

**GOVT. HOLKAR (MODEL AUTONOMOUS)
SCIENCE COLLEGE, INDORE**



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CURRICULAR ASPECTS

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Curriculum Relevance to Local, Regional, National and Global



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Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biochemistry

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course/Paper Name	Course code	Local	Regional	National	Global
1	Biochemical Techniques (Major)	S1-BCH1T	Concept of acids, bases	General principle of chromatographic separation	Introduction, Principle and Types of Electrophoresis	Measurement of radioactivity - Methods based
2	Chemistry of Biomolecules (Minor)	S1-BCH2T	Water as a biological solvent	Blood group polysaccharides	Denaturation and renaturation of proteins.	Nature of genetic material
3	Basis of Biochemistry (Open elective)	S1-BCH3T	Important derivatives of monosaccharides	Properties and functions of Glycerophospholipid	Composition of RNA and DNA	Structure and biological role of water- and fat-soluble vitamins
4	Chemistry of Biomolecules (Major)	S2-BCH1T	Cell wall-polysaccharides	Prostaglandins	Structure & function of fibrous protein	Effect of UV radiation absorption
5	Biochemical Techniques (Minor)	S2-BCH2T	Glass and reference electrode	Agarose gel and SDS-PAGE	Ultracentrifugation and its application	Biological hazard of radiations
6	Analytical techniques (Open elective)	S2-BCH3T	Preparation of buffers	Principle of centrifugation	Light absorption and transmission	Autoradiography
7	Enzymology	201-I	IUB enzyme classification	Methods for isolation, purification and characterization of enzyme	Medical application of enzymes	Industrial and clinical application of enzymes

8	Intermediary Metabolism	201-II	Glycolysis and its regulation	Oxidative phosphorylation	Sphingolipids and Cholesterol	Production of bile pigments
9	Molecular Biology	301-I	Central dogma	Mechanism of Replication	Genetic code	Applications of recombinant DNA technology
10	Nutrition, Clinical & Environmental Biochemistry	301-II	Recommended dietary allowances (RDA)	Nutritive and calorific value of foods	Functional tests of liver and kidney	Isozymes and diagnostic tests
11	Chemistry of Biomolecules	BC-11	Phospholipids and proteolipids	Structural constituents of nucleic acid	Bacterial cell wall polysaccharide	Ramachandran Plot
12	Analytical Biochemistry	BC-12	Concept of pH	Gel Electrophoresis	Atomic absorption spectrophotometry	Use of radioisotopes in vivo and in vitro labeling
13	Cell Biology	BC-13	Structure of plant and animal cell	Structure and functions of the Ribosomes	Electron transport complexes	Cell-cell interactions
14	Biostatistics	BC-14	Measures of Central Tendency	Correlation coefficient	Chi-square distributions	Sampling and non-sampling methods
15	Physiology	BC-21	Blood clotting factors	Hydrogen Ion homeostasis	Structure of skeletal, smooth and cardiac muscles	Nerve conduction across synapse
16	Microbial Biochemistry	BC-22	Bacterial growth and its kinetics	Primary and secondary metabolites	Identification and classification of bacteria	Vaccines and prevention
17	Nutritional Biochemistry	BC-23	Direct and indirect Calorimetry	Nutritional aspects of the proteins	Nutritional significance	Balanced diet

18	Genetics	BC-24	Mendelian inheritance	Detection in fungi by tetrad analysis	Transposable element	Molecular basis of mutation
19	Enzymology	BC-31	Classification and nomenclature of enzyme	Menten kinetics	Reversible and irreversible inhibition	Immobilized enzymes and their industrial applications
20	Metabolism I	BC-32	Substrate level and oxidative phosphorylation	Uranic acid pathway	Ketone bodies	Regulation of lipid metabolism
21	Plant Biochemistry	BC-33-A	Photosynthesis concept	Nitrogen metabolism	Ammonia assimilation	Secondary plant metabolism
22	Environmental Toxicology	BC-33-B	Fundamental of toxicology	Tissue specificity and organ specificity of toxicity	Insecticide toxicology	Air Pollution, Common air pollutants and their sources
23	Biotechnology	BC-34-A	Restriction fragment length polymorphism	Genomic library and cDNA library	Transfection methods for animals	DNA sequencing techniques
24	Advanced Biotechnology	BC-34-B	Heterochromatin & Euchromatin	Isolation of genomic DNA, RNA, Plasmid DNA	Pathway of intracellular signal transduction	Inborn error of lipid metabolism
25	Biochemical Techniques	BC-35	Dissociation and ionization of acids and bases	Ion-exchange chromatography	Isoelectric focusing technique	Applications of UV-VIS spectrophotometry
26	Molecular Biology	BC-41	Concept and definition of the gene	Reverse transcriptase	Inhibitors of transcription	Regulation of gene expression in prokaryotes, and eukaryotes

27	Metabolism II	BC-42	Urea cycle	Glucogenic and ketogenic amino acids	Biological role of minerals and trace elements	Inborn errors associated with Amino acid metabolism
28	Clinical Biochemistry	BC-43	Chemical analysis of CSF	Chemistry and mode of action of antibiotics	Carcinogenesis	Enzymes in differential diagnosis of diseases
29	Immunology	BC-44-A	Physiology of immune response	Role of MHC antigens in immune responses	Immunological tolerance and suppression	Monoclonal antibodies- production and application
30	Environmental Biochemistry	BC-44-B	Weathering and soil formation	Ecosystems: concept of ecosystems	Biomes and Habitat Diversity	Global Water Balance

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Bioinformatics

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course Title	Course Code	Local	Regional	National	Global
1	Cell and Molecular Biology (Major)	S1-BINFO1T	Cell Theory	Cytoplasmic organelles	Cell Cycle, Carbohydrate, Protein	Genetics
2	Cell and Molecular Biology (Minor)	S1-BINFO2T		Data Base Management System	Biological Data Base	Data Base Management System
3	General Introduction to Bioinformatics (Open Elective)	S1-BINFO3T			DBMS	Sequence Analysis,
4	General Introduction to Bioinformatics (Major)	S2-BINFO1T			Sub cellular organization	Cell Cycle, Genetics
5	Fundamentals of Bioinformatics (Minor)	S2-BINFO2T	Database Searching	Comparative Genome Analysis		Phylogenetic Analysis
6	Basic of Bioinformatics (Open Elective)	S2-BINFO3T				Sequence Analysis, DBMS
7	Introduction to Computer & Programming	202 - I		Computer		Programming languages
8	Structural Bioinformatics	202 - II			Sequence Analysis	DBMS
9	Biostatistics	302 - I				Matrix, Geometry
10	Mathematics for Biological Sciences	302 - II				Y

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Biotechnology

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course Title	Course Code	Local	Regional	National	Global
1	Cell Biology and Biochemistry (Major)	S1-BTECH1T	Role of Water in Bio molecular Structure.		Cell Cycle	Cancer Biology
2	Microbiology and Immunology (Minor)	S1-BTECH2T		Factor affecting growth		Immuno separation & Immuno Tolerance
3	Microbiology and Immunology (Open Elective)	S1-BTECH3T				Immuno separation & Immuno Tolerance
4	Microbiology and Immunology (Major)	S2-BTECH1T		Factor affecting growth	Microbial diversity	Immuno separation & Immuno Tolerance
5	Cell Biology and Biochemistry (Minor)	S2-BTECH2T			Cell Cycle,	Cancer Biology
6	Microbiology (Open Elective)	S2-BTECH3T			Microbial diversity	
7	Biophysics and Biochemistry	203 - I			Y	Structure of amino acid
8	Bioinstrumentations, Biostatistics and Bioinformatics	203 - II			Microscope	
9	Molecular Biology and Genetic Engineering	303 - I			Y	Y
10	Applied Biotechnology	303 - II			Y	Y

