

# THE LEARNING OUTCOME FRAME OF UG COURSE IN BIOCHEMISTRY

# PO, PSO AND CO OF UG BIOCHEMISTRY

At the completion of B. Sc. in Biochemistry. This programme is designed with an objective to cover all important topics so that students will be able to use this knowledge in advancement of their career. Students will employ critical thinking and the scientific method to design, carry out, record and analyse the results of biochemical experiments and get an awareness of the impact of biochemistry on the environment, society, and other cultures outside the scientific community.

- Demonstrate, solve and an understanding of major concepts in all disciplines of biochemistry.
- Solve the problem and also think methodically, independently and draw a logical conclusion.
- Employ critical thinking and the scientific knowledge to design, carry out, record and analyse the results of biochemical reactions.
- To inculcate the scientific temperament in the students and outside the scientific community.
- Learn the laboratory skills and safely to transfer and interpret knowledge entirely in the working environment.
- Got exposures of a breadth of experimental techniques using modern instrumentation

After completion of degree, students gained the theoretical as well as practical knowledge. Also, they expand the knowledge available opportunities related to biochemistry in the government services through public service commission particularly in the field of food safety, health inspector, pharmacist, pathology etc

## Program Outcomes (POs) for B.Sc. Biochemistry Program

Pos1.Comprehending fundamental concepts in modern biology to meet the Program emerging trends outcome Pos2.Handling microbial, cellular and biochemical systems Pos3.Contribution to the betterment of the society by inculcating expertise in healthcare sector pos4.Facilitate placement in various clinical laboratories and biological research institutes Pos5.Procuring hands on real time experience in industries. Pos6. Acquire necessary knowledge and skills to undertake post graduation and than a career in research, either in industry or in an academic set up. Pos7. Apply the knowledge of experimental approaches to solve problems of a chemical nature and will have an ability to extend that knowledge to the solution to new program. Pos8. Integrate and apply the techniques in biophysics, analytical biochemistry, clinical biochemistry, microbiology, molecular biology and basics in bioinformatics.

# **Course Outcomes (CO) for B.Sc. Biochemistry Program**

# **B. Sc. First Year**

Course Outcome - *To study this course, a student must have had the subject Biology in class*  $12^{th}$ .

FIRST PAPER – BIOCHEMICAL TECHNIQUES – Core Course	
CO1:	The course covers essential techniques used in various laboratories.
CO2:	It trains the learners to work in the laboratories and R&D sections of various industries.
CO3:	Helpful for developing technological skills.
CO4:	Students get exposed to various techniques and their applications in separation and characterization of different biological molecules.
SECOND PAPER – CHEMISTRY IN BIOMOLECULES – Core Course – On successful	
completio	n of this course the students
CO1:	Are exposed to importance of biological molecules and their role in maintenance of life.
CO2:	Enthusiastically learn about DNA, RNA, Vitamins and Lipids and their importance in biological system.
CO3:	Get the insight of bio-molecular properties which can be used to carry out various studies.
CO4:	Will be able to pursue research in any field as biomolecules are basis of all researches.

#### LABORATORY COURSE: Application of Techniques in Biochemical Analysis

CO1: Will obtain hands-on training in basic separation techniques in biochemistry.
 CO2: Will gain expertise in the isolation, purification and characterization of biomolecules and organelles.

#### **Biomolecular Analysis**

CO1: Understands good laboratory practices, safety and precautions.
 CO2: Will acquire proficiency in preparation of laboratory solutions, reagents, use of glassware, and qualitative analysis of biomolecules.
 CO3: Learn the principles, theory and calculations for each experiment.

# **B. Sc. Second Year**

CourseOn completion of this course, successfully students will be able to:outcomeTitle of the paper

FIRST P/	APER – ENZYMOLOGY CLASSIFICATION OF ENZYMES
CO1:	• Understand the basics of enzymes their nomenclature and IUB enzyme classification
CO2:	• Describe the basic principle of enzymatic catalysis. Determine enzyme
	activity, urn over number and specific activity.
	Understand the difference between the water soluble and fat soluble
	vitamins and their key role in the metabolism as coenzymes.
CO3:	<ul> <li>Identify the enzyme kinetics and describe the factors affecting its activity.</li> </ul>
	<ul> <li>Derive Michaelis-Menten equation for uni-substrate reactions</li> </ul>
	<ul> <li>Understand Km and its significance</li> </ul>
CO4:	Have a complete understanding of rate of reactions and order of reactions, and inhibitions and their kinetics. To gain knowledge on enzyme catalysis and isoenzymes.
CO5:	<ul> <li>Identify the commercial applications of enzymes including clinical application.</li> </ul>
	<ul> <li>Understand the importance of enzymes such as SGOT, SGPT, ALP act as</li> </ul>
	marker enzymes and are used in assessing the functioning of liver
	• Perform immobilization of enzymes and understand the wide applications of
	enzymes and future potential.
SECOND	PAPER -INTERMEDIARY METABOLISM
CO1:	<ul> <li>Understand the concepts of metabolism</li> </ul>
	Illustrate the metabolism of carbohydrates through various anabolic and
	catabolic pathways like glycolysis, Kreb's cycle, Glycogen metabolism,
	glucuronic acid cycle etc.
	<ul> <li>Describe the regulation of glycolysis and TCA cycle.</li> </ul>
CO2:	Understand the fundamental energetics of biochemical processes, chemical
	logic of metabolic pathways. Knowing in detail about concepts to illustrate
	how enzymes and redox carriers and the oxidative phosphorylation
	machinery occur.
	• Describe coupled reactions and their role in metabolism and Chemiosmotic
	hypothesis of ATP synthesis.
	<ul> <li>Understand transportation of reducing potentials into mitochondria.</li> </ul>
	Describe Inhibitors of ETC and inhibitors and uncouplers of oxidative
	phosphorylation.

CO3:	• Illustrate the metabolism of lipid through various anabolic and catabolic
	pathways like ß-oxidation, Biosynthesis of saturated and unsaturated fatty
	acids, Metabolism of ketone bodies
	• Describe what happens: - when lipids are metabolized, cholesterol,
	prostaglandins etc. are synthesized, emphasizing the defects of lipid
	metabolism.
	<ul> <li>Describe regulation of cholesterol metabolism</li> </ul>
	<ul> <li>Describe synthesis &amp; Utilization of ketone bodies</li> </ul>
CO4:	• Describe general reactions of amino acids metabolism (transamination,
	oxidative deamination and decarboxylation)
	Illustrate urea cycle
	• Describe how amino acids and proteins are metabolized, emphasizing the
	role of few intermediates of their metabolism, monitoring the deficiency and
	abundance disorders of amino acid metabolisms (phenyl ketonuria,
	alkaptonuria and albinism) and the role of enzymes in the regulation of the
	pathways
CO5:	Understand the Sources of the atoms in the purine and pyrimidine molecules
	• Describe Biosynthesis, degradation and Regulation of purine and pyrimidine
	bases
	<ul> <li>Describe biosynthesis and degradation of porphyrins</li> </ul>

#### LABORATORY COURSE: BIOCHEMISTRY PRACTICAL

CO1:	✓ Determination of albumin and A/G ratio
CO2:	<ul> <li>Estimation of protein, lipids, blood urea, lipoprotein, bilirubin etc.</li> </ul>
CO3:	<ul> <li>Qualitative and quantitative analysis</li> </ul>
CO4:	✓ Separation techniques

# **B. Sc. Third Year**

**Course outcome -** *On completion of this course, successfully students will be able to learn:* 

FIKST PA	APER -IVIULECULAK BIULUGY
CO1:	Genetic information, structure levels of DNA
CO2:	DNA replication, mechanism of transcription,
CO3:	Transcription in Prokaryotes, Eukaryotes,
CO4:	Genetic code, mechanism of translation and gene expression in prokaryotes
CO5:	Mutation, mutagenicity testing, Recombinant DNA technology and its
	applications
SECOND	PAPER -NUTRITION, CLINICAL & ENVIRONMENTAL BIOCHEMISTRY
CO1:	Nutritional aspects of carbohydrates, fats, proteins, vitamins and minerals.
CO2:	Nutritive and calorific vale of foods, BMR, SDA
CO3:	Clinical biochemistry, quality control and importance of biochemical analysis
CO4:	Clinical enzymology, Diagnostic enzymes, SGOT, SGPT, LDH, Acid and Alkaline
	Phosphatase enzymes
CO5:	Air, water and soil pollution
LABORA	ATORY COURSE: BIOCHEMISTRY PRACTICAL
CO1:	✓ Determination of albumin and A/G ratio
CO2:	$\checkmark$ Estimation of hemoglobin, calcium, phosphorous, creatinine,
	immunoglobins, SGOT and SGPT.
CO3:	<ul> <li>Qualitative and quantitative analysis</li> </ul>
CO4:	<ul> <li>Separation techniques, Enumeration of bacteria</li> </ul>
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## PSOs (SESSION- 2021- 22)

#### **B. Sc. I Year (BIOTECHNOLOGY)**

- Knowledge of Cell Biology, Biochemistry, Microbiology and Immunology will enable students to work in field of research, higher education and technical support in various labs.
- By the knowledge of instrumentation they can get job as technician and demonstrator in labs of any school.
- They can join R & D Department of any pharmaceutical industries.
- They can work in any Research Laboratory/ Institute (ICMR, NII, CCMB and any other CSIR Lab) as JRF/SRF/RA.
- After getting degree in Biotechnology they can get opportunities in various fields:
  - A. Medical Science Organizations
  - B. Health care Organization
  - C. Forensic Science Laboratory
  - D. Food Industries
  - E. NGOs
- Students can also go in for Medical Lab Technique Courses, opening opportunities in hospitals & pathology laboratories.
- They can choose Lectureship and researches in Universities and institutes.
- They can procure some very prestigious foreign fellowships like commonwealth (UK), DAAD (Germany).

### COURSE OUT-COME (SESSION- 2021- 22)

## **B. Sc. I Year (BIOTECHNOLOGY)**

### PAPER I- CELL BIOLOGY & BIOCHEMISTRY

- Student will study the structural and chemical detail of cell & biomolecules.
- Students will be able understand the role of bonding & spatial arrangements of molecules for proper functioning & stability.
- They will get knowledge about biochemical testing.
- They will understand clinical significance of biochemical testing
- Students can also go in for Medical Lab Technique Courses, opening opportunities in hospitals & pathology laboratories.

## COURSE OUT-COME (SESSION- 2021- 22)

### **B. Sc. I Year (BIOTECHNOLOGY)**

#### PAPER II- MICROBIOLOGY & IMMUNOLOGY

- They will learn microbial diversity and nutrition
- Students will come to know the immune system, immune response and vaccination
- They will understand the role of immune system in maintaining health and role in diseases.
- They will be able to learn & perform various immunological techniques.

## PSOs (SESSION- 2021- 22)

#### B.Sc. FIRST YEAR MEDICAL DIAGNOSTICS (Vocational Subject) 2021-2022

- 1. After getting degree in they can get opportunities in various fields:
  - F. Clinical Lab Technician
  - G. Diagnostic Medical Sonographer
  - H. Diagnostic Molecular Scientist
  - I. Medical Lab Technician
  - J. Histotechnologist
  - 2. Student will be empowered to go for various educational institutions, hospitals, government
  - 3. Students can join organizations as lab consultancy services, health care service provider.

## COURSE OUT-COME (SESSION- 2021- 22)

#### B.Sc. FIRST YEAR MEDICAL DIAGNOSTICS (Vocational Subject) 2021-2022

- Students will be able understand the role of medical diagnostic and its role in Global market
- They will get knowledge about essential concept of medical diagnostics
- Student will learn the diagnostic procedure to identify diseases and analysis will facilitate treatment process
- Student will gain knowledge about the components of body fluid, their characteristics and abnormalities
- They will be equipped with the skills required to handle diagnostic equipment

# PSOs (SESSION- 2021- 22)

## B. Sc. II Year (BIOTECHNOLOGY)

- 1. By the knowledge of instrumentation they can get job as technician and demonstrator in labs of any school.
- 2. They can join R & D Department of any pharmaceutical industries.
- 3. They can work in aany Research Laboratory/ Intitute (ICMR, NII, CCMB and any other CSIR Lab) as JRF/SRF/RA.
- 4. After getting degree in Biotechnology they can get opportunities in various fields:
  - A. Medical Science Organizations
  - B. Health care Organization
  - C. Forensic Science Laboratory
  - D. Food Industries
  - E. NGOs
  - F. They can develop plant tissue culture lab and can sale saplings in nursery
- 5. They can choose Lectureship and researches in Universities and institutes.
- 6. They can procure some very prestigious foreign fellowships like commonwealth (UK), DAAD (Germany).

# COURSE OUT-COME (SESSION- 2021- 22)

# B. Sc. II Year (BIOTECHNOLOGY)

## PAPER I: Biophysics & Biochemistry

- In this paper student will learn principles of physics applied in Biology
- Student will learn application and principles of thermodynamics in biological systems
- They will study general biophysical method which is necessary for practical work and operation of various instruments
- They will also learn about <u>Biochemistry</u> which is molecular logic of living beings
- In depth knowledge of biomolecules which are the structural functional component of our body

## PAPER II: Bioinstrumentation, Biostatistics and Bioinformatics

- They will learn about bioinstrumentation under which they will know about microscopy, chromatography, electrophoresis, spectrometry, southern, western and northern blotting techniques
- All above techniques are basic need for study and research aspects
- Biostatistics is a very effective tool for data analysis that's why teaching of central tendency, probability, standard deviation, statistical presentation of data is important and covered in this syllabus

**Bioinformatics** is an interdisciplinary field in which student will learn storing, retrieving, organizing analyzing biological database sequences (EMBL, Gene Bank, UNIPROT), cluster and specialized database (KEGG etc.)

# PSOs (SESSION- 2021- 22)

## B. Sc. III Year (BIOTECHNOLOGY)

- Knowledge of genetic engineering enable students to work in field of research , higher education and technical support in various labs.
- By the knowledge of instrumentation they can get job as technician and demonstrator in labs of any school.
- They can join R & D Department of any pharmaceutical industries.
- They can work in aany Research Laboratory/ Intitute (ICMR, NII, CCMB and any other CSIR Lab) as JRF/SRF/RA.
- After getting degree in Biotechnology they can get opportunities in various fields:
  - K. Medical Science Organizations
  - L. Health care Organization
  - M. Forensic Science Laboratory
  - N. Food Industries
  - O. NGOs
- They can develop plant tissue culture lab and can sale saplings in nursery
- They can choose Lectureship and researches in Universities and institutes.
- They can procure some very prestigious foreign fellowships like commonwealth (UK), DAAD (Germany).

## COURSE OUT-COME (SESSION- 2021- 22)

## B. Sc. III Year (BIOTECHNOLOGY)

## PAPER I: Molecular Biology and Genetic Engineering

- Student will study the structural and chemical detail of DNA & RNA at molecular level
- They will get knowledge about prokaryotic and eukaryotic genome and their methods of replication
- Student will study epigenetics, evolution of macromolecules and mendelian genetics
- They will learn r DNA technology, gene cloning, cloning and expression vectors & PCR
- Protein synthesis, splicing and mutation

## PAPER II: Applied Biotechnology

- Student will learn technologies applied to biology, molecular biology, genetics, and many other subfields of biology.
- Under microbial biotechnology they will learn about food preservation, contamination, production of industrially important product
- Various techniques of plant tissue culture and their application to meet scarcity
- Knowledge of immunology, animal biotechnology and organ culture technique
- Study of stem cell culture, bioreactors, production techniques of economically important transgenic animals
- Environmental biotechnology for sustainable development of living beings

# PSO'S of B.Sc. BOTANY Session 2021-2022

- 1. Students will understand and learn about the plant kingdom, plant physiology, taxonomy and diversity of lower and higher plants.
- 2. They can do M.Sc. in (Botany, plant genetics, human genetics, microbiology etc.) after that they can prepare for SET, and NET (JRF).
- 3. Students can get opportunities in various fields like-
  - (i) Lab Technician
  - (ii) Biologist- in any institute
  - (iii) Teaching in middle and primary school
  - (iv) Medical representative in any pharmaceutical company.

# **Course Out-Come**

# B. Sc. I Year

#### **Paper- I: Applied Botany**

- 1. Understand the significance and role of botany.
- 2. Learn the basic aspects of applied botany.
- 3. Gain knowledge about employment opportunities in field of botany
- 4. Gain knowledge about start-up opportunities in field of botany
- 5. Learn about opportunities of social service.
- 6. Gain knowledge about best health practices

#### **Paper-II: Diversity of Higher Plants**

- 1. Understand the diversity of plants and evolutionary process in plant kingdom.
- 2. It gives an account of plant adaptation from aquatic condition to colonize terrestrial habitat.
- 3. Learn about the changes in morphological anatomical and reproductive structures that propel plant evolution.
- 4. Learn about economic importance and significance of plants in nature.
- 5. Acquainted with locally prevalent microbial diseases of plants and humans

# **Course Out-Come**

#### **B.Sc. II Year**

#### Paper-I: Taxonomy and Embryology of Angiosperms

- 1. They will know about the origin and evolution, nomenclature, classification, herbarium of angiospermic plants.
- 2. They will know about the terminology of plant identification description.
- 3. They will learn about diagnostic characters and economic importance of different families of angiosperms.
- 4. They will learn about the embryology of angiospermic plants, microsporogensis megasporogenesis, pollination and fertilization.
- 5. They will know about the development of endosperm embryo and development of fruits.

### Paper-II: Plant Ecology, Biodiversity and Phytogeography

- 1. They will understand about the ecosystem and their types.
- 2. They will know about the trophic structure, ecological pyramids and energy flow.
- 3. They will learn about the morphological, anatomical and physiological adaption.
- 4. They will learn about the biodiversity and sentuaries and national parks.
- 5. They will learn about the structure and properties of soil.
- 6. They will know about the phytogeographical regions of india.

# **Course Out-Come**

#### **B.Sc. III Year**

### Paper-I: Plant physiology and biochemistry

- 1. Students will understand the water relations and mechanism of transpiration
- 2. They will know about the nutrition uptake in plants and translocation of organic solutes in plants.
- **3**. They will understand the physiological process In plants like photosynthesis and respiration.
- 4. They will learn and understand the classification of enzymes their nomenclature and its mechanism.
- 5. They will learn to describe the plant hormones their discovery and mode of actions.

## Paper-II: Cell Biology, Genetics and Biotechnology

- 1. They will know about the cell structure and its organells.
- 2. They will learn the chromosomal organization and its structure & function.
- 3. They will learn about the structure and function of DMA and RNA
- 4. They will know about the genetic inheritance and gene interaction
- 5. They will know about the current knowledge of biotechnology and genetic engineering.

# PSO's of M.Sc. BOTANY Session 2021-2022

- 1. Students will thoronghly learn and understand about the diversity of plants physiological process, genetics, ecology, bio-informatics and ethnobotany
- 2. They can prepare for JRF NET and join (ICAR,ICMR,CSIR etc) as research fellow.
- 3. They can prepare for lectureship in any education department
- 4. Students can get opportunities in various fields like
  - i. Pharmaceutical Industries
  - ii. Forest department
  - iii. Herbal Industries

#### M. Sc. I sem

- I. Biology and Diversity of Viruses, Bacteria and Algae
- II. Biological Diversity of Bryophytes, Pteridophytes and Gymnosperms
- III. Basic Ecology
- IV. Biology and Diversity of Fungi

#### M.Sc. II sem

- I. Taxonomy of Angiosperms
- II. Resource Utilization and Conservation
- III. Biochemistry
- Iv. Biostatistics and Computer Application

#### M.Sc. III Sem

- I. Plant Physiology
- II. Genetics and Molecular Biology
- III. Plant Reproduction and Development
- Iv. Biotechnology

#### M.Sc. IV Sem

- I. Plant cell, Tissue and Organ Culture
- II. Biotechnology and Genetic Engineering
- III. Ethnobotany
- Iv. Plant Protection

# **COURSE OUT-COME**

# M.Sc. I Sem Botany

#### Paper I: Biology and Diversity of Viruses, Bacteria and Algae

- 1. They will understand the ultra structure of Bacteria and its biological importance.
- 2. They will know about the viruses, and its transmission.
- 3. They will learn and understand the classification of algae into different divisions and the life history of different members.
- 4. They will know about the association of Algae in different field like Fishries, soil forestry etc.

## Paper II: Biological Diversity of Bryophytes, Pteridophytes and Gymnosperms

- 1. They will learn and understand the classification of Bryophyta, Pteridophyta and Gymnosperms.
- 2. They will understand the morphological structure of Bryophytes, Pteridophytes and Gymnosperms.
- 3. They will know about the anatomical structure of Bryophytes, Pteridophytes and Gymnosperms.

#### Paper III: <u>Basic Ecology</u>

- 1. They will understand and learn about the ecosystem and their types.
- 2. They will understand about the community analysis.
- 3. They will learn about the soil structure and their characteristics.
- 4. They will understand and know about the global biogeochemical cycles.

#### Paper IV: Biology and Diversity of Fungi

- 1. They will understand the ultra structure of Fungi and its biological importance.
- 2. They will know about the transmission of fungi.
- 3. They will learn and understand the classification of Fungi into different divisions and the life history of different members.
- 4. They will know about the diseases caused by fungi.

# **COURSE OUT-COME**

# M.Sc. II Sem

# **BOTANY**

#### Paper I: Taxonomy of Angiosperms

- 1. They will know about the classification and nomenclature of plant and its systematic position.
- 2. They can take aknowledge of Principles of Boidiversity & its conservation.
- 3. They will understand the modern trends in Taxonomy especially numerical taxonomy.
- 4. They will understand and learn about the plant used for fuel, fiber, oil and timber etc.
- 5. Students gets knowledge about angiosperm families in details.(comparative studies)
- 6. They get knowledge about economic and medicinal importance of plants and their products.
- 7. They will know about the Herbarium and Botanical gardens of India and world.

#### Paper II: Resource Utilization and Conservation

- 1. They will learn about the major biomes of the world.
- 2. They will know and learn about the Biodiversity and threats to quality and quantity of Resources due to overexploitation.
- 3. They will know and learn about the conservation of resources.
- 4. They will know and learn about the air, water and soil pollution, ozone layer and ozone hole.
- 5. They will understand and learn about the remote sensing and its application in ecology.

### **Paper III: Biochemistry**

- 1. The students will be able to impart an insight into the various biochemical studies.
- 2. They will understand the mechanism of various phyto-chemicals studies in plants.
- 3. The will know about the different biochemical techniques in lab.
- 4. These studies are helpful in research work.

#### Paper IV: Biostatistics and Computer Application

- 1. They will understand and learn about how biostatistics is useful in different fields.
- 2. They will understand what are the different method about comparison, analysis of data.
- 3. They understand different techniques of calculation which are useful in research such as ANOVA, X2 Square and 't' test and how to interpreted their results .
- 4. They learn about the uses and application of computer, internet and how to use different softwares.

# **COURSE OUT-COME**

# M.Sc. III Sem

# BOTANY

#### Paper I: Plant Physiology

- 5. The students will be able to impart an insight into the various plant water relations.
- 6. They will understand the mechanism of various metabolic processes in plants such as photosynthesis & Reparation.
- 7. The will know about the growth hormones, growth regulators and secondary plant metabolites.

#### Paper II: Genetics and Molecular Biology

- 1. They will learn about genetic material DNA structure various types and cot curve.
- 2. They will learn about restriction mapping, and in-situhybridization techniques.
- 3. They will learn and understand about mechanism and factors which are responsible for mutation.
- 4. They will learn about DNA damage and repair mechanisms.
- 5. They will learn about different methods of recombination and its mechanisms.
- 6. They will understand independent assortment, linkage and crossing over.
- 7. They will learn about mechanism of DNA replication, and transcription process including splicing.
- 8. They will learn about translation process and protein synthesis inhibitors.
- 9. They will learn about gene expression in prokaryotes and eukaryotes.

