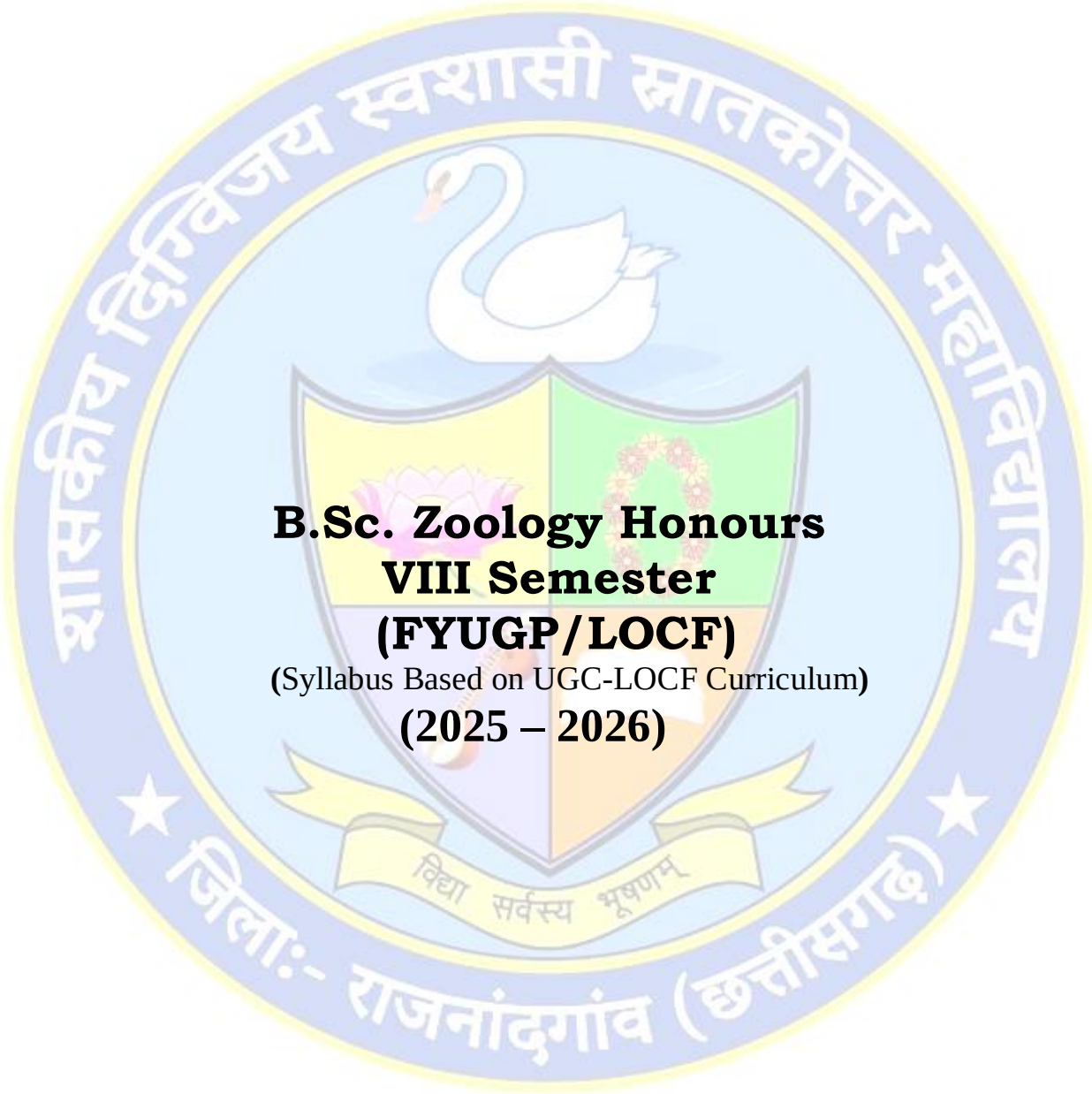
GOVT. DIGVIJAY P.G. AUTONOMOUS COLLEGE RAJNANDGAON (C.G.)

