1.1.1 Curriculum and its relevance to Local! Regional! National! Global needs

Department of Biochemistry

S. No.	*CourseName*	*Course Code*	*Local*	*Regional*	*National*	*Global*	*Curriculum - its relevance*
1	Biochemical Techniques (Paper I)	S1-BCHE1T	✓	✓	✓		Advanced Indian biochemical techniques.
			✓	✓	✓	✓	The course covers essential techniques used in various laboratories. It trains the learners to work in the laboratories and R&D sections of various industries. Helpful for developing technological skills. Students get exposed to various techniques and their applications in separation and characterization of different biological molecules.
2	Application of Techniques in Biochemical Analysis (Paper	S1-BCHE1P	✓	✓	✓	✓	Will obtain hands-on training in basic separation techniques in biochemistry. Will gain expertise in the isolation, purification and characterization of biomolecules and

	I)						organelles.
3	Chemistry of Biomolecules (Paper II)	S1-BCHE2T	✓	✓	✓	✓	Are exposed to importance of biological molecules and their role in maintenance of life. Enthusiastically learn about DNA, RNA, Vitamins and Lipids and their importance in biological system. Get the insight of bio-molecular properties which can be used to carry out various studies. Will be able to pursue research in any field as biomolecules are basis of all researches
4	Biomolecular Analysis (Paper II)	S1-BCHE2P	✓	✓	✓	✓	Understands good laboratory practices, safety and precautions. Will acquire proficiency in preparation of laboratory solutions, reagents, use of glassware, and qualitative analysis of biomolecules. Learn the principles, theory and calculations for each experiment.

5	Clinical Biochemistry (Paper I)	S2-BCHE1T		✓		✓	Gain concepts of assessing the human physiology using various biological fluids. Attain knowledge about normal composition of body fluids. Understand the mechanism of metabolic disorders at molecular level and different parameters used for diagnosis of the disease in the clinical laboratories. Seek employability in diagnostic and research institutes.
6	Clinical Investigations	S2-BCHE1P	✓	✓	✓	✓	Gain practical knowledge and develop technical skills towards various tests performed for diagnosis of diseases. Learn the handling of clinical samples and analyze various constituents of these biological samples. Attain knowledge of organ function tests. Separation techniques
7	Intermediary Metabolism (Paper II)	S2-BCHE2T	✓	✓	✓	✓	Understand the concepts of metabolism. Illustrate the metabolism of carbohydrates through various anabolic and catabolic pathways like glycolysis, Kreb'scycle, Glycogen metabolism, glucuronic acid cycle etc. Describe the regulation of glycolysis and TCAcycle. Understand the fundamental energetics of biochemical processes, chemicallogic 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. Understand transportation of reducing potentials into mitochondria. Describe Inhibitors of ETC and inhibitors and uncouplers of oxidative phosphorylation. Illustrate the metabolism of lipid through various anabolic and catabolic pathways like ß-oxidation, Biosynthesis of saturated and unsaturated fattyacids,Metabolism of ketone bodies. Describewhathappens:-when lipids are metabolized,cholesterol, prostaglandins etc.are synthesized,emphasizing the defects of lipid metabolism. Describe regulation of cholesterol metabolism. Describe synthesis & Utilization of ketone bodies. Describe general reactions of aminoacids metabolism(transamination,oxidative deamination and decarboxylation). Illustrate urea cycle. Describe how aminoacids and proteins are metabolized,emphasizing the role of few intermediates of their metabolism, monitoring the deficiency and abundance disorders of amino acid metabolisms(phenylketonuria,alkaptonuriaandalbinism)and the role of enzymes in the regulation

							of the pathways. Understand the Sources of the atoms in the purine and pyrimidine molecules • Describe Biosynthesis,degradation and Regulation of purine and pyrimidine Bases. Describe biosynthesis and degradation of porphyrins.
8	Human Physiology (Major)	S3-BCHE3D	✓	✓	✓	✓	Get a holistic understanding of the different organ systems to their components and basic functioning. Learn about various physiological pathways and mechanism for normal functions of the human body.
9	Physiological Analysis (Major)	S3-BCHE3Q	✓	✓	✓	✓	Get knowledge about the different components of blood. Learn about blood group and blood clotting. Measure blood pressure which is useful in determining early stage of various diseases.
10	Nutritional Biochemistry (Minor)	S3-BCHE4D	✓	✓	✓	✓	Learn about various physiological pathways and mechanism for normal functions of the human body. Get acquainted with biological role of macro and micronutrients. Learn to evaluate requirement of energy for various age groups. Gain knowledge of anti-nutrient components of foods.

							Get insight of processing methods to retain the nutritional quality of food.
11	Techniques in Nutritional Biochemistry (Minor)	S3-BCHE4Q	✓	✓	✓		✓ Get an insight of Nutritional Biochemistry and importance of nutrients ✓ . Understand the analysis of nutritional quality of food ✓ Develop skills of quantitative and qualitative analysis of nutrients ✓ . Learn the parameters of biochemical process for energy requirement for human nutrition.

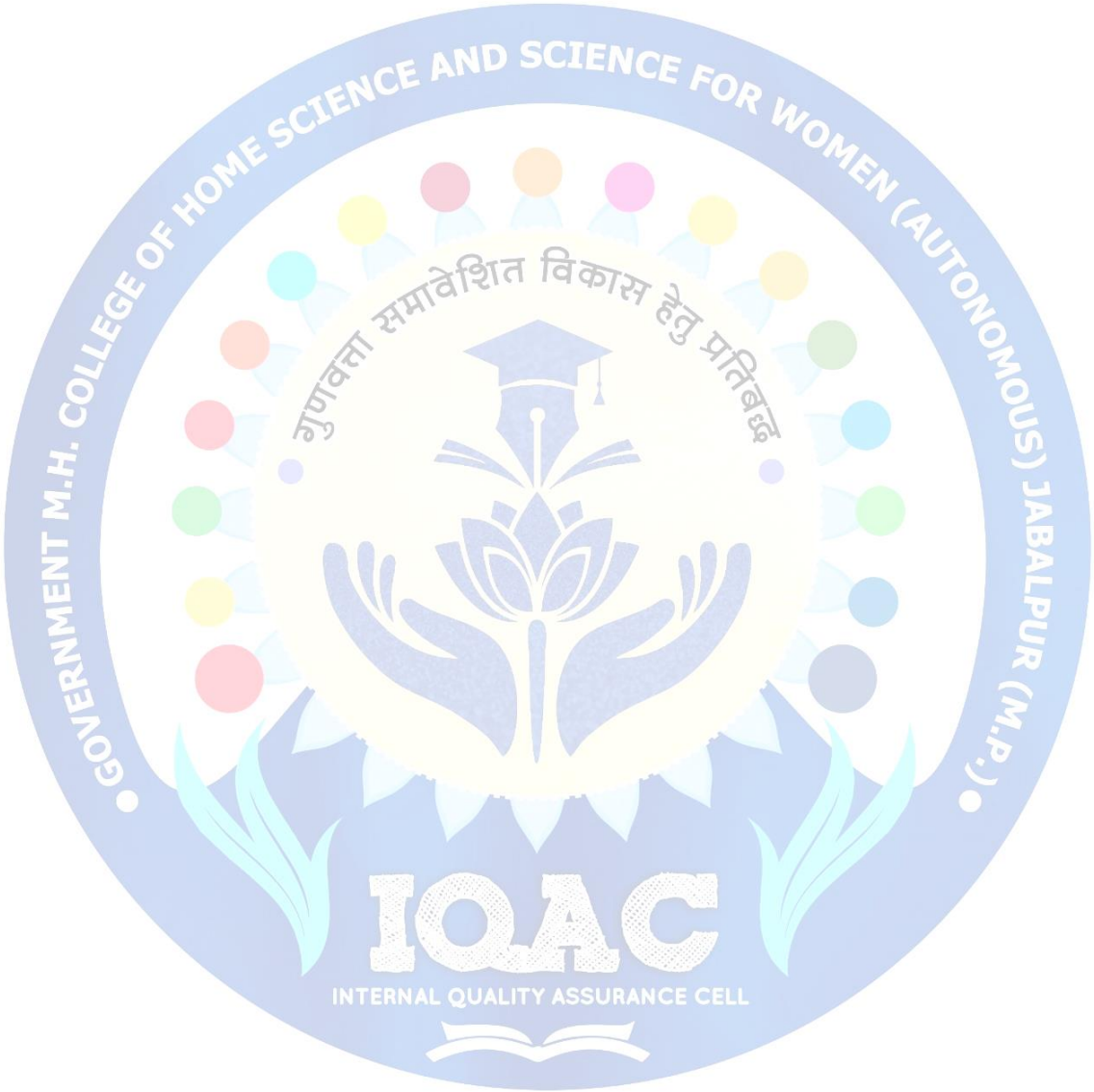
1.1.1 Curriculum and its Relevance to Local! Regional! National! Global Needs

Department of Biotechnology

S. No.	Course Name	Course Code	Local	Regional	National	Global	Curriculum - its relevance
1	Cell Biology and Biochemistry (Major Paper I)	CORE TH-1-SI-BTE ClT	✓	✓	✓	✓	Historical Background of the cell. Detailed Structure of Prokaryotic and Eukaryotic cell. Molecular Structure of Water and its role in Biomolecular Structure. Chemical Bonds and Biomolecules stability. Structure and Function of Biomoecule. Tools and Techniques for quanititative and Qualitative analysis etc.
2	Microbiology and Immunology (Major Paper II) Minor/Elective	CORE-TH-2 S1 BTEC2T	✓	✓	✓	✓	History and Basic concept of Microbiology and Culture Media. Study of Microbial Growth and measurement. Immunology and Immunological Techniques & microbial . Detailed note on vaccination.
3	Basic Molecular Biology (Major Paper I)	S2 BTE C1T	✓	✓	✓	✓	Students gain the knowledge of Genome organization ,Cell signalling, Cancer. Students will able to understand the mechanism of DNA replication, repair and recombination, Transcription and Translation in

							Eukaryotes and Prokaryotes. Control of gene expression in Prokaryotes and Eukaryotes.
4	Recombinant DNA technology (Major Paper II) & Minor/Elective	S2 BTE C2T	✓	✓	✓	✓	The basic Principle of Gene Cloning, Vectors,DNA analysis. Enzymology of Genetic manipulation and Gene Editing. Application and technique of Gene cloning.
5	Industrial Biotechnology (Major Paper I)	S3-BTEC1D	✓	✓	✓	✓	Discovery, classifications, nomenclature, Physico chemical characterization of enzymes, Immobilization of enzymes & its application, Enzymatic bioconversions e.g. starch and sugar conversion processes, Bioprocess technology, Primary and secondary metabolites; Bioreactor designs: Types of fermentation and fermenters, Measurement and control of bioprocess parameters; Scale up and scale down process. Techniques of enzyme isolation, purification, enzyme assay, strain improvement
6	Agriculture Biotechnology (Major Paper II	S3-BTEC2D	✓	✓	✓	✓	Organic farming: Biofertilizers and Biopesticides, , Organic Food Quality and Human Health. Agrobacterium plant interaction, Characterization of transgenics; Chloroplast transformation; Genetic Transformation Agrobacterium mediated gene delivery, Gene Editing- Gene transfer technique-physical chemical, Biological method, Regulation of gene editing, Gene editing tools- CRISPR-Cass & TALEN, Techniques and Applications: enzyme detection, hybridization, PCR, Gene probe technology

7	Applied Biotechnology (Minor/ Elective)	S3-BTEC2T	✓	✓	✓	✓	Basic concept on Pollution, Public awareness. Water Quality assessment and treatment. Biopesticide; Bacterial and fungal, microbial leaching , Biodegradation, modern fuel. National and International stratergies on Organic Farming, Biofertilizers, Fermentation. Elementary idea on Bioinformatics and Biostatics. IPR scope, WTO,TRIPS. GATT. Animal Breeder's rights, Gene Potential Marker and Variants.
8	Medical Diagnostics (Vocational)	V1-ZOO-MEDT	✓	✓	✓	✓	Introduction to Medical Diagnostics and its importance, Diagnostic· methods used for analysis of body fluids, Urine Analysis 2.1 Physical characteristics 2.2 Abnormal constituent, Elementary idea of Diseases and Diagnostic Medical Imaging Techniques, Elementary idea of Diseases and Diagnostic.
9	Clinical Pathology and Medical Diagnostics (Vocational)	V2-ZOO-MEDT	✓	✓	✓	✓	Introduction to Medical Diagnostics and it's scope, Detailed study on structure and anatomy of human heart, liver, kidney. Routine investigation in clinical pathology such as lipid Profile, Total Protein test etc. Study of medical lab equipment, specimen collection, histopathological techniques and slide preparation.
10	Medical Diagnostics & Health care (Vocational)	V3-ZOO-MEDT	✓	✓	✓		Ancient Medical Techniques in India &
			✓	✓	✓	✓	Modern medical system, Infectious diseases and Immunotechnology, Fundamentals of health care machines used in diagnosis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1.1.1 Curriculum and its relevance to Local! Regional! National! Global needs

Department of Botany & Microbiology

Subject- Botany

S. No.	Course Name	Course Code	Local	Regional	National	Global	Curriculum - its relevance
1.	Applied Botany (Major-I)	S1-BOTA1T	✓	✓	✓		Understood the significance and role of botany Learnt the basic aspects of applied botany Gained knowledge about employment opportunities in the field of botany Gained knowledge about start-up opportunities in the field of botany Learnt about opportunities of social services Gain knowledge about best health practices

2.	Basic Botany (Major-II)	S1-BOTA2T	✓	✓	✓	✓	This course will help the student to understand the diversity of plants and evolutionary process in plant kingdoms It gives an account of plant adaptations from aquatic condition to colonize terrestrial habitat The changes in morphological, anatomical and reproductive structures that propel plant evolution can be investigated The economic importance and significance of plants in nature will be understood They will be acquainted with locally prevalent microbial diseases of plants and humans
3.	Basic Botany (Minor)	S1-BOTA2T	✓	✓	✓	✓	This course will help the student to understand the diversity of plants and evolutionary process in plant kingdoms It gives an account of plant adaptations from aquatic condition to colonize terrestrial habitat The changes in morphological, anatomical and reproductive structures that propel plant evolution can be investigated The economic importance and significance of plants in nature will be understood They will be acquainted with locally prevalent microbial diseases of plants and humans
4.	Basic Botany (Elective)	S1-BOTA2T	✓	✓	✓	✓	This course will help the student to understand the diversity of plants and evolutionary process in plant kingdoms It gives an account of plant adaptations from aquatic condition to colonize terrestrial habitat The changes in morphological, anatomical and reproductive structures that propel plant evolution can be investigated The economic importance and significance of plants in nature will be understood They will be acquainted with locally prevalent microbial diseases of plants and humans

5.	Organic Farming (Vocational)	V1-HOR-ORGT	✓	✓	✓		Prepare media for protected cultivation Demonstrate irrigation and fustigation, green house operations, irrigation and fustigation, care and maintenance of protected structure Demonstrate special horticultural practices in protected cultivation Identify and control of insect-pest and diseases, harvest and postharvest practices
6.	Plant Anatomy and Embryology (Major-I)	S2-BOTA1T	✓	✓	✓	✓	Students will learn the internal structure of plants. It will enhance the basic understanding of organization of plant body by cells and tissues Students will understand the dynamic mechanism of plant pollination, fertilization and development They will have hands on training on section cutting, preparation of slides, study of pollen and ovules
7.	Industrial Botany (Major-II)	S2-BOTA2T	✓	✓	✓	✓	This course will provide knowledge on plants and their parts used in various industries. Students will get an idea to establish plant based natural product industry. This course will make the students self-reliant.
8.	Industrial Botany (Minor)	S2-BOTA2T	✓	✓	✓	✓	This course will provide knowledge on plants and their parts used in various industries. Students will get an idea to establish plant based natural product industry. This course will make the students self-reliant.
9.	Industrial Botany (Elective)	S2-BOTA2T	✓	✓	✓		This course will provide knowledge on plants and their parts used in various industries. Students will get an idea to establish plant based natural product industry. This course will make the students self-reliant.
10.	Process of Organic Farming (Vocational)	V2-HOR-ORGT	✓	✓	✓	✓	Compare chemical and organic fertilizers. Know about plant nutrient requirements. Develop skill for production of organic manures. Develop skill for production of biofertilizer. Develop the organic form.

