: Mean, median, mode, range, standard deviation, variance

Unit III

Correlation and Regression: types, Methods of calculation Karl-pearson's, Spearman's Regression equation and fitting

Unit IV

**Probability Distribution: Basics of Binomial, Poisson and Normal distributions and their application in biology.
Random Variable; Discrete and Continuous Probability Distribution, Probability mass function, probability Density function, Mathematical Expectation.**

Unit V

**Matrices, Types of Matrices, Addition of matrices, Subtraction of matrices and Product of matrices.
Properties of Matrix Multiplication. Transpose of Matrix, Symmetric and Skew-symmetric Matrices, Inverse of Matrix**

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DEVI AHILYA VISHWAVIDYALAYA, INDORE



Faculty of Science

B.Sc. (Pharmaceutical Chemistry)

Courses of Studies for the Examination of:

- B.Sc. I Semester (2011-12 & Onwards)
- B.Sc. II Semester (2011-12 & Onwards)

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INDORE (M.P.)-452 001**

DEVI AHILYA VISHWAVIDYALAYA, INDORE
UNDER GRADUATE SEMESTER WISE SYLLABUS

Session 2011-2012 & Onwards

SCHEME OF MARKS

Syllabus of B.Sc. Pharmaceutical Chemistry

B.Sc. I Year


Semester I

Organic Pharmaceutical Chemistry	70 marks
Practicals	50 marks

Semester II

Inorganic Pharmaceutical Chemistry	70 marks
Practicals	50 marks

30 Marks two CCE + 70 Marks Semester Examination = 100 Marks for Each Paper

 Sharma
27-6-2011
(Chairman, Board of studies in
chemistry)

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2011-12

**SEMESTER I
ORGANIC PHARMACEUTICAL CHEMISTRY**

Max. Marks: 70

UNIT I Introduction to Pharmaceutical Chemistry

- Pharmacy and pharmaceutical chemistry as a career.
- ~~Important aspects of pharmaceutical chemistry.~~
- Importance of chemistry in pharmacy.
- History of pharmacopoeia.

Drug: Classification and Sources

- Classification of drugs.
- Sources and uses of natural drug products- Biological (plants, animals and microbes), Geographical, Marine and Mineral sources.

UNIT II Drug

- Introduction to biological defenses.
- Theories of drug action: Surface active agents, Metabolic antagonism, Enzyme neutralizers
- Mechanism of drug action.

Drug Receptors

- Introduction to drug receptors.
- Nature of drug receptors.
- Different bondings involved in drug-receptor interactions.
- Drug receptor theories

UNIT III Drug Absorption

- Routes of Drug Administration.
- Absorption of Drugs and factors affecting Absorption.

Physiology of Biomolecules

- Physiological Functions of Carbohydrates, Lipids and Proteins.
- Digestion and biological oxidation of Carbohydrates, Fats and Proteins.

UNIT IV Medicinal System

- Different types of medicinal systems.
- Study of liquid solutions such as Aromatic waters, Solutions and Lotions.

Extraction Methods

- Extraction methods: percolation, maceration and infusion.
- Manufacturing procedure of crude extracts such as tinctures and infusions.

UNIT V Dispensing Pharmacy

- System of weights and measures in pharmacy.
- Dilution and concentration of formulation.
- Calculation by Alligation method: Alligation medial and Alligation alternate.

Pharmaceutical Dosage

- Meaning of pharmaceutical Dose and Dosage Formulae.
- Factors affecting Pharmaceutical Dose, Types of drug-drug antagonism.

30 Marks two CCE + 70 Marks Semester Examination=100 Marks for Each Paper

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SEMESTER I

Books Recommended

2011-12

1. G.R.Chatwal, Pharmaceutical Chemistry Organic Vol. II, Himalaya Publishing House, Bombay.
2. Dr.J.L.Jain, Fundamentals of Biochemistry, S.Chand & Company Ltd. New Delhi.
3. F.S.K.Barar, Essentials of Pharmacotherapeutics, S.Chand & Company Ltd. New Delhi.
4. R.S.Gaud & Dr. G.D.Gupta, Practical Pharmaceutics, CBS Publishers and Distributors, New Delhi
5. N.C.Choudhary and N.K.Gurbani, Pharmaceutical Chemistry. Vallabh Prakashan, Delhi.
6. N.K.Jain, Textbook of Professional Pharmacy. Vallabh Prakashan, Delhi.
7. B.M.Mithal., A text book of Pharmaceutical formulation. Vallabh Prakashan, Delhi.
8. Stenlake & Beckett, Practical Pharmaceutical Chemistry Part I, CBS Publishers and Distributors. New Delhi.