#### Paper III: Plant Reproduction and Development

- 1. Students will understand the tissue differentiation.
- 2. They will learn and understand about the structure of root and stem and study in detail about their meristematic tissues.
- 3. They will understand about the root and shoot apex organization.
- 4. They will know about the structure of leaves.
- 5. They will learn about the microporogenesis, mega sporogenesis, endosperm development and Embryo.
- 6. Students will know about the fertilization, double fertilization, seed germination and seed dormancy.

#### **PaperIV: Biotechnology**

- 1. They will know about the scope and history of Biotechnology.
- 2. Genetic Engineering procedure will be learned by students.
- 3. They will learn about the culturing of microorganism for production of biomass.
- 4. strains are improved procedure and its used in different things will be learned.

# <u>COURSE OUT-COME</u> <u>M.Sc. IV Sem</u> <u>BOTANY</u>

#### Paper I: Plant cell, Tissue and Organ Culture

- 1. They will understand the detailed aspects of invitro culture technique.
- 2. They will know about the various techniques of tissue culture such as organ culture, somatic embryogenesis, somatic hybridization.
- 3. They will learn about the scope of plant tissue culture technology.
- 4. They will understand the process of cryopreservation and germplesm storage.

#### Paper II: Biotechnology and Genetic Engineering

- 1. Students will learn about the concepts of Biotechnology and Genetic Engineering .
- 2. Principles and techniques of recombinant DNA technology will be understood by the students .
- 3. They will know about the microbial genetic manipulation.
- 4. They will learn about protein profiling and its significance.

#### Paper III: A-Ethnobotany

- 1. They will learn and understand about the ehnobotanical importance of plants.
- 2. They will know about the medicinal value of plants and how to cure various deseases.
- They will learn about the various tribal group of plants and their mytholical value such as taboos and totems in relation to plants, flokporeand floktales, wild life protection in tribal plants.
- 4. They will know about the role of etanobotany in the development of society.
- 5. They will understand about the presentation of genetic diversity, plants used in various system of medicines such as ayurvedic, unami, homeopathic and allopathic systems.

#### **Paper IV: Plant Protection**

- 1. Students will understand the basic concept of plant protection.
- 2. They will learn and understand about causal organism, symptoms and disease cycles of fungal diseases.
- 3. They will know about causal organism, symptoms and disease cycle of bacterial diseases viral diseases, disease caused by mycoplasma, and nematodes.
- 4. They will understand and learn about chemical, cultural and biological methods of plant protection.
- 5. They will learn about legislative methods of plant protection and plant quarantine.
- 6. They will be able to write about the remote sensing and integrated pest management



# THE LEARNING OUTCOME FRAME OF UG & PG COURSES

# DEPARTMENT OF CHEMISTRY

According to UGC guidelines. The chemistry graduates are expected to know the fundamental concepts of chemistry and applied chemistry. These fundamental concepts would reflect the latest understanding of the field, and therefore, are dynamic in nature and require frequent and time-bound revisions.

- Communication skills: Chemistry graduates are expected to possess minimum standards of communication skills expected of a science graduate in the country. They are expected to read and understand documents with in-depth analyses and logical arguments. Graduates are expected to be well-versed in speaking and communicating their idea/finding/concepts to wider audience.
- Critical thinking: Chemistry graduates are expected to know basics of cognitive biases, mental models, logical fallacies, scientific methodology and constructing cogent scientific arguments.
- Psychological skills: Graduates are expected to possess basic psychological skills required to face the world at large, as well as the skills to deal with individuals and students of various sociocultural, economic and educational levels. Psychological skills may include feedback loops, self-compassion, self-reflection, goal-setting, interpersonal relationships, and emotional management.
- Problem-solving: Graduates are expected to be equipped with problem-solving philosophical approaches that are pertinent across the disciplines.
- Analytical reasoning: Graduates are expected to acquire formulate cogent arguments and spot logical flaws, inconsistencies, circular reasoning etc.

- Research-skills: Graduates are expected to be keenly observant about what is going on in the natural surroundings to awake their curiosity. Graduates are expected to design a scientific experiment through statistical hypothesis testing and other a priori reasoning including logical deduction.
- Teamwork: Graduates are expected to be team players, with productive co-operations involving members from diverse socio-cultural backgrounds.
- Digital Literacy: Graduates are expected to be digitally literate for them to enroll and increase their core competency via e-learning resources such as MOOC and other digital tools for lifelong learning. Graduates should be able to spot data fabrication and fake news by applying rational skepticism and analytical reasoning.
- Moral and ethical awareness: Graduates are expected to be responsible citizen of India and be aware of moral and ethical baseline of the country and the world. They are expected to define their core ethical virtues good enough to distinguish what construes as illegal and crime in Indian constitution. Emphasis be given on academic and research ethics, including fair Benefit Sharing, Plagiarism, Scientific Misconduct and so on.
- Leadership readiness: Graduates are expected to be familiar with decision-making process and basic managerial skills to become a better leader. Skills may include defining objective vision and mission, how to become charismatic inspiring leader and so on.

ProgramTo demonstrate a systematic, extensive and coherent knowledgeoutcomeand understanding of academic fields of study as a whole and its<br/>applications and links to disciplinary areas of the study; including<br/>critical understanding of the established theories, principles and<br/>concepts of a number of advanced and emerging issues in the field<br/>of chemistry;

BSc CHEMISTRY	
PO1:	To demonstrate procedural knowledge that creates different types of professionals in the field of chemistry. Further application of knowledge can enhance productivity of several economically important product. Knowledge of Chemistry is also necessary for the development and management of industry, manufacturing of fine chemicals.
PO2:	Developing skills and ability to use knowledge efficiently in areas related to specializations and current updates in the subject
PO3:	Demonstrate comprehensive knowledge about chemistry, current research, scholarly and professional literature of advanced learning areas of Chemistry.
PO4:	Communicate the results of studies in the academic field of Chemistry using main concepts, constructs and techniques
PO5:	Apply one's knowledge and understanding of Chemistry to new/unfamiliar contexts and to identify problems and solutions in daily life.

PO6:To think any apply understanding of the subject of Chemistry, Chemical<br/>Sciences in identifying the problems which can be solved through the use<br/>of chemistry knowledge.

**PO7:** To think of the adopting expertise in chemical sciences and solve the problems of environment, green chemistry, ecology, sustainable development, hunger, etc.

Program program is designed to provide the students a comprehensive
 Specific understanding about the fundamentals of chemistry with an objective to
 outcome cover all the important principles and perspectives of physical, inorganic, organic and analytical chemistry expose the diversified aspects of chemistry where the students experience a broader outlook of the subject.

have sound knowledge about the fundamentals and applications of chemical and scientific theories. every branch of science and technology is related to chemistry. easily assess the properties of all elements discovered. apply appropriate techniques for the qualitative and quantitative analysis of chemicals in laboratories and in industries. helps in understanding the causes of environmental pollution and can open up new methods for environmental pollution control. develops analytical skills and problem-solving skills requiring application of chemical principles. acquires the ability to synthesize, separate and characterize compounds using laboratory and instrumentation techniques so that

#### **BSc CHEMISTRY**

PSO1 In this program students will learn mathematical concept, significance of
 PHYSICAL states of matter, i.e., gaseous, liquid and solid states, basics of
 CHEMISTRY: thermodynamics, chemical kinetics, nuclear chemistry, colloidal sols,
 phase equilibrium, entropy, buffer solutions, phase rule,

PRACTICAL

electrochemistry, photochemistry, UV-VIS, IR, Raman, NMR spectroscopies.

PSO2 Atomic structure Schrodinger wave, de Broglie's Equation, Ionic, covalent,
 INORGANIC coordinate bonds, periodic table covering s, p, d, and f block elements,
 CHEMISTRY: periodic properties. Chemical properties, theories of coordination compounds like Werner, VBT, CFT & MOT. Bioinorganic chemistry nitrogen fixation, concept of hard & soft acids and bases gravimetric analysis. Inorganic polymers, Errors, Magnetic & spectral properties of complexes, Orgel energy level diagrams.

PSO3 Reaction mechanism electrophilic, nucleophilic substitutions and additions, methods of preparations, important physical and chemical properties, saturated &unsaturated hydrocarbons, structure and substitution reactions of benzene, alcohols, phenols, aldehydes, ketones, carboxylic acids, acid derivatives like acid chlorides, amides, anhydrides, ammines. Electromagnetic & IR spectroscopy, organic compounds of nitrogen, Carbohydrates nucleic acids i.e., DNA & RNA, fats, oils, and detergents, Organometallic compounds

**PSO4:**Determination of melting point, boiling point, Weighing and preparation**LABORATORY**of solution, surface tension, viscosity, Crystallization, Sublimation,**COURSE:**Verification of Beer's-Lambert law. Job's method etc.**CHEMISTRY**Course is a sublimation of Beer's-Lambert law. Job's method etc.

Detection of elements, Identification of functional group, organic compound, separation of organic compounds, preparation Inorganic mixture analysis, interfering radical, Separation of cations by paper and thin chromatography, volumetric & gravimetric analysis preparation of complexes

# **B. Sc. First Year**

Course On completion of this course, successfully students will be able to learn: outcome **Title of the paper** 

#### FIRST PAPER - FUNDAMENTALS OF CHEMISTRY

- **1.** Ancient Indian chemical techniques.
- 2. Various theories and principles applied to reveal atomic structure.
- **3.** Significance of quantum numbers.
- **4.** Concept of periodic properties of elements.
- **5.** Theories related to chemical bonding.
- **6.** Acid-base concept, pH, buffer.
- **7.** Factors responsible for reactivity of organic molecules.
- 8. Basics and mechanism of chemical kinetics.
- **9.** Properties of electrolytes.

#### **SECOND PAPER - ANALYTICAL CHEMISTRY**

1.	Basic concepts of Mathematics for Chemists.
2.	Fundamentals of analytical chemistry and steps involved in analysis.
3.	Basic knowledge of Computer for chemists.
4.	Basic Concepts of Chemical equilibrium.
5.	Principles of Chromatography and chromatographic techniques.
6	Various techniques of Spectroscopic Analysis.

#### THIRD PAPER – CHEMISTRY IN EVERYDAY LIFE

1.	Learn about the chemistry of ancient India. Ancient construction materials and
	discoveries.
2.	Gain information about acids, bases and salts involved in our day to day life.
3.	Have an idea of food adulteration, its harmful effects, and methods to detect
	adulteration and the important constituents of our food.
4.	Student will be familiar with the chemical nomenclature of the commonly used

materials in daily life including toiletries, kitchen and beverages.

5.

Have an Elementary idea of disinfectants, pesticides and cleaners.

#### LABORATORY COURSE: CHEMISTRY PRACTICAL – (PAPER I) - QUALITATIVE & QUANTITATIVE CHEMICAL ANALYSIS CORE COURSE - BY THE END OF THIS COURSE STUDENTS WILL LEARN THE FOLLOWING ASPECTS OF LABORATORY EXERCISES IN CHEMISTRY:

CO1:	Importance of chemical safety and lab safety while performing experiments in laboratory
CO2:	Qualitative inorganic analysis
CO3:	Elemental analysis of organic compounds (non-instrumental)
CO4:	Qualitative identification of functional group of organic compounds
CO5:	Techniques of pH measurements
CO6:	Preparation of buffer solutions

#### (PAPER II) ANALYTICAL PROCESSES AND TECHNIQUES CORE COURSE/ MINOR/ ELECTIVE - BY THE END OF THIS COURSE STUDENTS WILL LEARN THE FOLLOWING ASPECTS OF LABORATORY EXERCISES IN CHEMISTRY:

CO1:	Concepts and analytical methods in Chemistry.
CO2:	Preparation of solutions of different concentrations.
CO3:	Standardization of the solution.
CO4:	Identification of Organic compounds by chromatographic techniques.
CO5:	Analysis by Spectral Techniques.

#### CHEMISTRY IN EVERYDAY LIFE - GENERIC ELECTIVE - BY THE END OF COURSE STUDENTS WILL LEARN THE FOLLOWING ASPECTS OF LABORATORY EXERCISES IN CHEMISTRY

CO1: Concepts and analytical methods in chemistry.
 CO2: Identification of acids, bases and salts involved in our day to day life.
 CO3: Methods to detect adulteration in commonly used food materials.
 CO4: Preparation of Natural indicator.
# **B. Sc. Second Year**

CourseOn completion of this course, successfully students will be able to learn:outcome**Title of the paper** 

#### FIRST PAPER -PHYSICAL CHEMISTRY

CO1:	Thermodynamic terms, second and third law of thermodynamics, Carnot cycle,				
	entropy, Nernst heat theorem, Gibbs(G) & Helmholtz (A) functions				
	Thermochemistry; enthalpy, Hess's law of constant heat summation, heat of reaction, buffer action, Henderson-Hazel equation.				
CO2:	Phase rule and electrochemistry, solid solutions, liquid-liquid mixtures, Raoult's,				
	Henry's, and Nernst law with their applications.				
CO3:	Basics of electrochemistry				
CO4:	Types of electrodes, electrolytic and galvanic cells.				

**CO5:** Surface Chemistry, Adsorption, Catalysis

### **SECOND PAPER - INORGANIC CHEMISTRY**

- **CO1:** Chemistry of first transition series elements.
- **CO2:** Chemistry of second and third transition series elements.
- **CO3:** Coordination compounds, Oxidation and Reduction
- **CO4:** Chemistry of lanthanides and actinides
- **CO5:** Acids and Bases, Non aqueous solvents

#### **THIRD PAPER -ORGANIC CHEMISTRY**

- **CO1:** Electromagnetic spectrum: UV and IR spectroscopy
- CO2: Nomenclature and chemistry associated with monohydric, dihydric and trihydric alcohols oxidative cleavage, pinacol-pinacolone rearrangement. Nomenclature, preparation methods, reaction mechanisms for acetylation, carboxylation, Fries rearrangement, Gattermann synthesis, Hauben-Hoesch, Lederer-Manasse and Reimer-Tiemann reactions

	Phenols: Nomenclature and chemistry, structure and bonding
CO3:	Preparation, properties of aldehydes and ketones. Knoevanagel, Gattermann - Koch, Cannizaro, Rosenmund, Perkin, Wittig, Reformatsky, Mannich, and Diels-
	Alder
CO4:	Chemistry of Carboxylic acids, preparation of Lactic, tartaric, citric acids and their important chemical properties. Ethers: nomenclature, preparation and properties
CO5:	Organic compounds of nitrogen: nitro alkanes, nitro arenes, halo nitro arenes

# LABORATORY COURSE: CHEMISTRY PRACTICAL

CO1:	<ul> <li>Analysis of inorganic mixture containing five radicals with at least on</li> </ul>
	interfering radical.
	$\checkmark$ Determination of acetic acid in commercial vinegar using NaOH.
	✓ Redox titrations.
	$\checkmark$ Estimation of hardness of water by EDTA.
CO2:	$\checkmark$ Determination of transition temperature of given substance by
	thermometric method.
	$\checkmark$ To determine the enthalpy of neutralization of strong acid, strong
	base.
	$\checkmark$ Verification of Beer's-Lambert law.
	$\checkmark$ To study the phase diagram of two component system by cooling
	curve method.
CO3:	(i) Identification of an organic compound through the functional group
	analysis, determination of melting point and preparation of suitable
	derivatives.
	(ii) Use of Paper chromatography/Thin layer chromatography:
determination of R <sub>f</sub> values, separation and identification	
	compounds.
	a. Separation of green leaf pigments (spinach leave may be used)

b. Separation of dyes

# **B. Sc. Third Year**

CourseOn completion of this course, successfully students will be able to learn:outcome**Title of the paper** 

### FIRST PAPER - PHYSICAL CHEMISTRY

CO1:	Elementary Quantum Mechanics, postulates of quantum mechanics, particle in			
	one-dimensional box.			
	Molecular orbital theory, Introduction to valence bond model of $H_2$ ion,			

comparison of M.O. and V.B. models.

- CO2: Spectroscopy-Introduction, Rotational Spectrum, Vibrational Spectrum
- **CO3:** Raman Spectrum, Electronic Spectrum, UV Spectroscopy
- CO4: Photochemistry
- **CO5:** Physical Properties and Molecular Structure

### SECOND PAPER - INORGANIC CHEMISTRY

- **CO1:** Hard and Soft Acids and Bases (HSAB), Silicones and Phosphagens
- CO2: Metal Ligand Bonding in Transition Metal Complexes, Thermodynamic and Kinetic Aspects of Metal Complexes.
- CO3: Magnetic Properties of Transition Metal Complexes,
- CO4: Electronic Spectra of Transition Metal Complex, Organometallic Chemistry
- **CO5:** Bio-Inorganic Chemistry, Metal Nitrosyl Complex

### THIRD PAPER -ORGANIC CHEMISTRY

- **CO1:** Spectroscopy: Nuclear Magnetic Resonance Spectroscopy.
- CO2:Organo-Metallic compounds:Organo-magnesium compounds, Organo-Sulphurcompounds, Organic synthesis by enolates:

CO3:	Carbohydrates, Fat, Oil and Detergents	
CO4:	Amino Acid, Peptide, Protein and nucleic acid, Synthetic dyes	
CO5:	Introduction of pyrrole, furan, thiophene and pyridine, Introductory idea about	
	five-and six-membered condensed heterocyclic compounds	

# LABORATORY COURSE: CHEMISTRY PRACTICAL

CO1:	✓ Gravimetric analysis:
	<ul> <li>Barium as Barium sulphate, Copper as cuprous-thiocyanate.</li> </ul>
	✓ Complex compound preparation
	✓ Potassium chlorochromate (IV)
	✓ Tetramine copper (II) sulphate monohydrate
	✓ Hexa ammine nickel (II) chloride
	$\checkmark$ Effluent water analysis, Identification of cations and anions in different
	samples.
	✓ Water analysis, to determine dissolved oxygen in water samples in ppm.
CO2:	$\checkmark$ To determine the velocity constant (specific reaction rate) of hydrolysis
	of methyl acetate/ethyl acetate catalyzed by hydrogen ions at room
	temperature.
	$\checkmark$ Determination of partition coefficient of iodine between carbon tetra
	chloride and water.
	✓ Job's method.
	✓ pH-metric titrations, conductometric titrations.
CO3:	✓ binary mixture analysis containing two solids:
	separation, identification and preparation of derivatives
	✓ preparation
	✓ acetylation, (ii) Benzoylation, (iii) Meta dinitro benzene (iv) Picric acid

Program Program is designed to provide the students a comprehensive understanding about the awareness and sense of responsibilities towards environment, apply knowledge to build up small scale industry for developing endogenous product, various aspects of chemistry in natural products isolations, pharmaceuticals, dyes, textiles, polymers, petroleum products, forensic etc. And also, to develop interdisciplinary approach of the subject. so that students will be able to use this knowledge in advancement of their career.

#### **MSc CHEMISTRY**

PO1:	Demonstrate and apply the fundamental knowledge of the basic		
	principles in various fields of Chemistry		
PO2:	It would help students to collaborate effectively on team-oriented		
	projects in the field of Chemistry or other related fields.		
PO3:	It would help students to communicate scientific information in a clear		
	and concise manner both orally and in Writing.		
PO4:	It would help students to inculcate logical thinking to address a problem		
	and become result oriented with a positive attitude		
PO5:	It would help students to Have developed their critical reasoning,		
	judgment and communication skills.		
PO6:	Augment the recent developments in the field of green and eco-friendly		
	reactions, pharmaceutical, supramolecular, Bioinorganic Chemistry and		
	relevant fields of research and development		
PO7:	It would help students to apply the knowledge to develop the sustainable		
	and eco-friendly technology in Industrial Chemistry.		
PO8:	It would help students to enhance the scientific temper among the		
	students so as to develop a research culture and implementation of the		
	policies to tackle the burning issues at global and local level.		

# M. Sc. Chemistry: Program Outcome

# **Program Specific Outcome**

Programprogram is designed to provide the students a comprehensiveSpecificunderstanding about the fundamentals of chemistry with an objective to<br/>cover all the important principles and perspectives of physical, inorganic,<br/>organic and analytical chemistry expose the diversified aspects of<br/>chemistry where the students experience a broader outlook of the<br/>subject.

have sound knowledge about the fundamentals and applications of chemical and scientific theories. so that students will be able to use this

#### **MSc CHEMISTRY**

**PSO1:** Chemical bonding theories i.e. Valence Bond Theory, Crystal Field Theory, and Molecular Orbital Theory, mechanism of nucleophilic substitution SN1 &SN2 for octahedral and square planar geometries. spectroscopic techniques like IR, Raman, NMR, ESR, Mass, Mossbauer spectroscopy and their applications. Correlation between vibrational spectroscopy and group theory. Bioinorganic chemistry structure and functioning of metalloenzymes and metalloproteins.

> Students will learn structure and bonding of metal carbonyls, metal nitrosyls and chemistry of Boranes, their nomenclature. Structure and bonding of dioxygen complexes

**PSO2:** Aromaticity, antiaromaticity, homoaromatic, stereochemistry, conformational analysis in mechanisms involved, nucleophilic and electrophilic substitution and elimination type of reactions, basic principles, instrumentation and applications of spectroscopic techniques i.e., IR, Raman, NMR, ESR, UV-VIS and Mass for characterization, Photochemical reactions, Pericyclic Reactions, Elimination reactions,

#### chemistry involved in functioning of enzymes

- **PSO3:** Basic principle and applications of Quantum Mechanics. Schrödinger Wave Equation, Approximation methods, angular moments, laws of thermodynamics, classical dynamics and applications. Adsorption phenomenon, capillary action, equations like Laplace and Kelvin and electrokinetic phenomenon. Electrochemistry, Debye-Huckle-Onsager treatment and Lipmann electro capillary phenomenon, solid state chemistry application, crystal defects, homo& heterogeneous catalysis, metallic bonds, conductors, semiconductors, NMR&ESR spectra Theory of photochemistry and phenomena like phosphorescence, fluorescence and their applications
- **PSO4:** Microwave, infrared, Raman and electronic spectroscopy. Basics of pure mathematics algebra, differential & integral calculus, probability, permutation, topics of biology i.e., structure and functions of cell, chemistry of lipids, fats, amino acids. Analytical Chemistry, statistical analysis, types and minimization of errors, accuracy and precision. Separative techniques like chromatography, Photoelectron spectroscopy, X-Ray, Electron &Neutron Diffraction. Biopolymers, thermodynamics and transport of biopolymeric ions.

PSO6:Use modern techniques, handling equipment's, qualitative andLABORATORYquantitative analytical skills. Acquires the ability to synthesize, separateCOURSE:and characterize compounds using laboratory and instrumentationCHEMISTRYtechniques. Carry out experiments in the area of organic analysis,PRACTICALestimation, separation, derivative process, inorganic semi micro analysis,preparation, conductometric, spectrophotometry, chemical kinetics,electronics, molecular modelling, Polarimetry, pH meter andpotentiometric analysis etc.

# **Course Outcome**

This program is designed with an objective to cover all important topics of physical, inorganic, organic and analytical branches so that students will be able to use this knowledge in advancement of their career.

# **M. Sc. First Semester**

**Course** On completion of this course, successfully students will be able to learn:

## outcome Title of the paper

### FIRST PAPER (MCH 101) INORGANIC CHEMISTRY

CO1:	Stereochemistry, bonding, VSEPR theory, MO treatment
CO2:	Reaction mechanism of Substitution inertness and lability
CO3:	Electronic spectra of transition metal complexes
CO4:	Metal carbonyls, Dioxygen Complexes
CO5:	Wilkinson's Catalyst, borane chemistry including topology, nomenclature, reactivity
	and bonding.