11	Biochemistry	BT-11			Biomolecules and Biosynthesis	
12	Cell and Developmental Biology	BT-12		Cell Membrane, Shoot and Root Apical Meristem		Drosophila Development
13	Microbiology	BT-13			Microbial diversity,	
14	Biostatistics and Bioinformatics	BT-14	Biostatistics, EDA	Statistical analysis, Graphical presentation	Sequence Analysis	DBMS
15	Molecular Biology	BT-21			Gene Transfer methods	Cloning methodologies
16	Bacterial Genetics and Genetic Engineering	BT-22			Gene Transfer methods	
17	Immunology	BT-23				Immuno separation & Immuno Tolerance
18	Analytical Techniques	BT-24			Advanced Technique (Chromatography, Microscopy, Centrifugation)	
19	Enzyme Technology	BT-31			Enzyme Classification, Enzyme kinetics,	
20	Plant Biotechnology	BT-32		Plant Tissue culture techniques,		
21	Environmental Biotechnology	BT-33-A		Waste management	Pollution, Ozone Depletion,	
22	Stem Cell Biology	BT-33-B				Stem Cell and Therapies

24	Food Biotechnology	BT-34-A			Food spoilage, Fermentation	
25	Pharmacogenomics	BT-34-B				Principal of pharmacogenomic and drug
26	Bioprocess Technology	OE-BB				Sequence Analysis, Data Base
27	Animal Biotechnology	BT-41			Alcohol Production	Strain Improvment
28	Cancer Genetics	BT-42				Animal Tissue Culture Technique, GMO
29	Bio nanotechnology	BT-43-A				Cancer Cells & Genetics
30	Genomics, Proteomics, IPR & Biosafety	BT-43-B				Nanomedicine drug delivery system and nanomaterial
31	Engineering Principles/Project	BT-43-C			Parasitic Diseases	HIV
32	Paper XVII A) Genomics, Proteomics, IPR & Biosafety	BT-44-A			Analysis of microarray data; Protein and peptide microarray-based technology	C-DNA array, SAGE, Intragenic array. IPR
33	Paper XVII B) Engineering Principles/Project	BT-44-B				

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Botany

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course/paper name	Topic	Course code	Local	Regional	National	Global
1	Applied Botany Major	Various disciplines of botany and their applications to human welfare, Bioremediation definition and types	S1-BOT1T	Various disciplines of botany and their applications to human welfare	Various disciplines of botany and their applications to human welfare	Bioremediation definition and types	Bioremediation definition and types
2	Basic Botany Minor	Microbes- Beneficial and harmful roles Lichens- Brief Knowledge and their significance Role of algae in nature and its economic importance	S1-BOT2T	Microbes- Beneficial and harmful roles	Microbes- Beneficial and harmful roles	Lichens-Brief Knowledge and their significance	Role of algae in nature and its economic importance
3	Basic Botany Open Elective	Economic importance of Lower Plants Archaeobacteria, Eubacteria Cyanobacteria, Mycoplasma, Actinomycetes and Virus	S1-BOT3T	Economic importance of Lower Plants	Economic importance of Lower Plants	Archaeobacteria, Eubacteria Cyanobacteria, Mycoplasma, Actinomycetes and Virus	Archaeobacteria, Eubacteria Cyanobacteria, Mycoplasma, Actinomycetes and Virus
4	Basic Botany Major	Microbes- Beneficial and harmful roles Lichens- Brief Knowledge and their significance Role of algae in nature and its economic importance	S2-BOT1T	Microbes- Beneficial and harmful roles	Microbes- Beneficial and harmful roles	Lichens-Brief Knowledge and their significance	Role of algae in nature and its economic importance

5	Applied Botany Minor	Various disciplines of botany and their applications to human welfare., Bioremediation definition and types	S2-BOT2T	Various disciplines of botany and their applications to human welfare	Various disciplines of botany and their applications to human welfare	Bioremediation definition and types	Bioremediation definition and types
6	Functional Botany (Open Elective)	Organic farming: Introduction objective and brief technique, Ethnobotany: Introduction and importance, Plant tissue culture: Definition, Types and Importance, Types of pollution and pollutants	S2-BOT3T	Types of pollution and pollutants	Ethnobotany: Introduction and importance	Plant tissue culture: Definition, Types and Importance	Organic farming: Introduction objective and brief technique
7	Taxonomy and embryology of angiosperms	Structure and Types of Embryos	204-I	Structure and Types of Embryos	Structure and Types of Embryos	Structure and Types of Embryos	Structure and Types of Embryos
8	Plant ecology biodiversity and phytogeography	Biodiversity Hot-Spots	204-II	Biodiversity Hot-Spots	Biodiversity Hot-Spots	Biodiversity Hot-Spots	Biodiversity Hot-Spots
9	Plant physiology and biochemistry	Photosynthesis	304-I	Photosynthesis	Photosynthesis	Photosynthesis	Photosynthesis
10	Biology and diversity of viruses, bacteria and fungi	Brief introduction of various Types if Microbes	BO-11	Brief introduction of various Types if Microbes	Brief introduction of various Types if Microbes	Brief introduction of various Types if Microbes	Brief introduction of various Types if Microbes
11	Biology and diversity of algae bryophytes	Range of Thallus organization of Algae & Bryophytes	BO-12	Range of Thallus organization of Algae & Bryophytes	Range of Thallus organization of Algae & Bryophytes	Range of Thallus organization of Algae & Bryophytes	Range of Thallus organization of Algae & Bryophytes

12	Biology and diversity of pteridophytes and gymnosperms	Economic importance of Pteridophytes & Gymnosperms	BO-13	Economic importance of Pteridophytes & Gymnosperms	Economic importance of Pteridophytes & Gymnosperms	Economic importance of Pteridophytes & Gymnosperms	Economic importance of Pteridophytes & Gymnosperms
13	Plant ecology	Global warming & Ozone layer Depletion	BO-14	Global warming & Ozone layer Depletion	Global warming & Ozone layer Depletion	Global warming & Ozone layer Depletion	Global warming & Ozone layer Depletion
14	Plant development and reproduction	Types of Embryo sacs	BO-21	Types of Embryo sacs	Types of Embryo sacs	Types of Embryo sacs	Types of Embryo sacs
15	Morphology and taxonomy of angiosperms	Phyllotaxy	BO-22		Phyllotaxy	Phyllotaxy	Phyllotaxy
16	Utilization and conservation of plant resources	In Situ and Ex Situ plant conservation	BO-23		In Situ and Ex Situ plant conservation	In Situ and Ex Situ plant conservation	In Situ and Ex Situ plant conservation
17	Cell biology	Structure and function of chromosome	BO-24		Structure and function of chromosome	Structure and function of chromosome	Structure and function of chromosome
18	Plant physiology	Ascent of Sap	BO-31			Ascent of Sap	Ascent of Sap
19	Cytology and genetics	Mendel's law	BO-33-A		Mendel's law	Mendel's law	Mendel's law
20	Economic botany	cultivation & uses of Medicinal Plants	BO-33-B	cultivation & uses of Medicinal Plants	cultivation & uses of Medicinal Plants	cultivation & uses of Medicinal Plants	

21	Advance-taxonomy, embryology and anatomy of angiosperms	Structure of embryo sac & polyembryony	BO-34-B	Structure of embryo sac & polyembryony	Structure of embryo sac & polyembryony	Structure of embryo sac & polyembryony	Structure of embryo sac & polyembryony
22	Plant pathology	Structural & Biochemical defence mechanism in plants	BO-43-A	Structural & Biochemical defence mechanism in plants	Structural & Biochemical defence mechanism in plants	Structural & Biochemical defence mechanism in plants	Structural & Biochemical defence mechanism in plants
23	Plant and society	Techniques of cultivation and marketing of Mushroom Cultivation	BO-43-B	Techniques of cultivation and marketing of Mushroom Cultivation	Techniques of cultivation and marketing of Mushroom Cultivation	Techniques of cultivation and marketing of Mushroom Cultivation	Techniques of cultivation and marketing of Mushroom Cultivation
24	Industrial Microbiology	Food preservation methods	BO-44-A	Food preservation methods	Food preservation methods	Food preservation methods	Food preservation methods
25	Pollution Ecology	Sources causes effects and control of air pollution	BO-44-B	Sources causes effects and control of air pollution	Sources causes effects and control of air pollution	Sources causes effects and control of air pollution	Sources causes effects and control of air pollution
26	Applied Botany	Plant tissue culture organic farming	BO-44-C	Plant tissue culture organic farming	Plant tissue culture organic farming	Plant tissue culture organic farming	