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SEMESTER I

2011-12

PRACTICAL: PHARMACEUTICAL CHEMISTRY

Max. Marks: 50

Examination: 4 hours

- I Preparation of pharmaceutical compounds: 12 Marks
(a) Aspirin (b) Acetanilide (c) Chrome alum (d) Potash alum (e) Mohr's salt
(f) Salicylic acid (g) Zinc oxide (h) p-bromoacetanilide (i) Anthraquinone
from anthracene (j) Reduction of nitro benzene, etc.

- II Volumetric estimation: 12 Marks
Acid – base titration
(a) Strong acid with strong base (b) Weak acid with strong base
(c) Weak base with strong acid.

- III Saponification, Iodine value of oil 12 Marks

- IV Viva 06 Marks

- V Practical record 08 Marks

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SEMESTER II

2011-12

3

-INORGANIC PHARMACEUTICAL CHEMISTRY

Max. Marks: 70

UNIT I Impurities in Pharmaceutical Substances

- Sources of impurities in pharmaceutical chemicals.
- Effect of impurities.
- Permissible impurities in pharmaceutical substances.

Purification of Pharmaceutical Substances

- Methods used to purify Inorganic Substances.
- Tests of purity.
- Limit test-Arsenic, Lead, Sulphate, Iron and other Heavy metals.

UNIT II Volumetric Estimation

- Introduction to volumetric estimation.
- Conditions, Requirement and Advantages of volumetric analysis.
- Primary standard and secondary standard.
- Methods of expressing concentration in volumetric analysis and numerical based on it.

Titration Methods

- Types of titration methods: Acid-base titrations, Non-aqueous titrations, Oxidation-Reduction titrations, Precipitation titrations, Complexometric titrations.

UNIT III Pharmaceutical Compounds I

9 Hrs

- Preparation and uses of: Alum, Aluminium hydroxide gel, Antimony potassium tartarate, Antimony sodium tartarate injection, Ammoniated mercury, Sodium antimony gluconate.
- Preparation and uses of: Ammonium chloride, Ammonium bicarbonate, Aromatic spirit of ammonia, Potassium iodide, Potassium permanganate, Chlorinated lime.

UNIT IV Pharmaceutical Compounds - II

- Preparation, properties and uses of : Boric acid, Borax, Plaster of paris, Potassium citrate, Magnesium containing antacids, Dicalcium phosphate, Sodium metaphosphate.
- Preparation, properties and uses of: Zinc oxide, Sodium benzoate, Lunar caustic (silver nitrate), Sodium fluoride, Potassium acetate, Zinc chloride.

UNIT V Colloidal System and Application

- Types of colloidal systems: Emulsions, Gels, Sols (Lyophobic and Lyophilic)
- Preparation of Lyophobic sols.
- Multimolecular, Macromolecular and Associated colloids.
- Protective action of Lyophilic colloids and Gold number.
- Properties of Colloidal Solutions: Physical, Mechanical, Optical and Electrical. Hardy Schulze law and Flocculation value.
- Pharmaceutical application of Colloids.

30 Marks two CCE + 70 Marks Semester Examination = 100 Marks for Each Paper

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27-6-2011
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chemistry)

SEMESTER II

2011-12

Books Recommended

1. G.R.Chatwal, Pharmaceutical Chemistry Inorganic Vol. I, Himalaya Publishing House, Bombay.
3. Dr.J.L.Jain, Fundamentals of Biochemistry, S.Chand & Company Ltd. New Delhi.
4. B.S.Bahl and G.D.Tuli, Physical Chemistry, S.Chand & Company Ltd. New Delhi.
5. F.S.K.Barar, Essentials of Pharmacotherapeutics, S.Chand & Company Ltd. New Delhi.
6. R.S.Gaud & Dr. G.D.Gupta, Practical Pharmaceutics, CBS Publishers and Distributors, New Delhi
7. N.C.Choudhary and N.K.Gurbani, Pharmaceutical Chemistry. Vallabh Prakashan, Delhi.
8. N.K.Jain, Textbook of Professional Pharmacy. Vallabh Prakashan, Delhi.
9. B.M.Mithal., A text book of Pharmaceutical formulation. Vallabh Prakashan, Delhi.
10. Stenlake & Beckett, Practical Pharmaceutical Chemistry Part I, CBS Publishers and Distributors. New Delhi.