11.	Pant Physiology and Metabolism (Major-I)	S3-BOTA1D	✓	✓	✓		This course provides learning opportunities in the field of plant physiology, metabolism and biochemical aspects. It gives knowledge about significance of vegetation for sustaining life on earth by learning interesting physiological functions of plants. Students can know the valuable contribution of plants for mankind and society with the help of this course. The practical application of different aspects will be possible for entrepreneurship development
12.	Ecology and Forestry (Major-II)	S3-BOTA2D	✓	✓	✓	✓	Observing the forested landscape Analyzing data Critiquing Synthesizing Communicating Identification of forest types Role and importance of forests in human life
13.	Ethnobotany (Minor)	S3-BOTA2T	✓	✓	✓	✓	Understand the importance of plants and their relationship with Human being. Explain how plants are a part of culture and traditions How traditional medicine can cure various diseases
14	Ethnobotany (Elective)	S3-BOTA2T	✓	✓	✓	✓	Understand the importance of plants and their relationship with Human being. Explain how plants are a part of culture and traditions How traditional medicine can cure various diseases
15.	Applied Organic Farming (Vocational)	V3-HOR-ORGT	✓	✓	✓	✓	Analyse the benefits of organic farming. Apply the knowledge for the production of organic and healthy fruits, vegetables and ornamental plants. Apply the skill for entrepreneurship, establishing startups and increased employability potential. Understand market potential of organic farming.
16.	Diversity of Plants (Core course-I)	S4-BOT-A1T	✓	✓	✓	✓	Understand the classification and description of plants. Acquire knowledge about plants and their utilization. Identify the economic importance of plants.

							Recognize basic distribution patterns and structural organization of plants. Comprehend concepts in the evolution of plants.
17.	Plant Systematics (Core course-II)	S4-BOT-A2T	✓	✓	✓	✓	Classify plant systematics and recognize the importance of herbarium and digital herbarium Evaluate the important herbaria and botanical gardens Interpret the rules of ICN in botanical nomenclature Assess terms and concepts related to phylogenetic systematics Generalize the characters of the families according to Bentham & Hooker's system of classification
18.	Ancient Indian Traditional and Vedic Botany Group-A (DSE-I)	GROUP-A S4-BOTA1D	✓	✓	✓	✓	Acquire knowledge of botany of ancient India. Familiarize basic aspects of Vedic botany. Get employment opportunities in field of medicinal botany and Ayurveda. Find career opportunities for startup in the field of botany. Accomplish social services. Pursue research in the field of naturopathy. Perform best health practices.
19.	Plant Tissue Culture and Biotechnology Group-A (DSE-II)	GROUP-A S4-BOTA2D	✓	✓	✓	✓	Understand the techniques of biotechnology and tissue culture and its applications. Learn various aspects of IPR Have insights into the various biotransformation processes and development of useful strains. Know recombinant DNA technology and its use in the production of transgenic plants. Get deep knowledge about cloning vehicles, phages, restriction endonucleases and blotting techniques
20.	Mycology and Plant Pathology Group-B (DSE-I)	GROUP-B S4-BOTA1D	✓	✓	✓	✓	Describe the introduction, definition of different terms, and basic concepts of Mycology. Explain the morphology and characters of different groups of fungi Acquire knowledge about the natural benefits and harmful effects of Fungi. Know about organisms and causal factors

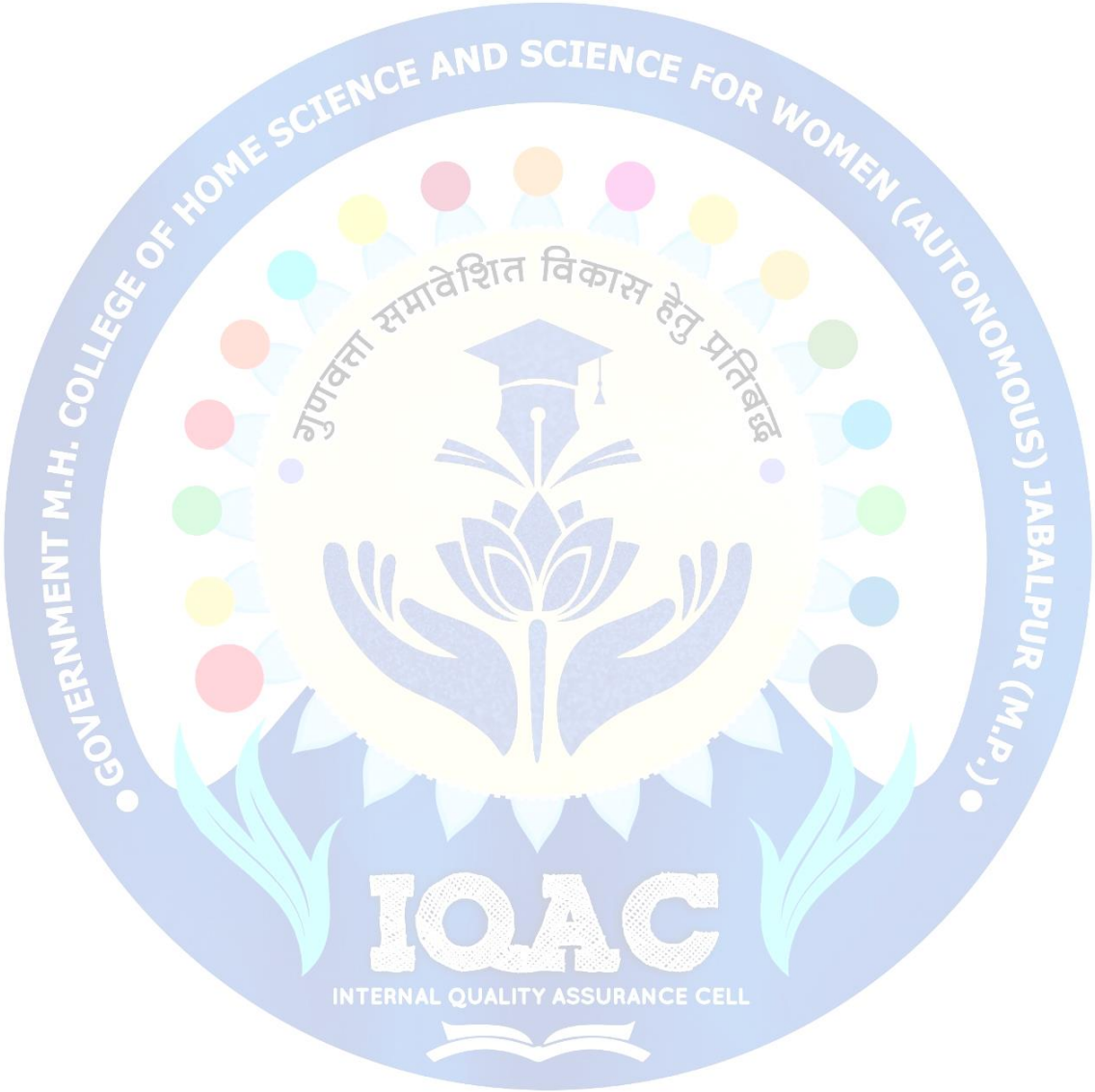
							responsible for Plant diseases comprehend the mechanism of transmission, cause and control measures of the plant diseases.
21.	Industrial Microbiology Group-B (DSE-II)	GROUP-B S4-BOTA2D	✓	✓	✓	✓	Familiarize with the scope of industrial microbiology and fermentation technology. Familiarize with industrially important microorganisms and acquire practical knowledge about their applications for human welfare Study about the production of important microbial products such as antibiotics, enzymes, vitamins, SCPs, Bio fertilizers Visualized the latest microbial applications in the production of fermented foods and dairy products. Understand the use of microbes in bioremediation and pesticide development
22.	Research Techniques in Plant Science (Subject Specific-RM)	S4-BOT-A1M	✓	✓	✓		Develop an understanding of the principles of various techniques used in Plant Sciences Understand different methodologies of modern instruments and its application Systematically analyze biological problems and propose solutions. Develop an intrinsic interest in statistical thinking
23.	BIOLOGY & DIVERSITY OF VIRUSES, BACTERIA AND ALGAE	Course No. I/ Paper- I	✓	✓	✓	✓	They will understand the ultra-structure of Bacteria and its biological importance. They will know about the viruses, and its transmission. They will learn and understand the classification of algae into different divisions and the life history of different members. They will know about the association of Algae in different field like Fishries, soil forestry etc.
24.	BIOLOGICAL DIVERSITY OF BRYOPHYTES, PTERIDOPHYTES	Course No. II/ Paper- II	✓	✓	✓	✓	They will learn and understand the classification of Bryophyta, Pteridophyta and Gymnosperms. They will understand the morphological structure of Bryophytes, Pteridophytes and Gymnosperms.

	& GYMNOSPERMS						They will know about the anatomical structure of Bryophytes, Pteridophytes and Gymnosperms.
25.	BASIC ECOLOGY	Course No. III/ Paper- III	✓	✓	✓	✓	They will understand and learn about the ecosystem and their types. They will understand about the community analysis. They will learn about the soil structure and their characteristics. They will understand and know about the global biogeochemical cycles.
26.	BIOLOGY AND DIVERSITY OF FUNGI	Course No. IV/ Paper- IV	✓	✓	✓	✓	They will understand the ultra-structure of Fungi and its biological importance. They will know about the transmission of fungi. They will learn and understand the classification of Fungi into different divisions and the life history of different members. They will know about the diseases caused by fungi.
27.	TAXONOMY OF ANGIOSPERMS	Course No. V/ Paper- I	✓	✓	✓	✓	They will know about the classification and nomenclature of plant and its systematic position. They can take knowledge of Principles of Biodiversity & its conservation. They will understand the modern trends in Taxonomy especially numerical taxonomy. They will understand and learn about the plant used for fuel, fiber, oil and timber etc. Students gets knowledge about angiosperm families in details. (Comparative studies) They get knowledge about economic and medicinal importance of plants and their products. They will know about the Herbarium and Botanical gardens of India and world.
28.	RESOURCE UTILIZATION AND CONSERVATION	Course No. VI/ Paper- II	✓	✓	✓	✓	They will learn about the major biomes of the world. They will know and learn about the biodiversity and threats to quality and quantity of Resources due to overexploitation. They will know and learn about the conservation of resources.

							They will know and learn about the air, water and soil pollution, ozone layer and ozone hole. They will understand and learn about the remote sensing and its application in ecology.
29.	BIOCHEMISTRY	Course No. VII/ Paper- III	✓	✓	✓	✓	The students will be able to impart an insight into the various biochemical studies. They will understand the mechanism of various phyto-chemicals studies in plants. They will know about the different biochemical techniques in lab. These studies are helpful in research work.
30.	BIOSTATISTICS AND COMPUTER APPLICATIONS	Course No. VIII/ Paper- IV	✓	✓	✓	✓	They will understand and learn about how biostatistics is useful in different fields. They will understand the different methods of comparison and analysis of data. They understand different techniques of calculation which are useful in research such as ANOVA, chi square and 't' test and how to interpreted their results. They learn about the uses and application of computer, internet and how to use different software.
31.	PLANT PHYSIOLOGY	Course No. IX/ Paper- I	✓	✓	✓	✓	The students will be able to impart an insight into the various plant water relations. They will understand the mechanism of various metabolic processes in plants such as photosynthesis & Reparation. They will know about the growth hormones, growth regulators and secondary plant metabolites.
32	GENETICS & MOLECULAR BIOLOGY	Course No. X/ Paper- II	✓	✓	✓	✓	They will learn about genetic material DNA structure various types and cot curve. They will learn about restriction mapping, and in-situ hybridization techniques. They will learn and understand about mechanism and factors which are responsible for mutation. They will learn about DNA damage and repair mechanisms. They will learn about different methods of recombination and its mechanisms. They will understand independent assortment,

							linkage and crossing over. They will learn about mechanism of DNA replication, and transcription process including splicing. They will learn about translation process and protein synthesis inhibitors. They will learn about gene expression in prokaryotes and eukaryotes.
33.	PLANT REPRODUCTION AND DEVELOPMENT	Course No. XI/ Paper- III	✓	✓	✓	✓	Students will understand the tissue differentiation. They will learn and understand about the structure of root and stem and study in detail about their meristematic tissues. They will understand about the root and shoot apex organization. They will know about the structure of leaves. They will learn about the microsporogenesis, mega sporogenesis, endosperm development and Embryo. Students will know about the fertilization, double fertilization, seed germination and seed dormancy.
34.	BIOTECHNOLOGY	Course No. XII/ Paper- IV	✓	✓	✓	✓	They will know about the scope and history of Biotechnology. Genetic Engineering procedure will be learned by students. They will learn about the culturing of microorganism for production of biomass. Strains are improved procedure and its used in different things will be learned.
35.	PLANT CELL TISSUE AND ORGAN CULTURE	Course No. XIII/ Paper- I	✓	✓	✓	✓	They will understand the detailed aspects of invitro culture technique. They will know about the various techniques of tissue culture such as organ culture, somatic embryogenesis and somatic hybridization. They will learn about the scope of plant tissue culture technology. They will understand the process of cryopreservation and germplasm storage.