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Chemistry

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course Name	Course Code	Local	Regional	National	Global
1	Fundamentals of Chemistry (Major)	S1-CHEM1T	Atomic Structure	Atomic Structure	Acid Base Concept	Stereochemistry Chemical Kinetics
2	Analytical Chemistry (Minor)	S1-CHEM2T	Chemical Equilibrium	Chemical Equilibrium	Computer for Chemistry, Analytical Chemistry, Chromatography, Spectral Techniques	Computer for Chemistry, Analytical Chemistry, Chromatography, Spectral Techniques
3	Chemistry in everyday life (Open Elective)	S1-CHEM3T	Salts in daily life, Metal extraction, Acids, Bases	Salts in daily life, Metal extraction, Acids, Bases	Major components of our food	Major components of our food
4	Analytical Chemistry (Major)	S2-CHEM1T	Chemical Equilibrium	Chemical Equilibrium	Computer for Chemists, Analytical Chemistry, Chromatography, Spectral Techniques	Computer for Chemists, Analytical Chemistry, Chromatography, Spectral Techniques
5	Fundamentals of Chemistry (Minor)	S2-CHEM2T	Atomic Structure	Atomic Structure	Acid Base Concept, Stereochemistry, Chemical Kinetics	Acid Base Concept, Stereochemistry, Chemical Kinetics
6	General Aspects of Chemistry (Open Elective)	S2-CHEM3T	Food Adulteration, Harmful effects of Food additives	Food Adulteration, Harmful effects of Food additives	Constituents of materials used in everyday life, Pesticides, Disinfectants	Constituents of materials used in everyday life, Pesticides, Disinfectants

7	Physical Chemistry	205-I	Thermodynamics and Thermochemistry	Thermodynamics and Thermochemistry	Thermodynamics and Thermochemistry	Thermodynamics and Thermochemistry
8	Inorganic Chemistry	205-II	Phase Equilibrium	Phase Equilibrium	Phase Equilibrium	Phase Equilibrium
9	Organic Chemistry	205-III	Surface Chemistry	Surface Chemistry	Surface Chemistry	Surface Chemistry
10	Physical Chemistry	305-I	Molecular Structure	Molecular Structure	Quantum Mechanics, Photochemistry, Spectroscopy	Quantum Mechanics, Photochemistry, Spectroscopy
11	Inorganic Chemistry	305-II	Polymers, Bio-inorganic Chemistry, HSAB	Polymers, Bio-inorganic Chemistry, HSAB	Electronic Spectra and Magnetic Properties	Electronic Spectra and Magnetic Properties
12	Organic Chemistry	305-III	Dyes, Carbohydrates, Fats, Oils & Detergents	Dyes, Carbohydrates, Fats, Oils & Detergents	NMR, Pericyclic reactions	NMR, Pericyclic reactions
13	Inorganic Chemistry - I	CH-11	Qualitative & Quantitative analysis	HSAB Theory	Stereochemistry and Bonding	Stereochemistry and Bonding
14	Organic Chemistry - I	CH-12	Nature of Structure Bonding and reactivity	Nature of Structure Bonding and reactivity	Reaction Mechanism of complexes Stereochemistry and Reaction Mechanism Confirmation Analysis	Reaction Mechanism of complexes Stereochemistry and Reaction Mechanism Confirmation Analysis
15	Physical Chemistry - I	CH-13	Molecular Orbital Theory		Quantum Mechanics Thermodynamics	Quantum Mechanics Thermodynamics
16	Group Theory and Spectroscopy-I	CH-14	Infra-red and Microwave Spectroscopy	Infra-red and Microwave Spectroscopy	Symmetry and Group theory, Raman Spectroscopy	Symmetry and Group theory, Raman Spectroscopy
17	Inorganic Chemistry - II	CH-21		CD, ORD	Electronic Spectral Studies and magnetic properties	Electronic Spectral Studies and magnetic properties

18	Organic Chemistry - II	CH-22	Reaction Mechanism	Reaction Mechanism	Pericyclic reactions	Pericyclic reactions
19	Physical Chemistry - II	CH-23	Surface Chemistry	Surface Chemistry	Thermodynamics, Macromolecules, Electrochemistry	Thermodynamics, Macromolecules, Electrochemistry
20	Group Theory and Spectroscopy-II	CH-24	General Spectroscopy	General Spectroscopy	NQR Spectroscopy, X-ray diffraction, NMR	NQR Spectroscopy, X-ray diffraction, NMR
21	Application of Spectroscopy - I	CH-31	Ele. Spectroscopy, Vibrational Spectroscopy	Elec. Spectroscopy, Vibrational Spectroscopy	NMR, Mossbauer	NMR, Mossbauer
22	Photochemistry	CH-32	Determination of Reaction Mechanism	Determination of Reaction Mechanism	Photochemical Reactions	Photochemical Reactions
23	Environmental Chemistry	CH-33	Atmospheric Pollution, Green House Effect	Atmospheric Pollution, Green House Effect	Pollution, Toxicology	Pollution, Toxicology
24	Organ transition Metal Complexes	CH-34-B		Transition Metals	Catalysis	
25	Polymer Chemistry	CH-34-A	Basics	Basics	Polymer analysis and Testing	Polymer analysis and Testing
26	Health Chemistry	OE-HC	Common and General Health Body Fluids	Enzymes and Hormones	Drugs	Drugs
27	Application of Spectroscopy - II	CH-41	Electronic Spectroscopy, Vibrational Spectroscopy	UV-Visible Spectroscopy, IR-Spectroscopy	C-13 NMR, Mass	C-13 NMR, Mass
28	Solid State Chemistry	CH-42		Crystal Defects	Band Theory	

29	Biochemistry	CH-43	Biological System	Electron Transfer in Biology	Enzymes	
30	Applied Analytical Chemistry	CH-44-A	Food Analysis	Analysis of Water Pollution	Chromatography	
31	Medicinal Chemistry	CH-44-B		Antifungal	SAR	Antibiotics

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Computer Science

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course/Paper name	Course code	Local	Regional	National	Global
1	Computer System Architecture (Major)	S1-CSC1T				RISK AND SISC
2	Programming Methodologies and Data Structure (minor)	S1-CSC2T				Object Oriented Programming USING c++
3	Computer System Architecture (Open Elective)	S1-CSC3T				Number system and combinational circuit
4	Multimedia & Animation- I (Open Elective)	S1-CSC4T				Multimedia & Animation tools
5	Programming Methodologies and Data Structure (major)	S2-CSC1T				Object Oriented Programming USING c++
6	Computer System Architecture (Minor)	S2-CSC2T				RISK AND SISC
7	Multimedia & Animation- II (Open Elective)	S2-CSC3T				Multimedia & Animation tools
8	Programming Methodologies and Data Structure (Open Elective)	S2-CSC4T				Object Oriented Programming USING c++
9	Object Oriented Programming concept using C++	206 - I				Object Oriented concepts Inheritance
10	Data Structure	206 - II				Stack, queue
11	Database Management System	306 - I				Normalization
12	Operating system concepts	306 - II				Deadlock
13	Digital Computer Organization (Major)	S1-BCA1T				Logic Gate

14	Programming and Problem Solving through C(Minor)	S1-BCA2T				Operators
15	Probability and Statistics (Open Elective)	S1-BCA3T				Theoretical Distribution
16	Programming Methodologies and Data Structure (Major)	S2-BCA1T				Basic of C++, function in C++, Inheritance
17	Operating System (Minor)	S2-BCA2T			BOSS Operating System	Linux, Operating System
18	Statistical Methods (Open Elective)	S2-BCA3T				Test of Hypotheses, Estimation Theory
19	Computational Mathematics (Open Elective)	S2-BCA4T				Mathematics Logic, Set Theory
20	Discrete Mathematics (Open Elective)	S2-BCA5T				Boolean Algebra, Graphs, Trees
21	Numerical Methods (Open Elective)	S2-BCA6T				Numerical Integration, Method to Solve System of Linear Equations
22	Discrete Mathematics	351				Y
23	Data Structure Using C	352				Linked list and graph and trees
24	Object Oriented Programming Using C++	353				Object, class
25	Unix Operating System	354				Pipes and filters
26	Accounting & Financial Management	355				Taxation Report
27	Communication Skills	356			Y	Y
28	Computer Oriented Numerical Methods (Using 'C' Language)	451				Numerical Methods
29	Software Engineering	452				MIS & DSS
30	Database Management System	453				Normalization
31	Programming with JAVA	454				Object and Class
32	Environment Awareness & Green Computing	455				Green Assets and Power Problems
33	Entrepreneurship	456		Y	Y	Y