DEPARTMENT OF ZOOLOGY



B.Sc. Zoology Honours
VIII 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 Zoology
VIII - Semester
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	1	15	-	-	50
	GE- III	Research Methodology	3	45	20	80	100
		Project	1	15	-	-	50
Total			20	300	100	480	750
VIII	DSC –VIII	Biotechniques	3	45	20	80	100
		Lab Course	1	15	-	-	50
	DSE- X	Basics of Computer and Biostatistics	3	45	20	80	100
		Lab Course	1	15	-	-	50
	DSE- XI	Vertebrates Physiology	3	45	20	80	100
		Lab Course	1	15	-	-	50
	DSE- XII	Developmental Biology	3	45	20	80	100
		Lab Course	1	15	-	-	50
	DSE- XIII	Molecular Biology	3	45	20	80	100
		Lab Course	1	15	-	-	50
Total			20	300	100	480	750

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: VIII	**Subject: Zoology**
Course type: DSC- VIII	**Course Code:**
Course Title : Biotechnique	
Credit: 04 (03+01)	**Lecture – 60 (45+15)**
MM: 100 = (ESE 80+IA 20)	**Minimum Passing Marks: 40%**

Title	**Biotechniques**
Course Learning Outcome:	Students will understand various microscopy techniques, microtomy processes, and tissue slide preparation. They will learn physiological tools like pH meters and spectrophotometry, chromatography and electrophoresis principles, and cell culture methods. Additionally, students will gain knowledge of sterilization techniques and lab bioethics for safe and ethical laboratory practice.
Program Specific Outcome:	Students will gain comprehensive knowledge of microscopy types, microtomy techniques, and tissue preparation. They will learn physiological tools like spectrophotometry and centrifugation, along with chromatography and electrophoresis principles. Skills in cell culture, sterilization, and lab bioethics prepare them for safe, ethical, and effective laboratory practices.

Unit	**Lectures**	**Topics**	**Credits**
I	10	**Microscopy and Microtomy:** **1. Types of Microscope:** Basic Principle, configuration and working of Light Microscope (Bright and Dark Field), Magnification & Resolution, and Numerical Aperture,Phase Contrast Microscope, Fluorescence Microscope,Conifocal Microscope Electron Microscope (SEM and TEM). **2. Microtomy** : Permanent slide preparation Through microtome :Tissue-preparation fixation, dehydration, **block** –preparation, trimming, **Cutting sections (sectioning / Ribbon)** - handling, affixing on the side, labeling and storage , **staining** the microtomy slides.	0.75
II	10	**Tools and techniques in Physiology:** Principle and applications of pH meter, Centrifugation, Colorimetry and Spectrophotometry -UV, visible spectrophotometer, Infra-red spectrophotometer, NMR and ESR.	0.75
III	10	**Chromatography and Electrophoresis:** **1. Chromatography:** Principle and Applications of Paper chromatography, Thin layer chromatography and Gel-filtration chromatography. 2. **Electrophoresis:** Principle and Applications of Agarose gel electrophoresis, Polyacrylamide, Gel electrophoresis , PAGE,2D PAGE.	0.75
IV	15	**Cell culture and Lab Bioethics:** **1.** Cell culture and its basic requirements. **2. Culture media:** Nutrient and Non-nutrient media, Types of animal cell culture : Pure Culture - Pour Plate Method, Streak Plate Method and Spread Plate Method. **3. Media preparation** of Animal Cell culture, viability testing, cell harvesting and storage method with special reference to Lymphocytes and stem cell culture. **4.** *In Vitro* cultureof Entamoeba *histolytica, Coenorhabditis elegans*	0.75