36.	BIOTECHNOLOGY & GENETIC ENGINEERING	Course No. XIV/ Paper- II	✓	✓	✓	✓	Students will learn about the concepts of Biotechnology and Genetic Engineering. Principles and techniques of recombinant DNA technology will be understood by the students. They will know about the microbial genetic manipulation. They will learn about protein profiling and its significance.
37.	ETHNOBOTANY	Course No. XV-A/ Paper- III	✓	✓	✓	✓	They will learn and understand about the ethnobotanical importance of plants. They will know about the medicinal value of plants and how to cure various diseases. They will learn about the various tribal group of plants and their mytholical value such as taboos and totems in relation to plants, flokpore and floktales, wild life protection in tribal plants. They will know about the role of ethnobotany in the development of society. They will understand about the presentation of genetic diversity, plants used in various system of medicines such as ayurvedic, Unani, homeopathic and allopathic systems.
38.	PLANT PROTECTION	Course No. XVI-B/ Paper- IV	✓	✓	✓	✓	Students will understand the basic concept of plant protection. They will learn and understand about causal organism, symptoms and disease cycles of fungal diseases. They will know about causal organism, symptoms and disease cycle of bacterial diseases viral diseases, disease caused by mycoplasma, and nematodes. They will understand and learn about chemical, cultural and biological methods of plant protection. They will learn about legislative methods of plant protection and plant quarantine. They will be able to write about the remote sensing and integrated pest management.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1.1.1 Curriculum and its relevance to Local! Regional! National! Global needs

Department of Chemistry

S. No.	Course Name	Course Code	Local	Regional	National	Global	Curriculum - its relevance
1	Fundamentals of Chemistry (Major)	S1-CHEM1T	✓	✓	✓		Ancient Indian chemical techniques.
			✓	✓	✓	✓	Various theories and principles applied to reveal atomic structure. Significance of quantum numbers. Concept of periodic properties of elements. Theories related to chemical bonding. Acid-base concept, pH, buffer. Factors responsible for reactivity of organic molecules. Basics and mechanism of chemical kinetics. Properties of electrolytes.
2	Qualitative & Quantitative Chemical analysis(Major)	S1-CHEM1P	✓	✓	✓	✓	Importance of chemical safety and lab safety while performing experiments in laboratory, Qualitative inorganic analysis, Elemental analysis of organic compounds (non-instrumental) Qualitative identification of functional group of organic compounds Techniques of pH measurements Preparation of buffer solutions

3	Analytical Chemistry (Minor)	S1-CHEM2T	✓	✓	✓	✓	Basic concepts of Mathematics for Chemists. Fundamentals of analytical chemistry and steps involved in analysis. Basic knowledge of Computer for chemists. Basic Concepts of Chemical equilibrium. Principles of Chromatography and chromatographic techniques. Various techniques of Spectroscopic Analysis
4	Analytical Processes and Techniques Core Course/ Minor/ Elective –	S1-CHEM2P	✓	✓	✓	✓	Concepts and analytical methods in Chemistry. Preparation of solutions of different concentrations. Standardization of the solution. Identification of Organic compounds by chromatographic techniques. Analysis by Spectral Techniques.
5	Chemistry in everyday life (OpenElective)	S1-CHEM3T	✓	✓	✓		Learn about the chemistry of ancient India. Ancient construction materials and discoveries.
			✓	✓	✓	✓	Gain information about acids, bases and salts involved in our day to day life. Have an idea of food adulteration, its harmful effects, and methods to detect adulteration and the important constituents of our food. Student will be familiar with the chemical nomenclature of the commonly used materials in daily life including toiletries, kitchen and beverages. Have an Elementary idea of disinfectants, pesticides and cleaners.
6	Chemistry in Everyday life	S1-CHEM3P	✓	✓	✓	✓	Concepts and analytical methods in chemistry. Identification of acids, bases and salts involved in our day to day life. Methods to detect adulteration in commonly used food materials. Preparation of Natural indicator.
7	Reactions, Reagents and Mechanisms in Organic Chemistry (Major 1)	S2-CHEM1T	✓	✓	✓	✓	Various organic reactions, reagents and their mechanisms, which will be helpful in understanding organic synthesis. Application of the reactions in the various industries. like pharmaceutical, polymer, pesticides, textile, Dyes etc. Important key reactions used in further study and Research work.

8	Organic Qualitative Analysis, Reactions and synthesis (Major)	S2-CHEM1P	✓	✓	✓	✓	To perform various reactions, which will be helpful in Understanding organic synthesis. To use reagents to perform organic reactions. To perform rearrangement reactions. To prepare various organic compounds. To use chromatographic technique to monitor organic reactions. Applications of the reactions in the industries, e.g., pharmaceutical, polymer, pesticides, textile, dyes, etc. industries. These experiments will also be useful in further study and research work.
9	Transition Elements, Chemi-energetics, Phase Equilibria (Core Course/ Minor/ Elective)	S2-CHEM2T	✓	✓	✓		Introductory idea about Traditional Indian Chemistry
			✓	✓	✓	✓	Chemistry of d- & f-block Elements, Basic Concepts of Coordination Chemistry. Stereochemistry of Transition Metal Complexes. Laws of Thermodynamics. Concepts of Phase Equilibrium with reference to Solid Solution, Liquid-Liquid Mixtures, partially Miscible Liquids. Basic Concepts of Electrochemistry
10	Metal Complex Preparation, Thermochemical & Phase equilibria experiments	S2-CHEM2P	✓	✓	✓	✓	Preparation of inorganic complexes. Use of calorimeter for thermochemistry experiments. Determination of enthalpy of various system and reactions. Experiments on phase equilibria. Construction of phase diagrams. Study of reaction equilibrium
11	Generic Elective - Chemistry for Farmers	S2-CHEM3T	✓	✓	✓		Pro cultivation crop improvement soil and crop management for sustainable organic agriculture production and development. Physical properties of soil and fertilizers types, Soil types and soil structure required for an agricultural field. Analysis and identification of complex agricultural problems and formulating ethical solutions. Innovative processes products and technology to meet the challenges in agriculture and farming practices. Fundamentals of horticulture modern farming and organic farming.

12	Green and Agriculture Chemistry	S3-CHEM1D	✓	✓	✓	✓	Basic principle of green and sustainable chemistry. Understand stoichiometric calculation and relate them to green process metrics. Learn alternative solvent media green catalysis and energy sources of chemical processes. Understand the requirements of manures and fertilizers for various crops and their proper time of application. Understand to maintain soil fertility for better crop production.
13	Green and Agriculture Chemistry	S3-CHEM1Q	✓	✓	✓	✓	To learn green synthesis of organic and inorganic compound.To learn to prepare green ionic liquids. To understand soil profile sampling and study minerals present in soil. To learn to estimate organic matter content of soil.
14	Laboratory Skill, Techniques and Management	S3-CHEM2D	✓	✓	✓	✓	Familiarized with the basic facilities available in laboratories. To adopt appropriate disposal procedures and safety method suitable for laboratories. Expected to gain knowledge of the basic skill of organisation and management of science laboratories. Unable to expertise in the procedures to procurement and storage of laboratory equipment and materials. Trained in the operation and maintenance of simple instruments used in Science laboratories. Unable to develop skills in common laboratory techniques. Trained to adopt appropriate disposal procedures and safety method suitable for laboratories.
15	Exercise for development of lab skills	S3-CHEM2Q	✓	✓	✓	✓	Preparation of standard solution. Determination of concentration. Determination of MP pH conductivity. Preparation of a stock solution. Preparation of various reagents.
16	Instrumental Techniques in Chemistry	S3-CHEM3D	✓	✓	✓	✓	Preparation of standard samples for analysis. Determination of concentration of solution spectrometrically. Determination of stoichiometry and stability constant and complexes. Potentiometric and conductometric titrations. Advance chromatography techniques.

17	Instrumental Techniques in Chemistry	S3-CHEM3Q	✓	✓	✓	✓	Preparation of standard samples for analysis. Determination of concentration of solution spectrometrically. Determination of stoichiometry and stability constant and complexes. Potentiometric and conductometric titrations. Advance chromatography techniques.
18	Bio Physical, Bio Inorganic and Organometallic Chemistry	S3-CHEM4D	✓	✓	✓	✓	Bio physical concepts like pH biological oxidation bioenergetics. Magnetic properties and electronic spectra of transition metal complexes. Structure and bonding analysis of organometallic compounds using the MO theory. Organometallic compounds of main group elements and their structure and bonding analysis. Bio Inorganic Chemistry and role of metal ions in biological systems.
19	Synthesis and analyticaL techniques	S3-CHEM4Q	✓	✓	✓	✓	Synthesise of ferrocene from ferric chloride, potassium tries oxalate ferrate. Determine pH of bio sample; determine sugar in blood sample by photometry.
20	pharmaceutical and medicinal chemistry	S3-CHEM2T	✓	✓	✓	✓	*Understand importance of pharmaceutical chemistry and pharmacopoeia. Learn intellectual property rights patents trademark and copyright. Understand definition classification of the drug with example and structures. Describe the structure activity relation of some important class of drugs. Describe the over all process of drug discovery and the role played by medicinal chemistry in this process. Relate the structure and physical properties of drugs to their pharmacological activity. Explain you chemical properties related to QSAR.*
21	pharmaceutical and medicinal chemistry	S3-CHEM2T	✓	✓	✓	✓	*Preparation of acetanilide. Isolate the caffeine from the tea leaves. To learn about preparation of simple syrup as per IP and USP. Morphology of turmeric, Ginger and mentha. Preparation of suspension emulsion on it means in organic separations pharmaceutical buffer solutions.*

22	Processing of fats and oils (Generic elective)		✓	✓	✓		Gain knowledge about traditional Indian oil and traditional Indian oil processing methods. Gain the knowledge about importance type natural resources of fats and oils and their effect on health. Learn the method of refining and modification of fats and oils. Know about the nutritional aspects of fats and oils and their storage and handling. Gain information regarding entrepreneurship in food processing and knowledge of local processing industries.
23	Environmental toxicology(Generic elective)		✓	✓	✓	✓	*Learn about definition and sources of toxicants. Learn about chemical toxicants biological toxicants and its assessment.Learn about different parts of ecotoxicology i.e. Immunotoxicology, Xenoviotics, neurotoxicology, bioaccumulation, biodegradation etc.Learn about the determination of acceptable risks and limits of environmental toxicants and utility of environmental benchmarks.Learn about environment al cytotoxicity and genotoxicity. Learn about what type of toxic chemicals affects in environment and solid West management. Learn about which factors influence the toxicity.*
24	Inorganic Chemistry	MCH 101	✓	✓	✓	✓	Stereochemistry, bonding, VSEPR theory, MO treatment Reaction mechanism of Substitution inertness and lability Electronic spectra of transition metal complexes Metal carbonyls, Dioxygen Complexes Wilkinson's Catalyst, borane chemistry including topology, nomenclature, reactivity and bonding.
25	Organic Chemistry	MCH 102	✓	✓	✓	✓	Structure and bonding in organic molecules Aromaticity, antiaromaticity, homo aromaticity including weaker bonds. Stereochemistry, symmetry, chirality, optical activity and conformational analysis, Reaction mechanism, Hammett equation, SN1, SN2 and SET mechanism, UV-VIS, ORD &CD Spectroscopy

26	Physical Chemistry	MCH 103	✓	✓	✓	✓	Schrodinger Wave equation, variation and perturbation theory, Classical thermodynamics, Phase rule, chemical dynamics, Arrhenius Equation, Theory of reaction rate and application of rate law on dynamic chain reaction Reaction catalysts
27	Spectroscopy	MCH 104	✓	✓	✓	✓	Electromagnetic spectrum Microwave spectroscopy Infrared Spectroscopy Raman and Electronic spectroscopy. CARS (Coherent and Stokes Raman Spectroscopy) and application of these spectral techniques in structure determination of molecule.
28	Mathematics for Chemist	MCH 105A	✓	✓	✓	✓	Basic concept of mathematical technique involved in Chemistry like Mathematics Algebra Differential calculus, integral calculus, Elementary differential equation Permutation Probability.
29	Biology for Chemist	MCH 105B	✓	✓	✓	✓	Cell structure Cell organs, and their function Carbohydrates, Lipids and fats, amino acids Nucleic acids
30	Inorganic Chemistry	MCH 106	✓	✓	✓	✓	Qualitative and Quantitative Analysis Chromatography Preparations- Preparation of selected inorganic complexes and their studies by measurements of decomposition temperature, molar conductance, IR and electronic spectra.
31	Organic Chemistry	MCH 107	✓	✓	✓	✓	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. Organic Synthesis- Purification of compounds by TLC and column chromatography.

							Aromatic electrophilic substitutions, Reduction reaction *Quantitative Analysis*-Determination of the percentage or number of hydroxyl groups in an organic compound by acetylation method
32	Physical Chemistry	MCH 108	✓	✓	✓	✓	Adsorption Phase Equilibria Chemical Kinetics Solutions
33	Inorganic Chemistry	MCH201	✓	✓	✓	✓	Metal ligand equilibrium, reaction mechanism, base hydrolysis, conjugate base mechanism in octahedral and mechanism of square planar complexes. Metal-ligand bonding Calculations of Dq, B and beta parameters Preparation, properties, structure and applications of metal nitrosyls. Symmetry elements, symmetry operations and the principle involved in group theory.
34	Organic Chemistry	MCH 202	✓	✓	✓	✓	Mechanism- aromatic/aliphatic electrophilic substitution Free radical, allylic halogenation reaction, Addition to carbon-carbon and carbon-hetero atom multiple bond and aromatic nucleophilic substitution, SE1, SE2, SN1 SN2 & SRN1 reactions. ESR Spectroscopy IR and Raman spectra and their application in characterization of organic compounds
35	Physical Chemistry	MCH 203	✓	✓	✓	✓	Chemical dynamics Adsorption and electrokinetic phenomenon, Micellization, DHO equation. Lipmann electro-capillary phenomenon including different models. Macromolecules and colloid including their types, emulsification, irreversible electrode phenomenon including decomposition voltage overlaps.

36	Spectroscopy & Diffraction Methods	MCH204	✓	✓	✓	✓	Photoelectron spectroscopy, photoacoustic spectroscopy, X ray Diffraction, Neutron Diffraction. Biological cell, constituents, Bioenergetics Thermodynamics of biopolymer solution and transport of ion through the cell membrane.
37	Computer for Chemist	MCH205	✓	✓	✓	✓	Basic knowledge of computer and computing BASIC and FORTRAN based programming with especial reference to programming in chemistry. Rerunning of standard program in MS Word and MS Excel Search engines and various types of files like PDF, RTF, JPG OMR & Webcam.
38	Inorganic Chemistry	MCH 206	✓	✓	✓	✓	Chromatography Separation of cations and anions by Column Chromatography Estimation of Ni – Fe, Ni (Gravimetrically), Fe (Volumetrically) Preparations- Preparation of selected inorganic complexes and their studies by measurements of decomposition temperature, molar conductance, IR and electronic spectra. *Interpretation of TG and NMR spectra of some known compounds*
39	Organic Chemistry	MCH 207	✓	✓	✓	✓	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. Preparation of phenyl azo – β – naphthol from aniline. Aromatic electrophilic substitutions, Reduction reaction *Quantitative Analysis*-Determination of the percentage or number of hydroxyl groups in an organic compound by acetylation method

40	Physical Chemistry	MCH 208	✓	✓	✓	✓	*Electrochemistry* *Conductometry* *Potentiometry/pH merry* *Polarimetry*
41	Inorganic Chemistry	MCH301	✓	✓	✓	✓	Group theory, Character tables, orthogonality theorem, applications for C2v and C3v point groups 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. Shift reagents in NMR spectroscopy Structure and functioning of metalloenzymes e.g., carboxypeptidase, carbonic anhydrase Structure and functioning of biomolecules like Hemoglobin.
42	Organic Chemistry	MCH302	✓	✓	✓	✓	Basic theory of NMR spectroscopy, applications to characterize organic compounds. Photochemical reactions. Mechanism of pericyclic reaction, Woodword Haffmann, FMO &PMO approach Sigma tropic rearrangements.
43	Physical Chemistry	MCH303	✓	✓	✓	✓	Atomic concepts, Russell-Saunders terms and coupling. Molecular Orbitals, Huckel theory of conjugated systems like ethylene, butadiene Homo and heterogeneous catalysis. Crystal defects. Schottky and Frankel defects Solid state reactions. Metallic bond Conductors, semiconductors, insulators and superconductors
44	Analytical Chemistry	MCH304B	✓	✓	✓	✓	Statistical Analysis., Sample Preparation for Chromatography. Chromatography. Theory of Chromatography, Gas Chromatography, High-Performance Liquid Chromatography, Capillary Electrophoresis. Ion Exchange, Solvent Extraction Atomic Absorption Spectrometry, Electrolytic Methods Acid-Base Titrations, Precipitation

