GOVT. DIGVIJAY P.G. AUTONOMOUS COLLEGE RAJNANDGAON (C.G.)

DEPARTMENT OF ZOOLOGY

**B.Sc. Zoology
Honours
&
Honours with Research
VII Semester
(FYUGP/LOCF)**
(Syllabus Based on UGC-LOCF Curriculum)
(2025 – 2026)

(Approved by Board of Studies)
Effective from July 2025-26
As Per provisions of NEP 2020 to be implemented from academic year 2022-23

GOVT. DIGVIJAY AUTONOMOUS PG COLLEGE, RAJNANDGAON (C.G.)

Department of Zoology
Syllabus of FYUGP/LOCF Curriculum
B.Sc. Honours with Research Course
VII - Semester Syllabus
Session: 2025-26

Sem	Course	Course Name	Credit	Lecture	Internal Marks	ESE Max Marks	M.M.
VII	DSC –VII	Biosystematics and Taxonomy	3	45	20	80	100
		Lab Course	1	15	-	-	50
	DSE- VII	Biotechnology & Genetic Engineering	3	45	20	80	100
		Lab Course	1	15	-	-	50
	DSE- VIII	Immunology	3	45	20	80	100
		Lab Course	1	15	-	-	50
	DSE- IX	Parasitology	3	45	20	80	100
		Lab Course/ Project	1	15	-	-	50
	GE- III	Research Methodology	3	45	20	80	100
		Project	1	15	-	-	50
		Total	20	300	100	480	750
		Total	20	300	100	480	500

GOVT. DIGVIJAY AUTONOMOUS PG COLLEGE RAJNANDGAON (C.G.)
FYUGP (CBCS and LOCF Pattern)
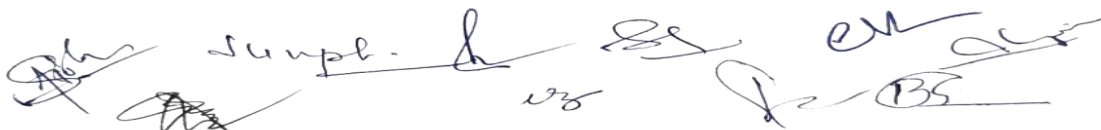**Department of Zoology**
B.Sc. Honours
2025-26

Session: 2025-26	**Program: B.Sc.**
Semester: VII	**Subject: Zoology**
Course type: DSC-VII	**Course Code:**
Course Title : Biosystematics & Taxonomy	
Credit: 04 (03+01)	**Lecture – 60 (45+15)**
MM: 100 = (ESE 80+IA 20)	**Minimum Passing Marks: 40%**

Title	**Biosystematics & Taxonomy**
Course Learning Outcome:	This Syllabus contains information about Biosystematics. Trends in Biosystematics. Dimensions of speciation & Taxonomic characte Procedure keys in Taxonomy.
Program Specific Outcome:	Students gain knowledge about • The basic taxonomy and Systematics trends in biosystematics. • Taxonomic characters and different keys of taxonomy. • Procedure keys in Taxonomy and Dimensions of Speciation & Taxonomic character.

Unit	Lectures	Topics	Credits
I	10	**Introduction to systematic and classification:** 1. Definition & basic concepts of Biosystematics and Taxonomy. Historical resume of systematic. 2. Taxonomic Hierarchy: Definition, Linnaean hierarchy and categories. 3. Classification: Purpose, use and basis. 4. Theories of Classification: Biological, artificial and natural classification. Levels of taxonomy: alpha, beta and gamma taxonomy. 5. Micro and macro taxonomy. 6. Scope and applications of biosystematics in biology. 7. The relevance of systematic in conservation programs.	0.75
II	10	**Taxonomic Characters and Scientific Nomenclature:** 1. Different types of taxonomic characters (morphological, physiological, ecological, ethological and geographical characters**).** 2. **Zoological nomenclature:** binominal and trinomial system, Principles and rules of International Code of Nomenclature (ICN), type material, author citation, Criteria for publication, types of names, principle of priority and its limitations.	0.75
III	10	**Taxonomic Keys, Taxonomic treatment and Phylogenetic:** 1. Types of taxonomic key their merits and demerits. 2. Type concept: Process of typification and different Zoological types and their applications. 3. Taxonomic treatment of Allopatric variation, homology and Reproductive and geographical isolating mechanisms and their role in Speciation process. 4. Evolutionary taxonomy: Cladistics. Constructing trees/ dendrograms : Phenogram, phylogram and cladogram and turning Them into classifications. 5. Mechanism of speciation in panmictic and apomictic species. 6. **Species concept:** different species concepts, **Species category:** sub-	0.75