34	Linear Algebra and Geometry	551				Y
35	Computer Networks	552				Network and security
36	Introduction to Cloud Computing	553				Cloud services and tools
37	Introduction to Data Science	554				Machine learning
38	Human Values and Professional Ethics	555				Nature and Dimensions of Attitude Components of Attitude
39	Information Technology Trend	556				Artificial Intelligence and Expert System
40	Operations Research	651			Y	Y
41	Internet and Web Technology using PHP	652			Y	
42	Computer Graphics and Multimedia	653				Animation and multimedia tools
43	Principal and Practices of Management	654			Management of employees	
44	Computers & Communication Fundamentals	CS-11				Logic gates and counters
45	Discrete Structure	CS-12				Set theory, Graph
46	Operating System	CS-13				PCB and scheduling
47	Programming & Problem Solving Through C-Language	CS-14				Structure and union
48	Computer Networks	CS-21				Network and security
49	Data Structures using C++	CS-22				Linked list, queue
50	Computer oriented numerical and Statistical method	CS-23			Statistical method	
51	Database Management Systems	CS-24				Hashing and indexing
52	Object Oriented Programming Using JAVA	CS-31				Database connectivity: JDBC

53	Database Application & Tools	CS-32				Advanced Topics (Overview): Data Warehousing
54	Theory of Computation	CS-33-A				Context-Free Languages
55	Computer Architecture	CS-33-B				Flip flops, counters
56	Software Engineering	CS-34-A				S/w assurance, SDLC, MIS
57	Linux/Unix Administration	CS-34-B				Unix system administration
58	System Analysis and Design	CS-41				Organization of EDP: Introduction. Job Responsibilities
59	Design and analysis of Algorithms	CS-42				Hard Problems and Approximation Algorithms
60	Internets and Web Technology	CS-43-A				Session handling in JSP, Types of errors and exceptions handling
61	Computer Graphics and Multimedia	CS-43-B				Multimedia: Introduction, Multimedia applications
62	Compiler Design	CS-44-A				Code Optimization: - Definition, loop Optimization
63	Python for Data Science	CS-44-B				Y

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Electronics

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course/paper name	CourseCode	Local	Regional	National	Global
1	Major: Semiconductor Devices	S1-ELE1T	Y	Y	Y	Y
			Semiconductor	Diodes	LEDs, SCR	Transistor
2	Minor: Basic Circuit Theory and Network Analysis	S1-ELE2T	Y	Y	Y	Y
			Resistor, Capacitor, Inductor Values	Node and Mesh	Power	Network theorems and Laws
3	Open Elective: Introduction of Electronics Components and Network	S1-ELE3T	Y	Y	Y	Y
			Resistor, Capacitor, Inductor Values	Node and Mesh	Power	Network theorems and Laws

4	Major: Basic Circuit Theory and Network Analysis	S2-ELE1T	Y	Y	Y	Y
			Resistor, Capacitor, Inductor Values	Node and Mesh	Power	Network theorems and Laws
5	Minor: Semiconductor Devices	S2-ELE2T	Y	Y	Y	Y
			Semiconductor tor	Diodes	LEDs, SCR	Transistor
6	Generic Elective: Basics of Semiconductor Devices	S2-ELE3T	Y	Y	Y	Y
			Semiconductor tor	Diodes	LEDs, SCR	Transistor
7	Digital Electronics & Microprocessor	207-I	Y	Y	Y	Y
			ICs	Convertor	Counter, Resistor	Microprocessor
8	Operational Amplifier and Instrumentation	207-II	Y	Y	Y	Y
			Differential Amplifier	Measuring Instrument	Biomedical Instrumentation: ECG Fundamentals	Op- amp Applications

9	Thyristors, IC Technology, Microprocessor and Electrical Motors	307-I	Y	Y	Y	Y
			Power Devices	Electrical Motors	INTEL 8086 Microprocessor	IC Techno logy
10	Communication Electronics	307-II	Y	Y	Y	Y
			Modulation	Generation of Modulation	Antenna	Fiber Optic Communication

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Economics

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course/paper name	Course code	Local	Regional	National	Global
1	Consumer Behaviour & Micro Economics	S1-ECO1T	Methods of Economics Analysis - Inductive and Deductive methods, Commodity, Price, Value, Rational Behaviour etc.	Meaning and Classification of Markets, Law of Supply and Elasticity of Supply etc.	Law of Demand and its exceptions- Giffen goods, Elasticity of Demand etc.	Law of Demand and its exceptions- Giffen goods, Elasticity of Demand, Law of Diminishing Marginal Utility etc.
2	Micro Economics	S1-ECO2T	Methods of Economics Analysis - Inductive and Deductive methods, Commodity, Price, Value, Rational Behaviour etc.	Meaning and Classification of Markets, Law of Supply and Elasticity of Supply etc.	Law of Demand and its exceptions- Giffen goods, Elasticity of Demand etc.	Law of Demand and its exceptions- Giffen goods, Elasticity of Demand, Law of Diminishing Marginal Utility etc.
3	Basics of Economics	S1-ECO3T	Methods of Economics Analysis - Inductive and Deductive methods, Commodity, Price, Value, Rational Behaviour etc.	Meaning and Classification of Markets, Law of Supply and Elasticity of Supply etc.	Law of Demand and its exceptions- Giffen goods, Elasticity of Demand etc.	Law of Demand and its exceptions- Giffen goods, Elasticity of Demand, Law of Diminishing Marginal Utility etc.

4	Indian & Agricultural Economy	S2-ECO1T	Demographic Features- Population Composition , Size and Growth Rates, Sectoral Distribution of workforce etc.	India's Foreign Trade- Importance, Composition and Direction Poverty, Unemployment and Regional Inequality etc.	Characteristic s of Indian Economy, Indian Planning – Objectives, Achievement s and Failures, NITI Aayog etc.	India's Foreign Trade- Importance, Composition and Direction, Role of Foreign Direct Investment, Multinational Corporations etc.
5	Indian Economy	S2-ECO2T	Demographic Features- Population Composition, Size and Growth Rates, Sectoral Distribution of workforce etc.	India's Foreign Trade- Importance, Composition and Direction Poverty, Unemployment and Regional Inequality etc.	Characteristic s of Indian Economy, Indian Planning – Objectives, Achievement s and Failures, NITI Aayog etc.	India's Foreign Trade- Importance, Composition and Direction, Role of Foreign Direct Investment, Multinational Corporations etc.
6	Basics of Indian Economy	S2-ECO3T	Demographic Features- Population Composition , Size and Growth Rates, Sectoral Distribution of workforce etc.	India's Foreign Trade- Importance, Composition and Direction Poverty, Unemployment and Regional Inequality etc.	Characteristic s of Indian Economy, Indian Planning – Objectives, Achievement s and Failures, NITI Aayog etc.	India's Foreign Trade- Importance, Composition and Direction, Role of Foreign Direct Investment, Multinational Corporations etc.
7	Macro Economics	221 - I	Inter- relationship between Microeconomics and Macroeconomics, Consumption Function, Meaning and Phase of Trade Cycle, Measures to Control the Trade Cycle etc.	Meaning of Inflation, Deflation and Stagflation, Types and Effects of Inflation etc.	Methods of Measuring National Income, National Income and Economic Welfare, Monetary Policy, Fiscal Policy etc.	Meaning and Phase of Trade Cycle, Measures to Control the Trade Cycle, Applicability of Keynes' Theory in Developing Countries Investment – Meaning, Types, Meaning of Inflation, Deflation etc.