# SECOND PAPER (MCH102) ORGANIC CHEMISTRY

CO1:	Structure and bonding in organic molecules
CO2:	Aromaticity, antiaromaticity, homo aromaticity including weaker bonds.
CO3:	Stereochemistry, symmetry, chirality, optical activity and conformational analysis,
CO4:	Reaction mechanism, Hammett equation, SN1, SN2 and SET mechanism,
CO5:	UV-VIS, ORD &CD Spectroscopy.

# THIRD PAPER (MCH 103) PHYSICAL CHEMISTRY

- CO1: Schrodinger Wave equation, variation and perturbation theory,
   CO2: Classical thermodynamics,
   CO3: Phase rule, chemical dynamics, Arrhenius Equation,
- **CO4:** Theory of reaction rate and application of rate law on dynamic chain reaction

### **CO5:** Reaction catalysts.

### FOURTH PAPER (MCH104) SPECTROSCOPY

- **CO1:** Electromagnetic spectrum
- **CO2:** Microwave spectroscopy
- **CO3:** Infrared Spectroscopy
- **CO4:** Raman and Electronic spectroscopy.
- **CO5:** CARS (Coherent and Stokes Raman Spectroscopy) and application of these spectral techniques in structure determination of molecule.

#### FIFTH PAPER (MCH 105 A) MATHEMATICS FOR CHEMIST

CO1:	Basic concept of mathematical technique involved in Chemistry like Mathematics	
	Algebra	
CO2:	Differential calculus, integral calculus,	
CO3:	Elementary differential equation	
CO4:	Permutation	
CO5:	Probability.	

### FIFTH PAPER (MCH 105 B) BIOLOGY FOR CHEMIST

CO1:	Cell structure
001.	

- **CO3:** Carbohydrates,
- **CO4:** Lipids and fats, amino acids
- **CO5:** Nucleic acids.

### LABORATORY COURSE: CHEMISTRY PRACTICAL COURSE MCH 106: INORGANIC CHEMISTRY

- **CO1:** Qualitative and Quantitative Analysis
- **CO2:** Chromatography

CO3: Preparations- Preparation of selected inorganic complexes and their studies by measurements of decomposition temperature, molar conductance, IR and electronic spectra.

### **COURSE MCH 107: ORGANIC CHEMISTRY**

CO1:	Qualitative Analysis: Separation, purification and identification of compounds of			
	binary mixture. Emphasis should be placed on physical principles, reaction cher			
	and the technique involved in analysis.			

- **CO2:** Organic Synthesis-Purification of compounds by TLC and column chromatography.
- **CO3:** Aromatic electrophilic substitutions, Reduction reaction
- **CO4:** Quantitative Analysis-Determination of the percentage or number of hydroxyl groups in an organic compound by acetylation method

#### **COURSE MCH 108: PHYSICAL CHEMISTRY**

CO1: Adsorption	
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- CO2: Phase Equilibria
- **CO3:** Chemical Kinetics
- CO4: Solutions

# **M. Sc. Second Semester**

*Course* On completion of this course, successfully students will be able to:

#### outcome Title of the paper

### FIRST PAPER (MCH 201) INORGANIC CHEMISTRY

- **CO1:** Metal ligand equilibrium, reaction mechanism, base hydrolysis, conjugate base mechanism in octahedral and mechanism of square planar complexes.
- CO2: Metal-ligand bonding
- **CO3:** Calculations of Dq, B and beta parameters
- **CO4:** Preparation, properties, structure and applications of metal nitrosyls.
- **CO5:** Symmetry elements, symmetry operations and the principle involved in group theory.

### SECOND PAPER (MCH 202) ORGANIC CHEMISTRY

- **CO1:** Mechanism- aromatic/aliphatic electrophilic substitution
- **CO2:** Free radical, allylic halogenation reaction,
- **CO3:** Addition to carbon-carbon and carbon-hetero atom multiple bond and aromatic

nucleophilic substitution, SE1, SE2, SN1 SN2 & SRN1 reactions.

**CO4:** ESR Spectroscopy

**CO5:** IR and Raman spectra and their application in characterization of organic compounds.

#### THIRD PAPER (MCH 203) PHYSICAL CHEMISTRY

- **CO1:** Chemical dynamics
- **CO2:** Adsorption and electrokinetic phenomenon,
- **CO3:** Micellization, DHO equation.
- **CO4:** Lipmann electro-capillary phenomenon including different models.
- **CO5:** Macromolecules and colloid including their types, emulsification, irreversible electrode phenomenon including decomposition voltage overlaps.

#### FOURTH PAPER (MCH 204) SPECTROSCOPY & DIFFRACTION METHODS

CO1:	Photoelectron spectroscopy, photoacoustic spectroscopy,	
CO2:	X ray Diffraction, Neutron Diffraction.	
CO3:	Biological cell, constituents,	
CO4:	Bioenergetics	
CO5:	Thermodynamics of biopolymer solution and transport of ion through the cell membrane.	

#### FIFTH PAPER (MCH 205) COMPUTER FOR CHEMIST

- **CO1:** Basic knowledge of computer and computing
- **CO2:.** BASIC and FORTRAN based programming with especial reference to programming in chemistry.
- **CO3:** Rerunning of standard program in MS Word and MS Excel
- **CO4:** Search engines and various types of files like PDF, RTF, JPG
- CO5: OMR & Webcam.

### LABORATORY COURSE: CHEMISTRY PRACTICAL

### COURSE MCH 206: INORGANIC CHEMISTRY

**CO1:** Chromatography Separation of cations and anions by Column Chromatography

**CO2:** Estimation of Ni – Fe, Ni (Gravimetrically), Fe (Volumetrically)

CO3:	Preparations- Preparation of selected inorganic complexes and their studies by		
	measurements of decomposition temperature, molar conductance, IR an	d	
	electronic spectra.		

CO4: Interpretation of TG and NMR spectra of some known compounds

#### **COURSE MCH 207: ORGANIC CHEMISTRY**

- CO1: Qualitative Analysis: Separation, purification and identification of compounds of binary mixture. Emphasis should be placed on physical principles, reaction chemistry and the technique involved in analysis.
- **CO2:** Preparation of phenyl azo  $-\beta$  naphthol from aniline.
- **CO3:** Aromatic electrophilic substitutions, Reduction reaction
- **CO4:** Quantitative Analysis-Determination of the percentage or number of hydroxyl groups in an organic compound by acetylation method

#### **COURSE MCH 208: PHYSICAL CHEMISTRY**

CO1:	Electrochemistry
CO2:	Conductometry
CO3:	Potentiometry/pH merry
CO4:	Polarimetry

# **M. Sc. Third Semester**

*Course* On completion of this course, successfully students will be able to:

outcome **Title of the paper** 

### FIRST PAPER (MCH 301) INORGANIC CHEMISTRY

- CO1: Group theory, Character tables, orthogonality theorem, applications for C2v and C3v point groups
- CO2: Correlation of vibrational spectroscopy with group theory. They will also understand molecular energy levels and M.O. Diagrams, bonding of multidentate ligands, characterization by IR &Raman spectroscopy.

- **CO3:** Shift reagents in NMR spectroscopy
- **CO4:** Structure and functioning of metalloenzymes e.g., carboxypeptidase, carbonic anhydrase
- **CO5:** Structure and functioning of biomolecules like Hemoglobin.

### SECOND PAPER (MCH 302) ORGANIC CHEMISTRY

- CO1: Basic theory of NMR spectroscopy, applications to characterize organic compounds.
- **CO2:** Photochemical reactions.
- **CO3:** Mechanism of pericyclic reaction,
- **CO4:** Woodword Haffmann, FMO & PMO approach
- **CO5:** Sigma tropic rearrangements.

### THIRD PAPER (MCH 303) PHYSICAL CHEMISTRY

CO1:	Atomic concepts, Russell-Saunders terms and coupling. Molecular Orbitals,				
	Huckel theory of conjugated systems like ethylene, butadiene				
CO2:	Homo and heterogeneous catalysis.				
CO3:	Crystal defects. Schottky and Frankel defects				
CO4:	Solid state reactions. Metallic bond				
CO5:	Conductors, semiconductors, insulators and superconductors				

### FOURTH PAPER (MCH 304 B) ANALYTICAL CHEMISTRY

CO1:	Statistical Analysis., Sample Preparation for Chromatography.			
CO2:	Chromatography. Theory of Chromatography, Gas Chromatography, High- Performance Liquid Chromatography, Capillary Electrophoresis.			
CO3:	Ion Exchange, Solvent Extraction			
CO4:	Atomic Absorption Spectrometry, Electrolytic Methods			
CO5:	Acid-Base Titrations, Precipitation Titrations, Complexometric Titrations, Redox Titrations.			

# FIFTH PAPER (MCH 304C) ELECTIVE PAPER: PHOTOCHEMISTRY

CO1:	Photochemical Reactions		
CO2:.	Determination of Reaction Mechanism		
CO3:	Photochemistry of Alkene		
CO4:	Photochemistry of Carbonyl		
CO5:	Miscellaneous Photochemical Reactions, Photo degradation of polymers.		
	Photochemistry of vision.		

## LABORATORY COURSE: CHEMISTRY PRACTICAL COURSE MCH 306: INORGANIC CHEMISTRY

CO1:	Synthesis					
	Synthesis of selected inorganic compounds and their studies by measurement					
	of decomposition temperatures and molar conductance, magnetic and IR					
	electronic spectra.					
CO2:	Qualitative test of suitable anion and determination of metal content gravimetrically in the above compounds.					
CO3:	Interpretation of ESR and mass spectra of some known coordination compounds.					

### **COURSE MCH 307: ORGANIC CHEMISTRY**

#### CO1: Qualitative Analysis

Separation, purification and systematic identification of the components of a mixture of three organic compounds (solids and liquids). Preparation of one derivative of each compound. Use of TLC for ascertainment of purity of compounds.

#### CO2: Multi-step Synthesis

This exercise should illustrate the use of organic reactions/ diverse conditions and principles for organic synthesis. Purification of compounds by chromatographic techniques.

### COURSE MCH 308: PHYSICAL CHEMISTRY

CO1:	Potentiometry
CO 1.	rocentionietry

**CO2:** Conductivity

CU3.	Spectrophotometry
LU3.	

CO4: Molecular Modeling

# **M.Sc. Fourth Semester**

*Course* On completion of this course, successfully students will be able to:

outcome Title of the paper

#### FIRST PAPER (MCH 401) INORGANIC CHEMISTRY

- **CO1:** ESR Spectroscopy
- **CO2:** Mossbauer, IR, Raman spectroscopy,
- **CO3:** Point groups and vibrational spectroscopy.
- **CO4:** Bio-inorganic chemistry, chlorophyll, photo systems one and two,
- **CO5:** Metalloproteins cytochromes, iron Sulphur protein, Nitrogen fixation.

#### SECOND PAPER (MCH 402) ORGANIC CHEMISTRY

- **CO1:** <sup>13</sup>C NMR Spectroscopy
- **CO2:** Mass spectroscopy.
- **CO3:** Reaction mechanism of elimination, E1, E2 & E1CB type,
- **CO4:** Substitution reactions.
- **CO5:** Enzymes, structure and functioning.

#### THIRD PAPER (MCH 403) PHYSICAL CHEMISTRY

- **CO1:** NMR, ESR spectroscopy.
- **CO2:** Laws of photochemistry, fluorescence,
- **CO3:** Steric and conformational properties of molecules,
- **CO4:** Winstein-Holmer and Curtin-Hammett Equations
- **CO5:** CO5: Electronic effects involved in SN1 and SN2 type of reactions, and curve crossing model.

#### FOURTH PAPER (MCH404) POLYMER CHEMISTRY

- **CO1:** Basic theory, classification of polymers
- **CO2:** Characterization, important properties of polymers

- **CO3:** Commercial importance of polymers
- **CO4:** Processing to understand different types of casting like die-rotational, film
- **CO5:** Methods for designing variety of polymers

#### FIFTH PAPER (MCH 405A) ELECTIVE: CHEMISTRY OF NATURAL PRODUCTS

- **CO1:** Terpenoids
- **CO2:** Alkaloids
- **CO3:** Steroids
- **CO4:** Plant Pigments. Carotenoid, Flavonoids, Chlorophyll
- **CO5:** Vitamins and Antibiotics, Antibiotics.

## LABORATORY COURSE: CHEMISTRY PRACTICAL COURSE MCH 406: INORGANIC CHEMISTRY

- **CO1:** Spectrophotometric Determination
- **CO2:** Flame photometric determination
- **CO3:** Model Experiments on Cyclic Voltammetry
- **CO4:** Interpretation of ESR, NMR and Thermogravimetric pre-recorded results of known compounds

#### COURSE MCH 407: ORGANIC CHEMISTRY

- **CO1:** Multi-step Synthèses Qualitative & Quantitative
- **CO2:** Quantitative Analysis
- **CO3:** Spectral Analysis: Interpretation of pre-recorded UV-Vis, IR, NMR, Mass, Raman spectrum and characterization of one organic compound.

#### **COURSE MCH 408: PHYSICAL CHEMISTRY**

- **CO1:** Spectrophotometry
- **CO2:** Chemical Kinetics
- **CO3:** Electronics
- CO4: Molecular Modeling

# **Department O Clothing & Textile**

# Class /कक्षा - B.Sc. (Home Science) I year

#### H1-HSCA2P Fundamentals of Textile (Paper2)

# **Course Outcome:**

On completion of this course, learners will be able to:

CO1: Develop the skills for identification of fibers and fabrics.

CO2: Understands the fabric construction techniques by preparing samples of various types of weaves.

CO3: Learn the methods of dyeing and printing of fabrics.

# H1-HSCA2G Dyeing And Printing

## **Course Outcome:**

A successful completion of this course will enable students to:

CO1: Describe the basics of dyeing, printing and finishing.

CO2: Examine the knowledge of auxiliaries and chemicals used for dyeing and printing.

CO3: Explain the relation between the dyes, pigments and fabrics.

CO4: Recommend the finishing for textile.

CO5: Dye and print textiles.

# H1-DRA-HNDT Handicraft

### **Course Outcome:**

CO1: Get acquainted with craft traditions of India and get practical knowledge.

CO2: Describe various craft materials.

CO3: Understand different craft materials.

CO4: Design new products for craft revival and income generations.

CO5: Contribution towards restoring lost cultural handicrafts of Madhya Pradesh.

CO6: To develop a sense of personal identity and self esteem through practical achievements in expressive, communicative and functional modes of craft.

Class / कक्षा	:	B.Sc. (Home Science) II Year
Subject / विषय	:	<b>Home Science/</b> गृहविज्ञान

# H2- HSCA2T Fundamentals of Clothing Construction

## **Course Outcome:**

On the successful completion of this course the students will be able to-

CO1: To understand basic sewing concept and sewing equipments.

CO2: To develop skill in basic sewing techniques.

CO3: Identify the common fabrics used for clo9thing construction.

CO4: Utilize design components in garment construction.

CO5: Gain an insight of various sewing machines and other sewing equipments available in the market, their functioning & common problems faced while usage.

CO6: Understands various garments construction process.

Class / कक्षा	:	B.Sc. (Home Science) III Year
Subject / विषय	:	<b>Home Science/</b> गृहविज्ञान
Title of Paper/ शीर्षक	:	Apparel Designing

# **Course Outcome:**

CO1: Apply knowledge of design elements and principles, product, market and technology to critique of fashion, textile and textile product design work.

CO2: To advance knowledge and pushing the boundaries in fashion, textiles and design.

CO3: To apply professional knowledge for the betterment of mankind.

CO4: Promote careers and entrepreneurship in the area of apparels and textiles.

# **Program Outcomes:**

PO1: Knowledge of fiber, yarn, fabric and its properties and its co-relation with construction and design.

PO2: Develop creative ability in designing and production.

PO3: This program provides basic understanding of the Art elements, principle of designs and their effects on apparel.

PO4: It educates the students about the concept and promotion of fashion.

PO5: knowledge about the different types of natural and synthetic dyes.

PO6: Students learn about the figure types and apparel designing according to them.

PO7: Basic sketching skills and preparation of a Croque is undertaken.

PO8: Understand the collars, sleeves, silhouettes etc for the designing of apparel.

PO9: Learn drafting, cutting, layout and stitching of children's and ladies Garments.

PO10: Imparting skills in the field of clothing and textile to needy people for income generation.

PO11: Prepare for higher education and entrepreneurship.

Title of Paper/ शीर्षक :

Job Oriented Course option (A) Garment Designing and Fashion गारमेंटडिजाईनिंग एवंफैषन

# **Course Outcome:**

CO1: To study the design and constructional details of historic costume and making use of knowledge in modern garment designing.

CO2: To enable students to gain knowledge on historic costumes and textiles of different countries.

CO3: To apply art principle of design in creating dress designing and selecting suitable fabric for particular design

# **Program Outcomes:**

PO1: Understanding the sketches of fashion and normal figure.

PO2: Develop designing skills for accessories through sketching.

PO3: Develop creative ability to modify and incorporate garments to the fashion figures.

PO4: Create and sketch own designs

PO5: Knowledge and understanding the body measurement methods for constructing various garments.

PO6: Understanding the fashion figure details.

PO7: Understanding the fashion concepts and fashion industry.

PO8: Understanding the features of state costumes of India.

PO9: Special Clothing for old age, Maternity, lactating mothers and physically challenged people are taught.

PO10: Pattern preparation methods for the commercial use of designing garments as well as individuals are all studied and understood.

PO11: Utility of leather and fur garments for purposive and supportive ways.

PO12: Design concepts are taught, the different types of design and its use in garment construction and designing.

PO13: Understand fashion retailing merchandising and promotion techniques.

# B.Sc. (Home Science)- Undergraduate Course

## **Program specific outcomes:**

PSO1: Gain knowledge in textile production and processing

PSO2: Acquire skills in textile dyeing and printing.

PSO3: Develop entrepreneurial skills in textiles and fashion

PSO4: Understand advance textile fabrication techniques

PSO5: Develop problem solving abilities in the areas of fashion designing, merchandising, textile testing and quality control

PSO6: Apply knowledge to introduce sustainable practices in the textile and apparel industry

PSO7: Through it students will enhance their scope in fabric and apparel quality, new opportunities for investment from economic – socio point of view

PSO8: Students will be able to develop the perspective to understand Art. They will be able to appreciate various art forms by implementing all graphic techniques in the assignments.

PSO9: Students learn to draw different fashion postures in relation to the garment.

PSO10: Learn different techniques of presentation to boost their personality.

PSO11: Develop entrepreneurship skills in textile and fashion.

PSO12: They will start using the correct procedure of designing i.e. trend analysis, PSO13: Gain knowledge about mood boards & design collection/product development.

PSO14: Use of different kinds of fabrics and materials is permitted

PSO15: Work on accessories /furnishing/ life style etc

PSO16: To acquaint students, with marketing process so that they can correlate theory with practical aspect of marketing.

PSO17: professionally trained in the areas of apparel designing and to acquire knowledge of various garments.

PSO18: Boost confidence and public speaking skills through presentation.

# M.Sc.(Clothing & Textile)- I Semester

# SEMESTER-I PAPER-I

#### **TEXTILE CHEMISTRY**

### **Course Outcome:**

CO1: To acquaint the students about the polymers of which the textile fibers are made.

CO2: To understand the chemistry, production and fundamental properties of natural and synthetic fibers.

CO3: To familiarize with the chemical processing from desizing to finishing of textiles and principles.

CO4: To acquaint the students with some advanced textile technology.

# **Program Outcomes:**

Students will be able to-

PO1: Understand the polymers and polymerization process of textile Fibers.

PO2: Understand the system of molecular arrangement to determine the fiber properties.

PO3: Understand the processes, chemical properties of cellulosic, Protein, manmade, synthetic fibers.

PO4: Understand different dye class and applied on various types of historic and modified fibres.

PO4: Understand the basic, chemical and special finishing.

PO5: Gain knowledge of modified and special Purpose fibers.

### SEMESTER-I PAPER-II

#### FABRIC CONSTRUCTION AND WOVEN FABRIC ANALYSIS

### **Course Outcome:**

CO1: To enable students to understand and learn methods of developing fabrics using different fibers, yarn and fabric making techniques.

CO2: To gain knowledge and understanding of fundamentals of weaving Machinery and processes.

CO3: To analyze different weave patterns and learn principles of creating design through weaving.

# **Program Outcomes:**

Students will able to-

- PO1: Understand the contemporary and new spinning system.
- PO2: Understand the modern yarn production technology.
- PO3: Understand different weave designs details and know the various
- fabric structures according to their construction techniques.
- PO4: Understand the Various looms and weaving operations.
- PO5: Understand principles of colour and design in weaving.

### SEMESTER-I PAPER-III

#### APPAREL DESIGN & ADVANCED APPAREL CONSTRUCTION

## **Course Outcome:**

CO1: To impart an in-depth knowledge of style reading, pattern making, And garment construction technique.

CO2: To develop and understand the principles of pattern making through Flat pattern and draping.

# **Program Outcomes:**

Students will be able to

PO1: Use industry terminology and equipments used for apparel construction techniques in appropriate ways.

PO2: Understand different apparel making techniques and their implementation as designer.

PO3: Understand the fitting sessions for best fitted garments.Improve fitting techniques.

CO4: Understand the buying criteria of different types of fabrics.

PO5: Identify the components and evaluate quality of apparel.

### SEMESTER-I

### PAPER-IV RESEARCH METHODS AND STATISTICS

## **Course Outcome:**

CO1: To understand the significance of statistics and research methodology in Home Science research.

CO2: To understand stand the types tools, methods of research and develop the ability to construct data gathering instruments appropriate to the research design. CO3: To understand and apply the appropriate statistical technique for the measurement and design.

### **Program Outcomes:**

Students will be able to-

PO1. Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling.

PO2. Have basic knowledge on qualitative research techniques.

PO3. Have adequate knowledge on measurement & scaling techniques as well as the quantitative data analysis.

PO4. Have basic awareness of data analysis-and hypothesis testing procedures.

### M.Sc.(Clothing & Textile)-II Sem.

# SEMESTER-I I

### PAPER-I

### **TEXTILE TESTING AND QUALITY CONTROL**

### **Course Outcome:**

CO1: To develop an understanding of methods and technique used to analysis Textile fiber, yarns and fabrics for end use performance.

CO2: To acquire knowledge and understanding of various structural properties of textiles and relate them to end use fabric performance and product.

CO3: To familiarize students with the different testing equipments, their Underlying principles and the international accepted standards, Test methods and the language of measurement.

CO4: To be able to analyze and interpret the results and predict the general textile testing.

### **Program Outcomes:**

Students will be able to-

PO1: Apply statistical tools in textile that is able to testing.

PO2: Test significance of textile testing

PO3: Sample selection technique for textile testing.

PO4: Able to perform measurements and evaluation of fibres, yarn and fabric properties.

PO5: Perform the measurement and evaluation of fabric colour fastness properties.

### SEMESTER-I I PAPER-II HISTORIC TEXTILES

### **Course Outcome:**

CO1: To gain knowledge of the significant developments in production of Textiles in the world.

CO2: To assess similarities and dissimilarities in different civilizations in Term of fiber production, Ornamentation and usage.

CO3: To study textiles of historical significance which influenced other cultures & civilization?

# **Program Outcomes:**

Students will be able to-

PO1: Understand the historical development and products achieved in historical perspective.

PO2: Analyze different traditional Indian and world embroideries.