|		species and other infra species categories.	
IV	15	**Procedure and Newer trends in biosystematics:** 1. Taxonomic Collection, Curetting, preservation, identification and classification. 2. **Newer trends in biosystematics:** Morphological, Embryological, Behavioral, Ecological, Cytological and Biochemical approach. 3. Numerical taxonomy. 4. Differential systematic. 5. Molecular Taxonomy. 6. DNA bar coding for identification of species.	0.75
Lab course	15	1. Study and sketch of museum specimens of Invertebrates and Vertebrates on the basis of systematic and Taxonomic Hierarchy 2. Preparation of identification keys for select specimens of non chordate (e.g., insects) and chordates (e.g., birds). 3. Make a record of biodiversity of college campus. Construct the dendrograms , through Interactive software for exploring phylogeny and analyzing character 4. Use DNA bar coding for identification of species. 5. General discussion, distinguishing characters and classification of selected animals. 6. Generation of a character -state matrix by selecting and scoring diagnostic taxonomic characters. 7. Distance -based methods of phylogenetic reconstruction using manual and computer methods. 8. Group discussion/Viva or Seminar presentation on two related topics 9. An "animal album or Practical Record" containing sketches, photographs, cut outs, with appropriate writes up about the above mentioned taxa. 10. Study of some videos to develop understanding on the animals of different taxa.	1
Recommended Books		*Text BooksRecommended* – • Lehninger –Principles of Biochemistry, WH Freeman. • Satyanarayan U - Biotechnology, Saras Publication . • Gupta P.K. –Elements of Biotechnology, Rastogi Publications. • Gupta P.K. Biotechnology and Genomics, Rastogi Publications. • Kumar Pranav, Verma Praveen, Meena Usha – Biotechnology: A problem approach- Pathfinder Publications. • Rastogi S.C., Rastogi P., MendirattaN :Bioinformatics: Methods and Applications: Genomics, Proteomics and Drug Discovery, PHI Learning. • Bosu Orpita, Thukral S .K.- Bioinformatics: Experiments, Tools, Databases, and logrithms – Oxford University Press *Reference Books Recommended* – • Lodish H et al.,- Freeman • Watson JD et al.-Macmillan - Recombinant DNA: Genes and Genomes, A Short Course. • Alberts B et al., Molecular Biology of the Cell, - Garland • Brown TA – Genomes, Garland	

Evaluation Scheme

Evaluation Scheme	Sections in Question Paper	Question type	Word Limit	No. of Questions	Marks per Question	Total
External	A	Very Short answer type	50	8	2	16
	B	Short answer type	100	4	6	24
	C	Long answer type	200	4	10	40
Internal	**Based on CT & Assignment/Project**					20
Total =						100

Evaluation Scheme of Practical

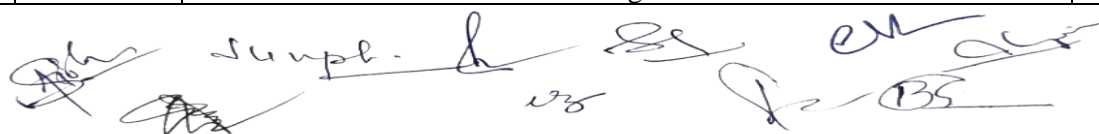|		
Practical	Experiment 01	12
	Experiment 02	08
	Experiment 03	04
	Spotting	16
	Viva	05
	Sessional	05
	Total -	**50**