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SEMESTER II

2011-12

PRACTICAL: PHARMACEUTICAL CHEMISTRY

Max. Marks: 50

Examination hrs: 4 hours

I Medicated preparations:

12 Marks

(a) Aromatic waters (b) Solutions (c) Syrups (d) Lotions (e) Spirits (f) Elixirs, (g) Liniments (h) Glycerites (i) Gargles (j) Mouthwashes (k) Inhalations (l) Emulsions (m) Suspensions (n) Mucilages (o) Jellies (p) Infusions (q) Decoctions (r) Tinctures (s) Milks and Magmas

II Volumetric Estimation:

12 Marks

Oxidation-Reduction titration: Estimation of Ferrous Sulphate in Mohr's salt using (a) KMnO_4 (b) $\text{K}_2\text{Cr}_2\text{O}_7$

III Paper Chromatography:

12 Marks

(a) Separation of Aminoacids.
(b) Separation of Plant pigments.

IV Viva

06 Marks

V Practical record

08 Marks

Asharma
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chemistry)

Govt. P.G. College, Barwani (M.P.)

Session 2011-12

B. Sc. Ist Year

Industrial Fish and Fisheries

Semester - I

Paper - Fish Biology

Time: 3 Hrs.

Unit - I

1. Definition and need of taxonomy.
2. Nomenclature, requirements and methods for collection of taxonomic data.
3. General characteristics and classification of Pisces upto subclasses only (Berg-1940).
4. Economic importance of fishes.

Unit - II

1. Morphology of Typical Teleost Labeo.
2. Morphology of typical Elasmobranch - Scoliodon.
3. Variation in form, position of mouth and types of teeth.
4. Structure of skin and its derivatives (scales, spines and fins)
5. Coloration in fishes.
6. Lateral line system

Unit - III

1. Digestive system.
2. Circulatory system.
3. Nervous system (Brain and Cranial nerve).
4. Reproductive system.
5. Excretory system.

Unit - IV

1. Food of fishes (Basic food, secondary food, incidental food, obligatory food, artificial and natural food)
2. Feeding habits of spawn, fry and fingerlings.
3. Food and feeding habits & its analysis.
4. Stimuli of feeding.
5. Food quality.

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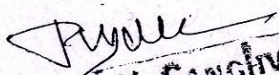
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Unit - V

1. Growth, meaning and kinds (Absolute and Relative).
2. Growth promoting hormones & factors affecting growth rate.
3. Stress and growth inhibition in fishes.
4. Methods of determining age and growth and fishes.
5. Condition factors and cube law.
6. Reproductive organs and reproductive behavior (Courtship)

Suggested Book:

1. Inland fish - culture - मनोहरलाल अरोड़ा
अन्तस्थलीय मछली पालन
2. An Introduction to Fishes - S. S. Khanna
3. Unified Zoology - V. K. Tiwari, V. K. Singh & J. K. Awasthi
4. A Text Book of Fish Biology & Indian slums
5. मछली पालन एक सस्योग -- डॉ. विश्व रमण प्रसाद सिन्हा


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Industrial Fish & Fisheries

Syllabus ~~2010-11~~ 2011-12

B. Sc. Semester I (Practical)

Scheme for Practical Examinations

Identification of fishes	10 Marks
Spotting (Biology, Osteology & Museum)	16 Marks
Dissection	
Minor Dissection-	05 Marks
Major Dissection-	05 Marks
Mounting-	04 Marks
Internal assessment	
(Collection & Field-report, Record)-	05 Marks
Viva	05 Marks
Total	50 Marks

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Govt. P.G. College, Barwani (M.P.)
B. Sc. I Semester Industrial Fish and Fisheries
Practical