8	Public Finance and International Economics	221 - II	Public Finance- Meaning, Nature and Scope, Role of Public Finance in Modern Economy etc.	Budget- Definition and Preparation, Central- State Financial Relation etc.	GST – AnIntroduction, Taxable Capacity in India, Characteristic s of Indian Tax Structure, Balance of Payment etc.	Principles of Public Expenditure – Wagner Hypothesis, Peacock and Wiseman Approach, Terms of Trade etc.
9	Development and Environment Economics	321 - I	Economic Growth and Development, Factors of Economic Development etc.	Population- Environment linkage, Market Failure for Environment Goods etc.	Investment Criteria of Economic Development, Gender Development Index (GDI), Women Empowerment etc.	Environment Economics – Concepts, Components and Factors Affecting Environments, Human Development Index etc.
10	Statistics	321 - II	Meaning and Definition of Statistics Universe and Sample Graphical Representation on of Data etc.	Probability: Concept, Rules of Probability, Measures of Central Tendency, Measures of Dispersion etc.	Correlation, Regression Analysis, Index Numbers, Measures of Central Tendency, Measures of Dispersion etc.	Correlation, Regression Analysis, Measures of Central Tendency, Measures of Dispersion etc.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Forensic Science

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course Name	Course Code	Local	Regional	National	Global
1	Criminal investigation and law (Major)	S1-FOSC1T	Case diary	Home Guard	CrPC, IEA, IPC	Social change and crime
2	Introduction to Forensic Science and Criminalistics (Minor)	S1-FOSC2T	Police organization	Finger print bureaus	CFSL, LNJPNNICFS	Duties and code of conduct of forensic scientist
3	Introduction to Forensic Science and Criminalistics (Open Elective)	S1-FOSC3T	Police organization	Finger print bureaus	CFSL, LNJPNNICFS	Duties and code of conduct of forensic scientist
4	Introduction to Forensic Science and Criminalistics (Minor)	S2-FOSC1T	Police organization	Finger print bureaus	CFSL, LNJPNNICFS	Duties and code of conduct of forensic scientist
5	Criminal investigation and law (Major)	S2-FOSC2T	Case diary	Home Guard	CrPC, IEA, IPC	Social change and crime
6	Criminal investigation and law (Open Elective)	S2-FOSC3T	Case diary	Home Guard	CrPC, IEA, IPC	Social change and crime
7	Indian Penal Code, Criminal Procedure Code, Indian Evidence Act and judicial System	222-I	-----	Family court	IPC, CrPC, IEA	----

8	Examination of Physical Evidence & Forensic Ballistics	222-II	Ink & paper	Improvised ammunition and fire arms	Genetic marker	DNA Fingerprinting
9	Forensic Medicine and Toxicology	322-I	Illicit alcohol	----	NADA	WADA
10	Detective Tools and techniques	322-II	Chromato-graphic methods		AFIS	RFPL & PCR
11	Forensic Science and Criminal Justice System	FS-11	Police organization	RFSL	IPC, CrPC, IEA	Theories of Crime
12	Forensic Medicine	FS-12	Tattoo marks	Regional injuries	Medical jurisprudence	Personal identity
13	Questioned Documents, Finger Print, and other prints	FS-13	Ink & Paper	---	IPC, IEA, AADHAR	Fingerprint identification
14	Instrumental Methods – Physical	FS-14	UV Spectroscopy	---	Radio chemical technique	NMR, ICP-MS, EDX ray
15	Instrumental Methods – Chemical	FS-21	TLC & PC	Microscopy	Electrophoretic technique	Electron microscope
16	Forensic Biology	FS-22	Seeds & timber	Pollen grains	Wild life Protection act 1972	Facial Reconstruction
17	Forensic Chemistry and Explosives	FS-23	---	Illicit alcohol	Explosive act NDPS act	Drugs abuse in sports

18	Forensic Toxicology and Pharmacology	FS-24	---	Animal poison	Classification of drugs	General study and analysis of poison, drugs, pesticide
19	Forensic Ballistics	FS-31	Different types of marks produced during firing	-----	Arms act and Arms rule 2016	Safety measures for handling firearms
20	Instrumental methods- Biology	FS-32	Centrifuge	Microbe and plants	Enzyme assay, Radio labeling and immunochemical methods	Recombinant DNA technology
21	Forensic Serology	FS-33-A	Carbohydrates and lipids	Mutation	Paternity disputes	Genetics and Gene expression
22	Fingerprints, Impressions and their examination	FS-33-B	Latent marks	---	-----	Fingerprint identification system
23	DNA profiling	FS-34-A	---	Mutation	Quality Assurance and Validation of DNA & DNA labs	RFLP & PCR
24	Pharmaceutical Jurisprudence	FS-34-B	----	----	IPR and patent laws	WTO
25	Forensic Physics	FS-41	Different tools & tool marks	Building materials	Counterfeit coins & currency	Bay theorem, t-test, F-test,
26	Applied Forensic Science and Scientific	FS-42	Alcohol related crimes	-----	Government laboratories & institutes	Human Trafficking & Bio- terrorism
27	Investigation of crime					

28	Emerging trends in forensic science	FS-43-A	---	Social media crimes	Narco analysis, Brain mapping & polygraph	GPS & facial reconstruction
29	Forensic Psychology	FS-43-B	Modus operandi	Serial killers	Juvenile Delinquency Act	Theories of offending
30	Biometrics	FS-44-A	----	-----	Fingerprints identification	Pattern Recognition and Biometrics
31	Computer and Cyber Forensic	FS-44-B	IP address	---	IT act 2000	Cyber warfare

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geology

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course/Paper	Course code	Local	Regional	National	Global
1	Petrology	211-I	-	Volcanic igneous rock-basalt	Various, Igneous, metamorphic, sedimentary rocks	Petrological and petrographic studies of rocks
2	Palaeontology and Stratigraphy	311-I	Deccan trap Studies	Geology of Madhya Pradesh Deccan trap, Bagh beds	Various Stratigraphic units of India, Geoheritage sites of India	-
3	Earth resources and Applied Geology	311-II	-	Geology and Mineral Wealth of Madhya Pradesh	Metallic and non-metallic minerals, and Fossil fuels of India	Mineral forming processes
4.	Geodynamics	G-11	-	-	Seismic zones of India	Plate tectonics, Global distribution of Earth quake and Volcanoes
5	Stratigraphy of India	G-13	Deccan trap studies	Archeans of Madhya Pradesh Deccan traps, Cretaceous of Narmada valley	Tectonic framework of India Various Stratigraphic units of India, Geoheritage sites of India	Geological Time scale Geology and organic evolution
6	Geomorphology	G-21	-	-	Geomorphic features of Indian subcontinents and landforms	-
7	Igneous and metamorphic petrology	G-22	-	-	Distribution, petrography of rocks in India	

8	Palaeobiology	G-24	-	-	Geoparks and Fossils parks of India	-
9	Economic Geology	G-31	-	Mineral resources of Madhya Pradesh	Economic minerals and fuels of India	-
10	Hydrogeology	G-34-A	-	Artificial recharge, rain water harvesting	Groundwater management in urban and rural area,	-
11	Engineering Geology and Geotechniques	G-34-B	-	-	Geological and engineering details of Dams and Bridges of India	-
12	Ore Geology-	G-41	-	Manganese deposit of Sausar group and Malanjkhand Copper deposits of Madhya	Metallogenic provinces and epochs with reference to India, production and prices of minerals and mineral concession rules in India.	-
13	Applied Geology	G-42	-	Ground water provinces of Madhya Pradesh	Ground water provinces of India	-
14	Environmental Geology	G-43-A	-	-	Natural disaster, Unsafe and hazardous areas in India, seismic zones of India	Global warming causes and effects
15	Mineral processing and Technology	G-43-B	-	-	Beneficiation flow sheets of Coal and ores of India	Mineral processing technology
16	Fuel geology	G-44-A	-	-	Geology of productive coal, oil and atomic minerals fields of India	Coal, Hydrocarbons and Nuclear minerals

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Geography

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course/Paper	Coursecode	Local	Regional	National	Global
1	Human Geography: Environment and Culture (Major)	S1-GEOG1T	Environmental issues of rural & urban settlements.	Bhils, Gond and Saharia Tribes of Madhya Pradesh.	Human Settlement Problems in India. Human Races of India.	Environmental Regions of the World. World population growth, density & distribution, migration and immigration.
2	Physical Geography: Lithosphere (Geomorphology) (Minor)	S1-GEOG2T	Local rock types and composition. Geomorphic landforms in the field.	Geomorphic features in the state.	Various Geomorphic land forms in India.	Geological Time Scale. Earth system processes.
3.	Physical Geography (Open Elective)	S1-GEOG3T	Weathering.	Rocks and their types.	Monsoon	Plate Tectonics. Global atmospheric circulation. World climatic classification. Ocean bottom relief. Marine resources.
4.	Physical Geography: Lithosphere (Geomorphology) (Major)	S2-GEOG1T	Local rock types and composition. Geomorphic landforms in the field.	Geomorphic features in the state.	Various Geomorphic land forms in India	Geological Time Scale. Earth system processes.