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GOVT. DIGVIJAY AUTONOMOUS PG COLLEGE RAJNANDGAON (C.G.)
FYUGP (CBCS and LOCF Pattern)
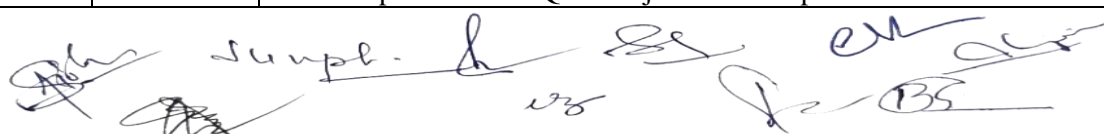
Department of Zoology
B.Sc. Honours
2025-26

Session: 2025-26	**Program: B.Sc.**
Semester: VII	**Subject: Zoology**
Course type: DSE-VII	**Course Code:**
Course Title : Biotechnology & Genetic Engineering	
Credit: 04 (03+01)	**Lecture – 60 (45+15)**
MM: 100 = (ESE 80+IA 20)	**Minimum Passing Marks: 40%**

Title	**Biotechniques & Genetic Engineering**
Course Learning Outcome:	Students will understand fundamental concepts of biotechnology, includi recombinant DNA technology, genetic engineering, and molecular techniques li PCR and cloning. They will learn applications in gene editing, stem cell biolog bioinformatics, and ethical issues. Students will also gain skills in DNA/RN purification, genome analysis, and modern biotechnological tools.
Program Specific Outcome:	The program equips students with comprehensive knowledge of biotechnology, genetic engineering, and bioinformatics. Graduates will develop skills in molecular techniques, genome analysis, and genetic manipulation. They will understand ethical implications, advance in biotechnological applications, and contribute to research, healthcare, agriculture, and environmental biotechnology sectors effectively.

Unit	Lectures	Topics	Credits
I	10	**Introduction to Biotechnology :** **1.** An overview of Biotechnology: History, Definition, scope, applications and ethical issues in biotechnology. Recombinant DNA , Restriction Enzymes, Application of different enzymes in Recombinant DNA technology, Restriction and modification system, Linkers & Adaptors, Restriction mapping. **2.** Vectors (Cloning and Expression Vectors) Gene Recombination and Gene transfer: Transfection, Transduction,Microinjection, Electroporation and Ultrasonication Antibiotic Resistant Gene and their mode of action. **3.** Polymerase chain reaction (PCR) : Principle and applications of different types of PCR . **4.** DNA and RNA Purification.	0.75
II	10	**Elementary Genetic Engineering:** **1.** Preparation and comparison of Genomic and cDNA library, screening of recombinants, Genome: organization, coding and non -coding sequences & genome mapping, Comparative genome hybridization. **2.** Whole genome shotgun sequencing, Chromosome Banding. Gene tagging, DNA Cloning, DNA Sequencing methods , DNA profiling. **3.** Genetic Markers, Molecular markers: Types & Features. **4.** Stem Cells**:** Embryonic Stem Cells , Adult Stem Cells and Induced Pluripotent Stem Cells, Formation and selection of recombinant ES cells, Role of ES cells in gene targeting in mice, Gene Probe, Colony Hybridization, Blotting Techniques (Southern, Northern, Western and Eastern Blotting) , Animal Cell Culture (Primary Cultures, Cell line, Transformation characteristics, Culture Media & Growth Cycle).	0.75
III	10	**Advancements in Genetic Engineering :** **1.** Random and site - directed mutagenesis: Primer extension and PCR	0.75