PO3: Understand the development process of dyeing and printing.

PO4: Analyze and identify fabric structure, material content, and method of manufacture of historic textiles for purposes of either conservation work or for descriptive analytical reports;

PO5: Interpret the historic context of textiles to a specific intended audience through published papers, exhibitions, and public presentations.

#### SEMESTER-I I PAPER-III FASHION DESIGN

## **Course Outcome:**

CO1: The course aim at providing in depth working knowledge of the development and Enables to the student to use and practice skills and use it to market situation.

## **Program Outcomes:**

Students will be able to-

PO1: Apply knowledge of design elements and principles.

PO2: Understand the application of fashion components in the field of fashion.

PO3: Understand the fashion forecasting process for become a fashion designer.

PO4: Sketch fashion figure and applying various components of garment details for the purpose of making fashionable or designer garments.

### **SEMESTER-II**

### PAPER-IVSTATISTICS & COMPUTER APPLICATIONS

### **Course Outcome:**

CO1:To understand the role of Statistics & computer applications in research.

CO2: To apply Statistical techniques to research data for analyzing and interpreting data.

CO3: To understand the significance of statistics and research methodology in Home Science research.

CO4: To understand the types tool, methods of research and develop the ability to construct data gathering instruments appropriate to the research design.

CO5: To understand and apply the appropriate statistical technique for measurement and testing.

### **Program Outcomes :**

Students will be able to

PO1: Summarize data visually and numerically.

PO2: Understand the statistical techniques and application of computer in the field of subjective research.

PO3: Students will execute statistical analyses with professional software.

# SEMESTER-III PAPER-I

### **KNITTING TECHNOLOGY**

## **Course Outcome:**

CO1: To gain experience in hand knitting and machine knitting. CO2: To know about Indian knitting Industry.

CO3: To develop an understanding of the various knitting structure.

CO4: To understand stitching of knitted garments.

## **Program outcomes:**

Students will be able to:

PO1: Demonstrate basic skills in knitting techniques and knitting theory,

PO2: Describe types, characteristics and structure of knitted products,

PO3: Understand the Principle of knitting by different types of knitting machines

PO4: Demonstrate basic skills in knitting techniques by knitting on a hand knitting machine and a circular knitting machine.

# SEMESTER-III PAPER-II

#### **HISTORIC COSTUME**

### **Course Outcome:**

CO1: To acquaint students the privileging designs of costumes worms by people of different countries different periods.

CO2: To develop sensitivity and understanding towards historic silhouettes and designs.

CO3: To enable students to discuss about major Political, Economic and Social happenings in post and present.

## **Program Outcome:**

Students will be able to-

PO1: Identify costumes and style features of selected historical periods of the Western world from the time of the Egyptians to the 1990s.

PO2: Understand costume as an expression of the cultures of various historical periods. Relate historical costume design to contemporary dress.

PO3: Describe, define, and/or identify clothing forms associated with various ancient civilizations and time periods of selected Western civilizations.

PO4: Recognize similarities and differences in clothing forms used by selected civilizations and the effect of technological and natural resources on the development of clothing patterns and jewellery.

PO5: Address historical periods and clothing as they are utilized in creating costume design, and understand the social and artistic movements which shaped the era.

PO6: Compile research in costume history, placing it in an historical, social and geographical context.

PO7: analyze and identify fabric structure, material content, and method of manufacture of historic costume and textiles for purposes of either conservation work or for descriptive analytical reports;

PO8: employ practiced methodologies for the protection and longevity of historic costume and textiles in collections; and

PO9: interpret the historic context of costume and textiles to a specific intended audience through published papers, exhibitions, and public presentations.

# SEMESTER-III PAPER-III

# Social and Psychological aspects of Clothing

## **Course Outcome:**

CO1: The aim of this course is to study the psychological effects of clothing on the individual in social situations.

## **Programe Outcomes:**

Students will be able to-

PO1: understand the development of clothing from original stage to present era.

PO2: know different personality theories

PO3: understand the psychological aspects of clothing with reference to different criteria.

# SEMESTER-III PAPER-IV FASHION COMMUNICATION

## **Course Outcome:**

CO1: To enable the students to critically appreciate and understand the intricacies of the fashion industry and to impart skills of communication comprising of visualization and illustration.

## **Progame Outcomes-**

Students will be able to-

PO1: Understand the communication processes

PO2:give examples of various types of fashion shows and outline the fashion show plan.

PO3: construct a visual merchandising display with specified criteria.

PO4: write and present a report about the various types of retail organizations.

PO5: knowledge of opportunities and problems as regards the communication of clothing and fashion.

PO6: critically evaluate the fashion design work of others and provide constructive criticism for ongoing work.

PO7: deconstruct and reconstruct alternative collection developments from existing work.

## SEMESTER-IV

# PAPER-I DYEING AND PRINTING

### **Course Outcome:**

CO1: To impart the knowledge about preparation of fabric for dyeing & Printing.

CO2: To understand the theory of dyeing in relation to various classes of Dyes.

CO3: To introduce the concept, application of various dyes & properties related to it of dyeing at commercial level.

CO4: To inculcate awareness of the different methods of printing and appreciate the technical advantage of each.

CO5: To develop technical competency in printing with different dyes on different fabrics.

# **Program Outcomes:**

Students should be able to:

PO1: Explain the effect of dyes and chemicals on the properties of textile materials, in both aesthetic and functional terms.

PO2: Independently carry out different types of dyeing, printing and processing of textile materials.

PO3: Describe the methods and styles of printing.

### SEMESTER-IV

## PAPER-II

# **GARMENT PRODUCTION TECHNOLOGY**

### **Course Outcome:**

CO1: To enable the students to get acquainted with the latest garment/clothing manufacturing technology related to the current practice in the clothing industry.

CO2: To make the students aware of the influence of garment retailing on the clothing production process.

CO3: To impart knowledge about the latest electronic equipments and machines used in the garment industry.

CO4: To make students aware of the importance of maintaining quality standards during production.

## **Program Outcome:**

- Students will be able to-
- PO1: Knowledge of garment industry, structure and functioning.

- PO2: Knowledge related to processes before, during and after production.
- PO3: Familiarity with various machines, tools and equipment used in garment industry.
- PO4: Understand various materials and components of garment production.

# SEMESTER-IV PAPER-III

# **Fashion Retailing and Merchandising**

## **Course Outcome:**

CO1: To impart knowledge regarding the marketing environment and the prevalent merchandising practices.

CO2: To guide the process of product development toward the market needs.

# **Program Outcomes:**

Students will be able to-

PO1: Knowledge of merchandising activities in a retail setup

PO2: Manage stakeholders involved in retailing

PO3: Understanding the use and characteristics of various tools of promotion

PO4: Understanding the concept of store design, store layout and visual merchandising.

# SEMESTER-IV PAPER-IV

# **Textile Industry In India**

# **Course Outcome:**

CO1: The aim of this paper is to acquaint the student with the multifaceted CO2: Profile of the textile industry of India, the economic regime and policy regulations within which the industry is operating.

# **Program Outcomes:-**

Students will be able to-

PO1: An understanding of the textile supply chain, associated sustainability issues and the effect of industrial revolution on current fashion scenario PO2: Understand the National textile policy and foreign trade policy.

PO3: Understand the textile and clothing industry in relation to various aspects.

# Semester - IV Optional IV Paper Mass Communication

# **Course Outcome:**

CO1: To understand the importance of communication.

CO2: To develop skill for communication ability.

CO3: Importance of audio visual aids in communication.

# **Program Outcomes:**

Students will be able to-

PO1: Evaluate mass communication theories and assess their use.

PO2: Introduce different types of media their characteristics, merits and demerits

PO3: Understand news values and qualities of reporters.

PO4: Introduce students to basics of advertising and its role in society.

PO5: Understand the scope, functioning of Public relations

PO6: rasp the complex relationship between communication/media theories and a diverse set of individual, social, and professional practices.

# Semester - IV Optional IV Paper Dissertation

# **Course Outcome:**

CO1: To develop skills in conducting a research study/ working in a project and learn the process of writing a dissertation/ project report

# **Program Outcomes:**

Student will be able to -

PO1: Know the practical aspects of, collecting data/ project work

PO2: Evaluate, select and use appropriate strategies for reduction, analysis and presentation of data collected during research process/ project work

PO3: Suitably illustrate data/ insights using various graphical and other methods.

PO4: Prepare a dissertation document/ project report based on research process/ project work done.

# **Program Specific Outcomes:**

After the completion of the post graduate degree course students will be able to-

PSO1: Understand the current processes and trends, new developments and technological changes in the field of textiles and apparel.

PSO2: Identify and appreciate the historic textiles and costumes of the world and draw inspiration for the present

PSO3: Apply creative, managerial and technical skills for careers and entrepreneurship in the field of apparel and textiles.

PSO4: Understand and apply tools and methods of research and statistics for conducting research in the subject area.

PSO5: Apply their knowledge and skills and reach out to the community for their capacity building.

PSO6: Implement the creative design process and evaluate them.

PSO7: Interpret aesthetic, historic and trend information from the variety of sources to create innovative and artistic textile and apparel products.

PSO8: Communicate creative and design work to professionals and consumers. PSO9: Understand various accessories used in apparel.

PSO10: Understand analysis and developing of fashion resources and buying behaviors.

PSO11: Understand different aspects of fashion marketing.

PSO12: Understand the basic concept of technical textile.

PSO13: Understand the design details and able to know the various fabric structures as well as colour and weave effect.

PSO14: Students will be able to make effective oral presentations on a variety of topics in public settings.

PSO15: Students will be able to make effective business and professional presentations to internal and external audiences.

PSO16: Run their own business as well as they have developed links with the fashion, garment and textile industry.

PSO17: Open their own cloth sewing centres and other sewing related work.

PSO17: Identifying employment opportunities

PSO18: Understand the textile printing processes.

PSO19: Students will comprehend the foundations, process, and practices of writing for and about the media, and demonstrate proficiency in writing in one or more professional media writing applications.

PSO20: Understand demonstration of software applications in textile as well as fashion designing

PSO21: Understand the research areas to related field.

PSO22: Apply fundamental computer skills to complement traditional design skills and develop original designs using CAD as a tool including basic technical preparation of designs for production;

PSO23: Apply historic costume knowledge to modern fashion design construction.

PSO24: Analyze and use color units effectively in their design process.

PSO25: Adapt their artistic abilities to support their future design careers.

PSO26: Demonstrate professionalism by managing time to meet deadlines with quality work and effectively collaborating in teams.

# **B.Sc. I st Year (Computer Application- Major)**

# Paper-I

1.	Course Code	S1-COAP IT
2.	Course Title	Progrmming in C language
	Course Type (Core	Core Course
3	Course/Elective/Generic	
	Elective/Vocational	
		To study this source a student must have had the subject
4.	Pre-Requisite (if any)	Physics/Maths in 1 2"' class.
5.	Course Learning	On completion of this course learners will be able to:
	Outcomes(CLO)	on completion of this course, learners will be able to.
		1. To explore basics of C programming languages.
		2 .To approach the programming tasks using technique learned
		and write pseudo-code.
		3. To choose the right data representation formats based on the
		requirements of the problem
		4 To use the comparisons and limitations of the various
		programming constructs and choose the right one for the task in
		hand
		nand.
		5. To identify tasks in which the numerical techniques learned are
		applicable and apply them to write programs, and hence use
		computers effectively to solve the task
		bompaters encentery to borte the task.

# **B.Sc. I st Year (Computer Application- Major)**

# Paper-II

1.	Course Code	S1-COAP2T
2.	Course Title	<b>Data processing Software</b> ( Paper – <b>I I</b> )
3	Course Type (Core Course/Elective/Generic Elective/ Vocational	Core Course
4.	Pre-Requisite (if any)	To study this course. a student must have had the subject Physics/ Maths in 1 2"' class.
5.	Course Learning Outcomes(CLO)	<ul> <li>On completion of this course, learners will be able to:</li> <li>1. To understand the basic concept of various applications of software.</li> <li>2 .To gain knowledge of MS Word Excel Access and Power point.</li> <li>3 . To apply acquired knowledge in office automation tasks.</li> <li>4. To study various methods of formatting of documentation and use of spreadsheets.</li> <li>5 .To develop and enhance presentation skills using PowerPoint.</li> </ul>

# **B.Sc. IInd Year (Computer Application- Major)**

# Paper-I

1.	Course Code	S2-COAPIT
2.	Course Title	Database Management System
	Course Type (Core	Core Course
3	Course/Elective/Generic	
	E lective/ Vocational	
4.	Pre-Requisite (if any)	To study this course. a student must have had the subject Physics/Maths in 1 2"' class.
5.	Course Learning	
	Outcomes(CLO)	On completion of this course, learners will be able to:
		1. To understand database concepts, applications,
		structure, need and database terminologies.
		2. To know about fundamental of relational algebra and
		recovery and backup.
		3. To gain skills to create logical design of database,
		including E-R method and normalization approach.
		4 To explore issues of transaction processing and
		concurrency control.
		5. To acquire knowledge of back-end project management
		skill.
		6. To get knowledge of database and create own database.
		7. To implementation of different security feature to
		secure database
## **B.Sc. II nd Year (Computer Application- Major)**

Paper-II
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1.	Course Code	S2-COAP2T
2.	Course Title	Introduction to ASP.NET & C# ( Paper - I I )
3	Course Type (Core Course/Elective/Generic E lective/ Vocational	Core Course
4.	Pre-Requisite (if any)	To study this course. a student must have had the subject Physics/Maths in 1 2"' class.
5.	Course Learning Outcomes(CLO)	<ul> <li>On completion of this course, learners will be able to:</li> <li>1. To learn fundamental of .NET framework.</li> <li>2. To enrich knowledge about windows forms, control and ASP .NET based application.</li> <li>3. To gain proficiency in C# by building stand-alone applications in the .NET framework using C#.</li> <li>4. To build data-driven application using the .NET framework, C# &amp; ADO.NET.</li> <li>5. To acquire skills to create web based applications and reports using .NET technology.</li> </ul>

## **B.Sc. IIIrd Year (Computer Application)**

## Paper-I

1.	Course Title	PAPER I: (Web Designing)
2.	Course Learning Outcomes(CLO)	On completion of this course, learners will be able to: 1. Overview of Web page & Websites(Static &dynamic), creating a site structure, , publishing & Addressing web site, Absolute & Relative addresses, URL. 2. About HTML, Different kind of Tags, three-click navigation, email links, site linkage. 3. HTML Forms creation & used controls. 4. creating and editing cascading style sheets, Domain names, web hosting. 5. Introduction to PHP, \$_GET & \$_POST Variable, concept of MY- SQL connectivity of database.

## **B.Sc. IIIrd Year (Computer Application)**

## Paper-II

1.	Course Title	PAPER II : Digital Marketing
2.	Course Learning	
	Outcomes(CLO)	<b>On completion of this course, learners will be</b> able to:
		1. Overview of digital marketing Increasing Visibility & types,
		Visitor Engagement, Inbound & Outbound, Understanding-
		Conversion Process, Retention,
		2. Understanding internet & domain names, extensions, Web
		server & web hosting Planning ,building website using CMS
		3. Overview Google Analytics, understanding goals and
		conversions, setup goals, concept & bounce rate and exit rate,
		Monitoring traffic sources.
		4. Marketing on social networking websites- viral marketing
		Facebook, twitter, Linkedin, Googleplus, Pinterest.
		5. Introduction to SEO, Google AdWords overview, Algorithm,
		creating search campaigns, racking performance/ conversion,
		Optimizing Search Campaigns,

## **Department of Physics**

## Govt. M. H. College of H. Sc. & Sc. for Women, Jabalpur

#### **PSOs of B.Sc. Computer Maintenance**

- PSO1 Understanding of basic concepts of computer, system software, hardware and networking.
- PSO2 Acquiring knowledge on micro operations, computer architecture, microprocessor and memory organization.
- PSO3 Developing skills for computer maintenance to create opportunities of better job prospects in computer market.
- PSO4 Acquiring the concepts of peripherals and its related troubleshooting.
- PSO5 Analyzing why network needs security and control, what errors might occur and how to control network errors.
- PSO6 Performing computer experiments/projects as per program framework to have the practical know-how of different programming software and trouble-shootings.
- PSO7 Getting the practical knowledge of server administrator and its application and solving its practical problems
- PSO8 Serve as programmers with sound knowledge of practical and theoretical concept for developing software.

#### 1.1 COs of the Course 'Computer fundamentals and system diagnostics'

- CO1 This course will provide skill on various component of computer systems and addressing mechanics of PC problems. Upon completing this course, students will be ables to;
- CO2 Understand the fundamentals of computer & system diagnostics.
- CO3 Study and demonstrate the hardware components of computer.
- CO4 Get proficiency in computer configuration activities.
- CO5 Handle computer assembling as per customer requirement.
- CO6 Know about hardware components, diagnostics & replacement.
- CO7 Get insight about interface & connectors between computers & peripherals.

#### 1.2 COs of the Course 'System administration'

- CO1 This course aims to equip the students with operational activities of operating system. Upon completing this course, students will be able to;
- CO2 Understand the operating system concepts and commands.
- CO3 Get knowledge of various operating system and their modules.
- CO4 Demonstrate the Window operating system, important controls and commands.
- CO5 Practice various commands of DOS.

#### 1.3 COs of the Course 'Application of System Software'

- CO1 Introduction of computer fundamentals and operating system.
- CO2 Understanding and need for DOS and its commands, logical system architecture with hardware.
- CO3 Learning windows operating systems in detail with processor, memory and information management.
- CO4 Understanding the concept of windows computer file management.
- CO5 Learning application software for documentation using MS Word, Excel and Power Point.
- CO6 Performing computer experiments as per laboratory framework on above topics.

#### 1.4 COs of the Course 'Computer peripherals and its architecture'

- CO1 Understanding the basic terms and concepts of system modules and functions.
- CO2 Identifying the components of motherboard and understanding Bus architecture.
- CO3 Study of monitor and its function.
- CO4 Knowledge of binary number theory, Boolean Algebra and binary codes.
- CO5 Learning the conversion of A/D and D/A interfacing, multiple microprocessor system and buses.
- CO6 Designing and implementation of different types of logic circuit using flip-flop.

#### 1.5 COs of the Course 'Computer architecture and troubleshooting procedures'

- CO1 Understanding the operations of microprocessor and micro computer system.
- CO1 Understanding the concepts of stack organization, type of instructions, interrupts and addressing modes.
- CO2 Learning I/O organization synchronous/Asynchronous data CPU and I/O communication, DMA.
- CO1 Understanding the memory organization mapping technique of memory.
- CO2 Learning the characteristic of multiprocessor, interconnection structure.

#### 1.6 COs of the Course 'Computer Networking and Troubleshooting'

- CO1 Understanding networking fundamentals, reference models and switching techniques.
- CO2 Reading hardware elements used in networking and workstation with applications.
- CO3 Understanding networking protocol like CSMA, TCP/IP, UDP and their sub netting.
- CO4 Understanding basics of network security, protection and related troubleshooting.
- CO5 Determining an internet address and startup (RARP) and mapping internet addresses.
- CO6 Accessing network administration services through firewall, network security, and encryption and understanding user authentication application.
- CO7 Performing experiments on installation of LAN, Remote Control Desktop, and Server-Client Network.

#### 1.7 COs of the Course 'Architecture of Unix/Linux and system administration '

- CO1 Understanding architecture of UNIX /Linux and features with standards, file system with commands.
- CO2 Learning the processes of UNIX, multiple jobs in background and foreground.
- CO3 Installing apache and its configuration, connection of Linux to internet, configure web server, client server and troubleshooting.
- CO4 Exploring Unix administration task, configuration and installing X-free 86.
- CO5 Learning disk partitions, file system and LAN with Linux such as –NIC, Boot protocol, IP etc.
- CO6 Performing mounting and un-mounting file system, access remote system through Telnet, Managing Servers.

## **B.Sc. Ist Year (Computer Science- Major)**

1.	Course Code	si-cosc1T
	Course Title	Computer System Architecture
2.		(Paper - I)
	Course Type (Core	Core Course
3	course/Elective/Gen	
	Vocational	
4.	Pre-Requisite (if any)	To study this course. a student must have had the subject
		Physics/Maths in 1 2"' class.
5.	Course Learning	
	Outcomes(CLO)	On completion of this course, learners will
		be able to:
		1. Understand the basic structure. operation
		and
		Characteristics of digital computer.
		2. Be able to design simple combinational
		digital circuits based on given parameters.
		3. Familiarity with working of arithmetic and
		logic unit as well as the concept of pipe ling.
		4. Know about hierarchical memory system
		including cache memories and virtual memory.
		5. Understand concept and advantages of
		parallelism, threading, multiprocessors and
		multi core processors.
		6. Know the contributions of Indians in the field of computer architecture and related technologies.

## Paper-I

#### **B.Sc. Ist Year (Computer Science- Major)**

#### 1. Course Code si-cosc2T Programming Methodologies & Data Structures **Course Title** 2. (Paper - II) Core Course Course Type (Core Course/Elective/Gen 3 eric E lective/ Vocational To study this course. a student must have had the Pre-Requisite (if any) 4. subject Physics/Maths in 1 2"' class. 5. On completion of this course, learners will be able **Course Learning** to: Outcomes(CLO) I. Develop simple algorithms & flowcharts to solve a problem with Programming using top down design. 2. Writing efficient and well structured computer Algorithms / Programs. 3. Learn to formulate iterative solutions and array processing Algorithms for problems. 4. Use recursive techniques, pointers & searching methods in Programming. 5. Will be familiar with fundamental data structures, their implementation : become accustomed to the description of Algorithms in both functional & procedural styles. 6. Have knowledge of complexity of basic operations like insert, Delete, search on these data structures. 7. Possess ability to choose a data structures to suitably model any data used in computer applications. 8. Design programs using various data structures including hashtables, Binary & general search tress, heap, graphs etc. 9. Assess efficiency tradeoffs among different data structure implementations. 10. Implement and know the applications of Algorithms searching and sorting etc. 11. know the contributions of Indians in the field of programming and data structures.