5	Human Geography: Environment and Culture (Minor)	S2-GEOG2T	Environmental issues of rural & urban settlements	Bhils, Gond and Saharia Tribes of Madhya Pradesh	Human Settlement Problems in India. Human Races of India	Environmental Regions of the World. World population growth, density & distribution, migration and immigration.
6	Environmental Issues and Disaster Management (Open Elective)	S2-GEOG3T	Refuge operation, Human settlement and Rehabilitation issues during and after Disasters.	Indigenous knowledge and Community based Disaster Management.	National organizations for disaster management. Role of ISRO, NIDM, SDAM and others.	Environmental Issues. International organizations for disaster management.
7	Physical Geography (Atmosphere and Hydrosphere)	223-I	Local Winds	Tropical and Temperate Cyclones	Seasonal Winds- Monsoon.	Global climate change. Laws of the sea & marine pollution. Atmospheric & hydrospheric circulation. Ocean bottom relief.
8	Economic Geography	223-II	Primary, secondary and tertiary economic activities.	Command Area Development. Watershed Management. Planning for backward desert, drought prone, hill and tribal area development.	Five Year Plans, Integrated Rural Development Programs. Panchayati Raj and Decentralized Planning.	Global distribution & production of different crops, minerals and energy resources & industries. Transportation.
9	Geography of India	323-I	Type of forest, soil and vegetation.	Physical & cultural aspects of Madhya Pradesh.	Physical, cultural, economic and political aspects of India.	India's Role in World Affairs. Geopolitics of South Asia and Indian Ocean Realm.

10	Environment and Resource Management	323-II	Social Forestry.	Biodiversity and Sustainable Development.	Environmental Policy. Environmental Education and Legislation. Resource Regions of India	Contemporary Environmental Issues. Major Gene Pool Centres. World Distribution of Plants and Animals.
11	Geomorphology	GO-11	Urban geomorphology	Morphogenetic regions. Geomorphic features in the state.	Various Geomorphic land forms in India.	Climate Change. Exogenic and endogenic forces and processes and resultant landforms.
12	History of Geographical Thought	GO-12	-	spatial distribution, spatial interactions, spatial organization, areal differentiation and cultural landscapes	Geographical Knowledge in Ancient India.	Laws, Theories & Models. Geographical thoughts in ancient and medieval periods and recent trends.
13	Geography of India (Physical & Resources)	GO-13	-	-	Physiography, geology, drainage and climate of India. Power, Mineral, Forest and human resources of India.	-
14	Economic Geography	GO-14	Primary, secondary and tertiary activities. Typology of market.	Market network in rural society. market system in urban economy	Liberalization and globalization its economic impact on India. Economic regions of India	Major world organizations. Principles of trade. Case study of selected industries.
15	Climatology	GO-21	-	Local winds.	Monsoon winds	Physical and dynamic atmospheric phenomena. Types of global climates.

16	Resource Management	GO-22	-	Land evaluation- concept and methods.	Status of common property resources. Resource development policies & Population policies.	Uses of GIS and Remote Sensing in resource management. Natural hazards and risk management
17	Geography of India: Economy and Region	GO-23	-	Narmada basin, Malwa plateau, Bundelkhand upland, Marusthali and Chhattisgarh basin regions.	Economy, agriculture, industry, transport, trade & regional classification of India	Internal and international trade of India- organization and change.
18	Geography of Environment	GO-24	Agricultural ecosystem.	Impact of topography, climate and natural resources on human activities.	Forest act, water and air pollution act.	Ecosystems of the world. Environmental Hazards and their mitigation. Pollution and their measures to control.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Horticulture

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course Name	Course Code	Local	Regional	National	Global
1	Paper - 1 Fundamentals of Horticulture (Major)	S1-HOR1T	Irrigation	Manures	Significance of horticulture	Plant propagation
2	Paper – 2 Horticulture Production (Minor)	S1-HOR2T	High-tech Horticultural production	High-tech Horticultural production	Entrepreneurship	Entrepreneurship
3	Paper -3: Fundamentals of Horticulture (Open Elective)	S1-HOR3T	Irrigation	Manures	Significance of horticulture	Plant propagation
4	Paper –1 Horticulture Production (Major)	S2-HOR1T	High-tech Horticultural production	High-tech Horticultural production	Entrepreneurship	Entrepreneurship
5	Paper – 2 Fundamentals of Horticulture (Minor)	S2-HOR2T	Irrigation	Manures	Significance of horticulture	Plant propagation
6	Paper -3: Commercial Horticulture Production technology (Open Elective)	S2-HOR3T	High-tech Horticultural production	High-tech Horticultural production	Entrepreneurship	Entrepreneurship
7	Paper -1: Establishment and management of orchard and nursery	212-I	Orchard Management	Weeds	Ornamental Garden	Lawn Management

8	Paper -2 Farming Systems in Horticulture	212-II	Mixed cropping	Crop rotation	Cropping system.	Farming system.
9	Paper -1: Soil Productivity & Agro forestry	312-I	Tillage	Soil fertility	Soil Erosion, Plant nutrition	Agro-forestry.
10	Paper -2: Processing of Horticultural Crops & Value addition	312-II	Fruit preservation	preservatives, Principles of fruit and vegetable preservation	Fruits and vegetables spoilage	tissue culture.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Microbiology

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course/paper name	Coursecode	Local	Regional	National	Global
1	Microbial Genetics and Molecular Biology	215-II	Pure Culture	Isolation methods of microbes	Types of culture media	
2	Applied and Environmental Microbiology	315-I	Industrial production of alcohol	Liquid waste disposal	Primary, secondary & tertiary sewage system	Genetic modified organisms
3	Immunology and Medical Microbiology	315-II	ABO blood group & Rh factor incompatibility	Immune diagnosis of tumor	ELISA	Bio nanotechnology & drug delivery system
4	Bacteriology	MB-11	Measurement of bacterial growth	Bacterial growth curve	Control of microbes by physical & chemical agents	Basic of microbial classification
5	Virology, Mycology and Phycology	MB-12	Cultivation of Algae	Prevention of growth	Infectivity assay	Bacteriophage typi
6	Microbial Biochemistry	MB-14	Blood group lipopolysaccharide	Structure of Hemoglobin & myoglobin	--	---
7	Instrumentation	MB-23	Light Microscope	Analytical centrifugation	Measurement of radioactivity	---
8	Fermentation Technology	MB-24	Screening of industrially important microbes	Industrial sterilization process	Scale up of fermentation process	Microbial productions of Penicillin and Streptomycin
9	Molecular Biology and Genetic Engineering	MB-31	PCR	cDNA library and genomic library	IPR and Patenting	Automated sequence and physical mapping
10	Medical Microbiology	MB-32	Venereal infections	Measles, mumps and rabies	Nosocomial infection	AIDS
11	Biostatistics and Computer applications	MB-33 A	Collection of primary and secondary data	Small sample test	MS Office	Internet

12	Microbial Ecology	MB-33 B	Competition and coexistence	Lake and river microbiology	Management and improvement of waste and Barrer land	Microbial technology and sustainable development
13	Agriculture Microbiology	MB-34 B	Epidemiology of plants diseases	Host and parasite infection	Biofertilizers	Environment
14	Food and Dairy Microbiology	MB-41	SCP	Whey utilization and disposal	FDA, EPA, HACCP, ISI	Pasteurization
15	Environmental Microbiology	MB-42	Aerobiology	Water borne diseases	Microbial enhancement of oil recovery	Application of GMO
16	Pharmaceutical Microbiology	MB-43 A	Role of microbiologist in pharma industry	Dry development	Pharmacopeia	R & D, QA & QC

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Pharmaceutical Chemistry

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S.No.	Course/paper Name	Course code	Local	Regional	National	Global
1	Pharmaceutical Inorganic Chemistry (Major)	S1-PCH1T	Preparation of antacids, topical agents and dental products	Preparation of antacids, topical agents and dental products	Preparation of antacids, topical agents and dental products	Preparation of antacids, topical agents and dental products
2	Medicinal Chemistry-I	216-I	Synthesis and MOA of GA, LA, Diuretics and antihypertensives	Synthesis and MOA of GA, LA, Diuretics and antihypertensives	Synthesis and MOA of GA, LA, Diuretics and antihypertensives	Synthesis and MOA of GA, LA, Diuretics and antihypertensives
3	Instrumental Analysis	316-II	Conductometry	Polarography	Applications of UV, IR, NMR	HPLC
4	Principles of Inorganic Pharmaceutical Chemistry II	PC-21	Impurities in pharmaceuticals	Antioxidants, Emetics Astringents	Antioxidants, Emetics Astringents	Radiopharmaceuticals
5	Pharmaceutical Analysis II	PC-24	Nephelometry and Turbidimetry	Solvent Extraction	Titrimetric and Gravimetry	HPLC