							Titrations, Complexometric Titrations, Redox Titrations.
45	Photochemistry	MCH304C	✓	✓	✓	✓	Photochemical Reactions Determination of Reaction Mechanism Photochemistry of Alkene Photochemistry of Carbonyl Miscellaneous Photochemical Reactions, Photo degradation of polymers. Photochemistry of vision.
46	Inorganic Chemistry	MCH306	✓	✓	✓	✓	Synthesis Synthesis of selected inorganic compounds and their studies by measurements of decomposition temperatures and molar conductance, magnetic and IR electronic spectra. Qualitative test of suitable anion and determination of metal content gravimetrically in the above compounds. Interpretation of ESR and mass spectra of some known coordination compounds.
47	Organic Chemistry	MCH307	✓	✓	✓	✓	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. 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.
48	Physical Chemistry	MCH308	✓	✓	✓	✓	Potentiometry Conductivity Spectrophotometry Molecular Modeling

49	Inorganic Chemistry	MCH401	✓	✓	✓	✓	ESR Spectroscopy Mossbauer, IR, Raman spectroscopy, Point groups and vibrational spectroscopy. Bio-inorganic chemistry, chlorophyll, photo systems one and two, Metalloproteins cytochromes, iron Sulphur protein, Nitrogen fixation.
50	Organic Chemistry	MCH402	✓	✓	✓	✓	^{13}C NMR Spectroscopy, Mass spectroscopy. Reaction mechanism of elimination, E1, E2 & E1CB type, Substitution reactions. Enzymes, structure and functioning.
51	Physical Chemistry	MCH403	✓	✓	✓	✓	NMR, ESR spectroscopy. Laws of photochemistry, fluorescence, Steric and conformational properties of molecules, Winstein-Holmer and Curtin-Hammett Equations CO5: Electronic effects involved in SN1 and SN2 type of reactions, and curve crossing model.
52	Polymer Chemistry	MCH404	✓	✓	✓	✓	Basic theory, classification of polymers Characterization, important properties of polymers Commercial importance of polymers Processing to understand different types of casting like die-rotational, film Methods for designing variety of polymers
53	Chemistry of Natural Products	MCH405	✓	✓	✓	✓	*Terpenoids, Alkaloids, Steroids* *Plant Pigments. Carotenoid, Flavonoids, Chlorophyll, Vitamins and Antibiotics, Antibiotics.*
54	Inorganic Chemistry	MCH406	✓	✓	✓	✓	Spectrophotometric Determination Flame photometric determination Model Experiments on Cyclic Voltammetry Interpretation of ESR, NMR and Thermogravimetric pre-recorded results of known compounds
55	Organic Chemistry	MCH407	✓	✓	✓	✓	Multi-step Synthèses - Qualitative & Quantitative Quantitative Analysis Spectral Analysis: Interpretation of pre-recorded UV-Vis, IR, NMR, Mass, Raman spectrum and characterization of one organic compound.

56	**Physical Chemistry**	**MCH408**	✓	✓	✓	✓	Spectrophotometry Chemical Kinetics Electronics Molecular Modeling

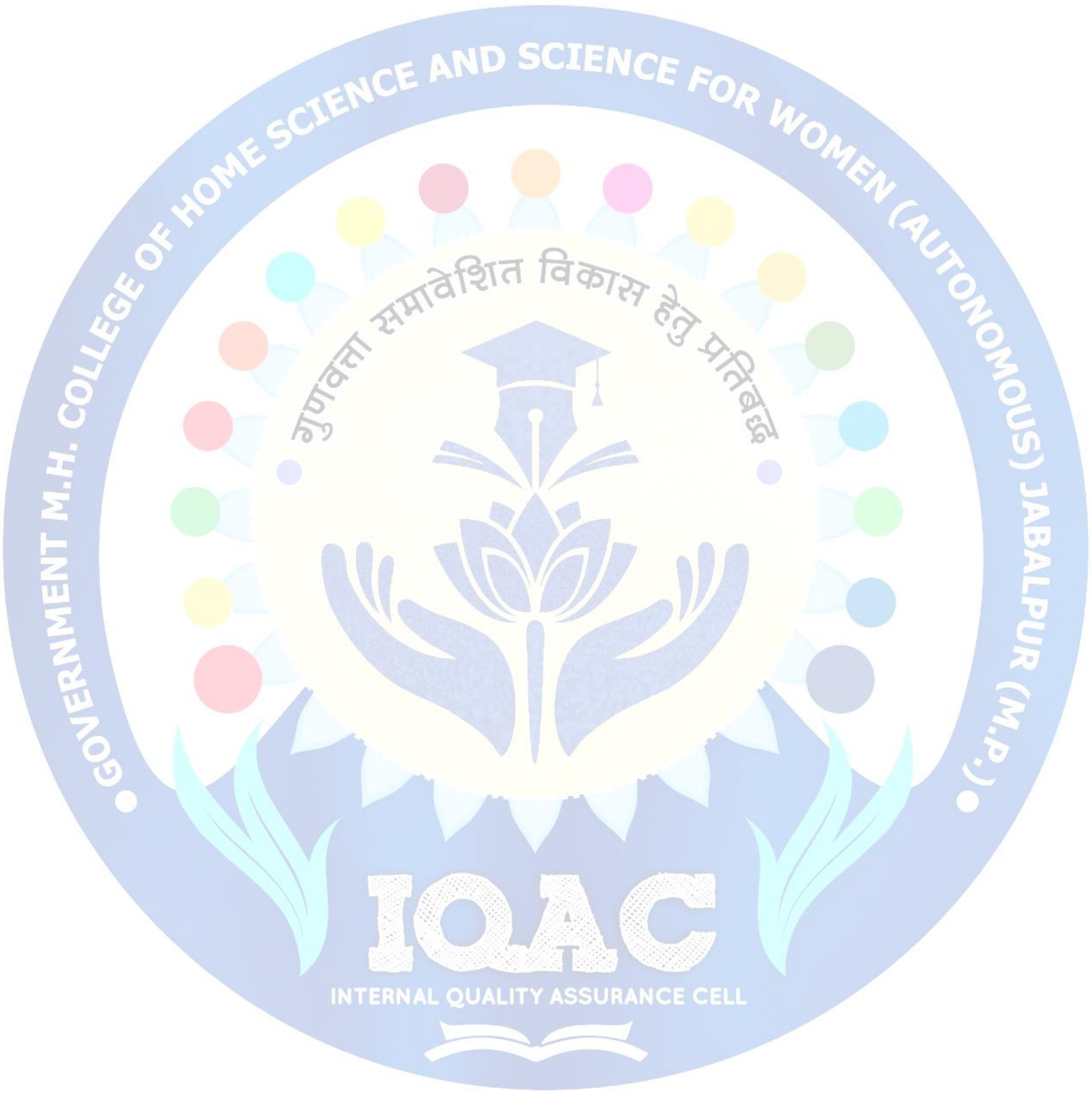
1.1.1 Curriculum and its relevance to Local! Regional! National! Global needs

Department of Mathematics & Computer

S. No.	Course Name	Course Code	Local	Regional	National	Global	Curriculum - its relevance
1	**Programming in C language** (Major Paper I)	**S1-COAP1T**	✓	✓	✓	✓	• To explore basics of C programming languages. • To approach the programming tasks using techniques learned and write pseudo-code. • To choose the right data representation formats based on the requirements of the problem. • To use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand. 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.
2	**Data Processing Software** (PaperII)/Minor/Elective)	**S1-COAP2T**	✓	✓	✓	✓	• To understand the basic concept of various application of software. • To gain knowledge of MS Word, Excel, Access and power point. • To apply acquired knowledge in office automation tasks. • To study various methods of formatting of documentation and use of spreadsheets. To develop and enhance presentation skills using power point.
3	**Database Management System** (Major Paper-I)	**S2-COAP1T**	✓	✓	✓	✓	• To understand database concepts, applications, structure, need and database terminologies. • To know about fundamentals of Relational Algebra and recovery & backup. • To gain skills to create logical design of databases, including the E R method and normalization approach. • To explore issues of transaction processing and concurrency control. • To acquire knowledge of back-end project management skills. • To get knowledge of Database and create own Database. For implementation of different security features to secure the

							database.
4	**Introduction to ASP.NET& C#** **(PaperII)/Minor/Elective)**	**S2-COAP2T**	✓	✓	✓	✓	• To learn fundamentals of .net framework. • To enrich knowledge about Windows Forms, Controls and ASP.NET based applications. • To gain proficiency in C# by building stand-alone applications in the.NET framework using C#. • To build data-driven applications using the .NET Framework, C#, and ADO.NET To acquire skills to create web-based applications and Reports using.net technologies. .
5	**Operating System (Theory)** **(Group A , Paper I)**	**S3-COAP1D**	✓	✓	✓	✓	• To understand to analyze the structure and basic architectural components involved in OS. • To display competence in recognizing and using operating system features. • To gain knowledge of implementation of different operating system aspect. • To apply knowledge of different operating system algorithms. • To contributes and make enhancements in the features of operating systems. • To create own android OS based application (Apps) and implement or install in smart phone. • To create new apps for business point of view.
6	**Computer Networks (Theory)** **(Group A, Paper II)**	**S3-COAP2D**	✓	✓	✓	✓	• To learn the basic taxonomy and terminology of computer networking area. • To enrich various concepts of protocol Hierarchies, Design Issues, Interfaces and Services including Connection Oriented and Connection less Services. • To study about OSI Layers, LAN, MAN, WAN, Internet and IEEE Standards. • To build network topologies and use appropriate network tools. • To gain skills of implementation of Network Security and Socket Programming.
7	**Programming in Java (Theory)** **(Group B , Paper I)**	**S3-COAP3D**	✓	✓	✓	✓	• Understand the features and applications of Java. • To know the strengths and weaknesses of Java programming and the basic concepts of object – oriented programming. • To Identify Java code

							utilities in applets, Java packages, and classes. • To write Java code using advanced Java features.
8	**Multimedia Tools and Applications (Theory) (Group B , Paper II)**	**S3-COAP4D**	✓	✓	✓	✓	• To gain knowledge about basics of Multimedia tools and its applications. • To understand the representation of different multimedia data and different data formats. • To work with all aspects of text, audio, images and video. • To understand the principles of multimedia authoring paradigm and tools. • To apply different compression principles, compression techniques and compression standards.
9	**Internet and its Applications (theory) (Minor)**	**S3-COAP2T**	✓	✓	✓	✓	• Understand the features and applications of Internet. • To trouble shoot day to day problems with internet. • To understand basics of networking and web designing to use internet effectively for official and domestic applications. • To structure a web page and its content. • To build ecommerce websites.


GOVERNMENT M.H. COLLEGE OF HOME SCIENCE AND SCIENCE FOR WOMEN (AUTONOMOUS) JABALPUR (M.P.)
गुणवत्ता समावेशित विकास हेतु प्रतिबद्ध
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Govt. M.H. College of Home Science & Science for Women (Autonomous) Jabalpur (M.P.)

1.1.1 Curriculum and its relevance to Local! Regional! National! Global needs

Department of Mathematics & Computer

Computer Science

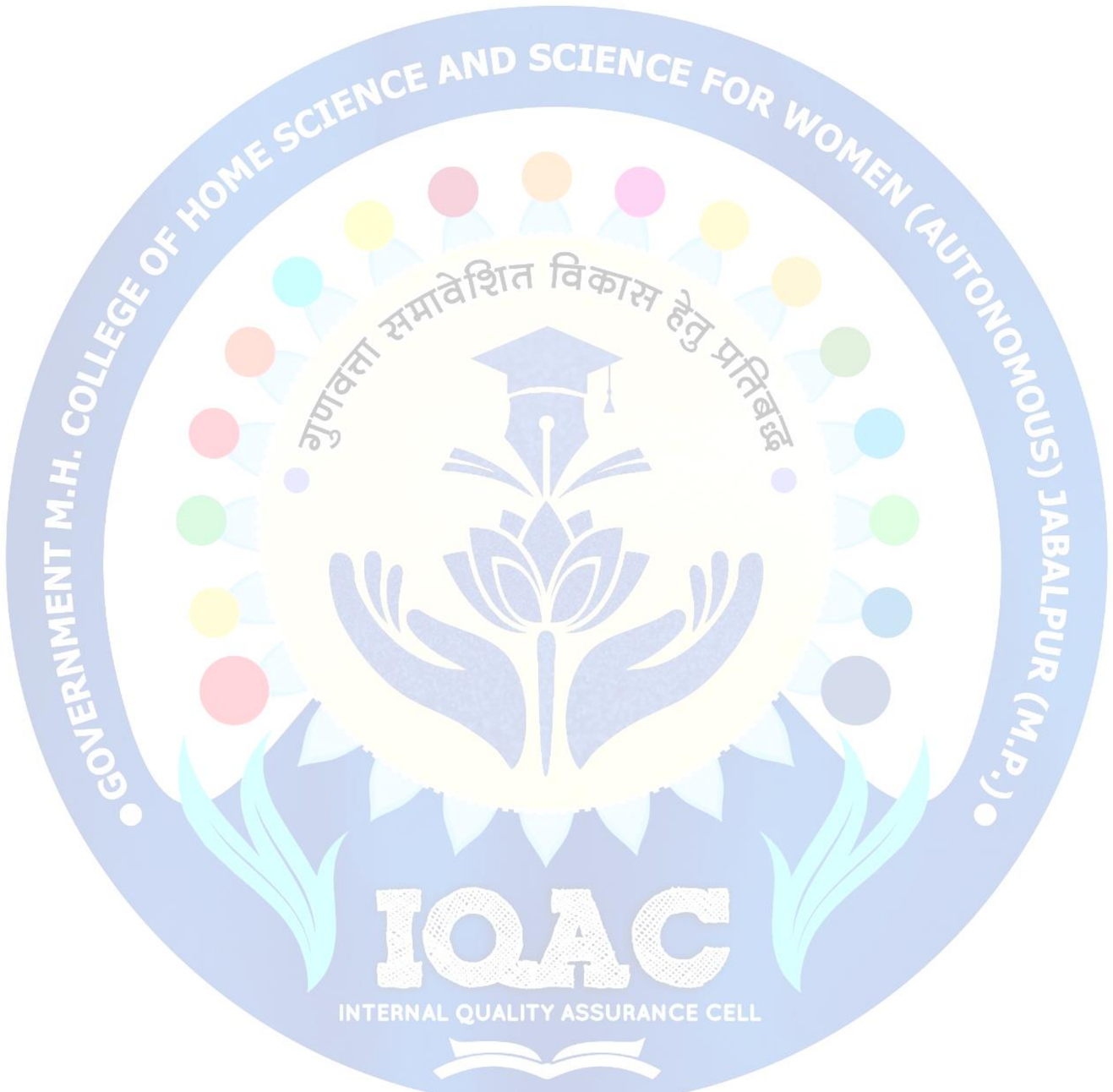
S. No.	Course Name	Course Code	Local	Regional	National	Global	Curriculum - its relevance
1	**Computer System Architecture (Major Paper I)**	**S1-COSP1T**	✓	✓	✓	✓	1. Understand the basic structure, operation and characteristics of digital computer. 2. Be able to design simple combinational digital circuits based on given parameters. 3. Familiarity with working of arithmetic and logic unit as well as the concept of pipelining. 4. Know about hierarchical memory system including cache memories and virtual memory. 5. Understand concept and advantages of parallelism, threading, multiprocessors and multicore processors. 6. Know the contributions of Indians in the field of computer architecture and related technologies.
2	**Programming Methodologies & Data Structure (PaperII)/Minor/Elective)**	**S1-COSP2T**	✓	✓	✓	✓	1. Develop simple algorithms and flow charts to solve a problem with programming using top down design principles. 2. Writing efficient and well-structured computer algorithms/programs. 3. Learn to formulate iterative solution and array processing algorithms for problems. 4. Use recursive techniques, pointers and searching methods in programming. 5. Will be familiar with fundamental data structures, their implementation; become accustomed to the description of algorithms in both functional and 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 structure to suitably model any data used in computer applications. 8. Design programs using various