		5. **Sterilization technique** (Physical Method: Autoclave sterilization , Hot air Sterlization, U V sterilization, filtration and chemical Method: alcohol, Formalin and Chromic acid), sterilization of glass wares, Media and laminar flow, Flow cytometery. 6. **Lab Bioethics:** Lab safety, disposal of bio –waste.	
Lab course	15	**1.** Study and handling of Compound Microscope, pH meter, Colorimeter, Centrifuge, **2.** Spectrophotometer, Chromatography Chamber, ElectrophorosisUnit, Microtome. **3.** Sterilization of Lab equipments. **4.** Determination of pH of different soil samples & water samples. **5.** Determination of maximum absorption. **6.** Separation of Amino acids, plant pigment and sugar by paper and thin layer **7.** chromatography **8.** Separation of DNA and RNA through Paper & Gel Electrophoresis **9.** Separation of particles by Centrifuge. Preparation of Permanent slides through Microtome. **10.** Preparation of Temporary and Permanente slides of some microscopic organisms. **11.** Pure culture of cell. **12.** Cell fractionation **13.** Contour drawing through Camera Lusida Preparation of Practical Record. **14.** Group discussion/Viva or Seminar presentation on above mentioned topics.	1
Recommended Books		• Pearse, A.G.E. (1980-1993) Histochemistr-Theoretical and applied, Volume I -III, Churchill - Livingstones. • Plummer, D. (2017) An Introduction to Practical Biochemistry (3 rd edition) McGraw Hill. • Wilson, K. and Walker, J. (2010) Experimental Biochemistry, Cambridge. Practical. • Swarup N, Arora S and Pathak SC, Laboratory Techniques in Modern Biology. Kalyani Publishers. • SharmaB.K,Principles of Instrumentation Goel Publishing House • Upadhayay Upadhayay & Nath, Principles of Instrumentation , Himalaya Publishing House. • Chatwal G R&Anand Sharma , Principles of Instrumental method of Chemical Analysis, HimalayaPublishing House. • Arumugam N, Kumaresan V, Biotechniques Saras Publication. • Ghatak K L, Techniques and Methods in Biology PHI Learning	

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: VIII	**Subject: Zoology**
Course type: DSE- XI	**Course Code:**
Course Title : Basics of Computer and Biostatistics	
Credit: 04 (03+01)	**Lecture – 60 (45+15)**
MM: 100 = (ESE 80+IA 20)	**Minimum Passing Marks: 40%**

Title	**Basics of Computer and Biostatistics**
Course Learning Outcome:	Students will understand computer fundamentals, including hardware, software, number systems, and MS Office applications. They will learn data collection, classification, and presentation techniques using tables and graphs. Students will grasp statistical concepts such as central tendency, dispersion, correlation, regression, probability distributions, and significance tests like t-tests and ANOVA.
Program Specific Outcome:	This syllabus equips students with foundational knowledge of computer systems, software applications, and digital concepts, enabling effective data management and analysis. It develops skills in statistical methods, hypothesis testing, and interpretation of data, preparing learners for research, data-driven decision-making, and problem-solving in various scientific and professional fields.

Unit	Lectures	Topics	Credits
I	10	**Unit -I: Computer structure and Applications:** History of Computers, Structure of Computers, Classification of Computers, Introduction to digital computer - basic knowledge of hardware & software**,** CPU, Input and Output devices, Computer Codes : Decimal System, Binary number system, hexadecimal system, octal system, Conversion of numbers. Introduction to MS Office-MS Word, MS Excel, MS Power point, Introduction of Internet, web-mail, various search engine, Plagiarism, Artificial Intelligence (AI).	0.75
II	10	**Unit-II: Data collection, presentation, and Measures of central tendency:** Collection and classification of data. Presentation of data: by Tables -rules for making tables, use of tables, Types of tables, By Graphs : rules for making graph & it's uses, Pie chart, Bar diagram, Histogram, Frequency polygon, Cumulative frequency curve (Ogive and Polygon). Measures of central tendency: Arithmetic Mean, Median, Mode.	0.75
III	10	**Dispersion Correlation and Regression:** Measures of dispersion: Standard deviation and Standard error. Correlation: Types, significance and application of correlation, calculation of correlation in continuous data and ordinal data. Regression: Linear regression, regression coefficient.	0.75
IV	15	**Probability and Analysis of Significant Test:** Probability: normal, binomial Distribution and Poisson distributions. Hypothesis testing, Test of significance: Paired and unpaired t-test and Chi square test. Analysis of Variance (one & two way ANOVA).	0.75
Lab course	15	**1.** Exercise based on Microsoft word. **2.** Study of hardware & software.	