2011-12

- Local survey of fish fauna and their identification

1. Catla-catla
2. Cirrihinus mrigala
3. Mystus Seenghala
4. Anabus Testudinus
5. Xenonthonodon Cancila
6. Notopterus - notopterus
7. Channa - striatus
8. Channa - punctatus
9. Labeo rohita
10. Labeo Calbasu

- Slides

1. T.S. of Stomach
2. T.S. of Kidney
3. T.S. of Intestine
4. T.S. of Testis
5. T.S. of Ovary
6. V.S. of Skin
7. V.S. o Liver

- Macro preparation of:

1. Placoid Scale
2. Ccloid Scale
3. Gill lamella
4. Cartilage
5. Spinal cord

- Bones of Labeo:

1. Preopercular
2. Caudal Fin
3. Trunk vertebra
4. Pelvic Girdle
5. Dentry
6. Caudal vertebra

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2011-12

Economically important fishes -

- 1. Indian Mackerel fish
- 2. Sardinella
- 3. Neherus (Bombay Duck)

- General Anatomy and visceral organs of any bony fish - *Labeo rohita*

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Govt. P.G. College, Barwani (M.P.)
Session 2011-12
B. Sc. Ist Year
Industrial Fish and Fisheries
Semester - II
Paper - Capture fisheries

Time: 3 Hrs.

Unit - I

1. Introduction, Kinds and importance of capture fishery.
2. Inland capture fishery resources of India (General idea).
3. Statistics of Indian capture fishery.
4. Riverine fisheries.
5. Problems of riverine fisheries.
6. Nets and gears used in riverine fisheries.

Unit - II

1. Introduction and importance of cold water fishery resources.
2. Fisheries of Trout.
3. Fisheries of Mahaseer.
4. Types and ecology of lakes.
5. Lacustrine fisheries.
6. Estuarine fisheries.

Unit - III

1. Introduction to marine fishery of India including historical background.
2. Inshore fishery and offshore fishery.
3. Deep sea fisheries.
4. Exploitation and management of under exploited resources of EEZ.
5. Exploitation and management of unexploited resources of EEZ.

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Unit - IV

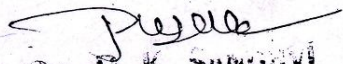
1. Fisheries of Mackerel, Ribbon fishes and Tunnies.
2. Fisheries of Sea fishes and Carangids.
3. Mid water and demersal fisheries - Sharks, Bombay duck and catfishes.
4. Pelagic fishery resources of India - Fishery of oil sardines, Lesser sardines, Anchovies and other Clupeids.
5. Nets gears and vessels used in marine fisheries.

Unit - V

1. Fisheries of Backwater.
2. Problems confronting brackish water fisheries.
3. Fisheries of brackish water
4. Nets and gears used in brackish water fisheries.

Suggested Books:

1. A text book of Fisheries science & Indian fisheries - C.B.L. Shrivastava.
2. A Hand book of fish farming - S.C. Agrawal.
3. मत्स्य जैविकी - डॉ. किरण दुबे
4. माछली एवं झींगा पालन - संकलन - राजेश्वर डनियाल
5. Fish & Fisheries - Shukla and Pandey
6. General & applied Ichthyology (Fish & Fisheries) Dr. S.K. Gupta
P.C. Gupta
7. A text book of Fish biology and Indian Fisheries - R. P. Parihar


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GOVT P.G. COLLEGE, BARWANI
INDUSTRIAL FISH & FISHERIES

Practical Syllabus 2011-12

B.Sc. Semester - II

1. Important counts related with fins, scales and barbels etc.
2. Different body measurement of local fishes i.e. Total length, Standard length, Body depth, Head length, Head width, Eye diameter, snout length, inter-orbital width, Pre-dorsal length, Post dorsal length, pelvic distances, Length of caudal peduncle etc.
3. Determination of GSI (Gonosomatic Index)
4. Determination of fecundity.
5. Measurement of growth.
6. Determination of Condition factor.
7. Identification of locally available fresh water fishes.

Scheme

Marks 50

1. Identification of fishes	16
2. Two exercise based on syllabus points 1 to 6	14
3. Record & collection	10
4. Viva	10

Total 50

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