		based methods of site directed mutagenesis, Random mutagenesis.	
		2. Gene Editing, Gene shuffling, Genetic Manipulation of Animal Cells (Transgenesis and transgenic animals), Gene Knockout, Nuclear Transfer Technology and Animal Cloning, Gene Therapy, Gene Delivery System (Virus mediated transduction & non viral transduction methods).	
		3. Molecular Farming (Therapeutic products produced by genetic engineering-blood proteins, human hormones, immune modulators and vaccines), Microarrays and next generation sequencing technologies.	
IV	15	**Applications of Genetic Engineering & Bioinformatics :** 1. Cord blood banking, Genetically Modified Organism (GMO), Animals as bioreactors: Genetically engineered animals for research. Conditional knock outs using cre-loxP recombination; tissue specific promoters, CRISPR-Cas9 and its applications in treating genetic disorders. 2. Genetic modification of livestock for improved productivity and disease resistance. Ethical, Legal, and Social Implications (ELSI) of genetic engineering. 3. Bioinformatics: Overview and its relation with molecular biology. Biological Databases: Overview, Applications & Prospects .Examples of related tools(FASTA, BLAST, BLAT, RASMOL), databases(GENBANK, Pub med, PDB) and software(RASMOL,Ligand Explorer), Data generation; Generation of large scale molecular biology data. (Through Genome sequencing) File Format (Gene bank, DDBJ, FASTA, PDB, Swiss Prot). 4. Sequence gnments and Visualization, General Introduction of Biological Databases; Nucleic acid databases (NCBI, DDBJ, and EMBL). 5. Protein databases (Primary, Composite, and Secondary). 6. Specialized Genome databases: (SGD, TIGR, and ACeDB). Structure databases (CATH, SCOP, and PDB sum).	0.75
Lab course	15	1. Sterilization of glassware, media and laboratory. 2. Working principle and applications of - Hot Air Oven, Autoclave & Laminar flow hood. 3. Demonstration of cell culture techniques. 4. Demonstration of gene library and cDNA library. 5. Isolation of DNA from plant sample 6. Isolation of plasmid DNA from E. coli cells 7. Isolation of genomic DNA from whole blood. 8. Demonstration of Gel electrophoresis techniques. 9. Separation and visualization of DNA fragments using agarose gel electrophoresis. 10. Spectrophotometric estimation of isolated DNA. 11. Restriction digestion of plasmid DNA and genomic DNA. 12. Study related to working principle of PCR machine. 13. Preparation of Minimal Essential Growth medium. 14. Staining the cultured cells using dyes such as heamatoxylin and eosin (H&E), and 15. Observe them under a light microscope to study cell morphology and structure. 16. B0ioinformatics: Analyze DNA or protein sequences using online tools and databases. 17. Demonstration of online data bases for bioinformatics based studies. 18. Demonstration of DNA band visualization techniques (e.g., Ethidium bromide staining, DNA intercalating dyes) 19. Group discussion/ Quiz/Project/Seminar presentation on related	1

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Recommended Books	Text Books Recommended –
	- Lehninger –Principles of Biochemistry, WH Freeman. - Satyanarayan U - Biotechnology, Saras Publication . - Gupta P.K. –Elements of Biotechnology, Rastogi Publications. - Gupta P.K. Biotechnology and Genomics, Rastogi Publications. - Kumar Pranav, Verma Praveen, Meena Usha – Biotechnology: A problem approach- Pathfinder Publications. - Rastogi S.C., Rastogi P., MendirattaN :Bioinformatics: Methods and Applications: Genomics, Proteomics and Drug Discovery, PHI Learning. - Bosu Orpita, Thukral S .K.- Bioinformatics: Experiments, Tools, Databases, and logrithms – Oxford University Press *Reference Books Recommended –* - Lodish H et al.,- Freeman - Watson JD et al.-Macmillan - Recombinant DNA: Genes and Genomes, A Short Course. - Alberts B et al., Molecular Biology of the Cell, - Garland - Brown TA – Genomes, Garland.