#### PAPER-II

## **B.Sc. IInd Year (Computer Science- Major)**

## Paper-I

1.	Course Code	S2-COSCIT
2.	Course Title	Computer Networks & Information Security ( Paper - I )
3	Course Type (Core Course/Elective/Generic E lective/ Vocational	Core Course
4.	Pre-Requisite (if any)	To study this course. a student must have had the subject Physics/Maths in 1 2"' class.
5.	Course Learning Outcomes(CLO)	<ul> <li>On completion of this course, learners will be able to: <ol> <li>Define and describe the components of data</li> <li>communication system such as various protocpls, OSI</li> <li>Model , data transmission in analog and digital format .</li> </ol> </li> <li>Identify &amp; differentiate among the network devices and drivers .</li> <li>Learn and describe various error detection and correction method . Define the various terminologies used in network and application layers .</li> <li>Compare the various network technologies and decide the suitable technologies installation as per requirement and environment at any work place .</li> <li>Describe the various protocols and can identify the application areas of each protocol.</li> <li>Know the fundamentals of network and information security issues, laws and various security technologies Which can be applied on work place .</li> </ul>

## **B.Sc. IInd Year (Computer Science- Major)**

## Paper-II

1.	Course Code	S2-COSC2T
2.	Course Title	<b>Object Oriented Programming with Java</b> ( Paper - I I )
3	Course Type (Core Course/Elective/Generic E lective/ Vocational	Core Course
4.	Pre-Requisite (if any)	To study this course. a student must have had the subject Physics/Maths in 1 2"' class.
5.	Course Learning Outcomes(CLO)	<ul> <li>On completion of this course, learners will be able to: <ol> <li>Implement object oriented programming concept using basic syntaxes of control structures, string &amp; function for development skills of logic building activity.</li> </ol> </li> <li>Identify classes, objects, members of a class and the relationship among them needed for a finding a solution to a specific problem.</li> <li>Demonstrates how to achieve reusability using Inheritance, interfaces &amp; packages and describe faster application development can be achieved</li> <li>Demonstrate understanding and use of different exception handling mechanism and concept of multithreading robust faster and efficient application development.</li> <li>Identify and describe common abstract user interface components to design GUI in Java using Applet &amp; AWT along with response with events.</li> <li>Identify, Design and Develop complex graphical user interface using principal java Swing classes based on MVC architecture.</li> </ul>

## **B.Sc. IIIrd Year (Computer Science)**

## Paper-I

1.	Course Title	PAPER I: DATA BASE MANAGEMENT SYSTEM
2.	Course Learning Outcomes(CLO)	On completion of this course, learners will be able to:
		l .Concept of DBMS and they will learn database language, 3L architecture.
		2. E -R model and conceptual design, relationship, aggregation, specialization and generalization.
		3. Fundamentals of set theoretical notations and concept different keys, integrity rules, relation algebra.
		4, Functional Dependencies, Normalization, Hashing, indexing.
		5 Oracle data types Component of SQL, oracle function, Data constraints, Joins

## **B.Sc. IIIrd Year (Computer Science)**

## Paper-II

1.	Course Title	PAPER II : OPERATING SYSTEM CONCEPT
2.	Course Learning Outcomes(CLO)	<ul> <li>On completion of this course, learners will be able to:</li> <li>1. Concept of Operating System and its types client- server, peer-to peer, protection of I/O, memory and CPU.</li> <li>2. Process Management , context switch, types of schedulers, scheduling algorithms, , multilevel queue, Inter process communication , Deadlocks .</li> <li>3. Memory Management, fragmentation, swapping relocation, compaction, paging , segmentation ,Virtual Memory algorithms , Thrashing, page fault frequency.</li> <li>4. Storage Management, Device Management:</li> <li>5. Introduction of Linux , working with Linux , concept of shell and its types, VI editor.</li> </ul>

## **Department of Physics**

## Govt. M. H. College of H. Sc. & Sc. for Women, Jabalpur

## **B.Sc. Electronics**

#### [1] PSOs of B.Sc. Electronics

- PSO1 Understanding the fundamental concepts of semiconductor devices which has become the essential component of everyday life.
- PSO2 Acquiring the knowledge of electronic circuits and related techniques to have an understanding of many electronic devices.
- PSO3 Learning the concepts of digital electronics, microprocessors, operational amplifiers, Bio medical devices and related electronic systems.
- PSO4 Understanding basic power electronics, electrical motors for developing skills in the related areas.
- PSO5 Understanding electronic communication systems and their applications.
- PSO6 Performing experiments in the laboratory to have the practical knowledge of different electronic devices and fabricate certain circuits.
- PSO7 Carrying out minor project work as per the syllabus.

#### 1.1 COs of the Course 'Semiconductor devices"

- CO1 Student learn the basic behavior of semiconductor material
- CO2 Learning of reproduce the I-V characteristics of diode/BJT/MOSFET devices.
- CO3 Learn to apply standard device models to explain calculate critical internal parameters of semiconductor devices.
- CO4 Student learns to explain the behavior and characteristics of power devices such as SCR/UJT etc.

#### 1.2 COs of the Course 'Basic circuit theory and network analysis"

- CO1 Student learns to study circuit in a systematic manner suitable for analysis and design.
- CO2 Student understands how to formulate circuit analysis problem in a mathematically traceable way with an emphasis on solving linear systems of equations.
- CO3 To analyze the electric circuit using network theorems.
- CO4 Determine sinusoidal steady state response.
- CO5 Understand the two-port network parameter with an ability to find out two-port network parameter and overall response for interconnection of two-port networks.

#### 1.3 COs of the Course 'Digital Electronics and Microprocessor'

- CO1 To study the concepts of logic gates, arithmetic circuits and flip flops.
- CO2 Learning logic families counters and registers with their types and uses.
- CO3 Understanding D/A & A/D converters with concepts of memories.
- CO4 Learning the microprocessor 8085, its instruction sets and basic straight line programming.
- CO5 Learning architecture of personal computer and interfacing devices with concept of multipurpose programmable devices.
- CO6 Developing practical skills on above topics/concepts.

#### 1.4 COs of the Course 'Operational Amplifier and Instrumentation'

- CO1 Learning working and applications of differential amplifier and operational amplifier.
- CO2 Studying construction and working of CRO and LCD.
- CO3 Understanding fundamentals of signal generator with working and applications of IC 555 timer and IC 8038 Function generator.
- CO4 Learning measuring instruments, the operation of different types of multi-meters, counters and Biomedical instruments like ECG & x ray.
- CO5 Performing laboratory experiments on above topics.

## 1.5 COs of the Course 'Power Electronics, Electrical motors and Advanced Microprocessor'

- CO1 Understanding working of different power devices such as power diodes and transistors, UJT, SCR, DIAC, TRIAC and applications of SCR.
- CO2 Studying types and applications of electrical motors.
- CO3 Learning the architecture and organization of INTEL 8086 microprocessor and programming using macros and call procedures.
- CO4 Performing experiments on power devices and assembly language programming using INTEL 8086 microprocessor.

#### 1.6 COs of the Course 'Communication System'

- CO1 Learning the basic theory of noise and radio wave propagation.
- CO2 Understanding amplitude, frequency, phase and pulse modulation in communication system
- CO3 Explaining the role and type of antennas in transmission and the concept of television.
- CO4 Understanding satellite and wireless communication system through cellular telephony, GSM.
- CO5 Performing handful of laboratory experiments.
- CO6 Carrying out project work as per the syllabus.



# THE LEARNING OUTCOME FRAME OF UG AND PG COURSE OF FOOD AND NUTRITION

## B. Sc.(Home science) Subject -Food & Nutrition Course Outcome

This programme is designed with an objective to cover all important topics so that students will be able to use this knowledge in advancement of their career.

## **B. Sc. First Year**

Course Outcome Title of the Paper	On completion of this Course, successfully students will be able to :
<u>Group A – Major Paper - Ba</u>	asic Nutrition
Nutritional components of food .Their interaction to maintain positive health and ward off disease .Nutrients in food ,its chemical nature ,sources metabolism ,requirements, deficiencies.	
<u>Group C – Major Paper - Hu</u>	ıman Physiology
The study of human body a	at various levels of organization i.e organs and

The study of human body at various levels of organization i.e organs and tissue cells .Their structural components & functions .The process of ingestion ,Digestion, Absorption, Transportation, Respiration, Excretion are studies which involve in the innumerable regulatory activities.

## **B. Sc. Second Year (Home Science )**

Course Outcome Title of	On completion of this Course, successfully students
the Paper	will be able to :
Group A- Major Paper – Biochemistry	
Biochemistry is a branch of science which deals with the chemistry of living	
organism and their biological processes Home science subject this helps the	
learners to comprehend the chemical composition genetic disease and	
hereditary outcomes	

## B. Sc. Third Year (Home Science )

Course Outcome Title of the Paper	On completion of this Course, successfully students will be able to :	
First Paper – Normal and Therapeutic Nutrition		
The paper enables the learner to modify the normal diet to therapeutic diet in the family cycle and different disease related to diets.          Paper III –Job Orientation (Advance Bakery and Packaging)		
Bakery is an expanding pr candidate to study the pac importance ,Bakery indust structure .	ofessional job oriented course ,which helps the king material used for bakery products and its cry is an important part of the economic & social	

## **<u>B. Sc.(Clinical Nutrition)</u>** <u>Course Outcome</u>

This programme is designed with an objective to cover all important topics so that students will be able to use this knowledge in advancement of their career.

### **B. Sc. First Year**

Course Outcome Title of the Paper	On completion of this Course, successfully students will be able to :
Major Paper I –Introduction	n to Food
Diet has a powerful comple	ex effect on health. It enables the learner to study
the nutrient content of diff	erent food groups, different proportions, choice and
customize it according to r	ieeds.
Major Paper II - Basic Nutri	tion

Enables the students to study the functions and role of nutrients and their requirements. It will help the learners to calculate energy requirement and the Recommended Dietary Allowances.

## B. Sc. Second Year

Course Outcome Title of	On completion of this Course, successfully students			
the Paper	will be able to :			
Major Danor I - Human Biochomistry				

<u>Major Paper I – Human Biochemistry</u>

The paper enables the students to learn the importance of Balanced diet, Meal planning at different phases of life. It also teaches the tools of Nutritional assessment, screening and the role of different nutritional agencies for the upliftment of health.

<u>Major Paper II – Human Physiology</u>

This paper will help the students to learn about different organ system ,their function and help to correlate human physiology with various diseases and their pathogenesis.

## **B. Sc. Third Year**

Course Outcome Title of the Paper	On completion of this Course, successfully student will be able to :	
<u>Paper I – Advance Clinical N</u>	Iutrition & Dietetics	
The paper enables the stud planning at different phase assessment, screening and upliftment of health.	lents to learn the importance of Balanced diet, Meal es of life. It also teaches the tools of Nutritional the role of different nutritional agencies for the	
Paper II – Food Microbiolog	y Sanitation & Hygiene	
Student will learn about th	e microorganisms in human environment and to	

Student will learn about the microorganisms in human environment and to understand the importance of Microorganisms in foods technology. The paper

## M. Sc. Food & Nutrition Course Outcome

This programme is designed with an objective to cover all important topics so that students will be able to use this knowledge in advancement of their career.

## M. Sc. First Semester

Course Outcome Title of	On completion of this Course, successfully students
the Paper	will be able to :

Paper I - Applied Physiology

This course offers our insight into the functioning of the different parts of the body. It unfolds the mysteries and design of the human body and makes the learner aware of the sequences of events in the body, subject reveals the pathophysiological conditions.

#### Paper II – Advanced Nutritional Biochemistry

Nutritional Biochemistry deals with the study of Biochemical structure of nutrients their activities within the cell, and their metabolism as an individual and inter dependent ways the students are made aware of the cause of degenerative diseases, and the effect of medicines its control to overcome the problem.

#### Paper III – Public Nutrition

The scope of Public Nutrition for learners which provides awareness regarding Nutritional Problems their nature, causes, consequences and prevention advocacy and linkage with the population. It also helps in the planning, and implementation of Nutrition Education Programs, for the community focusing on Vulnerable groups.

#### Paper IV – Research Methods and Statistics

The learner is focused on the scientific and systematic steps in Research. The different methods of research have well defined steps which are followed. Research designs with technical writing skills are introduced.

#### M. Sc. Second Semester

Course Outcome Title of	On completion of this Course, successfully students			
the Paper	will be able to :			

Paper I – Advances in Food Microbiology

Students study the fascinating diversity of microbial life, role and importance of microbes in daily lives emphases of microbes in chemical and industrial situations.

Paper II – Applied Biochemistry & Techniques

Applied Biochemistry helps the learner to co-relate the biochemical activities in the living organisms to the cause of the biological processes and clinical diagnosis by various techniques.

#### Paper III – Nutrition & Health Problems

It covers the concept of nutritional status as a reflection of eating habits, pharmacological and nutritional treatments and resources in the community like communicable and non-communicable disease.

Paper IV – Statistics and Computer Application

It enables the students to use proper methods to collect the data, employ correct analysis and effectively present the result. It helps in critical thinking and analytical skills.

### M. Sc. Third Semester

Course Outcome Title of	On completion of this Course, successfully students
the Paper	will be able to :

#### Paper I – Advanced Nutrition

Nutrition is the prime need for survival. Sustaining physical and mental health. Nutritional needs at various stages of life.

#### Paper II – Clinical and Therapeutic Nutrition

Therapeutic diet its application and knowledge to plan a diet for patients of various degenerative diseases. It enables the students to learn the concept of Nutritional care adopted by the profession of dietetics.

#### Paper III – Food Science and Current Trends

It deals and helps the learner to study the facts of chemistry involved in the physical, chemical and biological science of food. The influence of cooking, processing and preservation on the quality of food.

#### Paper IV – Issues Related To Women's Health

For the development of the nation the wellbeing of women is important as they constitute half of the population, which includes physical, mental, social, psychological, economical and spiritual health. It enables the learner to study about gender sensitization, schemes and policies, law and rights laid in the constitution.

### **M.Sc. Fourth Semester**

Course Outcome Title of	On completion of this Course, successfully students
the Paper	will be able to :

Paper I – Health & Fitness

Health is primary for all the organisms to exist including human beings. The students learn to make use of non-nutritive and hidden health benefits of food for fighting at various disease and other conditions like sports, bone and dental health.

Paper II – Clinical and Therapeutic Nutrition

Therapeutic diets are planned to maintain and restore good nutrition in patients at various disease states like Diabetes, Heart Disease, Kidney Disease, Ulcers, and Liver Disease.

#### Paper III – Food Science and Current Trends

It helps the learners to know the quality of food. Nutritional factors and functional foods and its mechanism of action.

#### Paper IV – Nutrition & Health of Mother Child & Elderly

To enable the students to learn about adequate nutrition during pregnancy this has a greater potential for long term health. Maternal health is complex and is influenced by genetic, social, economic factors. Emphasis in old age which is not a disease but a biological process.

		P	ART A: Introduc	tion		
Program	rogram: UG Level Class: I Year			Year: 2021-22	Session: 2021-22 onwards	
		Subject: 1	<b>Foundation Cours</b>	e (English)		
1.	Course Code		X1-FCHB1T			
2.	Course Title		English Language	e and Indian Cultu	ire	
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational		Foundation Course			
4.	Pre-Requisite (if any)		To study this course, a student should have basic knowledg of English language. This course will be studied by all th students of UG level under the Foundation Course category.			
5.	Course Learning (CLO)	g Outcomes	Through this count 1. Prepare for van English language 2. Promote their variety of texts and 3. Build and enhand 4. Develop the grammar and usand 5. Inculcate van heritage and envolution	rse the students w rious competitive competence. comprehension s and their interpreta ince their vocabul ir communicatio ges. ues which make ironmental issues	ill be able to: exams by developing thei kills by being exposed to tions. ary. * n skills by strengthenin e them aware of nations s, making them responsibl	

Program	ICATE	Class: B./	۸.	Year: 2021-22	Session: 2021-22 onwards	
LERI	TICALE	Subject: Fl	UNCTION	NAL ENGLISH		
1.	Course Code	A	1-FENG2	T		
2.	Course Title		Functional Grammar of English			
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational		Core			
4.	Pre-Requisite (if an	y) 1	10+2 in any stream / Open for all			
5.	Course Learning Or (CLO)	utcomes E	By the end De stru Pra con De em	of this course students monstrate an understa uctures in English lang actice the skills of gran nversations and discus evelop English languag poloyability prospects.	s will be able to: nding of grammatical guage, nmar in writing, ssions. ge competence for enhanced	

		Part A	Introduction		
Prog	ram: Certificate Course	Class': BA	Year: 1	Session: 2021-22	
		Subject:	Generic English		
1	Course Code			A1-ELITIG	
2	Course Title	Commi	inicative English	(Paper , Theory + Tutorial)	
3	Course Type (Core Course/Elective/Generic Elective/Vocational/. )		Elective		
4	Pre-requisite (if any)	This co followi /Open l	This course can be opted as an elective by the students following subjects: Class 12 <sup>th</sup> passed in any discipli /Open for all		
5	Course Learning Outcomes (CLO)	The stu- the known The stu- with ef- them;	dy of this course wledge of Phonology and N Syntax and Struc Vocabulary and I idents will be ab fective language Acquire literary s Use idiomatic and Communicate eff	will enable the students to acquire forphology, ture, and Discourse. It to converse in real-life situations is skills. The course will also help- sense, d lexical language, and fectively across the globe	

## Syllabus of Paper BA I Year: Generic English (Theory + Tutorial)

## Foundation Course: Yoga and Meditation

		Part-A	: Introdu	ction	
Program:	Program: Certificate course Class: B./		A. 1 Year	Year: 2021	Session: 2021 – 2022
		Subjec	et: Yogic Sc	ience	
1.	Course Code		A1-YOSC	C1F	
2.	Course Title	12.4 12.	Yogaand	Meditation (I	Paper-2)
3.	3. Course Type		Foundation Course		
4.	Pre-requisite (If	any)	For BA I Year students, this course is compulsory all.		, this course is compulsory for
5.	Course Learning	g Outcomes	After stud • Take ca social and	lying this cours are of their ow 1 spiritual healt	se,students will be able to: vn Physical Mental emotional, h.
6.	Credit Value	1020	Theory-2	St. Rates	
7.	Total Marks	19	Max. Marks: 50 Min. 1		Min. Passing Marks: 17

		(भाग-ए) परिचय			
÷	कार्यक्रम ः यूजी लेवल प्रमाण–पत्र	कक्षाः बी.ए. / बी.कॉम / वी.एरासी. / बी.एच.एससी. / बी.सी.ए. / वी.वी.ए (प्रथम: वर्ष)	तमे 2021	기년 2021	2022
	विषय :	आधार पाठ्यक्रम			-
1	कोर्स कोडः	X1-FCEAIT			
2	कोर्स का शीर्षकः	भाषा और संस्कृति			1
3	कोर्स का प्रकार	आधार पाठ्यक्रम			1
4	कोर्स अपेक्षित	कक्षा 12वी उत्तीर्ण किसी भी विषय समूह से।			
5	कोर्स अधिगम उपलब्धि (लर्निग आउटकम) (CLO)	<ol> <li>अच्ययन से रुचि का विकास करना।</li> <li>अध्ययन से रुचि का विकास करना।</li> <li>सांस्कृतिक चेतना और राष्ट्रीय भावना का विकास करना।</li> <li>भाषा-ज्ञान।</li> <li>सामान्य शब्दावली और विशेष शब्दावली के अध्ययन द्वारा भाषा एवं संस्कृति बोध का विकास करना</li> <li>विशिष्ट शब्दावली (बीज शब्द / की वर्ड) से परिचित करवाते हुए बोध के रत्तर को विकसित करना।</li> <li>प्रतियोगी परीक्षाओं हेतु तैयार करना।</li> </ol>			
6	क्रेडिट मान	02 क्रेडिट	1		1
7	कुल अंक	५० अंक			-1
8	उत्तीर्ण अंक	17 अंक			-

## आधार पाठ्यक्रमः प्रथम प्रश्न पत्र - हिन्दी भाषा

Onwel

## Foundation Course: ENVIRONMENTAL EDUCATION

		PA	RT A: Introdu	uction		
Program: UG Level Class: UG I Ye Certificate		ar	Year: FI	RST	Session: 2021-22 onwards	
- 513		Subject	: Environmental	Education		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1.	Course Code		X1-FCACIT			
2.	Course Title		Environmental Education			
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational		Foundation Course			
, 4,	Pre-Requisite (if any)		A course intended to create awareness about the life of human beings which is an integral part of environment; and to inculcate the skills required to protect the environment from all sides.			
		6	To study this course, the student must have a knowledge about the environmental components, pollution, biodiversity, and ecosystem at senior secondary, class 12 <sup>th</sup> level:			
5.	Course Learning	Outcomes (CLO)	<ol> <li>To under processes Anthropo</li> <li>To build issues, an practices inform de</li> </ol>	stand various , and the impo- cene era. capabilities t alyze the vario and policies, ecisions.	aspec acts or o iden ous un and c	tts of life forms, ecological in them by the human during ntify relevant environmental derlying causes, evaluate the develop framework to make
			<ol> <li>To develop empathy for all life forms, awareness, and responsibility towards environmental protection and nature preservation.</li> <li>To develop the critical thinking for shaping strategies such as; scientific, social, economic, administrative &amp; legal, environmental protection, conservation of biodiversity, environmental equity and sustainable development.</li> <li>To prepare for the competitive exams.</li> </ol>			
6.	Credit Value	1000	2 Credit			
7.	Total Marks	19451	Max.Marks : :	50	Min.	Passing Marks:17

(डा. अर्चना वचोली)

	Par	t A Introduction		
Program: Certificate		Year: First Year	Session: 2021-22	
		P A P P A P A P A P A P A P A P A P A P		
Course Code	V1-HOR-ORGT			
Course Title	Organic Farming			
Course Type	Vocational			
Pre-requisite (if any)	Open for All			
Course Learning outcomes (CLO)	<ul> <li>After studying this Course the Student will be able to:</li> <li>Prepare media for protected cultivation.</li> <li>Demonstrate irrigation and fustigation, green house operations, irrigation and fustigation, care and maintenance of protected structure.</li> <li>Demonstrate special horticultural practices in protected cultivation</li> <li>Identify and control of insect-pest and diseases, harvest and post-harvest practices.</li> </ul>			
Expected Job Role / career opportunities	Job opportunities in government sector as well as private sector and self employment.			
Credit Value	4			

	Part	A Introduction			
Program: Certificate/D	iploma/Degree	Year: First Year	Session:2021-22		
	in the shirt was				
Course Code	V1-PSY-DEVT				
Course Title	PERSONALITY DEVELOPMENT				
Course Type	Vocational				
Pre-requisite (if any)	Open for all				
Course Learning outcomes (CLO)	After studying this course the Student will be able to         • To cultivate skills for successful life and learn to handle failures         • To learn the process of goal setting and SWOT analysis         • To understand the importance of time and stress management         • To develop core skills for employability         • To develop effective communication skills         • To realize the role of technology in personality development				
Expected Job Role / • Growth and value addition in the respective job profiles			e job profiles		
Credit Value		4			

	Part.	A Introduction		
Program: Certificate	191	Year: First Year	Session:2021-22	
Course Code	V1-TNT-TTTT			
Course Title	Tourism, Transport and Travel Services			
Course Type	Vocational			
Pre-requisite (if any)	Open for All			
Course Learning outcomes (CLO)	<ul> <li>After studying this Course, the Student will be able to</li> <li>Understand the core concept of tourism, travel and transport services.</li> <li>Practically perform passport and visa formalities.</li> <li>Manage airport ground handlings.</li> <li>Independently escort the tourists group and guide these groups and individual tours also.</li> <li>Understand and practically know the procedure and functioning of travel agency.</li> </ul>			
Expected Job Role / career opportunities	Airport ground staff, airport manager, air ticketing, tour escort, tour manager, itinerary designer			
Credit Value 4				

	Part 2	A Introduction			
Program: Certificate		Year: First Year	Session: 2021-22		
Course Code		V1-COS-WEBT			
Course Title	Web Designing				
Course Type	Vocational				
Pre-requisite (if any)	Open for All				
Course Learning outcomes (CLO)	ourse Learning       After studying this Course the student will be able to –         * Code a handful of useful HTML & CSS examples         * Build semantic, HTML & CSS web page         * Write basic scripts         * Use Names, Objects, and Methods         * Add Interactivity to a Web Page         * Create Dynamic Web Pages using Java Script in HTML forms.				
Expected Job Role / Career opportunities	<ul> <li>Create Dynamic Web Pages using Java Script in HTML forms.</li> <li>pected Job Role / reer opportunities</li> <li>Job Role - Web Designer / Front End Developer/ Creative Ad Designer Job Description – Web designers develop functional and appealing pages, websites, web applications, online advertisements for individe businesses and government agencies to establish their online presence. use knowledge of computer programming and graphic design to of websites that meet client needs.</li> <li>Career Opportunities – Typical employers of web designers are –</li> <li>Software companies</li> <li>IT consultancies</li> <li>Specialist web design companies</li> <li>Large corporate organisations</li> <li>Any organisation that uses computer systems</li> <li>Self-employment/freelance work is often possible for individuals appropriate experience.</li> <li>Vacancies are advertised online, by career services and by recruit agencies</li> </ul>				
Credit Value		(4) Theory – 2 Practi	ical – 2		



# THE LEARNING OUTCOME FRAME OF UG AND PG COURSE OF HUMAN DEVELOPMENT

## Programme specific outcome B.Sc. Human development

**PSO1**- Describe how individuals develop and change from womb to tomb

**POS2**- Relate the principles of human development with self, family and society

**POS3** - Apply methods of teaching and training towards administration of early learning centers

POS4 - Appraise and identify life situations in need of referral services

POS5- Manage life crisis at every stage of life span

**PSO6** The student will acquire knowledge and insights about the dynamics of contemporary marriage and family system in india.