6	Chemistry of Natural Products	PC-32	Alkaloids	Plant Pigments	Steroids	N
7	Toxicology	PC-33(A)	Drug Abuse	Poisoning and treatment	Drug interaction	Drug dependence
8	Pharmaceutical Biotechnology	PC-33(B)	Genetics	Immunology	Vaccinology	Gene therapy
9	Applied Pharmaceutics I	PC-34(B)	Packaging of pharmaceutical product	Surgical products	Preformulation studies	Cosmeticology and cosmetic preparation
10	Modern Analytical Techniques I	PC-42	FT-IR, Mass spectroscopy	Thermal methods	ELISA	Radioimmunoassay
11	Drug Design	PC-43(A)	Prodrug and soft drug	Structure based drug design	QSAR	Computers in medicinal chemistry
12	Pharmacology	PC-43(B)				General Pharmacology
13	Applied Pharmaceutics II	PC-44(B)	solid, Liquid and semisolid dosage forms	solid, Liquid and semisolid dosage forms	Parenteral products	Microencapsulation

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Physics
Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No	Course/Paper name	Course code	Local	Regional	National	Global
1	Thermodynamics and Statistical Physics (Major)	S1-PHY1T			Heat Engine	Thermodynamics Potential
3	Mechanics and General-Properties of Matter (Minor)	S1-PHY2T				Gravitational Potential
5	Non-Convectional Energy Source-I	S1-PHY3T	Biomass Energy	Wind Energy		Ocean Energy
6	Mechanics and General-Properties of Matter (Open Elective)	S1-PHY4T				Gravitational Potential
7	Mechanics and General-Properties of Matter (Major)	S2-PHY1T				Gravitational Potential
9	Thermodynamics and Statistical Physics (Minor)	S2-PHY2T			Heat Engine	Thermodynamics Potential
11	Thermodynamics (Open Elective)	S2-PHY3T			Heat Engine	Thermodynamics Potential

12	Non-Conventional Energy Source-II	S2-PHY4T				
13	OPTICS	217-1			Geometric Optics	Fiber Optics
14	ELECTROSTATICS, MAGNETO STATICS AND ELECTRODYNAMICS	217-II			Magnetostatics	Electrodynamics
16	QUANTUM MECHANICS AND SPECTROSCOPY	317 - I			photoelectric effect	Molecular Spectroscopy
17	SOLID STATE PHYSICS AND SEMICONDUCTOR DEVICES	317 - II			Crystal Structure	Semiconductor devices
18	MATHEMATICAL PHYSICS	P-11				Fourier integral
19	CLASSICAL MECHANICS	P-12		rigid body	momentum and force	
20	QUANTUM MECHANICS- I	P-13			angular momentum	
21	ELECTRONIC DEVICES	P-14	transistor		photonic devices	op amp
22	QUANTUM MECHANICS -II	P-21		wkb	scattering	
23	STATISTICAL MECHANICS	P-22		BE	phase transition	
24	ELECTRODYNAMICS AND PLASMA PHYSICS	P-23			plasma	
25	ATOMIC AND MOLECULAR PHYSICS	P-24			alkali spectra	S-G experiments

26	CONDENSED MATTER PHYSICS-I	P-31			Crystal structure	Babd theory
27	NUCLEAR AND PARTICLE PHYSICS	P-32				nuclear models
28	DIGITAL ELECTRONICS	P-33	number system			counters
29	ATOMIC AND MOLECULAR PHYSICS	P-34			NMR, Raman	ESR
30	CONDENSED MATTER PHYSICS-II	P-41			Crystal imperfection	BCS theory
31	LASER PHYSICS	P-42			basic principle	non-linear optics
32	COMPUTER PROGRAMMING AND INFORMATICS	P-43(A)	-			programming
33	COMPUTATIONAL METHODS AND PROGRAMMING	P-43(B)				programming
34	COMMUNICATION ELECTRONICS	P-44(A)			DSBSC & SSB	Data transmission
35	RENEWABLE ENERGY RESOURCES	P-44(B)			Solar and Terrestrial Spectra	Y

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Seed Technology
Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No	Course/Paper name	Course code	Local	Regional	National	Global
1	Principles of Seed Technology (Major)	S1-SEED1T	Plant Tissue Culture	Characteristics of Good Seed	National Seed Programme	
2	Seed Production and practices (Minor)	S1-SEED2T		Economically Important Families	Seed Production	
3	Introduction of Seed Technology (Open Elective)	S1-SEED3T	Plant Tissue Culture	Seed Structure		
4	Seed Production and practices (Major)	S2-SEED1T		Floral Structure and Economic Importance	Seed Production	
5	Principles of Seed Technology (Minor)	S2-SEED2T	Plant Tissue Culture	Characteristics of Good Seed	National Seed Programme	
6	Seed Production and practices (Open Elective)	S2-SEED3T		Economically Important Families	Seed Production	
7	Plant Breeding	218 - I			Techniques of Hybridation	Seed Bank and Types of Seed Collection

8	Seed Testing and Quality Control	218 - II		Principal importance and Procedure of Seed Testing	Vigor Test, Viability Test, etc., Seed Act, Seed Control Order	
9	Seed Pathology & Entomology	318 - I	Role of Insect in Agriculture	Seed borne Disease	Seed Health Test	
10	Seed Processing, Storage & Marketing	318 - II	Seed Storage	Seed Treatment, Seed marketing		
11	Introduction To Seed Technology	ST-11	Plant Variety Protection		National Seed Corporation	
12	Floral Biology, Seed Development and Maturation	ST-12		Types of Fruits	Development of Seedless Fruit Crop and Their Commercial Exploitation	
13	Seed Physiology	ST-13			Seed Germination	
14	Principles Of Seed Production	ST-14			Hybrid Seed	Seed Multiplication Ratio Seed Replacement Rate Demand and Supply
15	Seed Production of Cereals, Pulses & Oil Seeds	ST-21		Floral Structure		

16	Seed Production in Vegetables, Fiber & Fodder Crops	ST-22		Floral Structure		
17	Seed Processing & Storage	ST-23		Assembly Line of Processing and storage	Seed Treatment	
18	Seed Quality Testing	ST-24	Seed Sampling		Physical Purity, Viability Test	

Government Holkar (Model Autonomous) Science College, Indore (M.P.)

Department of Statistics

Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course/paper name	Course code	Local	Regional	National	Global
1	Descriptive Statistics	S1-STAT1T	Curve Fitting, Regression, Multiple and Partial correlation, etc.	Classification of data, Measures of Location & Dispersion, etc	Theory of Attributes, Presentation of data, etc.	Classification of data, Measures of Location & Dispersion, etc.
2	Basic Statistics	S1-STAT2T	Classification of data, Measures of Location & Dispersion, etc	Theory of Attributes, Presentation of data, etc.	Curve Fitting, Regression	Curve Fitting, Regression, Multiple and Partial correlation, etc.
3	Elementary Statistics	S1-STAT3T	Curve Fitting, Regression, Multiple and Partial correlation, etc.	Classification of data, Measures of Location & Dispersion, etc	Theory of Attributes, Presentation of data, etc.	Theory of Attributes, Presentation of data, etc.
4	Probability and Probability Distribution	S2-STAT1T	Generating functions and Theoretical discrete distributions, their properties and applications, etc.	Random variables and related functions with properties	Theoretical continuous distributions, their properties and applications, etc.	Probability and its applications, Random variables and related functions with properties, etc.
5	Theory of Probability and Probability Distribution	S2-STAT2T	Theoretical continuous distributions, their properties and applications, etc.	Probability and its applications	Random variables and related functions with properties	Generating functions and Theoretical discrete distributions, their properties and applications, etc.
6	Introduction to Probability Theory	S2-STAT3T	Generating functions and Theoretical discrete distributions, their properties and applications, etc.	Random variables and related functions with properties	Probability and its applications	Theoretical continuous distributions, their properties and applications, etc.