Evaluation Scheme

Evaluation Scheme	Sections in Question Paper	Question type	Word Limit	No. of Questions	Marks per Question	Total
External	A	Very Short answer type	50	8	2	16
	B	Short answer type	100	4	6	24
	C	Long answer type	200	4	10	40
Internal	Based on CT & Assignment/Project					20
Total =						100

Evaluation Scheme of Practical

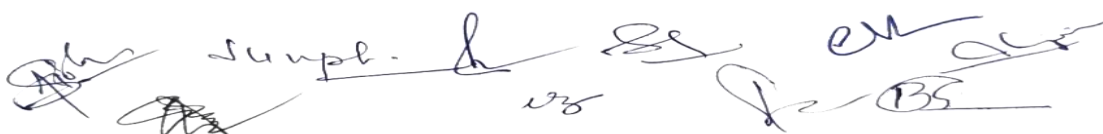| Practical	Experiment 01	12
	Experiment 02	08
	Experiment 03	04
	Spotting	16
	Viva	05
	Sessional	05
Total -		**50**

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GOVT. DIGVIJAY AUTONOMOUS PG COLLEGE RAJNANDGAON (C.G.)
FYUGP (CBCS and LOCF Pattern)

Department of Zoology
B.Sc. Honours
2025-26

Session: 2025-26	**Program: B.Sc.**
Semester: VII	**Subject: Zoology**
Course type: DSE-VIII	**Course Code:**
Course Title : Immunology	
Credit: 04 (03+01)	**Lecture – 60 (45+15)**
MM: 100 = (ESE 80+IA 20)	**Minimum Passing Marks: 40%**

Title	Immunology
Course Learning Outcome:	Students will understand fundamental immunological concepts, including innate a adaptive immunity, immune cells, antigen-antibody interactions, and immu system components. They will learn about immune disorders, vaccination, a advanced immunotechniques like ELISA and immunoelectrophoresis, enabli practical skills in immune analysis and disease diagnosis.
Program Specific Outcome:	Students will gain in-depth knowledge of immune system components, immune responses, and immunological disorders. They will develop practical skills in immunotechniques such as ELISA, immunodiffusion, and electrophoresis. This foundation enables them to apply immunology principles in research, diagnostics, clinical, and biotechnological fields effectively.

Unit	Lectures	Topics	Credits
I	10	**Understanding of Immunological Concepts:** 1. Immune System : Brief history of Immunity, Concept & Types of Immunity (Innate and Acquired or Adaptive), Origin and Evolution of Immune System. 2. Primary and Secondary lymphoid organs, lymphoid tissues. 3. Thymic Selection : Self and non self-recognition. Inflammation. Lymphocyt e trafficking Hematopoiesis.	0.75
II	10	**Components of Immune System I :** 1. Cells of Immune System: Structure and functions of macrophages, granulocytes, NK cells, T and B lymphocytes and Antigen presenting cells. 2. T & B Cell receptors, maturation, activation and differentiation of T& B. 3. Cell Antigen: Antigenicity v/s immunogenicity, F Factors affecting Immunogenicity, immunogen, haptens,super antigen, epitope, paratope. Adjuvants: Freund's complete and incomplete. 4. Processing and presentation of Ag.Major histocompatibility complex (MHC) and HLA. Cytokines	0.75
III	10	**Components of Immune System-II :** 1. Immunoglobulins : Nature, Primary structure of Immunoglobulins. 2. Enzymatic fragmentation of Ig. Domain structure of Ig and its significance. 3. Types and subtypes of Ig and its characteristics .Membranous antibody. 4. Antigenic determinants : isotype, allotype, idiotype . Abzymes. 5. Theories of Antibody Formation : Instructive, selective, clonal selection theories and evidences; Immunological memory. 6. Complement System. Hypersensitivity (Type I to IV with example) CMI & humoral immune response.	0.75