							data structures including hash tables. Binary and general search trees. Heaps, graphs etc. 9. Assess efficiency tradeoffs among different data structure implementations. 10. Implement and know the applications of algorithms for searching and sorting etc. Know the contributions of Indians in the field of programming and data structures..
3	**Computer Networks & Information Security (Major Paper-I)**	**S2-COSP1T**	✓	✓	✓	✓	1. Define and describe the components of Data Communications System such as various protocols, OSI Model, data transmission in analog and digital format. 2. Identify and differentiate among the network devices and drivers. 3. Learn and describe various error detection and correction methods. Define the various terminologies used in Network and Application layers. 4. Compare the various network technologies and can decide the suitable technology installation as per requirement and environment at any work place. 5. Describe the various protocols and can identify the application areas of each protocol. Know the fundamentals of network and information security issues, laws, and various security technologies which can be applied on work place.
4	**Object Oriented Programming with Java** **(PaperII)/Minor/Elective)**	**S2-COSP2T**	✓	✓	✓	✓	1. Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity. 2. Identify classes, objects, members of a class and the relationship s among them needed for a finding the solution to a specific problem. 3. Demonstrates how to achieve reusability using inheritance, interfaces and package and describes faster application development can be achieved. 4. Demonstrate understanding and use of different exception handing mechanisms and concepts of multi –threading for robust faster and efficient application development. 5. Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events. Identify, Design & Develop complex Graphical user interfaces using principal Java Swing classes based on MVC architecture.
5	**Operating System (Theory)** **(Group A , Paper I)**	**S3-COSP1D**	✓	✓	✓	✓	• Describe the importance of computer system resources

							and the role of operating system in their management policies and algorithms. • Specify objectives of modern operating system and describe how operating systems have evolved over time. • Understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks. • Describe the concepts of multithreading and memory management techniques. • Identify the best suited memory management technique for any process. • Describe various file operations, file allocation methods and disk space management. • To understand and identify potential threats to operating systems and the security features design to guard against them. • Learn to operate the Linux system, along with its administration and Shell programming. • Getting to know the Android OS and its application framework.
6	**Programming with Python (Group A, Paper II)**	**S3-COSP2D**	✓	✓	✓	✓	• Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements. • Express proficiency in the handling of strings, functions and file handling. • Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets. • Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and Polymorphism as used in Python with class, modules and packages. • Identify the commonly used operations involving database connectivity and use of tkinter for GUI programming
7	**PHP & MySQL (Group B , Paper I)**	**S3-COSP3D**	✓	✓	✓	✓	• Discover how the web works, what makes web sites work. • Implement simple and impressive design techniques, from basics till advanced to focus on goal oriented and user centric

							designs. • Use Server Side Scripting. • Implement concept of data persistence. • Apply skills to program logic using PHP and handle data using MySQL. • Develop dynamic websites using PHP & MySQL.
8	**Cloud Computing (Group B , Paper II)**	**S3-COSP4D**	✓	✓	✓	✓	• Analyze the trade –offs between deploying applications in the cloud and over the local infrastructure. • Compare the advantages and disadvantages of various cloud computing platforms. • Deploy applications over commercial cloud computing infrastructure such as Amazon Web Services, Windows Azure, and Google AppEngine. • Program data intensive parallel applications in the cloud. • Analyze the performance, scalability, and availability of the underlying cloud technologies and software. • Identify security and privacy issues in cloud computing. • Explain recent research results in cloud computing and identify their pros and cons. Solve a real –world problem using cloud computing through group collaboration.
9	**Data Analysis and Visualization with Python (theory) (Minor)**	**S3-COSP2T**	✓	✓	✓	✓	• Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements. • Express proficiency in the handling of strings, functions and file handling. • Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets. • Develop proficiency in using NumPy for data manipulation. • Create a variety of data visualizations using Matplotlib. • Apply NumPy and Matplotlib to analyze and visualize real-world datasets. • Complete a hands-on project involving data manipulation and visualization..
10	**Internet of Things (IoT) (Core-1)**	**S4-COSC1T**	✓	✓	✓	✓	• Understand the basic concept of IoT. • Use of Devices,Gateways and communication in IoT. • Learn Arduino and Python Programming. • Implement IoT with Raspberry Pi. Explore the relationship between IoT,Cloud Computing and data analytics.

11	**Artificial Intelligence (AI) (Core-2)**	**S4-COSC2T**	✓	✓	✓	✓	• Understand the basic concept and interdisciplinary nature AI • Develop the problem solving proficiency using AI. • Deeply understand the various search algorithms. • Develop skills in knowledge representation and their applications in handling uncertainty. • Gain a fundamental understanding of machine learning and their applications • Acquire skill on Prolog Programming. • Explore advanced knowledge representation techniques. • Develop an awareness of ethical consideration in AI. • Cultivate critical thinking skills to analyze and evaluate AI algorithm and systems.
12	**Computing with Scilab - D1**	**S4-COSC1D**	✓	✓	✓	✓	• Implement the concept of vectors & matrices in Scilab programming.. • Able to apply the programming concept like branching, iteration & functions in a Scliab program. • Use the inbuilt functions of Scliab for trigonometric & • Statistical calculations. • Analyze visualize the data through various 2-D and 3-D plots. • Apply Scliab tools in modeling and Simulations. • Use Scicos visual editor (Xcos)/Simulink Editor in various Simulations of scientific importance.
13	**Linux Server Administration -D2**	**S4-COSC2D**	✓	✓	✓	✓	• Write shell program for simple problems. • Use basic commands of Linux. • Analyze the need for security measures for Linux server. • Manage user accounts in Linux. Install and configure E-mail Server,DNS,FTP etc.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1.1.1 Curriculum and its relevance to Local! Regional! National! Global needs

Department of Clothing and Textiles

S. No.	CourseName	CourseCode	Local	Regional	National	Global	Curriculum - its relevance
1	Fundamentals of Textiles Major II / Minor	H1-HSCA2T	√	√	√	√	**The contents specially Identifies the characterstics of natural and manufactured fibers. Its characterstics will be comparatively studied with its end use,in addition to its different methods of fabric construction techniques and machines will be examined. The ethods will be related with the performance of textile till its last usage. Consumer decisions will be made based upon vocabulary linked up with textile terms. The contents hereby provide for opportunities into the study of textile by applying and enhancing the skill.**

	Fundamentals of Textiles Major II / Minor	H1-HSCA2P	√	√	√	√	**Iidentify different fibers through various tests help to get satisfactory result of textiles. Understand the weaves and consruction techniques are helpful to create variations in textile design.**
2	Dyeing and Printing Elective	H1-HSCA2G	√	√	√	√	**Understand the fundamentals of colour theory and to apply them thoughtyfully and creatively to develop designs using different colour schemes. The knowledge of the application of colours through different dyeing and printing methods will provide opportunities to apply thinking, designing skills etc. in fashion world to attract the consumer.**
3	Dyeing and Printing Elective	H1-HSCA2R	√	√	√	√	**Application of knowledge and creativity with careful consideration of colour, dyeing and printing technology, designers can create stunning, eye catching textiles that are sure to be a hit among customers.**
4	Fundamentals of Clothing Constructions Major II/ Minor	H2-HSCA2T	√	√	√	√	**Garment Construction is the core of fashion Designing. It involves all kinds of process like understanding sewing machines, seam types and stitching of garment.**
5	Fundamentals of Clothing Constructions Major II/ Minor	H2 - HSCA2P	√	√	√	√	**Develop the skill of stitching and dress designing and feel more confident in sewing skill and work in the garment and fashion industry.**

6	Textile and Craft DSE Paper-I	H3-HSCA3D	√	√	√	√	**Gaining knowledge of textile craft from history to popularity. Apart of it, develop various tradional textile craft through the creativity and empowering self in present scenario.**
7	Textile and Craft DSE Paper-I	H3-HSCA3Q	√	√	√	√	**understanding and appreciation of the various traditional Indian textile crafts such as embroideries, dyeing and printing techniques, and woven textiles to create textile craft products. Facilitate awareness with respect to the contemporary status of the textile crafts.**
8	TextileDesign and Illustration DSE Paper-II	H3-HSCA4D	√	√	√	√	**Promote the ways in which meanings, ideas and intensions relevent to textile design can be communicated through the elements and principles of design. Enhance creative possibilities through drawing skills and various illustration techniques to convey the ideas effectively.**
9	TextileDesign and Illustration DSE Paper-II	H3-HSCA4Q	√	√	√	√	**Support learners to develop the use of media and textile materials and digital imaginary. Allowing designers to visualize their creative concepts before committing them to fabric. By portraying garments in different styles, settings and moods, fashion illustrators set the tone for upcoming trends.**
10	Apparel Construction Minor/Elective Paper	H3-HSCA2T	√	√	√	√	**Develop the concept of drafting and pattern making methods. Learn about the adoptation of basic bodice block to produce various designs in apparel. Gain insights into fitting**

							and alterations, garment assembly, fastenings and finishing techniques.
11	Apparel Construction Minor/Elective Paper	H3-HSCA2P	√	√	√	√	**Enhance the Understanding of drafting and Pattern making. Preparation of various garment components and acquire skills of apparel construction.explore various career paths such as pattern making, garment production, boutique studios and fashion design etc**
12	Tradtional Textile and Costumes of India CC-I	H4HSCA3T	√	√	√	√	**Emphasise sustainable production methods, raise awareness and boost demand of tradtional textiles of India. Traditonal costumes would enhance knowledge of culture, promote national identity and strengthen the sense of patriotism. Understanding the diversity of Indian costumes. Tranferring traditional culture among society through different state costumes.**
13	Tradtional Textile and Costumes of India	H4HSCA3P	√	√	√	√	**Maintain and Preserve cultural heritage and educating consumers with new designs and techniques. Explore the draping styles of regional costumes. To promote culture with symbolism and feeling of association with our heritage.**
14	Processes in Apparel Designing CC-II	H4HSCA4T	√	√	√	√	**The process in apparel design is vital for ensuring creativity, quality, and efficiency. It streamlines workflow, aids in collaboration among stakeholders, and aligns designs with market demands. This approach**

							ultimately leads to well-crafted, market-ready garments that meet consumer expectations and industry standards.
15	Processes in Apparel Designing	H4HSCA4P	√	√	√	√	**By systematically developing concepts and prototypes, designers can innovate while maintaining high standards, reducing errors, and optimizing production.**
16	Textile Processing DSE-I	H4HSCA3D	√	√	√	√	**The study of Textile processing provides with knowledge of dyes,their application to different fibers and methods of applying them to prouce attractive textile in different way. Various printing technique with step by step help to create varities in textile printing. Gaining knowledge about after treatments and finishing techniques to sustain the products as long as possible.**
17	Textile Processing DSE-I	H4HSCA3Q	√	√	√	√	**Textile processing's relevance to the curriculum lies in its comprehensive coverage of techniques and technologies used in transforming raw fibers into finished fabrics. It equips students with practical skills and theoretical knowledge crucial for careers in the textile and fashion industries, ensuring they understand the entire supply chain from fiber to finished product.**
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18	Fashion Marketing & Merchandising DSE-II	H4HSCA4D	√	√	√	√	**The elements of that content were percieved as important to job performance in the occupational field of fashion ma.rketing with empasis of retail merchandising.**
19	Fashion Marketing & Merchandising DSE-II	H4HSCA4Q	√	√	√	√	
20	Research Methodology	H4HSCA1M	√	√	√	√	**Gain basic knowledge of reseach. Improve the reseach skill in the field of Textile and clothing. Understand the appropriate research methods, used for particular research.**
21	Research Methodology	H4HSCA1S	√	√	√	√	**A research methodology gives research legitimacy and provides scientifically sound findings. It also provides a detailed plan that helps to keep researchers on track, making the process smooth, effective and manageable. A researcher's methodology allows the reader to understand the approach and methods used to reach conclusions. Conducting research enhances knowledge and helps to boost analytical and critical thinking skills.**

22	Textile Chemistry	MCT-101	√	√	√	√	**Learn about the chemistry of fiber to fabric. Basic knowledge of polymers and polymerization process help to analyse the fiber properties. Understand the chemical process to produce all types of fibers which are used in daily life. Gain information of the constituents of various dyes and application on textile materials. Concept and analysis of blended fabrics. Understand the role of chemistry in textile finishings.Processes involved to improve the qualty of textiles.**
23	Fabric contruction & Woven fabric analysis	MCT-102	√	√	√	√	**This study gives information about methods of making different types of yarn.know the properties of yarn for making desirable fabric. Various fabric construction techniques help to identify fabrics which are available for different purposes in the market. Understand the importance and applications of technical textiles in present scenario. Detail information involved in weaving process help to know the different types of fabrics and their characteristics for the end use.**
24	Apparel Designing	MCT-103	√	√	√	√	**Developing a deep understanding of sophisticated design techniques and industry trends. It enhances skills in pattern making, fabric selection, and garment construction, enabling designers to create innovative and technically sound fashion. This course also offers insights into**

							sustainability, and market analysis, equipping designers to stay competitive and adaptable in a rapidly evolving fashion industry.
25	Research Methodology	MCT-104	√	√	√	√	**A research methodology gives research legitimacy and provides scientifically sound findings. It also provides a detailed plan that helps to keep researchers on track, making the process smooth, effective and manageable. A researcher's methodology allows the reader to understand the approach and methods used to reach conclusions. Conducting research enhances knowledge and helps to boost analytical and critical thinking skills.**
26	Textile Chemistry & fabric construction	MCT-105	√	√	√	√	**Analyze to fiber properties, dyeing Procedures of natural dyes, quantitative analysis of blends. Understand the different fabric construction techniques to develop or produce related products.**
27	Apparel Designing	MCT-106	√	√	√	√	**Apparel design practical are crucial as they bridge the gap between theoretical knowledge and real-world application. They provide hands-on experience in pattern making, garment construction, and fabric manipulation, allowing students to develop technical skills and problem-solving abilities. These classes foster creativity, improve attention to detail, and prepare students for industry challenges by simulating**

							professional environments and practices.
28	Textile Testing & Quality Control	MCT-201	√	√	√	√	**understanding of methods and technique used to analysis Textile fiber, yarns and fabrics for end use performance.familiarize students with the different testing equipments, their Underlying principles and the international accepted standards, Test methods and the language of measurement and able to analyze and interpret the results and predict the general textile testing.**
29	Historic Textiles	MCT-202	√	√	√	√	**Know the importance of textile fibers in historical perspective. Analyze different historic textiles, Indian traditional embroideries as well as world embroideries.Understand the development process of dyeing and printing. Create awareness about the different resist dyed textiles of India. Identifying the influencing factors for development and evolution of a specific textiles.**
30	Fashion Design	MCT-203	√	√	√	√	**In fashion design, principles elements and designs create visual interest and define garment structure, style with garment details These features contribute to the garment's functionality, style, and overall aesthetic, enhancing both design and wearability.Fashion**