		3. PPT Slide preparation using Microsoft Power Point. **4.** Data collection. **5.** Analyzing Data manually and through computer :Mean, Median, Mode, SD, SE ,Correlation and regression and its interpretation. **6.** Tabular &Graphical presentation of data manually and using excel **7.** Hypothsis testing by *t*-test, Chi -square test and ANOVA **8.** Group discussion/Quiz/Seminar presentation on related topics. **9.** Practical Recordor Lab assignment.	1
Recommended Books		***Text Books Recommended –*** • Balagurusamy, E. (2011) Fundamentals of Computers, McGraw Hill Education, Rajaraman, V.: Fundamentals of Computers, 5th edition, PHI Learning Pvt. Ltd., 2010 • Sinha, P., Sinha, P.K.(2004),Computer Fundamentals: Concepts, Systems and Applications, 8th edition, BPB Publications . • Khanal, A.B. (2015),Mahajan's Methods in Biostatistics, The Health Sciences Publishers. ***Reference Books Recommended –*** • Daniel, W.W. (2012)Biostatistics: A Foundation for Analysis in Health Sciences (10th edition) John Wiley. • Milton, J.S.& Tsokos,J.O. (1992) Statistical Methods in the Biological and Health Sciences 2nd edition) McGraw Hill. • Zar, JH , (2010), Biostatistical Analysis, Prentice -Hall/Pearson, 2010.	

Evaluation Scheme

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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: VIII	**Subject: Zoology**
Course type: DSE- XII	**Course Code:**
Course Title : Vertebrates Physiology	
Credit: 04 (03+01)	**Lecture – 60 (45+15)**
MM: 100 = (ESE 80+IA 20)	**Minimum Passing Marks: 40%**

Title	**Vertebrates Physiology**
Course Learning Outcome:	This syllabus enables students to understand cellular transport mechanisms, digestion, respiration, circulation, excretion, nerve impulse transmission, and receptor physiology. It develops knowledge of muscle contraction, reproduction, and thermoregulation, equipping learners with comprehensive insights into physiological processes essential for biomedical and life sciences applications.
Program Specific Outcome:	The program develops advanced understanding of cellular transport, physiological processes of digestion, respiration, circulation, excretion, and nerve function. It equips students with knowledge of muscle contraction, reproduction, and thermoregulation, fostering skills essential for careers in biomedical research, healthcare, and applied life sciences.

Unit	Lectures	Topics	Credits
I	10	**Cell Physiology: Cell membrane and transport mechanism:** Transport across membrane: osmosis, passive diffusion- simple and facilitated, & Active transport Mechanism of active transport Primary & secondary active transport, endocytosis and exocytosis, Vescicular Transport: Protein sorting from ER to Golgi, Retrograde transport, Transport across Mitochondrial membrane ; pH and its biological significance, Buffer: buffers in biological system, Regulation of pH by Lung and Kidney..	0.75
II	10	**Physiology of Digestion Respiration and Circulation: Physiology of Digestion:** • Biological significance of nutrients: carbohydrates, proteins, fats, vitamins and minerals. • Physiology of digestion with special reference to enzyme involved, Absorption of Carbohydrate, protein and lipid **Breathing mechanism:** Pulmonary ventilation, Respiratory volumes and capacities. • Transport of Oxygen and Carbon dioxide in blood. **Composition of blood** , blood groups, Theories of blood coagulation. • Conduction and Regulation of Heart beat, Cardiac, cycle, Cardiac output, Integration of Cardiovascular function, electrocardiogram (ECG).	0.75
III	10	**Physiology of Excretion, nerve impulse transmission and Receptor Physiology:** • **Physiology of excretion,: Nephron:** Structure, Types and their functions Mechanism of Urineformation, Counter current Mechanism, role of ADH and Renin- Angiotensin- Aldosterone system in Excretion, **Mechanism of Osmoregulation** in fresh water and marine and terrestrial vertebrates, Stenohalinity and Euryhalinity. • **Nerve Physiology:** Structure and functions of neuron, ionic basis of resting and action potentials, nerve impulse and its transmission,	0.75