**PSO7** To become aware about women empowerment and aware about legal aspect of women.

## **Course Outcome**

#### **B.Sc. I Year** VOCATIONAL COURSE-PERSONALITY DEVELOPMENT

Programme Outcome-

- PO1 Understand concept of personality.
- PO2 Helpful for set smart goal and self analysis.
- PO3 Develop stress management process
- PO4 Develop Communication skill and digital etiquettes.
- PO5 Develop skill about time management.

Course Outcomes

- CO1 To learn the process of goal setting and SWOT analysis
- CO2 To understand the importance of time and stress management
- CO3 To Devlop core skills for employability

- CO4 To develop effective communications skills
- CO5 To realise the role of technology in personality development

#### **B.Sc.(Home Science)**

#### I Year Introduction to Extension and Communication -

Programme Outcome-

PO-1.Understand Fundamental basic concept of Extension teaching and learning process.

PO-2. Develop knowledge and Skill about communication.

PO-3.Develop skills about communication media.

#### B.Sc. I Year Introduction to Extension and Communication

Course Outcome-

CO-1.To acquire knowledge of the need and importance of communication in each field of communication.

CO-2. To develop knowledge skill related to Extension Education and Communication

CO-3. Analyze the need for communication and effective use of media.

CO-4.To understand the importance of extension education and communication.

CO-5.To acquire knowledge of various teaching materials and their use.

#### **B.Sc.(Home Science) I Year**

#### Life Span Development -I Programme Outcome-

PO-1.To know basic concept of Life Span Development.

PO-2. To develop knowledge and skill related to pre and post natal development.

PO-3. Understand physical motor, social, emotional, cognitive, language and moral development of early and late childhood.

#### **B.Sc.(Home Science) I Year**

#### Life Span Development -I

Course Outcome-

Life Span Development explores how we change and grow from conception to

death in a scientific way. After studying this course , the student will be able to-

CO-1.Identify the diffrent stages of human life span development and their developmental tasks.

CO-2. Understand the impact of specific cultural practices family and community in Child's life.

CO-3. Understand Child's behaviour and their developmental domains occurring in infancy and Childhood.

Students will be to able to learn following points:-

- CO (1) History and scope of human development
- CO (2) Principles of growth & development
- CO (3) Pre natel development
- CO (4) Physical motor social & emotional development of 0-2 year old child.
- CO (5) Personality development and habit formation

## Bsc II year Early Childhood Care And Childhood Education

Students will be to able to learn following points:-

- CO 1 characteristics and developmental task of early and late childhood.
- CO 2 Physical, motor, social, emotional development of early childhood
- CO 3 Importance of play.
- CO 4 Personality development child rearing practices.
- CO 5 Significance and objectives of early childhood education.

#### Job Oriented Course :- Pre school education

- CO 1 Aims, objectives and history of pre school education
- CO 2 Planning, budget and curriculum of nursery school
- CO 3 Concept formation
- CO 4 Role of National and International agencies
- CO5 Play materials and types of play and play equipment's

#### B.sc. III year Adolescent and adulthood

- Students will be to able to learn following points:-
- CO 1 Physical changes in puberty and its effect
- CO 2 Problems of adolescence
- CO 3 Adjustment during adolescence and problem in family
- CO 4 Theories of sex role development
- CO 5 Middle and late adulthood problems and adjustment.

#### Job-Oriented Course:- Guidance and counseling

Students will be to able to learn following points:-

- CO 1 Techniques/method of guidance and counseling.
- CO 2 Role of Parents and teacher in guidance and counseling.
- CO 3 Counseling for adolescence, parenthood, marital and old age.
- CO 4 Guidance programme for behavioural problem child.
- CO 5 Counseling for gifted and mentally retarded children.

## Programme specific outcome B.sc. Extension Education

PSO1-Develop faith in the capacity of the people of take responsibility for their own development.

PSO2-Understand the role of non-govt. organizations in community development.

PSO3- The student will-

(a) Become aware of the need competencies and skills to be develop for empowerment and be motivated for self enhancement.

(b) Become aware of the role of improvement of women from the perspectives of personal and national development.

(c) Become aware of the inter disciplinary of home science education and its potential for person and professional enhancement.

PSO 4-Understand social economic structures and system that make up the rural and urban community.

PSO5- Recognize one's own role in the development process.

PSO6-To develop skills in the use of methods and media.

PSO7-To understand the process of communication in development work.

## Course outcome B.sc. Extension Education Bsc I year - Introduction to Extension Education

Students will be to able to learn following points:-

CO 1. Need, objective and principles of home science extension education.

- CO 2. Job opportunities in home science.
- CO 3 Classification, scope and use of teaching aids.
- CO 4 Role of national and international agencies in extension.
- CO 5 women issues.
### **B.sc. II year - Rural Development**

Students will be to able to learn following points:-

CO 1 Meaning and characteristics of rural leadership

CO2 Scope and importance of community development programme.

CO 3 Role of community organizer in govt and non govt organization

CO 4 Planning and evaluation of community development programme.

## B.sc. III year - Communication and extension

Students will be to able to learn following points:-

- CO 1 Analysis of family as a social unit.
- CO 2 Empowerment of women
- CO 3 Personal growth and personality development.
- CO 4 Conflicts and stress Coping strategies.

CO 5 The role of home science education for personal growth and professional development.

# **PSO's of M.Sc. Human Development**

**PSO 1** To study different methods and techniques of understanding to human development Understand family as a component of socio-cultural milieu and context. To familazed students with the developmental perspective in family life cycle To create awareness regarding philosophy structure function needs and strengths of families With specific reference to the Indian family to understand theoretical and methodological concerns related to family studies.

**PSO 2** To understand the need for theory in human development.

**PSO 3** To become aware of various impairments and the manner in which these affect the lives of Individuals .

**PSO 4** To develop an a understanding of their rights and understand that there is a wide variation between people with disabilities.

**PSO 5** To understand elderly person their needs desire psychology and social acceptance and adjustment factor.

**PSO 6**. Identify how families and communities influence the process of growth and development

**PSO 7**. Demonstrate skills in using tools to assess human behaviour.

**PSO 8**. Appraise and distinguish exceptional situations to make early detection

**PSO 9**. Advocate domain specific social programmes and policies

**PSO 10**. Become entrepreneurs in establishing learning centers

### CO's of M.Sc. Human Development

# SEMESTER – I Paper / Course - I History and Theories of Human Development

### Students will be to able to learn following points:-

- CO1 Early theories and ethological theories
- CO2 Psychoanalytic theory neo freudians theories and learning theory.
- CO3 Cognitive development theory and cross cultural relevance current status.
- CO4 Social learning and social cognition theories, theories of self
- CO5 Humanistic psychology, developmental theory.

# Paper / Course - II Methods of Studying Human Development

Students will be to able to learn following points:-

CO1 Understand the self methods of study human development observation, Interview questionnaire

CO2 Psychometric methods

CO3 Understand family as a component of socio-cultural milieu and context

CO4 Approaches and theories in family studies family and societal exchange, influences

CO5 Contemporary issues and concerns family violence

## Paper / Course - III

## **III - Early Childhood Care and Education**

### Students will be to able to learn following points:-

CO 1. Principles need and scope of early childhood care and education

CO 2. Historical Trends (Overview) Contribution of the following thinkers of ECCE pestalozzi, Rousseau Frobel, Maria montessorie, Jhon Dewey, m.k Gandhi, ravindranath tagore.

CO 3. Programmes of ECCE in india ICCW, IAPE, NCERT, ICDS, UNICEF, NCTE.

CO 4 Record and report, planning setting goals and objectives of plans.

CO 5 Activities for ECCE Language, Art and craft, Music mathematics, science, social studies.

### PAPER-IV Research Methods and Statistics

#### Students will be to able to learn following points:-

CO 1 Meaning , objectives and significance of research role of statistics and research in home science discipline

CO 2 sampling methods types of sampling

CO 3 Definition and identification of a research problem selection justification and limitation of research problem.

CO 4 Tabulation of data graphic presentation average of position in individual discrete and continuous series

CO 5 Hypothesis, concept testing of hypothesis type I and type II errors, non parametric methods

# SEMESTER – II Paper – I Advanced Study in Human Development

### Students will be to able to learn following points:-

CO 1 Principles and concepts of growth and development

CO 2 Pre natal development genetic environmental factors, Indian practices during pregnancy, Infancy, Birth to 2 years

CO 3 Transition form infancy to childhood. All round development.

CO 4 Late childhood(7-11 years) Physical ,motor, coginitive, moral, language and social development

CO 5 Adolescence (11-18 years) Transition from childhood to sexual maturity role of family, peers, community and ethinic group health, sexuality, mental health, delinquency, conformity

# Paper / Course - II II - Infant Development And Stimulation

### Students will be to able to learn following points:-

CO 1 New born behaviour capacities early interaction

CO 2 Language development, developmental assement need and reason for infant assessment intervention and stimulation programmes, activities.

CO 3 Parenting, task of parenting. Being a competent parent individual parenting role. The mothering role the fathering role.

CO 4 Developmental interaction in early childhood years. Family relation and communication, learning social role and interactions with others, meeting children's needs.

CO 5 Techniques of parent education in preschool setting informal meetings, parent library workshop, Individual meeting.

# Paper - III Adolescence and Youth

### Students will be to able to learn following points:-

CO 1 Adolescence stage, developmental tasks, theorical perspectives

CO 2 Physical and sexual development coginitive development

CO 3 Identity formation, developmental of self, social and emotional development, family, peer and friendship, conflict with authority.

CO 4 school college work and career education and formal training.

CO 5 Marriage and family relation. Delinquency and disturbance. Juvenile delinquency psychological disturbances.

# PAPER-IV STATISTICS & COMPUTER APPLICATIONS

### Students will be to able to learn following points:-

CO 1 Normal distribution, measures of variability.

CO 2 Quantitative research method, socio metric scale, questionnaire and schedule. Meaning concept and types of co-relation.

CO 3 Qualitative research, Case study, Interview, observation.

CO 4 Research design-meaning, feature, concept and purpose of research design.

CO 5 Meaning, nature, types and selection of variables experimental designs. Analysis of variance.

## SEMESTER-III Paper/Course-I Advanced Study in Human Development-I

### Students will be to able to learn following points:-

- CO 1 Biological and developmental perspectives on youth and adulthood.
- CO 2 Developmental task in middle age.
- CO 3 Physical and psychological change in women and in men.
- CO 4 Women's health problems after menopause.
- CO 5 Types and management of stress.

# Paper/Course-II Person with Special Needs-I (Compulsory)

#### Students will be to able to learn following points:-

- CO 1 Various approaches in defining and understanding disability.
- CO 2 Attitudes of people towards disability.
- CO 3 Classification of impairment.

CO 4 Meaning, Identification, Causes, Classification and educational provisions of orthopedic locomotive, visual, hearing, speech impairment.

CO 5 Problems of hearing and speech impairment.

# Paper/Course-III Principles of Guidance & Counselling-I (Compulsory)

### Students will be to able to learn following points:-

- CO 1 Need, objectives and principles of guidance and counseling.
- CO 2 Fundamental elements and types of guidance models.
- CO 3 Individual, group and family counseling.
- CO 4 Counseller-counselee relationship, skills of a counseller.
- CO 5 Process and techniques of counseling.

# Paper/Course-IV Mental Health and Psychopathology-I (Compalsory)

### Students will be to able to learn following points:-

- CO 1 Importance of mental health
- CO 2 Stress and adjustment disorders
- CO 3 Behaviour disorder of childhood and adolescence.

CO 4 Psychosocial, psychodynamic, behavioral and cognitive model of psychopathology.

CO 5 Different types of psychotherapies.

# SEMESTER-IV Paper/Course-I Advanced Study in Human Development-II

### Students will be to able to learn following points:-

CO 1 Developmental tasks, physical aspect and cognitive abilities of old age.

CO 2 Grand parenthood- intergenerational relations, types of adjustment in old age.

- CO 3 Atchley's views of retirement and stages of retirement
- CO 4 Mental and behavioural problems in late adulthood.
- CO 5 Death and Bereavement.

# Paper/Course-II Person with Special Needs-II

### Students will be to able to learn following points:-

CO 1 Meaning and concept of mental retardation.

CO 2 Meaning, concept, causes, identification and education provisions of learning disability.

CO 3 Gifted children- concept, classification identification and educational provisions.

CO 4 Use of assistive devices

CO 5 Persons with disability act (PWDAct), vocational and occupational rehabilitation provisions.

# Paper/Course-III Principles of Guidance & Counselling-II

### Students will be to able to learn following points:-

CO 1 Special areas of counseling- Adolescents, old age and drug abusers.

CO 2 Counseling for child with behaviour problem, maladjusted, delinquent and mentally retarted child.

CO 3 Need of placement services.

CO 4 Aims, types and method of follow up services.

CO5 Personal, pre and post marital and family counseling.

# Paper/Course-IV Mental Health and Psychopathology-II

### Students will be to able to learn following points:-

CO 1 Concept and causes of abnormal behavior.

CO 2 Different types of anxiety disorder

CO 3 Schizophrenia, Mood disorders and Bipolar disorders, their symptoms and treatment

CO 4 Somatoform disorder – types and treatment.

CO 5 Perspective on Prevention- Primary , secondary and tertiary

# Paper/Course-IV Mass Communication

### Students will be to able to learn following points:-

- CO 1 Concept, element, process and functions of communication
- CO 2 Types of communication
- CO 3 Print media- origin, development and characteristics.
- CO 4 Origin, development and characteristics of Radio, Television, folk media.
- CO 5 Socio cultural effects of mass media.

### Mathematics Course Outcome B.Sc. I Year Paper I Algebra, Vector Analysis of Geometry

- **1.** Recognize consistent and inconsistent system of linear equations by the row echelon form of the augmented matrix using the rank of matrix.
- 2. To find the Eigen values and corresponding Eigen vectors for a square matrix.
- **3.** Using the knowledge of vector calculus in geometry.
- **4.** Enhance the knowledge of three dimensional geometrical. Figure (eg. Cone and cylinder)

### Course Outcome B.Sc. I Year Paper II Calculus and differential Equations

The course will enable the students to

- **1.** Sketch curves in a plane using its mathematical properties in the different coordinate systems of reference.
- 2. Using the derivatives in optimization, social sciences, physics and life science etc.
- **3.** Formulate the differential equations for various mathematical models.
- 4. Using techniques to solve and analyze various mathematical models.

### Course Outcome B.Sc. II Year Paper I Abstract Algebra

The course will be enable the students to

- **1.** Recognize the algebraic structures as a group and classify them as abelian , cyclic and permutation groups.
- **2.** Link the fundamental concept of group and symmetrical figures.
- **3.** Analyze the subgroups of cyclic groups.
- **4.** Explain the significance of the nation of cosets, normal subgroups and quotient groups.
- **5.** The fundamental concept of rings, fields, subrings integral domain and corresponding morphisms.

### Course Outcome B.Sc. II Year Paper II Advanced Calculus

The course will enable the students to

- **1.** Understand many properties of the real line R and sequences.
- Calculate the limit superior the limit inferior and the limit of a bounded Sequence & continuity.
- **3.** Apply the mean value theorems and Taylor's theorem.
- **4**. Apply the various test to determine convergence and absolute convergence of an infinite series of real numbers.
- **5.** Double and triple integrals volume and surface of solids of revolution and change of order of integration.

### Course Outcome B.Sc. II Year Paper III Differential Equation

The course will enable the students to

- **1.** Series solution of differential equation by find power series. Bessels and Legendre equations.
- **2.** Laplace transforms Linearity, Differentiation and integration of Laplace transform.
- 3. Laplace transform for solving initial value problems.
- 4. Partial differential equation of first order, Charpits method.
- **5.** Partial differential equation of second and higher order equation of vibrating string, heat equation and other applications.

### Course Outcome Mathematics B.Sc. III Year Paper I Linear Algebra & Numerical Analysis

The students would have

- 1. Knowledge of Vector spaces, subspaces their dimension & basis.
- 2. Concept & applications of linear transformation
- 3. Orthogonal & orthonormal Vectors.
- **4.** Finding solution of equations by various numerical methods.
- 5. Solution of linear equation through direct methods, integration & differentiation.

### Course Outcome Mathematics B.Sc. III Year Paper II Real & Complex Analysis

- 1. Concept of Riemann integrability & partial derivatives.
- **2.** Determining convergence of improper integrals.
- **3.** Finding the fourier series of various functions.
- 4. Theory of metric spaces & continuous functions.
- **5.** Complex functions finding power series representation, residues & singularities of complex functions.

### Course Outcome Mathematics B.Sc. III Year Paper III Discrete Mathematics

- 1. Knowledge of Boolean functions & their properties.
- **2.** Relations and their types.
- **3.** Lattice & their properties.
- 4. Graphs their types & properties & their matrix representation.
- 5. Determination of shortest path.
- 6. Trees their types & properties.

# Course Outcome M.Sc. 1<sup>st</sup> Sem (Mathematics) Advanced Abstract Algebra

- 1. Students would have knowledge of elements of Galois theorem.
- Would be able to define & give examples of modules submodules & types of modules & their properties.
- **3.** Concept of Noetherian & Astinian rings & examples.
- 4. Applications of finitely generated modules.

# Course Outcome M.Sc. 1<sup>st</sup> Sem (Mathematics) Advanced Discrete Mathematics

Students would gain knowledge of

- 1. Algebraic structures examples & properties.
- 2. Lattices sublattices & their properties
- **3**. Defferential & examples of Boolean algebra.
- **4**. Graph theory, definition , examples & applications.
- 5. Tress their types & Properties.

# Course Outcome M.Sc. 1<sup>st</sup> Sem (Mathematics) Complex Analysis

Students would be able to prove & apply

- Wierstrass factorization theorem, Runge's theorem, Mittage Leffer's theorem Monodromy theorem, Harnack's inequality theorem Hadamad's, Blocks Picard theorems.
- 2. Work with Riemann zeta function, Gamma functions, Analytic continuity.
- **3**. Solve problem of Dirichlet Greens function, Jenson's & Jenson poission formula.

# Course Outcome M.Sc. 1<sup>st</sup> Sem (Mathematics) Lebesgue Measure & integration

Students would be able to find & apply

- **1.** Lebesgue outer measure, measurable & non measurable sets.
- 2. Solve Riemann lebesgue integrels, integrate non-negative functions, general integral & series.
- **3.** Knowledge of four derivatives & functions of bounded variation, complex functions & p spaces.
- **4.** Apply Jensen's inequality, Holders & Minkowskis' inequality.
- **5.** Understand the concept of dual space, convergence, uniform & almost uniform convergence.

# Course Outcome M.Sc. 1<sup>st</sup> Sem (Mathematics) Advanced Abstract Algebra

- **1.** Students would be able to define & prove elementary propositions of conjugacy relation, normalizer, Cauchy & sylow's theorems.
- 2. Knowledge of series of groups.
- 3. Solvable & nilpotent groups & their properties.
- **4.** Prove theorems & give examples of fields, extension & splitting field, perfect & finite field.

# Course Outcome M.Sc. 1<sup>st</sup> Sem (Mathematics) Complex Analysis I

- **1.** Solve problems of complex integration using Cauchy's theorem & integral formula.
- 2. Find poles & singularities of functions & prove various important theorems.
- **3.** Determine Laurent's & Taylor's expansion of functions.
- **4.** Find bilinear transforms of functions & conformal mappings.

# Course Outcome M.Sc. 1<sup>st</sup> Sem (Mathematics) Functional Analysis

- Students would become familiar with continuous map & uniformly continuous maps.
- 2. Define & give examples of normed linear space & Banach Space.
- **3.** Prove some important theorems on normed linear space & Banach space.
- 4. Define & give examples of Hilbert space & prove some of its important properties.
- 5. Concept of spectral theory.

# Course Outcome M.Sc. 1<sup>st</sup> Sem (Mathematics) Real Analysis

### Students would have

- **1.** Understanding of Riemann stoelges integral & its properties.
- **2.** Would be able to integrate vector valued functions.
- **3.** Would be able to test the convergence of sequence & series of functions using Wierstrass, Abel's & Dirichlets test.
- 4. Calculate derivatives of functions of sever at variables.
- 5. Prove theorem like implicit function theorem Stokes theorem etc.

# Course Outcome M.Sc. 1<sup>st</sup> Sem (Mathematics) Topology

Students would be able to

- 1. Define & give examples of Topological spaces, various types of topologies & topological subspaces.
- **2.** Understand continuous function & prove various theorems on box & product topology.
- **3.** Metric topology, metrizable spaces & related theorem.
- **4.** Knowledge of connected & path connected spaces with examples & related theorems.
- **5.** Define & give examples of compact spaces and prove related theorems.

# Course Outcome M.Sc. 2<sup>nd</sup> Sem (Mathematics) Ordinary & Partial Differential equations

- Students would be able to solve exact differential equations, find their adjoints, Strum Liouville differential equations & apply Lagrange's method of variation of parameters.
- **2.** Construct PDE & greens functions solve differential equation by Charpit's method.
- **3.** Find the power series solutions of 1<sup>st</sup> & 2<sup>nd</sup> order linear equation & find singular & regular pts.
- **4.** Find the Laplace transforms & inverse Laplace transforms, derivation & integrals of Laplace theorem & apply convolution theorem.

# Course Outcome M.Sc. 2<sup>nd</sup> Sem (Mathematics) Mathematical Statistics

- Calculation of measures of central tendency dispersion, based on mutual Differences & skewness.
- **2.** Probability theory & problems.
- **3**. Univariate theoretical & normal distributions.
- **4.** Bevariate distribution, multivariate distribution & their applications.
- **5**. Testing of hypothesis, measures of association, test for goodness of fit and homogeneity test.

# Course Outcome M.Sc. 2<sup>nd</sup> Sem (Mathematics) Advanced special Function

- **1**. Solution & application of Gamma & Beta functions.
- **2**. Application of Gauss multiplication theorem.
- **3**. Solution of problems based on hypergeometric & generalized hypergeometric functions.
- **4.** Contiguous function relations, hypergeometric differential equations.
- 5. Kummer's and Ramanujan's theorem, elementary series manipulation & simple transformation.

# Course Outcome M.Sc. 3<sup>rd</sup> Sem (Mathematics) Linear Programming

- **1.** Students would be able to formulate & solve linear Programming problems using graphical, simplex, two phase & Big M method.
- **2.** Find the dual of any L.P.P.
- **3.** Solve assignment transportation & Job sequencing problem & find the optimal Solutions.

# Course Outcome M.Sc. 3<sup>rd</sup> Sem (Mathematics) Applied Functional Analysis

- 1. Students would be familiar with Hilbert spaces convex sets & projections.
- 2. Weak convergence weak compactness & weak semi continuity.
- **3.** Convey programming & support functional, support plane & support mapping.
- **4.** Functions transformations & operators.
- **5**. Spectral theory of operators.