							marketing involves promoting and selling clothing, while fashion forecasting predicts future trends based on consumer behavior, market analysis, and cultural influences, guiding designers and brands in strategic planning.
31	Statistics & Computer Application	MCT-204	√	√	√	√	**Induction of computer application modifies the manufacturing techniques generating the idea leading to the final product to a great extent. it provides for running of commercial and open source softwares the pupose of research in the field of textile and clothing.**
32	Textile Testing & Quality Control	MCT-205	√	√	√	√	**Employ various sampling techniques in textile testing. Gain practical knowledge to test different types of textile fibers using the relevant instrument. Test fabric based on different quality parameters using the relevant instruments. Statistics in textile helps to learn Ms office spreadsheet tool such as excel for consumption, calculations and presentation of results as graphs, charts etc. different statistical methods are used to analyse data.**
33	Historic Textile, Fashion Design & Fashion Illustration	MCT-206	√	√	√	√	**Help to prepare portfolio of different traditional textiles for further study,employment and enhance the skill. Know the steps for developing a line of garment for various purposes. able to illustrate garment details and basic rendering techniques. These are important**

							features for the designer.
34	Knitting Technology	MCT-301	√	√	√	√	**Contents equip individuals with advanced knowledge and skills in textile production, focusing on knitting techniques, machine operation, and fabric analysis. This expertise is vital for optimizing production processes, ensuring quality, and driving innovation in the textile industry. Understanding modern technologies and materials helps professionals stay competitive and adapt to evolving market demands, ultimately enhancing efficiency and product excellence.**
35	Historic Costume	MCT-302	√	√	√	√	**Historic costume tells about the social status, gender roles, and cultural practices of a particular time and place.Knowing the roots and other cultures will help to adapt, extend and innovate fashion to suit specific cultures and ethnicities. The evolution of clothing will be studied in conjunction with correlated accessories.**
36	Social & Psychological Aspects of Clothing	MCT-303	√	√	√	√	**understand the development of clothing from original stage to present era.know different personality theories to create self awareness at the individual level.understand the psychological aspects of clothing with reference to different criteria.**

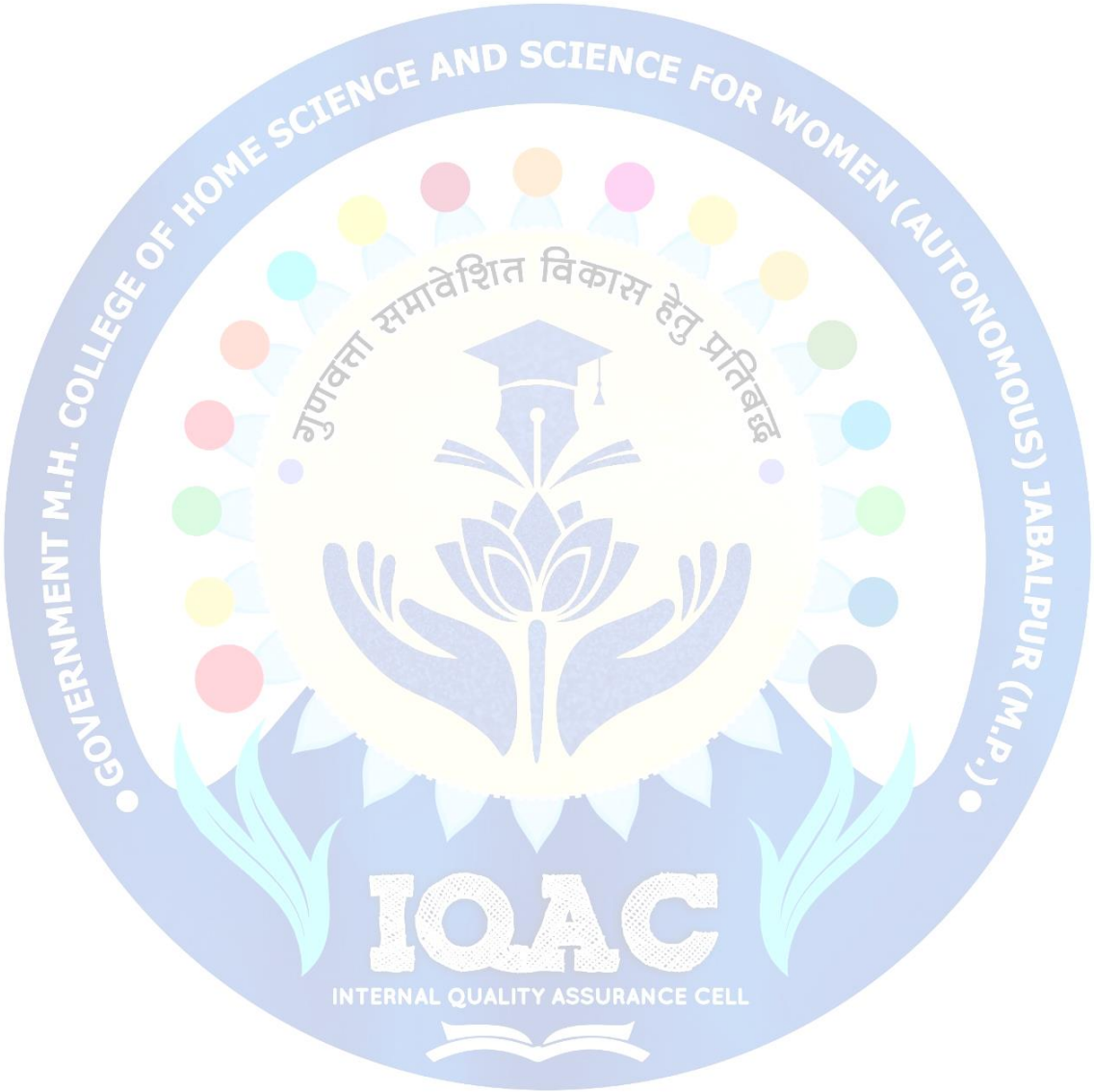
37	Fashion Communication	MCT-304	√	√	√	√	**Understand the various communication processes regarding with fashion. enhance the ability to construct a visual merchandising display with specified criteria.develop visual merchandising strategies for storefronts, online stores, or catalogs.To impart skills of communication comprising of visualization and illustration. The ever-growing world of fashion, there is an outstanding demand of fashion communication experts to develop a quirky and unique brand identity for creating maximum impact.**
38	Draping	MCT-305	√	√	√	√	**Draping practicals are essential for students as they offer direct experience in how fabric interacts with the human body, allowing them to experiment with garment structure, fit, and design. This hands-on approach helps in understanding fabric behavior, improving pattern-making skills, and refining design concepts. It also enhances creativity and problem-solving abilities by enabling students to visualize and adjust their designs in real-time.draping helps to create accurate, customizable garment patterns by providing a foundational template.Draping methods for crotchline garments allow students to understand fit and ease around the hip and thigh areas.**

39	Textile Design (Structure)	MCT-306	√	√	√	√	**Apply comprehensive textile design skills to design textiles through painting, weaving, screen printing, and demonstrate basic skills in drawing, repeat creation, and color application. Able to 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.**
40	Dyeing & Printing	MCT-401	√	√	√	√	**Contents impart color, patterns, and designs, enhancing aesthetic appeal and functionality. Dyeing involves applying color to fibers or fabrics, ensuring uniformity and permanence, Natural dyes offer eco-friendly, unique colors, and sustainable practices, while chemical dyes provide vibrant, consistent hues and durability. Both are important for meeting diverse consumer preferences and environmental standards in textiles. printing adds intricate patterns or designs on the fabric's surface. Both processes are essential for creating visually attractive textiles, meeting fashion trends, and satisfying consumer preferences. They significantly influence the overall quality and marketability of textile products.**

41	garment Production Technology	MCT-402	√	√	√	√	**Garment production technology is vital in the curriculum as it teaches students about modern manufacturing techniques, efficient production processes, and quality control. This knowledge is essential for creating high-quality garments, improving productivity, and meeting industry standards.**
42	Fashion Marketing & Merchandising	MCT-403	√	√	√	√	**Understand excellent marketing skills to promote and sell fashion products and also understand the target market, develop marketing strategies, and create effective advertising campaigns that resonate with customers.It encompasses everything from designing and creating clothing to promoting and marketing fashion products.It combines the knowledge of fashion, design and business to support fashion retail operations and ensure their functionality.**
43	Textile Industry in India	MCT-404A	√	√	√	√	**Gain knowledge of the Concept and importance of textile based industries in business environment in IndiaAn understanding of the textile supply chain, associated sustainability issues and the effect of industrial revolution on current fashion scenario, the National textile policy and foreign trade policy. Understand the textile and clothing industry in relation to various aspects.Information about favorable government policies,**

							increasing export demand and advancements in Technology for the growth of textile and garment Industry as well as other supportive industries.
44	Mass Communication	MCT-404B	√	√	√	√	**Contents provide students with in-depth knowledge of various functions and processes of mass media. Using effective communication tools like video conferencing, cell phones, emails, and so on will help you promote messages, products, and programs. With good strategies like content creation, social networking, and advertisement, among others, targeted at the right audience, you will be able to reach a larger audience.Gain competencies that can be applied anywhere**
45	Dissertation	MCT-404C	√	√	√	√	**Know the practical aspects of collecting data. Learn Suitably illustrate data/ insights using various graphical and other methods and prepare a dissertation based on research process.**
46	Dyeing and Printing	MCT-405	√	√	√	√	**Understand the different styles and methods involved in Dyeing & printing Textiles.For exposure, visit to processing and printing units-cottage & industrial level to understand their working system.**
47	Pattern Making and Grading	MCT-406	√	√	√	√	**Understand different types of paper pattern and preparation methods for different types of garments. Gain ability to use pattern making for**

							creating new garments designs.Competent to lay the pattern on the fabric.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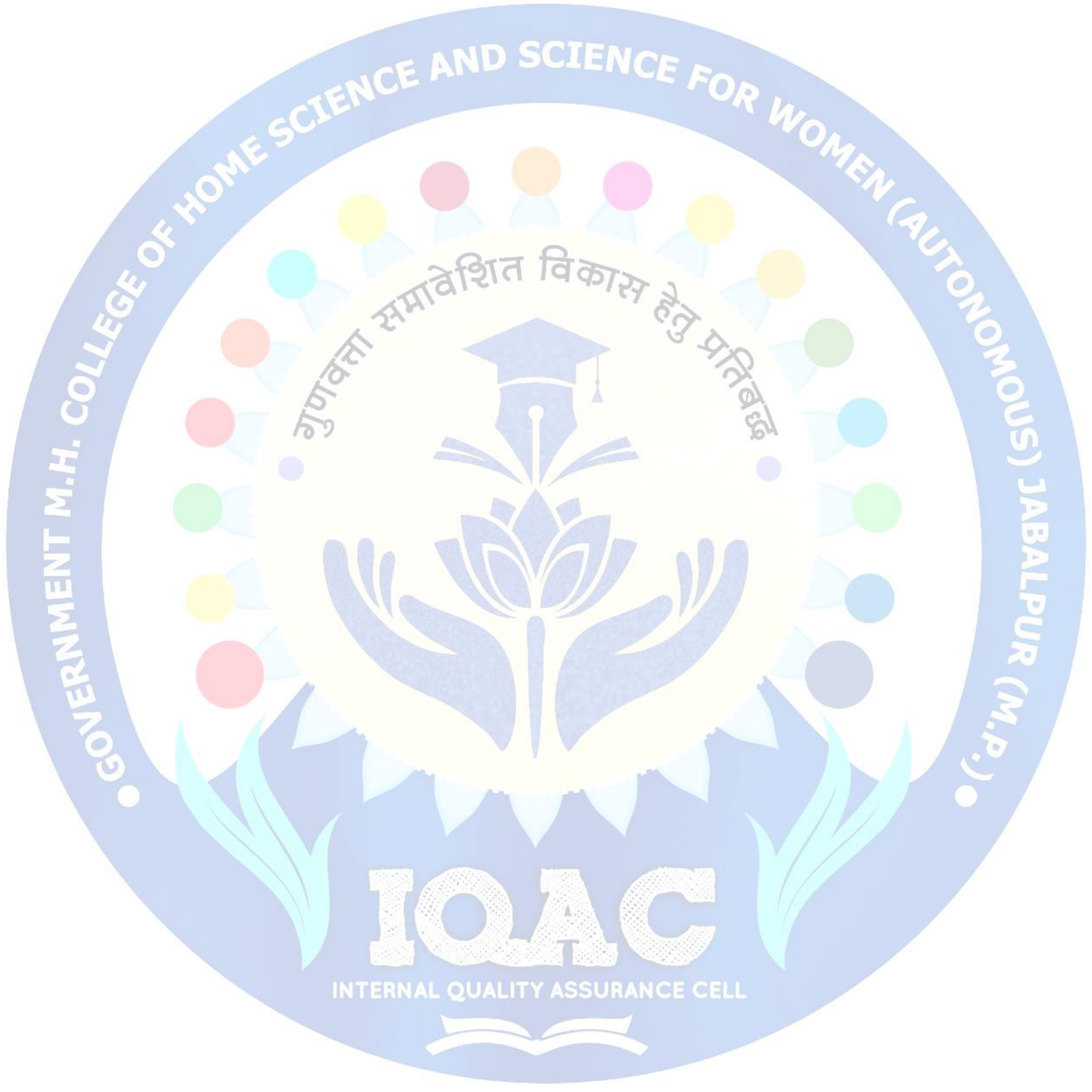
1.1.1 Curriculum and its relevance to Local! Regional! National! Global needs

Department of English Language

S. No.	Course Name	Course Code	Local	Regional	National	Global	Curriculum - its relevance
1	**English Language and Indian culture**	X1-FCHB1T	✓	✓	✓	✓	➢ Prepare for various competitive exams by developing their English language competence. ➢ Promote their comprehension skills by being exposed to a variety of texts and their interpretations. ➢ Build and enhance their vocabulary. ➢ Develop their communication skills by strengthening grammar and usages. ➢ Inculcate values which make them aware of national heritage and environmental issues, making them responsible citizens.
2	**English Language and Foundation**	X2-FCHB1T	✓	✓	✓	✓	➢ Strengthen their grammar and vocabulary. ➢ Acquire and develop LSRW (Listening, Speaking, Reading and Writing) skills. ➢ Learn to think creatively and critically. ➢ After the completion of the course, students are expected to gain competency and proficiency in English language to perform at examinations at State and National level.
3	**English Language and Communication Skill**	X3-FCHB1T	✓	✓	✓	✓	➢ Prepare for various competitive exams by developing their English language competence. ➢ Promote their comprehension skills by being exposed to a variety of texts and their interpretations.