		synapse and synaptic transmission, Reflex action. • **Receptor physiology-** Physiology of Vision, Physiology of Hearing and balancing, Mechano, chemo reception, Bioluminescence.	
IV	15	**Physiology of Reproduction, Muscle Contraction & Thermoregulation:** • **Physiology of Reproduction:** male reproduction: hormonal control of Spermatogenesis,female reproduction: hormonal Control of Oogenesis, menstrual cycle and its hormonal control. • **Muscle Contraction:** Structure and types of muscles, striated, non-striated and cardiac muscles, Molecular structure of muscles protein Actin and Myosin. Physiology of muscles contraction, Theories of Muscles Contraction. • **Thermoregulation:** Mechanism in Homeotherms and Poikilotherm.	0.75
Lab course	15	• Hematological practical : Determine blood group, RBC and WBC counting technique, clotting time • Preparation of haemine crystal • Measurement of Blood Pressure through sphygmomanometer. • Action of salivary amylase on starch • Biochemical analysis of food • Determination of oxygen consumption with the help of Respirometer • Preparation of casein from milk • Study of permanent histological section slides of (esophagus , stomach, duodenum, ilium , pancreas ,liver trachea kidney spinal cord, bone, cartilage & blood cells) mammal, • Demonstration of technique of microtome to have hands-on experience and learning of the technique • Glycolysis, Krebs's cycle, electron transportation demonstrate through Chart / Photographs • Preparation of Practical record group discussion /quiz / **A** small project report applying the knowledge	1
Recommended Books		***Text Books Recommended–*** • Verma P S , Tyagi B S, Agarwal VK *Animal Physiology*.*Author*,. Edition, illustrated. Publisher, S.Chand Publishing, 2000 -Science- 432 pages • *Berry AK*, A Textbook of *Animal Physiology By*(Second edition Emkay publication • Dr. C. C. Chatterjee, Human physiology, Vol. I & II, 1980, 12th Edn., Medical Applied Agency, Kolkata • Nagabhushanam, S. V. S. Rana, S. Kalavathy Text book of Animal Physiology, 2008, 2nd Edn., Oxford University Press, India. ***Reference Books Recommended –*** • Ian Kay, 2000, Introduction to Animal Physiology, Bios Scientific Publishers Limited. • Guyton A. C. & Hall J. E., 2006, Textbook of Medical Physiology, 11th Edition, Hercourt Asia Pvt. Ltd. / W. B. Saunders Company • Tortora G. J. & Grabowski S.,Principles of Anatomy & Physiology, 2006, 11th Edition, John Wiley & sons, Inc. • Schmidt -Nielsen, Knut, Animal Physiology: Adaptation and Environment, 1997, Cambridge University Press.	

	• Hoar W. S., General and Comparative Physiology, 1983, 3rd Edn., Prentice Hall, UK.7. • Barret , K.; Brooks, H.; Boitano, S. and Barman, S. (2010) Ganong's Review of Medical Physiology (23rd edition) Lange Medical. • Guyton, A.C. and Hall, J.E. (2006) A text book of Medical Physiology (11th edition) Saunders. • Keele, C.A. & Neil, E. (1989) Samson Wright's Applied Physiology (13th edition) Oxf.

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: VIII	**Subject: Zoology**
Course type: DSE- XII	**Course Code:**
Course Title : Developmental Biology	
Credit: 04 (03+01)	**Lecture – 60 (45+15)**
MM: 100 = (ESE 80+IA 20)	**Minimum Passing Marks: 40%**

Title	**Developmental Biology**
Course Learning Outcome:	• To understand the origin, structure, formation, and biochemical regulation of male and female gametes, including fertilization processes and causes of infertility. • To study embryological development stages such as cleavage, germ layer differentiation, morphogenesis, organogenesis, and mechanisms of regeneration and metamorphosis. • To explore advanced reproductive technologies, reproductive health issues, and the impact of teratogens, endocrine disruptors, and sexually transmitted diseases on human reproduction.
Program Specific Outcome:	• Students will be able to explain the processes of gamete formation, fertilization, and early embryonic development, including the biochemical and physiological mechanisms involved. • Students will understand key concepts of embryology such as cleavage, germ layer differentiation, morphogenesis, organogenesis, and the regulation of development and regeneration. • Students will gain knowledge about reproductive technologies, causes and treatments of infertility, and the impact of teratogens, endocrine disruptors, and sexually transmitted diseases on reproductive health.