### **Course Outcome**

# M.Sc. 3<sup>rd</sup> Sem (Mathematics)

### **Integral Transforms**

Students would be able to solve problems of

- **1**. Applications of Laplace transforms in differential equations.
- 2. Laplace equations.
- **3**. Laplace wave equations.
- **4**. Application of Laplace transforms in integral equations.
- **5**. Heat conduction equations.

# Course Outcome M.Sc. 4<sup>th</sup> Sem (Mathematics) Operations Research

The student would have knowledge of

- 1. Operations Research its scope, origin, development, characteristic models, uses & limitations.
- 2. Solve problems of inventory theory, Various models.
- **3**. Find solution of replacement problems.
- **4**. Apply network analysis & its constraints, calculate PERT.
- **5**. Game theory, solution of games with saddle point & without saddle point, graphical solution.

# Course Outcome M.Sc. 4<sup>th</sup> Sem (Mathematics) Spline Theory

Knowledge of –

- **1**. Polynomial interpolation & limitations of polynomial approximation.
- 2. Piecewise linear approximation.
- **3.** Piecewise cubic interpolation.
- 4. Parabolic spline interpolation.
- 5. Piecewise polynomial representation, basis splines.

# Course Outcome M.Sc. 4<sup>th</sup> Sem (Mathematics) Programming in C

- **1**. The students would be able to write programs in C language & know the basics of C programming.
- 2. Use of various operators in programming.
- **3**. Write programs using control statements.
- **4**. Write programs using variables & functions.
- **5.** Write programs using pointers.

# Course Outcome M.Sc. 4<sup>th</sup> Sem (Mathematics) Advance Special functions – II

Students would be able to apply & solve

- Legendre polynomials, generating functions, Christoffels, Murphy & Rodrigues formula & generating relations.
- 2. Solve & apply Legendre differential equations.
- **3.** Bessel's function, Bessel's differential equations & orthogonality of Bessel's functions.
- **4**. Hermite & Lagurre polynominals & generating functions.

# Course Outcome M.Sc. 4<sup>th</sup> Sem (Mathematics) Integral transforms II

Students would have knowledge of

- 1. Applications of Laplace transforms.
- **2**. Would be able to Solve electric circuit problems.
- **3**. Solve complex Fourier transforms.
- **4**. Properties of Fourier transforms & their derivatives.

# **PSO's of B. Sc. (Microbiology)**

# Session -2021-2022

- 1. They can join R&D Department of any pharmaceutical industries.
- 2. They can work in any Research Laboratory/Institutes (ICMR, NII, CCMB, and any other CSIR Lab) as JRF/ SRF/ RA.
- 3. After getting degree in Microbiology they can get opportunities in various fields-
  - A. Medical Science organizations.
  - B. Health care organizations.
  - C. Forensic Science Laboratories.
  - D. Food Industries.
  - E. NGOs
- 4. They can choose Lectureship and researches in Universities and institutes.

5. They can procure some very prestigious foreign fellowships like commonwealth (UK), DAAD (Germany), etc.

# **Course Out-Come**

### **B.Sc. I year**

### Paper I: General Microbiology and Cell Structure

- 1. Indian traditional knowledge and historical background of Microbiology.
- 2. Structure and transmission of Viruses.
- 3. Cell structure and cell organization of bacteria.
- 4. Different kinds of unicellular prokaryotic and eukaryotic microorganisms based on specific characteristics.
- 5. General characteristics of important Eubacteria.

### **B.Sc. I year**

### **Paper II : Microbial Techniques**

- 1. Recall the basic lab glassware to be used in the laboratory.
- 2. Summarize different methods of sterilization and isolation of pure cultures.
- 3. Understand the working of different kinds of instruments and microscopes.
- 4. Apply serial dilution technique to isolate the bacteria.
- 5. Practice different methods to culture bacteria in the laboratory.
- 6. Illustrate a method to differentiate between Gram positive and Gram negative bacteria.

# **Course Out-Come**

#### **B.Sc. II Year**

#### Paper I: Biochemistry and application of enzymes

- 1. Students will learn basic properties of carbohydrate protein and lipid.
- 2. They will learn about enzymes and its application.
- 3. They will get knowledge about mathematical expression of growth and factors which affect growth of microbes.
- 4. Student will get knowledge of bioenergetics.
- 5. They will learn about utilization of energy.
- 6. They will get knowledge about Electron Transport Chain.

#### **B.Sc. II Year**

#### Paper II : Microbial genetics and Molecular Biology

- 1. They will get knowledge about DNA in detail.
- 2. Student will learn about replication and molecular mechanism of chromosomal replication.
- 3. They will learn basic features of genetic code.
- 4. Student learns about genetic recombination in bacteria.
- 5. They learn about mutations and repair system.

# **Course Out-Come**

### B.Sc. III year Paper I: Applied and environmental microbiology

- 1. Students will learn about design and types of fermentors.
- 2. They will learn about Immobilization
- 3. They will learn about physical and microbial spoilage of food.
- 4. They will learn about application and production of SCP.
- 5. Students will learn about microbial interactions.
- They will learn about bioremediation, biomagnifications, bioleaching, biopesticides and waste water treatment.

#### **B.Sc. III year**

### Paper II: Immunology and Medical Microbiology

- 1. Student will learn about types of Immunity, humoral and cell mediated immune response.
- 2. They will learn about antigen and antibody reaction and how immune system works.
- 3. They will get knowledge about tumor immunology.
- 4. They will learn about Immunization
- 5. They will get knowledge about Host Microbe interaction.

# M. Sc. I<sup>st</sup> Sem- Microbiology

# <u>2021-22</u>

# **COURSE OUT-COME**

### **Paper 1 – Bacteriology**

- 1. They will learn about bacterial structure.
- 2. They will learn about classification of bacteria.
- 3. They will learn how to identify bacteria by staining techniques.
- 4. They will learn about extremophillous bacteria and its importance.

### Paper 2 – Mycology

- 1. They will learn about fungal morphology and physiology along with its taxonomy.
- 2. They will learn about life cycle and different life stages of all the fungi.
- 3. They will learn about economic importance of fungi.

## Paper 3 – Virology

- 1. They will learn about structure and different types of viruses.
- 2. They will learn about all viral diseases of plants, animals and human beings.
- 3. They will learn about serological techniques and viral vaccines.

### **Paper 4 – Biochemistry**

- 1. They will learn about all macromolecules like carbohydrates, lipids and proteins.
- 2. They will learn about signal transduction and membrane structures.
- They will get knowledge of various techniques like chromatography, electrophoresis, spectroscopy along with some advanced techniques like HPLC, SDS PAGE, MASS Spectroscopy, GC MS etc.

# M. Sc. II<sup>nd</sup> Sem

# **COURSE OUT-COME**

# Paper 1 – Molecular Biology And Recombinant DNA Technology

- 1. They will learn about structure of DNA and RNA along with their replication.
- 2. They will learn about various strategies of Gene Cloning and construction of genomic library.
- 3. They will learn about mechanism of mutation and mutagens along with types.
- 4. They will learn about operon system.

# **Paper 2 – Biostatistics**

- 1. They will learn about mean, mode, median and other statistical methodology.
- 2. They will learn about t test, f test and central tendency for data analysis.
- 3. They will learn about computer applications and bioinformatics.

# Paper 3 – Microbial Physiology and Metabolism

- 1. They will learn about metabolism and physiology of bacteria.
- 2. They will learn about growth patterns in bacteria.
- 3. They will learn about advantages of bacteria.

# **Paper 4 – Microbial Genetics**

- 1. They will learn about gene transfer and genetic mapping.
- 2. They will learn about DNA repair system.
- 3. They will get knowledge of production of proteins, hormones and design of vaccines.

# M. Sc. III<sup>rd</sup> Sem

# **COURSE OUT-COME**

# Paper 1 – Environmental Microbiology

- 1. They will learn about interaction between microbes and environment.
- 2. They will learn about waste water treatment by microbes.
- 3. They will learn how to purify water.
- 4. They will learn about biological nitrogen fixation.

# Paper 2 – Industrial and Food Microbiology

- 1. They will learn about fermentation technology.
- 2. They will learn about production of alcohol, enzymes, antibiotics, vitamins at industrial level.
- 3. They will learn about food and dairy microbiology with food borne diseases.

# Paper 3 – Medical Microbiology

- 1. They will learn about normal microflora of human beings.
- 2. They will learn about various bacterial, viral and fungal diseases.
- 3. They will learn about antigens, antibodies and serological techniques.
- 4. They will get knowledge of various diagnostic methods and prophylaxis of different diseases.

# **Paper 4 – Agricultural Microbiology**

- 1. They will learn about biofertilizers.
- 2. They will learn about all techniques which help in farming, GMO, GMP.
- 3. They will get knowledge of various plant diseases and their control measures.

# M. Sc. IV<sup>rth</sup> Sem

# **Dissertation work**

- 1. They will get experience about research work and their outcomes.
- 2. They will get opportunity to work in various reputed research labs for their dissertation work.
- 3. During dissertation they came into real scientific approach.
- 4. They will learn scientific writing skills for the thesis, research papers etc.

# **PSO's of M. Sc. Microbiology**

# Session 2020-2021

- 1. They can confer various research fellowships like JRF, SRF etc.
- 2. They can go for Ph. D. Programme.
- 3. They can work in prestigious Institute and Research laboratories like CSIR labs, NEERI, FRI etc.
- 4. They can appear to be Scientists in different fields like
  - a. Forensic Microbiology
  - b. Food Microbiology
  - c. Medical Microbiology
  - d. Agriculture Microbiology
  - e. Environmental Microbiology
  - f. Molecular Microbiology
  - g. Industrial Microbiology
- 5. They can open their own NGO's related with Microbiology.
- 6. They can go for teaching in various colleges like nursing, paramedical etc.

# **Department of Physics**

# Govt. M. H. College of H. Sc. & Sc. for Women, Jabalpur

# **B.Sc. PHYSICS**

### [1] PSOs of B.Sc. Physics

- PSO1 Describe the methodology of science and the relationship between observations and theory.
- PSO2 Apply conceptual understanding of physics to general real world situations
- PSO3 Understanding the basic concepts of mechanics and thermodynamics to explain the working principles of machines & engines. Preparing foundations for classical as well as quantum systems, statistically.
- PSO4 Acquiring the knowledge of optical phenomena &instruments, LASER, electric and magnetic fields in static and dynamic situations.
- PSO5 Understanding quantum mechanical tools to learn about the realm of atomic dimensions, principle of spectroscopy for determining the characteristics of various elements and solid state physics & electronics.
- PSO6 To develop problem solving skill.
- PSO7 To develop skill on experimentation for proper handling of apparatus.

### 1.1 COs of the Course 'Thermodynamics and statistical physics '

- CO1 The course would enable the students to understand the basic physics of heat and temperature in relation to energy, work, radiation and matter.
- CO2 Students are expected to learn that "how laws of thermodynamics are used in a heat engine to transform heat into work".
- CO3 This course will also develop and understanding of various concepts of statistics and the methods who apply them in thermodynamics.
- CO4 Student will understand the importance of studying statistical mechanics with the behavior of particles under classical and quantum conditions.

### 1.2 COs of the Course 'Mechanics and general properties of Matter '

- CO1 The course would empower the students to develop the idea about the behavior of physical bodies.
- CO2 It will provide the basic concepts related to the motion of all the objects around us in daily life.
- CO3 The students would be able to build foundation to various applied field in science and technology especially in the field of mechanical engineering.
- CO4 The students will acquire the knowledge of basic mathematical methods to solve the various problems in physics.
- CO5 The student will be able to understand the relativistic effect and the relation between energy and mass.

### 1.3 COs of the Course 'Optics'

- CO1 Learning the basic principles of geometrical optics, image formation and working of optical instruments.
- CO2 Introduction to interference, interferometers and their applications in determination of wavelength and spectral widths.
- CO3 Studying diffraction, related properties and instruments.
- CO4 Learning the concept of polarization and related instruments.
- CO5 Understanding theoretical and practical aspects of lasers.
- CO6 Performing experiments to understand the principles of optics by using various optical instruments, laser.

### 1.4 COs of the Course 'Electrostatics, Magneto statics & Electrodynamics'

- CO1 Learning the basics of electrostatics- Coulomb's law& its applications, concept of capacitors and relations between **D**, **E** and **P**.
- CO2 Understanding the basic concepts of magneto statics- BiotSavart's law, Ampere law and the relationship between **B**, **H** and **M**.
- CO3 Studying the growth and decay of current in LCR circuits and determination of their time constants.
- CO4 Learning the laws of electromagnetic theory, Maxwell's equations, and propagation of electromagnetic waves in diverse media.
- CO5 Developing skill to solve numerical problems.
- CO6 Performing laboratory experiments based on the above concepts.

### 1.5 COs of the Course 'Quantum Mechanics and Spectroscopy'

- CO1 The need and basic postulates of quantum mechanics.
- CO2 Application of Schrodinger wave equation to solve different problems.
- CO3 Studying the atomic spectra for hydrogen atom and X-rays.
- CO4 Understanding molecular spectra– electronic, vibrational and rotational spectra and their application to analyze the different types of molecules.
- CO5 Describing basic properties of nucleus &its stability, nuclear radiations, Reactions, models and finally the concepts of nuclear fission &fusion.

### 1.6 COs of the Course 'Solid State Physics and Devices'

- CO1 Studying the crystal structure and band theory for solids.
- CO2 Studying the thermal &electrical properties of solids-thermal and electrical conductivity, resistivity and specific heat.
- CO3 Understanding the occurrence of magnetism in solids and theoretical explanation provided by quantum and classical theories.

- CO4 Study of semiconductors and their applications in electronic devices: Zener diode, Photo diode, LED, Solar cell, Transistor, JFET, Amplifiers in CB, CE, CC configurations (Class A, B, C amplifiers), RC-coupled amplifiers, Feedback amplifiers, Oscillators.
- CO5 Understanding the need for modulations /demodulations and their types.
- CO6 Understanding essential differences in structures and properties of bulk and Nano materials. Synthesis of nano particles using chemical and physical methods and nanolithography.
- CO7 Performing laboratory experiments on the above devices.

# **Department of Physics**

# <u>Govt. M. H. College of H.Sc. & Sc. for Women, Jabalpur</u>

# **M.SC. PHYSICS**

### [1] PSOs of M.Sc. Physics

- PSO1 Understanding the intricacies of physical phenomena.
- PSO2 Recapitulating mathematical methods to comprehend and explain most of the physical phenomena.
- PSO3 Understanding the concepts of classical mechanics, statistical mechanics electrodynamics and applying them to physical events within their limitations.
- PSO4 Applications of concepts of condensed matter physics, nuclear & particle physics, atomic & molecular physics and quantum mechanicsat atomic & subatomic level.
- PSO5 Learning the essential features of electronic devices and related techniques to have a perceptive of manyinstruments and gadgets.
- PSO6 Enhancing the capability of calculations by a course on computer and programming methods.
- PSO7 Understanding advanced and special fields like plasma physics, LASERS, advanced electronic communication devices and their applications.
- PSO8 Performing handful of experiments/projects as per program framework.

### 1.1 COs of the Course 'Mathematical Physics'

- CO1 Students receive an all-round introduction to this fundamental course and can build on the deliverables from this course to attack problems in nuclear & particle physics, atomic & molecular physics, quantum mechanics, condensed matter physics, and elementary particle physics, and can also apply this if they become experimentalists.
- CO2 Solving problem on the topics mentioned in this course.

### 1.2 COs of the Course 'Classical Mechanics'

CO1 The student would learn Lagrangian and Hamiltonian formalisms which areessential to understand modern developments in physics, like field theory, condensedmatter physics, particle physics, etc.

- CO2 To appreciate the symmetries of space and time including the concepts of invariance, 4-vectors/scalars, Lorentz transformations and Hamiltonian formulation in relativistic mechanics.
- CO3 Solving problem on the topics mentioned in this course.

### 1.3 COs of the Course 'Electronic Devices'

- CO1 Understand the basic concepts of electronics.
- CO2 Learning about electronic components such as JFET, BJT, and MOSFET, MESFET photonic devices, diode lasers, microwave devices and their applications.
- CO3 To be acquainted with the concepts and applications of digital integrated circuits and operational amplifiers.
- CO4 Studying memory devices and the devices based on electro/magneto/acousto-optic, piezoelectric, and surface acoustic effects.
- CO5 Solving problem on the topics mentioned in this course.
- CO6 Performing laboratory experiments/project on above topics/concepts to understand the physics behind them.

### 1.4 COs of the Course 'Computational Methods and Programming'

- CO1 Learning programming in BASIC language.
- CO2 Solving various problems in physicsbytranslating them to the language of mathematics i.e. writing linear and non-linear algebraic/transcendental equations, simultaneous linear equations, Eigen values equations for matrices, curve-fitting and numerical differentiation & integration.
- CO3 Using the basic concepts of random variables to solve problems like alpha decay, random walk at molecular level etc.
- CO4 Finding numerical solution of ordinary and partial differential equations to treat 2 and 3 dimensional problems in physics.
- CO5 Solving problem on the topics mentioned in this course.
- CO6 Performing computer based laboratory experiments/project on above methods.

### 1.5 COs of the Course 'Quantum Mechanics-I'

- CO1 Understanding of history & basics of Schrodinger formulation.
- CO2 Learning Matrix formulation fundamentals likelinear vector space, Bra and Ket algebra, uncertainty relations.
- CO3 Solving problems by using both the formulations at atomic, molecular and nuclear level.
- CO4 Understanding Angular momentum in quantum mechanics &its applications
- CO5 Solving problemon the topics mentioned in this course.

### 1.6 COs of the Course 'Statistical Mechanics'

- CO1 Understanding foundations of statistical mechanics and its association with thermodynamics to evaluate macroscopic thermal properties of matter such as specific heat, magnetic susceptibility, etc. The course begins with first using classical dynamics and then using quantum dynamics as the microscopic principles.
- CO2 Evaluating equation of state byCluster expansion method
  - CO3 Studying phase transition by 1. A Dynamical model 2. Ising model 2. Landau theory 3. Scaling hypothesis
  - CO4 Learning role of thermo-dynamical fluctuations in non-equilibrium state.Studying Brownian motion, Langevin's theory and Fokker-Planck equation.
  - CO5 Solving problem on the topics mentioned in this course.

### 1.7 COs of the Course 'Electrodynamics and Plasma Physics'

- CO1 Recapitulating basics of electrostatics and magnetostatics to comprehend Maxwell's equations and their solution in various media.
- CO2 Understanding radiations by moving charges, the concepts of retarded potentials and Abrahm-Lorentz method of self force.
- CO3 Describing 4-vectors and Lorentz transformation in 4-dimensional space to revise invariance of charge & potential under Lorentz transformation and furthermore the motion of charged particles in electromagnetic fields.
- CO4 Learning magnetohydrodynamic equations, magnetosonic waves, Alfven waves and their applications in the cram of plasma.
- CO5 Solving problem on the topics mentioned in this course.

### 1.8 COs of the Course 'Condensed Matter Physics'

- CO1 To understand the structure of crystal and defects in solidsby study of interaction x-rays with matter, and learn electron microscopic techniques.
- CO2 Learning basics of solids such as band theory, classification, concept of effective mass. Studying about Fermi surface, de Hass von Alfen effect, atomic and molecular polarizability, quantum Hall effect, magnetoresistance, superconductivity, magnetic properties, Optical reflectance, Photo-electromagnetic effect, Faraday and Raman effect in solids.
- CO3 Solving problem on the topics mentioned in this course.
- CO4 Performing laboratory experiments/projectas per course framework to understand the physics behind above topics/concepts.

### 1.9 COs of the Course 'Quantum Mechanics-II'

- CO1 Learning various approximation methods for bound states, i.e. perturbation theory, variation method and WKB approximation method with their application to physical problems.
- CO2 Solving Time dependent problems by perturbation theory, scattering theory along with introduction to relativistic quantum mechanics.
- CO3 Learning the application of Schrodinger's and Dirac's relativistic equations to understanding negative energy states and hyperfine splitting of energy states.

CO4 Solving problem on the topics mentioned in this course.

### 1.10 COs of the Course 'Nuclear and Particle Physics'

- CO1 Learning fundamental principles of nuclear interactions and reactions with probable consequences.
- CO2 Understanding nuclear models and associated physics.
- CO3 Exploring theories of nuclear decays and general principles of nuclear radiation detectors.
- CO4 Acquiring the basic understanding of elementary particle physics with inputs of cosmic rays and their characteristics.
- CO5 Solving problem on the topics mentioned in this course.

### 1.11 COs of the Course 'Condensed Matter Physics-I'

- CO1 Understanding the concept and mechanism of imperfections in solids and the properties of solids.
- CO2 Studying experimental methods of observing imperfections such as electron microscopy, scanning, tunneling and atomic force microscopy.
- CO3 Study of properties of thin films and surfaces.
- CO4 Study of lattice dynamics to understand the thermal conductivity and optical properties of solids.
- CO5 Solving problem on the topics mentioned in this course.
- CO6 Performing laboratory experiments/project as per course structure to comprehend the physics behind above topics/concepts.

### 1.12 COs of the Course 'Electronics-I'

- CO1 To understand the basic elements of communication electronics, microwave transmission and satellite communication.
- CO2 Learning the construction, operation and application of microwave devices and RADAR.
- CO3 Learning the operation of Intel 8085 microprocessor its interrupts.
- CO4 Analyzing potential aspects of programmable interface devices and interfacing with D/A & A/D converters.
- CO5 Solving problem on the topics mentioned in this course.
- CO6 Performing laboratory experiments/project as per course structure to figure out the physics behind above topics/concepts.

### 1.13 COs of the Course 'Atomic and Molecular Physics'

- CO1 Learning the fundamentals of atomic Physics namely quantum states of one and two electron systems, interaction energy in LS & JJ couplings, hyperfine structure and broadening mechanisms.
- CO2 Understanding the types of molecules, energy levels and intensity of their rotational spectra.
- CO3 Studying vibrational spectra of diatomic molecules and energy levels, IR spectrometer.
- CO4 Learning the concepts, techniques and instrumentation of ultraviolet, visible infrared, Raman, Photoelectron, Photo-acoustic, Mossbauer and NMR spectroscopy.

- CO5 Solving problems on the topics mentioned in this course.
- CO6 Performing sophisticated laboratory experiments/project as per course structure to figure out the physics behind above topics/concepts.

### 1.14 COs of the Course 'Physics of Lasers and its Applications'

- CO1 Learning the principles of laser and related phenomenon.
- CO2 Understanding the structure and basic operating principles of different laser systems and their applications.
- CO3 Applications of laser induced spectroscopic techniques.
- CO4 Describing the concepts of electro-optic effect and non-linear interaction of light with matter.
- CO5 Solving problems on the topics mentioned in this course.
- CO6 Performing sophisticated laboratory experiments/project on assorted applications of lasers and allied techniques.

### 1.15 COs of the Course 'Condensed Matter Physics-II'

- CO1 Studying the interaction of electrons with acoustic and optical phonons and basic ideas of high Tc superconductivity.
- CO2 Describing point defects in crystals and structure/symmetries of liquids.
- CO3 Learning special carbon solids such as Fullerenes/Tubules and definition, properties, methods of synthesis and techniques for characterization of nanostructured materials.
- CO4 Describing disorders in condensed matter with structural description and physics of glasses and liquids.
- CO5 Solving problems on the topics mentioned in this course.
- CO6 Performing sophisticated laboratory experiments/project on above topics/concepts.

#### 1.16 COs of the Course 'Electronics-II'

- CO1 Learning the advanced concepts of digital communication and associated physics.
- CO2 Understanding noise, communication systems with introduction to mobile radio and satellites.
- CO3 Learning the operation of 8086 microprocessor with techniques of assembly language programming.
- CO4 Understanding working of 8086 microprocessorwith elementary idea about 80816, 80286, and 80386 to Pentium processors.
- CO5 Solving problems on the topics mentioned in this course.
- CO6 Performing sophisticated laboratory experiments/project on above topics/concepts.