							➢ Build and enhance their language competence through regular Practice. ➢ Develop their knowledge of English Grammar and usages in a practical manner. ➢ Compete in national and state level examinations for various competitions after the completion of the course. ➢ Seek a good job and to settle down in self employment or their own business of profession.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1.1.1 Curriculum and its relevance to Local! Regional! National! Global needs

Department of Human Development

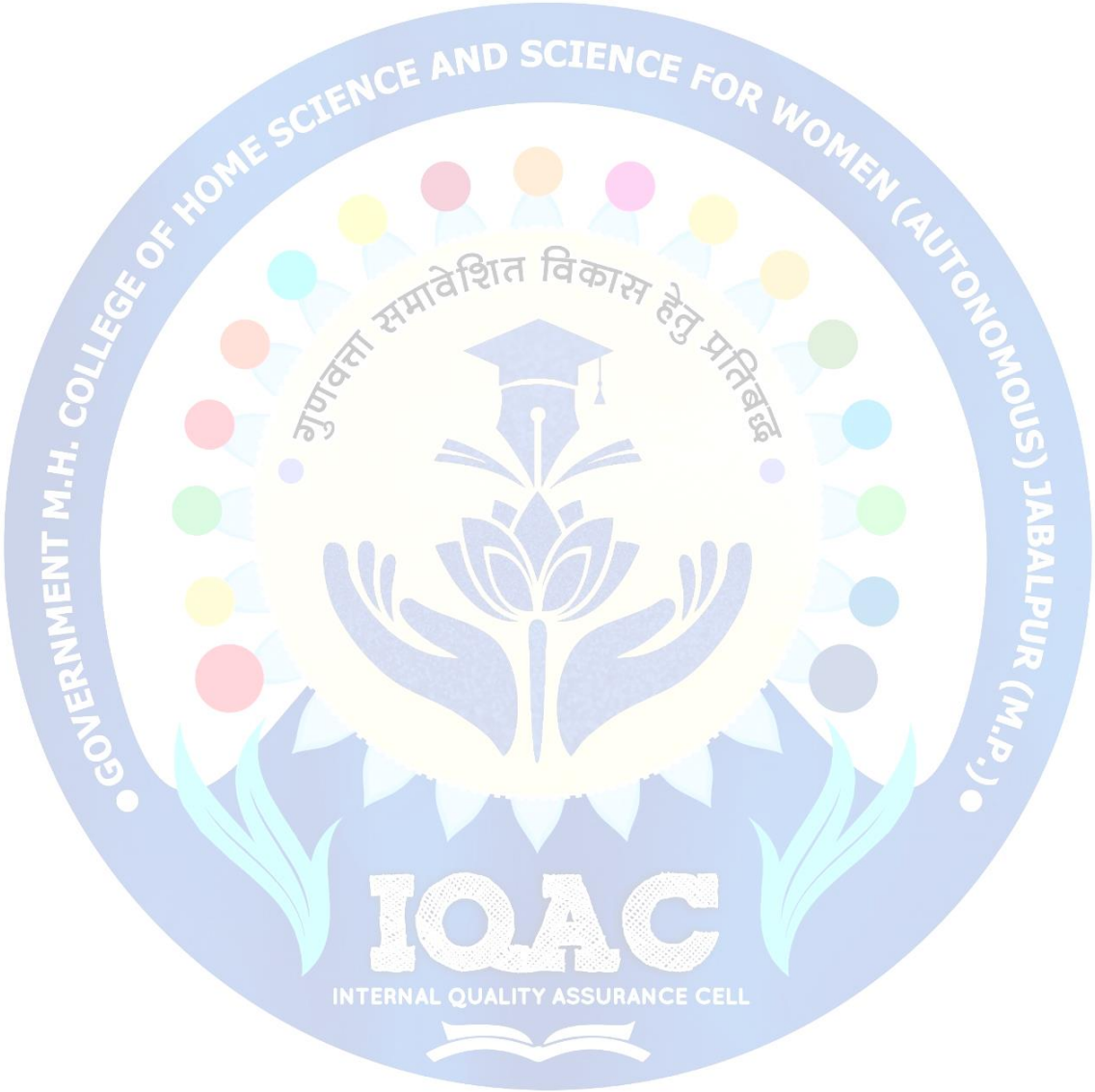
S. No.	*Course Name*	*Course Code*	*Local*	*Regional*	*National*	*Global*	*Curriculum - its relevance*
1	History and theory of human Development - 1	101	Student will be able to know various developmental theories	Human Development stages help us understand people's growth and changes in life. Here we understand many principles of human development	Major theories of development include the cognitive development learning system and psychoanalytic theory. Their system of thought give rise to various theories.	To Critically evaluate the cross culture theory	To understand the stages of adolescence and Youth in Human development and study the major development characteristics of these stages

2	(A) Methods of Studying human development (B) Study of family in Society	102					
3	Early Childhood Care and Education	103	Activities For Early Childhood Care and Education (ECCE)	Educational Visit of Teaching Centre.	Skill to know the system of pre education.	Co Creating innovative solutions to education challanges	
4	Research Methods and Statistics	104					
5	Advance Study in Human Development	201					
6	(A) Infant Development and Stimulation	202	Study Infant Development	Child Raring Practices	Interaction Programme related to mother and child	Advance study of parenting skill	

	(B) Parenting in Early Childhood						
7	Adolescence and Youth	203	Study of inter group relationship	Case study of any one abnormality or behaviour disorder	To Know the Solution of adolescence problem.	Recognise status of youth	
8	Statistics and Computer Application	204	✓	✓	✓	✓	
9	Development of the self	301	✓	✓	✓	✓	
10	(A) Scientific writing **(B)** Planning for project management	302	✓	✓	✓	✓	Understanding of mental retardation. Educational Provisions of Learning disabilities. Use of assistive devices. Vocational and Occupational rehabilitation Provisions
11	(A) Persons with Disabilities **(B)** Care	303	✓	✓	✓	✓	

	of the Elderly						
12	Mental Health and development perspective.	304	✓	✓	✓	✓	
13	(A) Advanced study in Human Development **(B)** Management of program for children and families	401	✓	✓	✓	✓	
14	Child and human rights	402	✓	✓	✓	✓	

15	(A) Principles of guidance and counselling **(B)** Guidance and coping in crises	403	✓	✓	✓	✓	
16	**Mass Communication**	**404**	✓	✓	✓	✓	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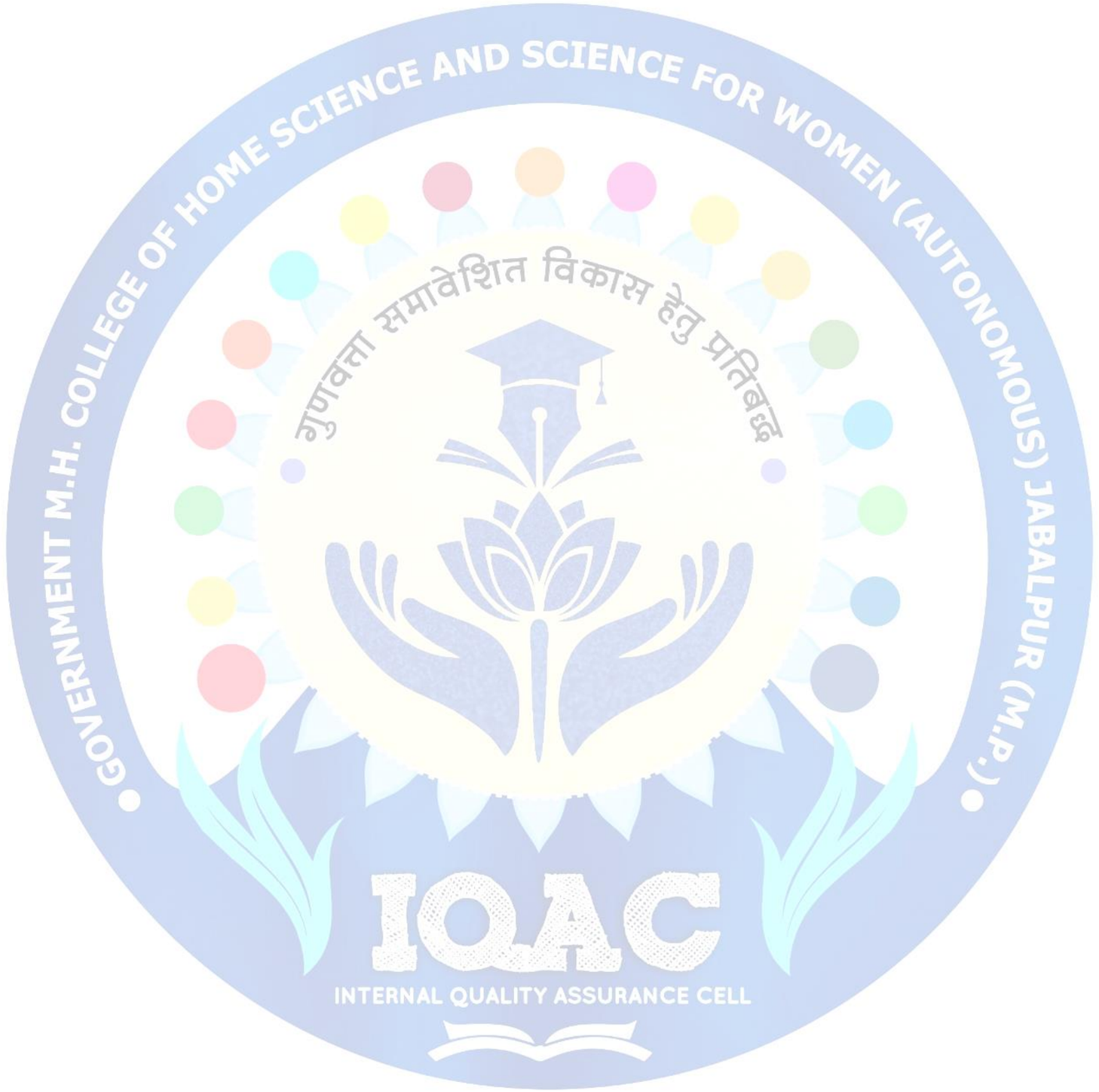
1.1.1 Curriculum and its relevance to Local! Regional! National! Global needs

Department of Hindi Language

S. No.	Course Name	Course Code	Local	Regional	National	Global	Curriculum - its relevance
1	Hkk"kk ,oa laLd`fr	X1-FCEA1T	✓	✓	✓		➢ mRd`"V lkfgfR;d ikBksa ds v/;;u ls :fp dk fodkl djukA ➢ lkaLd`frd psruk vkSj jk"Vªh; Hkkouk dk fodkl djukA ➢ Hkk"kk&Kku ➢ lkekU; 'kCnkoyh vkSj fo'ks"k 'kCnkoyh ds v/;;u }kjk Hkk"kk ,oa laLd`fr cks/k dk fodkl djukA ➢ fof'k"V 'kCnkoyh ¼cht 'kCn@dh oMZ½ ls ifjfpr djokrs gq;s cks/k ds Lrj dks fodflr djukA ➢ izfr;ksxh ijh{kkvksa gsrq rS;kj djukA
2	Hkk"kk ,oa laLd`fr	X2-FCEA1T	✓	✓	✓		➢ Hkkjrh; Kku ijaijk ls fo|kfFkZ;ksa dks voxr ,oa ykHkkafor djukA ➢ mRd`"V lkfgfR;d ikBksa ds v/;;u ls :fp dk fodkl djukA ➢ lkaLd`frd psruk vkSj jk"Vªh; Hkkouk dk fodkl djukA ➢ Hkk"kk&Kku ➢ lkekU; 'kCnkoyh vkSj fo'ks"k 'kCnkoyh ds v/;;u }kjk Hkk"kk ,oa laLd`fr cks/k dk fodkl djukA ➢ fof'k"V 'kCnkoyh ¼cht 'kCn@dh oMZ½ ls ifjfpr djokrs gq;s cks/k ds Lrj dks fodflr djukA

							.
3	Hkk"kk ,oa laLd`fr	X3-FCEA1T	✓	✓	✓		➢ bl ikB~;Øe ds v/;;u ls fo|kFkhZ fgUnh ds izfl) jpukdkj ,oa mudh jpukvksa ls ifjfpr gks ldsaxsA ➢ ifBr jpukvksa ds ek/;e ls fo|kFkhZ ns'k dh lF;rk ,oa laLd`fr ls ifjfpr gks ldsaxsA ➢ ikB~;Øe ds v/;;u ls fo|kfFkZ;ksa ds O;fDrRo dk cgqeq[kh fodkl gksxk ,oa jkstxkj ds volj miyC/k gksaxsA ➢ fof'k"V 'kCnkoyh ¼cht 'kCn@dh oMZ½ ls ifjfpr djokrs gq;s cks/k ds Lrj dks fodflr djukA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1.1.1 Curriculum and its relevance to Local! Regional! National! Global needs

Department of Mathematics & Computer

S. No.	Course Name	Course Code	Local	Regional	National	Global	Curriculum - its relevance
1	**Algebra, Vector Analysis and Geometry (Major Paper-I)**	**S1-MATH1T**				✓	• Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix, using the rank of matrix. • To find the Eigen values and corresponding Eigen vectors for a square matrix. • Using the knowledge of vector calculus in geometry. Enhance the knowledge of three dimensional geometrical figures (eg. Cone and cylinder).
2	**Calculus and Differential Equations (PaperII)/Minor/Elective)**	**S1-MATH2T**			✓	✓	• Sketch curves in a plane using its Mathematical properties in the different coordinate systems of reference. • Using the derivatives in Optimization, Social sciences, Physics and Life sciences etc. • Formulate the Differential equations for various Mathematical models. Using techniques to solve and analyze various Mathematical models.
3	**Abstract Algebra and Linear Algebra (Major Paper-I)**	**S2-MATH1T**	✓	✓	✓	✓	• Recognize the algebraic structures as a group, and classify them as abelian, cyclic and permutation groups, etc. • Link the fundamental concepts of groups and symmetrical figures. • Analyze the subgroup of cyclic groups. • Explain the significance of the notion of cosets, normal subgroups, and quotient groups. • The fundamental concept of rings, fields, subrings, integral domains and the corresponding morphisms. • Analyse whether a finite set of vectors in a vector space is linearly independent. Explain the concepts of basis and dimension of a

							vector space. • Understand the linear transformations, rank and nullity, matrix of a linear transformation, algebra of transformations and change of basis. Compute the characteristic polynomial, eigenvalues, eigenvectors, and eigenspaces , as well as the geometric and the algebraic multiplicities of an eigenvalue and apply the basic diagonalization result.
4	**Advanced Calculus and Partial Differential Equations (PaperII)/Minor/Elective)**	**S2-MATH2T**	✓	✓	✓	✓	• Understand many properties of the real line R and sequences. • Calculate the limit superior, the limit inferior, and the limit of a bounded sequence. • Apply the mean value theorems and Taylor's theorem. • Apply the various tests to determine convergence and absolute convergence of an infinite series of real numbers. Formulate, classify and transform partial differential equations into canonical form.
5	**Numerical Methods and Scientific Computation (Group A , Paper I)**	**S3-MATH1D**	✓	✓	✓	✓	• 1.Understand numerical methods to find the solution of a • system of linear equations. • 2. Compute interpolation value for real data. • 3. Find quadrature by using various numerical methods. • 4. Solve system of linear equations by using various numerical • techniques. • 5. Obtain solution of ordinary different equations by using • numerical methods.
6	**Elements of Discrete Mathematics (Group A, Paper II)**	**S3-MATH2D**	✓	✓	✓	✓	• Apply the Boolean algebra, switching circuits and their • applications. • Minimize the Boolean Function using Karnaugh Map. • Understand the lattices and their types. • Graphs, their types and its applications in study of shortest • path algorithms. • Test whether two given graphs are isomorphic. • Understand the Eulerian and Hamiltonian graphs. • 7. Represent graphs using adjacency and incidence matrices.