		7. Antigen - Antibody interaction : affinity & avidity.	
IV	15	**Immune disorders &Immuno-techniques :** 1. **Auto -immunity:** Auto -recognition, classes of auto-immuno diseases.(Hashimoto disease, Thyrotoxicosis, Systemic lupus erythematosus, Rheumatoid arthritis). 2. Transplantation: Autograft, Isograft, Allograft, Xenograft, Immunological basis of transplantation reactions. Immune Deficiencies:Primary and secondary immune deficiencies. 3. T-cell, B-cell and SCID, AIDS.Vaccination and types of vaccines (First,Second & Third generation vaccines). Immunological techniques: Precipitin curve, Immuno -diffusion, one and two dimensional, single radial immune - diffusion, (Double Ouchterlony) immune - diffusion. 4. Immuno-electrophoresis: Rocket immuno-electrophoresis; CIE, Graber and William technique. 5. Radio-immunoassay: ELISA–Principle, Methodology and applications. 6. Immuno-fluorescence: Direct, indirect and Sandwich, in situ localization by techniques :FISH and GISH Hybridoma, Monoclonal antibodies.	0.75
Lab course	15	1. Study of permanent slides of organs of immune system 2. Enumeration of total leucocytes from human blood samples 3. Enumeration of differential leucocytes from human blood samples 4. Demonstration of agglutination reaction using human RBC 5. Demonstration of Ag-Ab precipitation by immunodiffusion technique 6. Antigen detection by radial immunodiffusion technique (RID) 7. Estimation of total serum protein 8. Estimation of serum gamma globulins/Separation of globulin by salt precipitation. 9. Estimation of A/G ratio 10. Isolation of lymphocyte by using density gradient centrifugation 11. Paper and gel immune electrophoresis 12. Rocket immunoelectrophores is 13. Counter current immunoelectrophoresis 14. ELISA 15. Groupdiscussion/Quiz/Seminarpresentationonrelatedtopics 16. Making of Pract ical record.	1
Recommended Books		*Text Books Recommended –* • Pravash Sen. Gupta, Clinical Immunology. Oxford University Press. 2003. • N Arumugam, Immunology, Saras Publication. 2014. • Fatima D, Arumugam, Immunology , Saras Publication *Reference Books Recommended –* • Janis Kuby, Immunology, II edition. W. H. Freeman and Company, New York. 1993. • Ivan M. Roitt, J. Brostoff and D. K. Male, Immunology, Gower Medical Publishing, London.1993.	

Evaluation Scheme

Evaluation Scheme	Sections in Question Paper	Question type	Word Limit	No. of Questions	Marks per Question	Total
External	A	Very Short answer type	50	8	2	16
	B	Short answer type	100	4	6	24
	C	Long answer type	200	4	10	40
Internal		Based on CT & Assignment/Project				20
		Total =				100

Evaluation Scheme of Practical

Practical	Experiment 01	12
	Experiment 02	08
	Experiment 03	04
	Spotting	16
	Viva	05
	Sessional	05
	Total -	**50**

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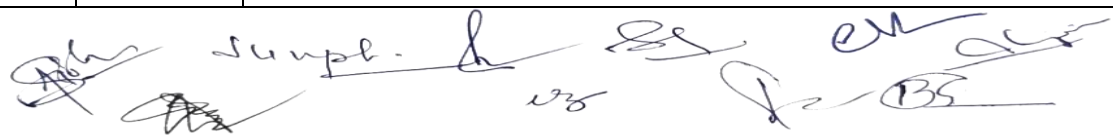
Session: 2025-26	Program: B.Sc.
Semester: VII	Subject: Zoology
Course type: DSE-IX	Course Code:
Course Title : Parasitology	
Credit: 04 (03+01)	Lecture – 60 (45+15)
MM: 100 = (ESE 80+IA 20)	Minimum Passing Marks: 40%

Title	Parasitology
Course Learning Outcome:	Students will understand virus, bacterial, fungal, protozoan, and helminth disease including their structure, classification, pathogenesis, diagnosis, and treatment. Th will gain practical skills in identifying pathogens, staining techniques, and specim analysis, preparing them for research, clinical diagnostics, and public hea applications in infectious disease management.
Program Specific Outcome:	This program equips students with comprehensive knowledge of viral, bacterial, fungal, protozoan, and helminth diseases, emphasizing pathogen biology, disease mechanisms, and diagnostics. It develops practical skills in specimen analysis, staining, and microscopy, preparing graduates for careers in microbiology, infectious disease research, clinical diagnostics, and public health management.