#### 1.17 COs of the Course 'Project Work'

- CO1 Carrying out a job oriented major project
- CO2 Preparing a Dissertation containing different aspects of the project with important conclusions.
- CO3 Learning how to prepare a presentation to defend the selection and outcomes of the major project.

- CO4 Understanding the important future applications of the major findings during the course of the project work.
- CO5 Undergoing a viva voce of the major project work.
#### **Course Outcomes of Resource Management at UG level**

#### B.Sc I Year.

#### Course Code:H1-HSCB2T

#### **Course Title- Family Resource Management**

#### Course type- Core Course

**Course Outcome :-** Understanding of Management process, decision making, resources, values and goal setting is very essential for happy and healthy family and society. This course would empower the students to develop a clear vision about Resource Management. The student will acquire the knowledge of-

- 1. The concept of Family Resource Management.
- 2. The process of management in the scientific manner for the use of resources.
- 3. Imbibing nuances of Human Values and standards in successful management and decision making.
- 4. Effective management of time, energy, money and Work simplification.

#### Course Code:H1-HSCC1G

#### **Course Title- Housekeeping & Hospitality Management**

#### **Course type- Elective**

**Course Outcome :-** This course will be able to give an idea about the need of maintenance and cleaning facilities required in any hospitality related organization. This course will empower the student in the field of Housekeeping and hospitality management. The student will be able to-

- 1. Understand the techniques and operational procedure related to the maintenance and cleaning of any organization.
- 2. Developing professional competencies and practices to prepare for working successfully in hospitality.
- 3. Appreciate the need for maintenance of facilities and services in housekeeping and hospitality management.

#### Course Code:V1-DRA-HNDT

#### **Course Title- Handicraft**

#### **Course type- Vocational**

Course Outcome:- After studying this course the student will be able to:-

- 1. Get acquainted with craft traditions of India and Get practical Knowledge.
- 2. Describe various craft materials.
- 3. Understand different craft process and techniques.
- 4. Design new products for craft revival and income generation.
- 5. Contribute towards restoring lost cultural handicrafts of Madhya Pradesh.
- 6. To develop a sense of personal identity and self esteem through practical achievement in the expressive, communicative and functional modes of crafts.

#### **B.Scll Year**

- Understand the concept of Decoration.
- Understand the elements of Art , principle of designs and their application in Interior decoration.
- Understand the application of Colours.
- Understand the basic of Housing, House plans ,their principles and building byelaws.
- Allocation of space for different activities of home and their furnishing.
- Get basic of Planning of Landscaping

#### B Sc II Job Oriented \_Soft Furnishing

- Understand basic of soft furnishing .
- Get basic Knowledge of Sewing tools and Machine.
- Making of different types of Cushion, Curtain, covers, lamps and Screens
  B. Sc III Yr.
- Evaluate the characteristics and performance of Base and Furnishing materials of Household Equipment.

- Basic of different household equipment.
- Understand the classification of Furniture and Furniture Finishes.
- Understand the Lighting, Fixtures application in Inteiror.
- •

#### B. Sc. III Yr. Job Orientation-Interior Decoration

- Basics of Interior .
- Different types and material of Flower Arrangement.
- Use and types of Accessories

#### Programme Specific Out comes-

- The degree course gives good base for further studies such as a master degree.
- They can also go for social work programs being undertaken by various NGO"s.
- They can also become private teacher in school.
- run their own business as well as they have developed links with the Interior Decoration industry.
- Identifying employment opportunities as counselor ,garden and land scape desiger.
- Run their business of soft Furnishing materials
- Understand the Art elements, principle of designs and their effects In Interior.
- Understand the soft furnishing items and their drafting, cutting and stitching techniques
- Identifying employment opportunities
- Demonstrate various modes of communication.

## SPECIFIC PROGRAM OUTCOMES (PSO) of

### **MSc Resource Management**

The Degree Course is beneficial for further studies such as a Research or Doctorate degree.

After having passed the Master Degree Candidates have the option to joining production industry, tourism industry and service sectors.

There are a lot of Career options for these degree holders in Non Governmental Organizations (NGO's).

After passing Master degree they can join teaching profession in School as well as after obtaining National eligibility Test (NET) entitle to get regular lecturer in Colleges and Universities.

#### **Course outcomes**

### MSc.I Sem Paper-I

#### THEORY OF MANAGEMENT

Student after complete their master degree they are able to

- understand the significance of management in the micro and macro level organization.
- know the conceptual, human and scientific aspects of management functions.
- Develop the ability to evaluate the management efficiency and effectiveness in the family and other organizations.
- Enhance the understanding of the similarities among all areas of management education and research, the dissemination of the professional knowledge, skills and attitudes.
- They can manage special Resource
- They can manage Different Events.

#### SEMESTER- I

#### PAPER-II

#### **ENVIRONMENT MANAGEMENT**

- To be aware of the holistic ecological approaches to environment.
- To be aware of the environmental problem, hazards and risks.
- To understand the aspects of environmental pollution and waste management.
- To be aware of the environmental policies, movements and ethics.
- They become a responsible citizen and play their better role in Environment Management.

#### SEMESTER- I

#### PAPER-III

#### LANDSCAPING

- To Study and to understand the landscape designing and its appropriate application.
- To get familiar with the various materials related to landscaping.

## 1st Semester Paper -IV

#### **RESEARCH METHODS AND STATISTIC**

- To understand the significance of statistics and research **methodology** in Home Science research.
- To understand stand the types tools, methods of research **and develop the** ability to construct data gathering instrument appropriate to the **research** design.
- To understand and apply the appropriate statistical technique for **the** measurement and design.

#### IIND SEMESTER PAPER- I HOUSING FOR FAMILY LIVING

- To enable the students to
- Recognize the role of housing for national development

- Be aware of the housing, problems in India and the measures for alleviating the problems.

- Understand and apply the principles of design in housing.

Understand the New Materials and Technology used in housing.

#### **M.Sc. - IIND SEMESTER**

#### PAPER –II CONSUMER IN THE MARKET

- To familiarize the students with the changing economic environment and the rising consumerism.
- To enhance the understanding of the marketing system and the marketing strategies.
- To have an overview of the consumer behavior and the consumer

movement

To help then to become wise consumers for judicial use of resources in the "present market systems and environment.

#### **M.Sc. - IIND SEMESTER**

#### PAPER- III- CONSUMER EDUCATION

- To sensitise the student with the need for consumer education.
- To develop and understanding of market environment and business strategies.
- To strengthen the consumer knowledge and to equip them to face challenge in the market situation.

#### **M.Sc. - IIND SEMESTER**

#### PAPER- IV STATISTICS & COMPUTER APPLICATION

- To understand the role of statistics and computer applications in research.
- To apply statistical techniques to research data for analyzing and interpreting data meaningfully.

#### M.Sc. - IIIRD SEMESTER

#### PAPER-I ENTREPRENEURSHIP MANAGEMENT

To provide conceptual in outs regarding entrepreneurship management.

- To sensitive and motivate the students towards entrepreneurship Management.
- To Orient and impact knowledge towards identify and implementing entrepreneur-ship opportunities.
  - •To develop management skill for entrepreneurship management.

#### M.Sc. - IIIRD SEMESTER

#### PAPER- II HOSPITALITY ADMINISTRATION

- 1. To orient the students with the functions of front office department in the hospitality industry.
- 2. To acquaint the students with the housekeeping department and its Administration.

3. To enable the students to manage resources in the housekeeping department of fulfill the hospitality function.

#### M.Sc. - IIIRD SEMESTER

#### PAPER- III ADVERTISING AND MARKETING

- To become aware of different market organization in our Economy.
- To understand the different marketing-functions and the distribution system in our economy.
- The familliarics with the marketing strategies and market research
- To understand the role of advertising in sales promotion.

#### M.Sc. - III SEMESTER

#### PAPER- IV

#### SCIENTIFIC WRITING & COMMUNICATION TECHNOLOGY

- To be able to appreciate and understand importance of writing Scientifically
- o develops competence in writing and abstracting skills.
- To write either a draft research proposal or a chapter of dissertation

#### SCIENTIFIC WRITING & COMMUNICATION TECHNOLOGY

#### **PRACTICAL:**

- To develop underlining regarding the vital aspects of communication and Behaviors Audio and Visual Media and their use.
- The develop understanding regarding the new communication technologies and their use.
- To develop skills in developing using different c communication technology for various presentations.

#### M.Sc.- IV TH SEMESTER

#### PAPER- I FINANCIAL MANAGEMENT

- To become aware of socio economic environment of the families
- To understand some of the problems and objectives involved in accumulation, control and use of saving.
- To understand cost of living studies and price index.
- To become aware of the aspects of Financial management
- To become familiar with the techniques of financial management.

#### M.Sc.- IV TH SEMESTER

#### PAPER- II RESIDENTIAL SPACE DESIGN

- To understand the factors influencing space design organization for optimum comfort and functionalism.
- To provide adequate facility for work, relaxation rest, comfort, privacy, care, esthetes etc. through interior space designing.
- . To study the fittings and fixtures used in residential interiors
- To develop skills of drawing the working details.

## M.Sc. – IV SEMESTER

#### PAPER III CONSUMER ECONOMICS

- To familiarize the students with the changing economic environment and the rising consumerism.
- To develop an understanding of the marketing system and marketing strategies keeping in view of consumers.
- To know the techniques of consumer decision making and the aids for wise decision making.

#### M.Sc. – IV TH SEMESTER

#### PAPER- IV (OPTIONAL)

#### **CONSUMER INFORMATION AND REDRESSAL**

- To equip and impart knowledge on consumer related facts and issues.
- To provide an understanding of the significance of consumer information.
- To develop and acquire skills in consumerism and utilizing the provisions in Redressal mechanism.

## MSc. (Home Science) H.D./F.N./C&T/R.M./Ext.Edu. Semester - IV Optional IV Paper Mass Communication

- To understand the importance of communication.
- To develop skill for communication ability.
- Importance of audio visual aids in communication.

#### B.Sc. ZOOLOGY 2021 – 22 FIRST YEAR PAPER - I INVERTEBRATES

- Understand basic concept of classification, rules of nomenclature and structure of representative animals and function of their organ system.
- Understand and know pathogenic protozoa in nematodes disease caused by them and insect as vector of diseases.
- Identify Larval form of Crustacea, Mollusca and Echinodermata and understand the significance of trochophore larva in evolution.
- Gain knowledge of minor phyla and hemichordates and understand affinities of hemichordates.
- Develop practical knowledge of invertebrates by museum study and display of dissection by LCD as dissection of animal is banned.

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## B.Sc. ZOOLOGY 2021 – 22 FIRST YEAR PAPER - II CELL BIOLOGY AND DEVELOPMENTAL BIOLOGY

- Differentiate between prokaryotic and eukaryotic cell and have knowledge of nuclear and extra nuclear organelles of cells.
- Gain knowledge of cell division necrosis and apoptosis.
- Develop knowledge of spermatogenesis and Oogenesis and developmental process of embryo.
- Understand development of Frog and Chick.
- Gain knowledge of extra embryonic membrane, regeneration and stem cell.
- Develop practical knowledge of cell division and embryo stages through permanent slide.
- Different types of Disease will be cure by the knowledge of Developmental Biology.

## B.Sc. ZOOLOGY 2021 – 22 SECOND YEAR PAPER - I VERTEBRATES AND EVOLUTION

- Students will gain knowledge of origin of chordates and its classification.
- Students will also learn about comparative accounts of integument, limbs and girdles.
- Students will also gain knowledge about Origin of life, adaptation and mimicry.
- Students will be able to understand about micro macro and mega evolution.
- Students will be learn about evolution of man.

## B.Sc. ZOOLOGY 2021 – 22 SECOND YEAR PAPER - II ANIMAL PHYSIOLOGY AND BIOCHEMISTRY

- Understand the physiology of mammals and various metabolic process.
- Understand vital process like digestion, respiration excretion, Osmoregulation and thermoregulation.
- Develop understanding of physiology of nerve impulse and muscle contraction.
- Gain knowledge of endocrine glands their function and effects of hypo and hyper secretion and physiology of reproduction.
- Develop practical knowledge of biochemical test histological slides and hematology.

## B.Sc. ZOOLOGY 2022 – 23 THIRD YEAR PAPER - I GENETICS

- Students will learn about laws of inheritance and causes of variations among different organisms. structure, function and application of DNA and RNA.
- Students will learn about the complicated process of gene expression.
- Students gain knowledge of linkage and chromosomal aberrations. They gain very important information about genetic disorders and mutation.
- Students will learn about human Genetics, Human genome project, inheritance of blood group and fatal diseases like sickle cell anemia and thalassemia.
- Students will learn about genetic engineering and gene therapy.

## B.Sc. ZOOLOGY 2022 – 23 THIRD YEAR PAPER - II ECOLOGY AND APPLIED ZOOLOGY

- Students will be able to learn about the importance of ecosystem and bio geochemical cycle.
- Students will give the knowledge about population and factors affecting it.
- Students will create awareness about habitat ecology and its importance.
- Students will be able to understand about natural resources and their conservation.
- Students will also gain knowledge about wildlife and endangered species.
- Students will be aware about different types and pollution and its control.
- Students will learn about different types of aquaculture.
- students will also learn about the sericulture, Frog culture, Lac culture and Apiculture and pests and their biological control.

## GOVERNMENT M. H. COLLEGE OF HOME SCIENCE AND SCIENCE FOR WOMEN JABALPUR, MADHYA PRADESH- 482002



## **DEPARTMENT OF ZOOLOGY**

# M.Sc. ZOOLOGY SYLLABUS SESSION : 2021-2022

Program Specific Outcomes (PSOs)



#### M.Sc. ZOOLOGY 2021 – 22 FIRST –SEMESTER PAPER - I BIOSYSTEMATICS, TAXONOMY AND EVOLUTION

- Taxonomy uses hierarchical classification as a way to help scientists understand and organize the diversity of life on our planet.
- Students Know basic concepts of Biosystematics taxonomy and Classification.
- They Gain Knowledge of Nomenclature and Taxonomic Procedures.
- They learn about concept and trends in Evolution.
- Students get Knowledge of Phylogenetic and Biological Concept of Species.



## M.Sc. ZOOLOGY 2021 – 22 FIRST –SEMESTER PAPER – II STRUCTURE AND FUNCTION OF INVERTEBRATES

- Students Know how to evolve multicellularity.
- Did learn about organization of coelom.
- They learn movements or filters in invertebrates.
- They learn about respiratory and excretory organ in invertebrates.
- They get knowledge of primitive and advanced nervous system.
- They learn about protostones and Duterostomes.
- They know about Minor phyla.



## M.Sc. ZOOLOGY 2021 – 22 FIRST – SEMESTER PAPER - III QUANTITATIVE BIOLOGY, BIODIVERSITY AND WILDLIFE

- They Gain Knowledge of Mean, Mode, Median, Variation, ANOVA and Chi Square Test.
- Central tendency refers to measures used to assess the average of observations.
- Analysis of variance (ANOVA) is used to determine whether there are any statistically significant differences between the means of two or more independent (unrelated) groups.
- The Chi-Square test is a statistical procedure used by students to examine the differences between categorical variables in the same population.
- They Gain Knowledge of Principal and Conservation of Biodiversity.
- Biodiversity provides functioning of ecosystems.
- Students Know about Wildlife Protection act and its Types.
- They learn about rare species, National parks, Sanctuaries and Biosphere reserve.
- Wildlife provides stability to different processes of the nature.
- The goal of wildlife conservation is to ensure the survival of these species, and to educate people on living sustainably with other species.



## M.Sc. ZOOLOGY 2021 – 22 FIRST – SEMESTER PAPER - IV BIOMOLECULES AND STRUCTURAL BIOLOGY

- Student will learn about chemical foundation of biology that is acid base buffer system and Biomolecules.
- Students will learn about importance of nanoparticles and biomaterials in the field of biology which is important branch of modern biology.
- Students gain knowledge of proteins, nucleic acids, carbohydrates and fats with their importance for eukaryotes.
- Students also know about genetic material, Application and transport of materials by active and passive transport.
- Students will learn about basic concepts of metabolism and about biosynthesis of Biomolecules.
- They gain knowledge of Protein synthesis and enzymes. They also learn about principles of thermodynamics in biology and also about biological energy transducers.



## M.Sc. ZOOLOGY 2021 – 22 SECOND – SEMESTER PAPER - I GENERAL AND COMPARATIVE ANIMAL PHYSIOLOGY AND ENDOCRINOLOGY

- Student Know about Respiratory pigments, Transport of oxygen and carbon dioxide in blood and body fluids.
- Students will learn about Nitrogenous Waste Product, Structure of Kidney and Mechanism of Urine formation.
- They also Known as Comparative physiology of digestion.
- They also Known as Comparative study of Mechanoreceptor, Photoreception, Phonoreception and Chemoreception.
- They learn about Bioluminescence and Pheromones amongst fishes.
- Students gain knowledge of Phylogeny and Ontogeny of endocrine glands.



## M.Sc. ZOOLOGY 2021 – 22 SECOND – SEMESTER PAPER - II POPULATION ECOLOGY AND ENVIRONMENTAL PHYSIOLOGY

- Student Know about Populations : Growth & Regulation and Demography.
- Students will learn about Eco-physiological adaptations to terrestrial, marine and fresh water environments.
- Students will learn about Environmental limiting factors and Inter and intra-specific relationship.
- Students will gain knowledge of Environmental pollution, Impact and effect on human health.
- Students will learn about Meditation, yoga and their effects.



## M.Sc. ZOOLOGY 2021 – 22 SECOND – SEMESTER PAPER - III TOOLS AND TECHNIQUES IN BIOLOGY

- Students gain knowledge of Various types of Microscope, Principle & Applications of Various Lab Instrument like as Colorimeter, Spectrophotometer and Ultra centrifuge.
- Students will learn about Media Preparation and sterilization.
- Students will learn about Use of Fomenters and Microbial identification.
- Students gain knowledge of Computer aided techniques for data presentation data analysis and Statistical techniques.
- Students gain knowledge of Radioisotope and main isotope techniques related to biology.
- Students will learn about Immunological and Surgical techniques.
- Students will learn about Cytological and Molecular biology techniques.



## M.Sc. ZOOLOGY 2021 – 22 SECOND – SEMESTER PAPER - IV MOLECULAR CELL BIOLOGY AND GENETICS

- Students will learn about biomembranes, transport process, cell skeleton and cell movement.
- They will learn about Cell to cell signaling through cell surface receptors and second messenger system.
- Students will gain knowledge of Cell adhesion and cell communication process along with genome organization and non coding DNA, which helps in understanding of genomic material and their function.
- Students will learn about some basics about sex determination in Drosophila and mammals. They also get familiar with human genome project.
- Students will gain knowledge of some basic but very important topics like human gene therapy, prenatal diagnosis, genetic screening, gene library and transgenic animals.



## M.Sc. ZOOLOGY 2021 – 22 THIRD – SEMESTER PAPER - I COMPARATIVE ANATOMY OF VERTEBRATES

- Students will learn about Origin of Chordata : Concept of Protochordata.
- Students can be able to identify all organs and organ systems of vertebrates.
- Students able to explain the evolutionary significance and function of each of these system.
- Students able to identify all classes of vertebrates by their various anatomical features.
- Students can explain and apply the concept of homology, analogy, morphogenesis, ontogeny and phylogeny related to the anatomical features of vertebrates.



## M.Sc. ZOOLOGY 2021 – 22 THIRD – SEMESTER PAPER - II LIMNOLOGY

- Students will be able to learn about the new branch of zoology i.e. limnology is its scope, definition and historical development.
- Students will gain the knowledge of different physiological parameter of freshwater.
- Students will learn about plankton and their interrelationship and aquatic flora and fauna.
- Students will learn about Bioindicators and Sewage treatment.
- Students will gain the knowledge of aquatic pollution its causes control and legislation.
- Students will be aware about aquatic birds & Insects and Their Environmental Significance.



## M.Sc. ZOOLOGY 2021 – 22 THIRD – SEMESTER PAPER - III ECO - TOXICOLOGY

- Students will gain the knowledge of Environmental Biology with emphasis on ecosystems.
- Students will learn about remote sensing techniques in environmental conservation.
- Students will gain the knowledge of Radioactive compounds and their impact on the environment.
- They will learn about Food toxicants and their control methods.
- Students will learn about Toxicology and various types of toxicological agents.
- Students will be aware about Public Health Hazards due to environmental disasters.



## M.Sc. ZOOLOGY 2021 – 22 THIRD – SEMESTER PAPER - IV AQUACULTURE

- Students will gain the knowledge of Sustainability & Management of Aquaculture & Fisheries.
- Students will gain the knowledge of Mono, Poly, mixed and composite Fish culture.
- They also learn about Prawn culture and Frog culture.
- Students will learn about Fresh water fish farm engineering.
- Students will learn about Designing, layout and construction of different types of fish ponds
- Students will gain the knowledge of Different types of craft and gears in fisheries.
- Students will gain the knowledge of Biochemical composition and nutritional value of fish.



## M.Sc. ZOOLOGY 2021 – 22 FOURTH– SEMESTER PAPER - I ANIMAL BEHAVIOUR AND NEUROPHYSIOLOGY

- Students will gain the knowledge of the biology of Behaviour, and Comparative Psychology.
- Students will learn about Principles of Animal Communication.
- They will learn about Neural and hormonal control of behaviour and Ecological aspects of behaviour.
- Students will learn about Social behaviour and Reproductive behavior of various animals.
- Students will gain the knowledge of Biological rhythms, Learning and memory in various animals.
- Students will gain the knowledge of Thermoregulation and comparative study of Receptor physiology.



## M.SC. ZOOLOGY 2021 – 22 FOURTH– SEMESTER PAPER - II GAMETE BIOLOGY, DEVELOPMENT AND DIFFERENTIATION IN VERTEBRATES

- Students will learn about differentiation and Developments of gonads in mammals.
- Students will gain the knowledge of Spermatogenesis, oogenesis and vitellogenesis.
- Students will gain the knowledge of Cryopreservation of gametes and Embryo.
- Students will gain the knowledge of development of mammary gland and lactation.
- Students will learn about Haemopoietic and Embryonic stem cells.



### M.SC. ZOOLOGY 2021 – 22 FOURTH– SEMESTER PAPER - III (ICHTHYOLOGY) STRUCTURE AND FUNCTION

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- Student gain knowledge of evolution and classification of fishes.
- They know about specific organ of fishes weberian ossiclel, air bladder, lateral line system and electric organs.
- Student will learn respiratory, excretory and digestive system.
- They learn migration and Osmoregulation in fishes.
- They gain knowledge of deep sea and Hill stream adaptation.
- Students know about early development and parental care in fishes.



## M.SC. ZOOLOGY 2021 – 22 FOURTH– SEMESTER PAPER- IV A (ICHTHYOLOGY) PISCI CULTURE AND ECONOMIC IMPORTANCE OF FISHES

- Students will be able to learn about collection of fish seed and hypophysation and breeding of fishes.
- Students will gain the knowledge about the drugs useful in indeed breeding of fishes.
- They will also learn about types of points required for fish culture.
- Students will be able to learn about composite fish culture and prawn culture and riverine fisheries.
- Students will learn about coastal fisheries in India.
- They will gain the knowledge about rule of history in rural development.
- Students will learn about methods of fish preservation and marketing of fish in India.
- Students will gain the knowledge of shark liver oil industry in India and genetic engineering in fishes.