7	Statistical Inference	219-I	Non-Parametric Tests	Testing of Hypothesis	Sampling Distribution	Testing of Hypothesis, Non-Parametric Tests, Sampling Distribution, etc.
8	Sampling Techniques	219-II	Sample Survey, Simple Random Sampling, etc.	Sample Survey, Simple Random Sampling	Stratified Random Sampling, Systematic Sampling, etc.	Sample Survey, Simple Random Sampling, Ratio Method of Estimation, etc.
9	Applied Statistics	319-I	Vital Statistics, Index Numbers, etc.	Vital Statistics, Index Numbers, etc.	Vital Statistics, Index Numbers, etc.	Demand Analysis, Time series, etc.
10	SQC and Design of Experiments	319-II	control charts and its applications, etc	control charts and its applications, etc	control charts and its applications, etc	Layout and analysis of various designs, etc.
11	Real Analysis	S-11	Set Theory	Sequences and Series,	Sequences and Series,	Set Theory, Sequences and Series, etc.
12	Distribution Theory-I	S-12	Standard Discrete Distributions	Continuous Distributions	Standard Discrete Distributions, Continuous Distributions	Standard Discrete Distributions, Continuous Distributions, etc.
13	Sampling Techniques	S-13	Stratified random sampling,	Simple random sampling,	Systematic Sampling	Simple random sampling, Stratified random sampling, Systematic Sampling, etc.
14	Measure Theory and Probability	S-14	Lebesgue Measure	Steljess Lebesgue measure	Almost Sure convergence	Central Limit Theorem, Convergence in Probability and Measure, etc.
15	Linear Algebra	S-21	Vector Space, Eigen values, Eigen Vectors, etc	Vector Space, Eigen values, Eigen Vectors, etc	Vector Space, Eigen values, Eigen Vectors, etc	Vector Space, Eigen values, Eigen Vectors, etc.
16	Distribution Theory-II	S-22	correlation and regression, etc	Non central chi-square, t and F distributions, their properties and applications, etc.	correlation and regression, etc.	Non central chi-square, t and F distributions, their properties and applications, etc.

17	Statistical Computing	S-23	Problem Solving on Computers, etc.	Problem Solving on Computers, etc.	Problem Solving on Computers, etc.	Problem Solving on Computers, etc.
18	Statistical Inference-I	S-24	Methods of estimation,	Testing of Hypothesis	Methods of estimation,	Methods of estimation, Testing of Hypothesis, etc.
19	Multivariate Analysis	S-31	Multivariate normal distribution	Multivariate normal distribution and its distribution, variance-covariance matrix etc.	variance-covariance matrix e	Multivariate normal distribution and its distribution, variance-covariance matrix etc.
20	Linear Models	S-32	least square estimates, Principal component regression etc	least square estimates, Principal component regression etc	least square estimates, Principal component regression etc	least square estimates, Principal component regression etc.
21	Operation Research	S-33-A	Transportation and Assignment problem etc.	Transportation and Assignment problem etc.	Integer Linear Programming	Linear programming problems Integer Linear Programming, etc.
22	Demography	S-33-B	Population projection and their matrix presentation, etc	Census and Vital Statistics data, etc.	Population projection and their matrix presentation, etc.	Census and Vital Statistics data, etc.
23	Programming with Language 'C'	S-34-A	Simple Programme related to statistics in 'C', etc.	Simple Programme related to statistics in 'C', etc.	Simple Programme related to statistics in 'C', etc.	Simple Programme related to statistics in 'C', etc.
24	Statistical Interference-II	S-34-B	Sequential Analysis	Sequential Analysis	Sequential Analysis	Sequential Analysis Non-parametric methods, etc.
25	Design of Experiments	S-41	design of experiments, etc	Factorial experiments, factorial effects	design of experiments, etc.	Factorial experiments, factorial effects, etc.
26	Statistical Quality Control	S-42	Control charts	Continuous Sampling Plans, etc.	Sampling inspection plans, etc.	Control charts, Continuous Sampling Plans, etc.
27	Advanced Operation Research	S-43-A	Theory of games, Replacement, etc.	Inventory management	Job Sequencing	Inventory management, Job Sequencing etc
28	Official Statistics	S-43-B	Population Growth in developed and developing countries,	Evaluation of performance of family welfare program etc.	Organization of Large-Scale sample Surveys	Crop forecasting and estimation etc

			Crop forecasting and estimation etc.		, Evaluation of performance of family welfare program etc.	
29	Econometrics	S-44-A	Instrumental variable estimation,	Recursive models etc.	Auto-Correlation etc.	Instrumental variable estimation, Recursive models etc.
30	Stochastic Processes	S-44-B	Branching process, Discrete state space continuous time MC	Branching process,	Branching process Discrete state space continuous time MC,	Branching process, Discrete state space continuous time MC, Stationary process etc.

Government Holkar (Model Autonomous) Science College, Indore (M.P.)
Department of Zoology
Session: 2021-22

Title: Curriculum Relevance to Local, Regional, National and Global

S. No.	Course/paper name	Course code	Local	Regional	National	Global
1	Biosystematics, Taxonomy and Evolution	ZO-11	Taxonomic Keys	Micro & Macro Evolution	Speciation	International Code of Zoological Nomenclature
2	Structure & Function of Invertebrate	ZO-12	Study of minor phyla	-	-	-
3	Quantitative Biology, Biodiversity & Wild life	ZO-13	Biodiversity	Sanctuaries & Nationals Parks	Bio-Statistical Study and Wild life of India	Biosphere reserves
4	Biomolecules & Structural Biology	ZO-14	Ph, Acid base buffer	Thermodynamic Principle	Functional Importance of lipid	Nano particles
5	General And Comparative Animal Physiology and Endocrinology	ZO-21	Hormones	Physiology of Pregnancy	Breast and lactation	-
6	Population Ecology and Environmental Physiology	ZO-22	Population and their characters.	Demography	Eco-physiological adaptations	Environmental Hazards and Human health.

7	Tools and Techniques in Biology	ZO-23	Microbiological Techniques & Microtomy	Immunological Techniques	-	ELISA
8	Molecular Cell Biology and Genetics	ZO-24	Prenatal diagnosis & Genetic Counselling	Gene libraries	-	Human Genome project
9	Comparative Anatomy of Vertebrates	ZO-31	Comparative Anatomy of Vertebrates	Comparative Anatomy of Vertebrates	Comparative Anatomy of Vertebrates	-
10	Eco Toxicology	ZO-32	Environmental Indicators	Solid liquid wastes Management	Environmental Pollution	Public Health Hazards
11	Limnology	ZO-33-A	Fresh Water Physical Parameter	Aquatic pollution	Fresh Water Resources of India, Legislations to regulate fresh water pollution	-
12	Immunology	ZO-33-B	Immune System	Immune Cells	Immunization	Immunization
13	Aquaculture	ZO-34-A	Fish Culture, Prawn paddy cum fish culture	fish industry	fish industry	fish marketing
14	Cellular Organization & Molecular Organization	ZO-34-B	-	-	Vaccination Strategies	Human Papillomavirus (HPV)
15	Basic of Bioinformatics	OE -BB	Local Alignment	-	Application of Bioinformatics	Structure Databases & Global alignment

16	Animal Behaviour and Neurophysiology	ZO-41	Behavioural pattern	communication	Social Behaviour	Drugs, & Human behavior
17	Gamete Biology, Development and Differentiation	ZO-42	Sex Determination	Embryonic stem Cells	Xenobiotics	Cryopreservation
18	Ichthyology (Fish Structure and Function)	ZO-43-A	Biology of fish fry and fingerlings	-	Migration in fishes	Migration in fishes
19	Biology of Parasites	ZO-43-B	Study of the protozoan and helminths parasites	-	Malarial Parasite	-
20	Pisci Culture and Economic Importance of Fishes (Ichthyology)	ZO-44-A	Role of fisheries in rural development	Fisheries resources of M.P.	Riverine, Costal, Offshore, Fisheries in India and their Problems	-
21	Cell Biology	ZO-44-B	Chromosome	-	Ageing and Senescence	Environmental Modulation of Gene Activity
22	Applied Zoology	ZO-44-C	Animal Farming	Common pests and beneficial insects	Aquaculture	Hepatitis and Tuberculosis