Unit	Lectures	Topics	Credits
I	10	**Viral diseases:** 1. General characters, Structure and Classification of virus , A brief account of pathogenic viruses. 2. Brief history of microbiology : germ theory of disease, Host pathogen interaction: invasion, antigenic heterogeneity, toxins and enzymes Secretions. 3. Viral diseases: hepatitis, influenza, AIDS, Covid -19 with emphasis on their causative agents, pathogenesis, diagnosis, prophylaxis and chemotherapy.	0.75
II	10	**Acterial &Fungal diseases** : 1. General characters, Structure and Classification of bacteria. 2. **Bacterial Diseases :** A brief account of pathogenic bacteria , discovery of penicillin, diseasescaused by *Streptococcus pneumonia, Salmonella typhi, Escherichia coli, Mycobacterium tuberculosis, Rickettsia, Spirochaetes.* 3. **Fungal diseases:** Ringworm infection , *Aspergillosis, candidiasis.*	0.75
III	10	**Protozoan parasites: An** overview of protozoa & disease. 1. Introduction to parasites and parasitic diseases. 2. Mode of transmission, portals of entry and implications of Parasitism. 3. Parasitic adaptations. 4. Concept of zoonotic diseases. 5. Protozoan diseases of medical importance: Brief account of life History, pathogenicity of the following Protozoa with reference to Man, prophylaxis and treatment :*Entamoeba histolitica, Trypanosoma gambiens, Plasmodium vivex , Giardi.*	0.75
IV	15	**Helminth parasites:** An overview of Helminthes diseases.Brief account of life	0.75

		1. History, pathogenicity of the following Helminths with reference to Man, prophylaxis and treatment - *Taenia solium, Schistosoma haematobium, Ascaris lumbricoides, Wuchereria branrofti.* 2. Vector insects.		
Lab course	15	1. Study of permanent slides and specimens of parasitic Protozoans and Helminthes. 2. Pathological examination of sputum, blood, urine and stool. 3. Blood: Erythrocyte Sedimentation Rate (ESR), Haematocrit. 4. Staining and identification of Grampositive and Gram negative bacteria. 5. Preparation of thin and thick blood films to diagnose Plasmodium infections/ or permanent slides. 6. Preparation of temporary and permanent slides of faecal matter by saline 7. preparation and concentration techniques to identify cysts of parasitic Protozoan's and 8. Helminthes eggs /or parmanant slides studies. 9. Study Kinetics of bacterial growth and staining techniques. 10. Group discussion or Seminar presentation on one or two related topics 11. Group discussion/quiz seminar on topics related to theory. 12. Preparation of practical record or Album of parasites.		1
Recommended Books		*Text Books Recommended –* • Agrawal Anju Principles of Toxicology. • Parija, S. C. (2013) Textbook of Medical Parasitology, Protozoology & Helminthology (Text and color Atlas), IV Edition, All India Publishers & Distributers, New Delhi. • Ichh pujani, R.L. and Bhatia, R. (2009) Medical Parasitology. III Edition, Jaypee BrothersMedical Publishers (P) Ltd., New Delhi. • Ahmed, N., Dawson, M., Smith, C. and Wood, Ed. (2007) Biology of Disease. Taylor andFrancis Group. • Chatterjee, K. D. (2009). Parasi tology: Protozoology and Helminthology. XIII Edition, CBSPublishers & Distributors (P) Ltd. • Arora, D. R and Arora, B. (2001) Medical Parasitology. II Edition. CBS Publications and Distributors. • Chatterjee, K.D (2015) Parasitology (13th edition) *Reference Books Recommended –* • Jawetz, M. and Adelberg (2015) Medical Microbiology (27th edition) • Noble, E.R. and Noble, G.A. (1989) Parasitology: The Biology of Animal Parasites. VIEdition, Lea and Febiger.		