7	**Probability and Statistics (Group B , Paper I)**	**S3-MATH3D**	✓	✓	✓	✓	• Describe and calculate the mean deviation. Standard • deviation, range, quartiles and percentiles. • Understand and use the terminology of probability. • Determine whether two events are mutually exclusive and • independent. • Calculate probabilities using the addition and multiplication • rules. • Recognize and understand discrete and continuous • probability distribution functions. Binomial, uniform and • exponential probability distribution. • Calculate and interpret the correlation coefficient. • Understand the basic concepts of linear regression and • correlation. • Interpret the student's probability distribution. Chi-square • goodness-of-fit. F and Z test.
8	**Integral Transform (Group B , Paper II)**	**S3-MATH4D**	✓	✓	✓	✓	• Understanding about Laplace transform and its properties. • Solve ordinary differential equations using Laplace transform. • Familiarise with Fourier transformof functions. Relation between Laplace and Fourier transform. • Explain Parseval's identity and applications of Fourier transform to boundary value problems. • Apply the concepts of the course in real life problems.
9	**Fundamental of Boolean Algebra (Minor)**	**S3-MATH2T**	✓	✓	✓	✓	• Using the Boolean algebra in logical problems. • Minimize the Boolean Function using Karnaugh Map. • Understanding the various logic gates. • Applying the circuits in logical problems.
10	**ADVANCED ABSTRACT ALGEBRA (Core-1)**	**S4-MATH1T**	✓	✓	✓	✓	To understand the concept of Cost, Inventory Contol and Overheads Accounting. To understand the determination cost of product/service To understand the learning about fixed and variable cost and its impact on profit as well as decision making To understand about types and

							preparation of budget To understand the various standards cost of materials, labour and overheads
11	**REAL ANALYSIS(Core-2)**	**S4-MATH2T**	✓	✓	✓	✓	Learn the properties of Riemann and Riemann-Stieltjes integrable functions and applications of the fundamental theorems of integration. Understand the concepts of convergence and term by term integration and differentiation of a power series. Understanding and evaluating uniform convergence of series of real valued functions Analyzing the relation between uniform convergence and continuity, uniform continuity and differentiation and integration of sequences of real valued functions. Determine interior, closure, boundary and limit points of metric space.
12	**TOPOLOGY- D1**	**S4-MATH1D**	✓	✓	✓	✓	On successful completion of this course, the students will be able to: Determine interior, closure, boundary, limit points, basis and subbasis of topological spaces. Check whether a collection of subsets is a basis for a given topological spaces or not and determine the topology generated by a given basis. 3. Identify the continuous maps between two spaces and maps from a space into product space. Determine common topological properties of given two spaces Recognize Hausdorff spaces, Tychonoff spaces and normal spaces and understand first and second countable spaces and separable spaces.
13	**COMPLEX -D2**	**S4-MATH2D**	✓	✓	✓	✓	Visualize complex numbers as points of R2 and stereographic projection of complex plane on the Riemann sphere. Recognize the significance of differentiability and Whalyticity of complex functions. Use Cauchy-Goursat theorem and Cauchy integral formula in evaluation of contour integrals. Apply Liouville's theorem in fundamental theorem of Algebra. Learn Taylor and Laurent series expansions of analytic functions. Classify the nature of singularity, poles and residues and apply Cauchy residue theorem.
14	**ADVANCED ABSTRACT ALGEBRA**	M101	✓	✓	✓	✓	Students would have knowledge of elements of Galois theorem. Would be able to define & give examples of modules submodules& types of modules& their properties. Concept of Noetherian&Astinian rings & examples.

							Applications of finitely generated modules.
15	**COMPLEX ANALYSIS II**	M102	✓	✓	✓	✓	Solve problems of complex integration using Cauchy's theorem & integral formula. Find poles & singularities of functions & prove various important theorems. Determine Laurent's & Taylor's expansion of functions. Find bilinear transforms of functions & conformal mappings.
16	**FUNCTIONAL ANALYSIS**	M103	✓	✓	✓	✓	Students would become familiar with continuous map & uniformly continuous maps . Define & give examples of normed linear space &Banach Space. Prove some important theorems on normed linear space &Banach space. Define & give examples of Hilbert space & prove some of its important properties. Concept of spectral theory.
17	**REAL ANALYSIS**	M104				✓	Understanding of Riemann stoelges integral & its properties. Would be able to integrate vector valued functions. Would be able to test the convergence of sequence & series of functions using Wierstrass, Abel's &Dirichlets test. Calculate derivatives of functions of sever at variables. Prove theorem like implicit function theorem Stokes theorem etc.
18	**TOPOLOGY**	M105				✓	Define & give examples of Topological spaces, various types of topologies & topological subspaces. Understand continuous function & prove various theorems on box & product topology. Metric topology, metrizable spaces & related theorem. Knowledge of connected & path connected spaces with examples & related theorems. Define & give examples of compact spaces and prove related theorems.
19	**Advanced Abstract Algebra**	M201				✓	Students would be able to define & prove elementary propositions of conjugacy relation, normalizer, Cauchy &sylow's theorems. Knowledge of series of groups. Knowledge of series of groups. Solvable & nilpotent groups & their properties.

							Prove theorems & give examples of fields, extension & splitting field, perfect & finite field
20	**ADVANCED DISCRETE MATHEMATICS**	M202				✓	Algebraic structures examples & properties. Lattices sublattices& their properties Defferential& examples of Boolean algebra. Graph theory, definition , examples & applications. Tress their types & Properties
21	**COMPLEX ANALYSIS**	M203				✓	Wierstrass factorization theorem, Runge's theorem, MittageLeffer's theorem Monodromy theorem, Harnack's inequality theorem Hadamad's , Blocks Picard theorems. Work with Riemann zeta function, Gamma functions, Analytic continuity. Solve problem of Dirichlet Greens function, Jenson's &Jenson poission formula.
22	**LEBESGUE MEASURE & INTEGRATION**	M204				✓	Lebesgue outer measure, measurable & non measurable sets. Solve Riemann lebesgueintegrels, integrate non- negative functions, general integral & series. Knowledge of four derivatives & functions of bounded variation, complex functions & p spaces. Apply Jensen's inequality, Holders &Minkowskis' inequality. Understand the concept of dual space, convergence, uniform & almost uniform convergence.
23	**FUZZY SET AND THEIR APPLICATION** (Optional)	M205				✓	Students would be familiar with various fuzzy sets, membership functions and their representations. Properties and operations of fuzzy sets Application of knowledge of fuzzy sets in various real life problems and situations.
24	**ORDINARY & PARTIAL DIFFERENTIAL EQUATIONS (Optional)**	M205				✓	Students would be able to solve exact differential equations, find their adjoints, Strum Liouville differential equations & apply Lagrange's method of variation of parameters. Construct PDE & greens functions solve differential equation by Charpit's method. Find the power series solutions of 1st& 2nd order linear equation & find singular & regular pts. Find the Laplace transforms & inverse Laplace transforms, derivation & integrals of Laplace theorem & apply convolution theorem.
25	**LINEAR PROGRAMMING**	M301				✓	Students would be able to formulate & solve linear Programming problems using graphical, simplex, two phase & Big M method. Find the dual of any L.P.P. Solve assignment transportation & Job sequencing problem & find the optimal Solutions.
26	**MATHEMATICAL STATISTICS**	M302				✓	Calculation of measures of central tendency dispersion, based on mutual Differences &skewness. Probability theory & problems. Univariate theoretical & normal distributions. Bevariate distribution, multivariate distribution & their applications.

							Testing of hypothesis, measures of association, test for goodness of fit and homogeneity test.
27	**ADVANCED SPECIAL FUNCTION**	M303				✓	Solution & application of Gamma & Beta functions. Application of Gauss multiplication theorem. Solution of problems based on hypergeometric& generalized hypergeometric functions. Contiguous function relations, hypergeometric differential equations. Kummer's and Ramanujan's theorem, elementary series manipulation & simple transformation.
28	**APPLIED FUNCTIONAL ANALYSIS**	M304				✓	Students would be familiar with Hilbert spaces convex sets & projections. Weak convergence weak compactness & weak semi continuity. Convey programming & support functional, support plane & support mapping. Functions transformations & operators. Spectral theory of operators.
29	**INTEGRAL TRANSFORMS**	M305				✓	Applications of Laplace transforms in differential equations. Laplace equations. Laplace wave equations. Application of Laplace transforms in integral equations. Heat conduction equations.
30	**OPERATIONS RESEARCH**	M401				✓	Operations Research its scope, origin, development, characteristic models, uses & limitations. Solve problems of inventory theory, Various models. Find solution of replacement problems. Apply network analysis & its constraints, calculate PERT. Game theory, solution of games with saddle point & without saddle point, graphical solution
31	**SPLINE THEORY**	M402				✓	Polynomial interpolation & limitations of polynomial approximation. Piecewise linear approximation. Piecewise cubic interpolation. Parabolic spline interpolation. Piecewise polynomial representation, basis splines.
32	**PROGRAMMING IN C**	M403				✓	The students would be able to write programs in C language & know the basics of C programming. Use of various operators in programming. Write programs using control statements. Write programs using variables & functions. Write programs using pointers
33	**ADVANCE SPECIAL FUNCTIONS – II**	M404				✓	Legendre polynomials, generating functions, Christoffels, Murphy & Rodrigues formula & generating relations. Solve & apply Legendre differential equations. Bessel's function, Bessel's differential equations &orthogonality of Bessel's functions. Hermite&Lagurrepolynominals& generating functions..

34	**INTEGRAL TRANSFORMS II**	M405				✓	Applications of Laplace transforms. Would be able to Solve electric circuit problems. Solve complex Fourier transforms. Properties of Fourier transforms & their derivatives.

1.1.1 Curriculum and its relevance to Local! Regional! National! Global needs

Department of Zoology & Biotechnology

S. No.	CourseName	CourseCode	Local	Regional	National	Global	Curriculum - its relevance
1	Animal Diversity: Non-Chordata MAJOR I	S1-ZOO1T	✓	✓	✓	✓	Systemic taxonomy and phylogeny to get a concrete idea of evolution of non-chordate phyla. Understand the various morphological, anatomical structures and functions of animals of different phyla. Get the knowledge about economic, ecological and medical significance of various animals in human welfare. Understand the important parasites and their control measures.

2	Cell biology, Reproductive biology and Developmental Biology Core Course/ Minor/ Elective –	S1-ZOO2T	✓	✓	✓	✓	Develop deeper understanding of what life is and how it functions at cellular level. Understand the nature and basic concepts of Cell biology, Reproductive and Developmental biology. Understand structure and functions of cell membrane and cellular organelles. Understand the importance of latest reproductive trends, reproductive techniques to be applied for human welfare. Understand the general patterns and sequential developmental stages during embryogenesis; and understand how the developmental processes lead to establishment of body plan of multi -cell ular orgamsms. Understand about the evolutionary development of various animals.
3	- Diversity of Chordates and Comparative Anatomy MAJOR I	S2-ZOOL 1T	✓	✓	✓	✓	Understand. chordate of animals and their taxonomic p o s i t i o n IdentIfy the morrphological and anatomical features and basis of chordate classification Know economic importance and present status that will develop positive attitude towards conservation of ;' biodiversity. Diifferentiate the organism belonging to different taxa by studying comparative anatomy. The project, assignment will give them a flavor of research in studying biodiversity, taxonomy besides improving their writing skills and lay foundation of career in Zoology

4	Physiology and Biochemistry Core Course/ Minor/ Elective –	S2-ZOOL2T	✓	✓	✓	✓	Understand how organs function at different levels i.e. from cellular to system levels. Examine internal harmony of different body systems by learning Understand functions of biomolecules & their role in metabolism by studying biochemistry. Develop a strong foundation for research & employability skills Improve the student's perspective of health biology through deep study of physiology .
5	Aquaculture major paper I	S3-ZOOL1D	✓	✓	✓		Identify Aquaculture and its scope in India. Recognize the different economically important fishes and other culturable fauna. Identify the details of different steps involved in Aquaculture. Identify the profitability of the culture and identify the fields of Aquaculture which generate self employment. .

6	MAJORPAPER II-WILD LIFE CONSERVATION & MANAGEMENT	S3-ZOOL2D	✓	✓	✓		Gain knowledge of conservation of forest and wild animals (Ex situ and In situ) Identify the role of local and tribal communities in protected areas. Know the opportunities of employment in the field of wild life.
			✓	✓	✓	✓	Identify and realize the values of wild animals, forests and the rare, threatened and endangered species of wildlife. Develop an understanding for wise use and management of natural resources
7	GENETICS PAPER-MINOR/ELECTIVE	S3-ZOOL2T	✓	✓	✓	✓	Deeper understanding of linkage, Sex determination, Chromosomes, Mutations and mutagens. Gain knowledge of human karyotype, Genome project, Inheritance Demonstrate, gene therapy, PCR, DNA fingerprinting techniques and their

							application. Find Job Opportunities in Hospitals, Pharmaceutical Companies and other health services, Forensic Science Research Associates, Genetic Counselor, Clinical Research Associate, Animal Breeder, Genetic Laboratory Technician
8	M.Sc. ZOOLOGY Semester-I PAPER I BIOSYSTEMATIC, 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.

9	M.Sc. ZOOLOGY Semester-I 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.
10	M.Sc. ZOOLOGY Semester-I PAPER III QUANTATIVE BIOLOGY BIODIVERSITY AND WILD LIFE		✓	✓	✓		They learn about rare species, National parks, Sanctuaries and Biosphere reserve.
			✓	✓	✓	✓	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.

							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.
11	M.Sc. ZOOLOGY Semester-I PAPER IV BIOMOLECULE 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. .
12	M.Sc. ZOOLOGY Semester-II 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. .
13	M.Sc. ZOOLOGY 2024 – 25 SECOND – SEMESTER PAPER - II POPULATION ECOLOGY AND ENVIRONMENTAL PHYSIOLOGY		✓	✓	✓	✓	. Student Know about Populations : Growth & Regulation and Demography. Students will learn aboutEco-physiological adaptationsto terrestrial, marine and freshwater 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.
14	M.Sc. ZOOLOGY 2024 – 25 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.
15	M.Sc. ZOOLOGY 2024 – 25 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. .
16	M.Sc. ZOOLOGY 2024 – 25 THIRD –SEMESTER PAPER - I COMPARATIVE ANATOMY OF VERTEBRATES	S3-CHEM3Q	✓	✓	✓	✓	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.
17	M.Sc. ZOOLOGY 2024 – 25THIRD – SEMEST 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.
18	M.Sc. ZOOLOGY 2024 – 25THIRD 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.
19	M.Sc. ZOOLOGY 2024 – 25 THIRD SEMESTER PAPER - IV AQUACULTURE	S3-CHEM2T	✓	✓	✓	✓	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 Differe**nt** types of craft and gears in fisheries. Students will gain the knowledge of Biochemical composition and nutritional value of fish.
20	M.Sc. ZOOLOGY 2024 – 25 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. .
21	M.Sc. ZOOLOGY 2024 – 25 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.
22	M.Sc. ZOOLOGY 2024 – 25 FOURTH SEMESTER PAPER - III (ICHTHYOLOGY) STRUCTURE AND FUNCTION -)		✓	✓	✓	✓	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. .
23	M.Sc. ZOOLOGY 2024 – 25 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.

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