Evaluation Scheme

Evaluation Scheme	Sections in Question Paper	Question type	Word Limit	No. of Questions	Marks per Question	Total
External	A	Very Short answer type	50	8	2	16
	B	Short answer type	100	4	6	24
	C	Long answer type	200	4	10	40
Internal	**Based on CT & Assignment/Project**					20
Total =						100

Evaluation Scheme of Practical

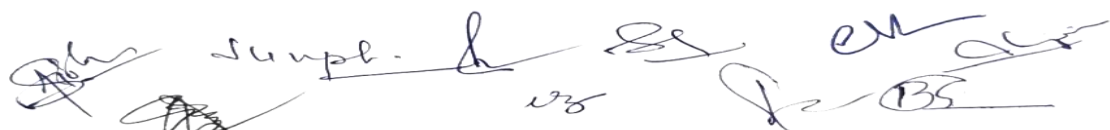|		
Practical	Experiment 01	12
	Experiment 02	08
	Experiment 03	04
	Spotting	16
	Viva	05
	Sessional	05
	Total -	**50**

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GOVT. DIGVIJAY AUTONOMOUS PG COLLEGE RAJNANDGAON (C.G.)
FYUGP (CBCS and LOCF Pattern)

Department of Zoology
B.Sc. Honours
2025-26

Session: 2025-26	**Program: B.Sc.**
Semester: VII	**Subject: Zoology**
Course type: GE - III	**Course Code:**
Course Title : Research Methodology	
Credit: 04 (03+01)	**Lecture – 60 (45+15)**
MM: 100 = (ESE 80+IA 20)	**Minimum Passing Marks: 40%**

Title	Research Methodology
Course Learning Outcome:	Students will understand research fundamentals, including problem formulation, hypothesis development, and research design. They will learn effective sampling, data collection, and analysis methods like ANOVA and Chi-square tests. The course enhances skills in ethical research conduct, literature review, and scientific report writing for academic and professional excellence.
Program Specific Outcome:	This program develops students' abilities to design, conduct, and analyze research effectively. It equips learners with skills in problem formulation, hypothesis testing, sampling techniques, data collection, and statistical analysis. Graduates gain proficiency in ethical research practices, literature review, and scientific report writing for academic and professional success.

Unit	Lectures	Topics	Credits
I	10	Introduction to research definition, Nature, Scope and Significance. Types of research, characteristics of a good research. Qualities of Researcher, introduction to review of literature.	0.75
II	10	Research process defining research problem, components of research Problem. Title formulation, hypothesis. Types of hypothesis Research Design- Exploratory , descriptive and Experimental Research design	0.75
III	10	Sampling design, criteria of selective a sampling procedure , characteristics of good sample design, sampling procedure, characterics of good sample design, sampling Errors, Sampling methods. Measurement and scaling, methods of collection of primary and secondary data, process of questionnaire design, processing of data- Editing, coding, classification and tabulation	0.75
IV	15	Analysis and Report Writing- Hypothesis testing, one way and two way ANOVA; Chi square test. Introduction to Non Parametric Test: Report writing. Essentials, Structure /Layout, presentation of Result , Ethical Norms in Research , Plagiarism.	0.75
Lab course	15	**Project work:** 1. how to decide thesis, project and Research paper title 2. synopsis writing 3. Review writing 4. Data presentation through table and Graphs.	1

	5. how to write Bibliography 6. how to write concluding remark 7. project work summary presentation through PPT 8. one research paper writing in any peer reviewed Journal 9. Viva –Voice.	
Recommended Books	• "Research Methodology: Methods and Techniques" C.R. Kothari & Gaurav Garg , New Age International. • "Research Methodology: A Step-by-Step Guide for Beginners" Ranjit Kumar,SAGE Publications. • Methodology of Research in Social Sciences", O.R. Krishnaswami, Himalaya Publishing House. • "Research Methods for the Behavioral Sciences" Frederick J. Gravetter & Lori-Ann B. Forzano,Cengage Learning. • "Business Research Methods" Donald R. Cooper & Pamela S. Schindler, McGraw-Hill Education. *Reference Books Recommended –* • Research Design: Qualitative, Quantitative, and Mixed Methods Approaches" John W. Creswell & J. David Creswell, SAGE Publications. • "The Foundations of Social Research: Meaning and Perspective in the Research Process" Michael Crotty,SAGE Publications.	

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Evaluation Scheme of Practical

Practical	Experiment 01	12
	Experiment 02	08
	Experiment 03	04
	Spotting	16
	Viva	05
	Sessional	05
Total -		**50**

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