Unit	**Lectures**	**Topics**	**Credits**
I	10	**Gametes Biology :** • Biology of sexed termination and differentiation , Origin of primordial germ cells. • Morphology of different types of gametes Male gamete and female gamete. • Formation of Gametes: Process of Spermatogenesis. , Biochemical changes in spermatogenesis and control of spermatogenesis, Seminat ion. • Process of Oogenesis, Biochemical changes in Oogenesis and control of Oogenesis ,Vitellogenesis . • Structure and composition of yolk . • Ovulation and ovum transport in mammals. • Infertility in Male and female: Causes and Cure. • Fertilization: external and internal fertilization, Recognition of gametes, capacitation, acrosome reaction, activation of egg metabolism, migration of pronuclei, amphimixis and post fertilization changes in the egg cytoplasm. • Block to polyspermy. Parthenogenesis.	0.75
II	10	**Embryology :** Cleavage pattern and mechanism of cleavage, physiology of cleavage	0.75

		Mosaic and regulative development, Direct and indirect development, Body plan and symmetries. Germ layer differentiation. Tubulation. Morphogenesis: Epiboly,Emboly/ invagination, involution and ingression. Fate maps: Methods of construction of fate map, fate map of Amphioxus, Amphibians and Chick. Formative movements, Metamorphosis: Innsect and in frog. Hormonal regulation of metamorphosis. Cell signaling, cell adhesion during tissue organization, lateral inhibition, induction, and recruitment. Organogenesis: formation of gut, heart, idneyandmuscles , molecular mechanism involved. Pleuropotency.	
III	10	**Developmental Biology:** • **Organizer concept:** Types, characteristics & mechanism of organizer. • Extra embryonic membranes: Development and functions in chick. Axis Formation in Drosophila,Metamorphosis in insect and in Frog. Hormonal regulation of metamorphosis. • Placenta: Structure, functions and its types. • Regeneration: Types - epimorphosis, morphollaxis and compensatory regeneration , mechanisms and physiological processes involved in regeneration, ability of regeneration in invertebrates and vertebrates, difference between embryogenesis and regeneration and tissue repair. • Concept of competence, determination and differentiation and growth Ageing and apoptosis.	0.75
IV	15	**Reproductive Technology and Reproductive Health : *In vitro* fertilization:** • Artificial insemination (AI); Gamete intra-fallopian transfer (GIFT) , Intra -cytoplasmic sperm injection(ICSI) , Zygote Intra Fallopian Transfer (ZIFT), Test tube baby. • Causes of Infertility. Multiple ovulation and embryo transfer Technology (IVF and IVET) , Pre implantation genetic diagnosis (PGD) Ethics in surrogacy. • Teratology & teratogens: wound healing, birth defects, developmental brain disorders. • Neuro degeneration. Endocrine Disruptors & Cancer. • Causes of Sexually transmitted diseases: HIV/AIDS & Human Papillomavirus (HPV), Syphilis Menstrual Disorders, Polycystic Ovarian Disease & Polycystic Ovarian Syndrome (PCOD & PCOS).	0.75
Lab course	15	1. Types of eggs based on quantity and distribution of yolk: sea urchin, insect, frog, Chick. 2. Comparative study of cleavage patterns in Frog and Amphioxus models. 3. Study of cell movement, shape and size during morphogenetic movement of Blastulation, Gastrulation in Frog, Amphioxus, Chick through models and charts. 4. Study of whole mounts and sections of developmental stages of frog through permanent slides: blastula, gastrula, neurula (Neural plate, Neural fold and Neural tube stages), tai-bud stage, tadpole (external and internal gill stages) 5. Study of whole mounts of developmental stages of chick through permanent Slides -18 hours, 24 hours, 33 hours, 48 hours, 72 hours and 96 hours of incubation. 6. Extra embryonic membranes of chick through models and	1

		charts. 7. In vivo study of chick embryo development by windowing and candling Methods. (Demonstration only) 8. Some videos to develop understanding on the process of development. 9. Group Discussion/Quiz/Seminar / Project related topics	
Recommended Books		**Text BooksRecommended –** • Agrawal V K, Evolution and Developmental Biology, S Chand Publication • Verma P S, Agrawal V K, Chordate Embryology, S Chand Publication • Arumugam N, Embryology , Saras Publication • Shasrti K V, Shukla Vinita, Developmental Biology, Rastogi Publication **Reference Books Recommended –** • Gerhart, J. et al. (1997) Cells, Embryos and Evolution. Blackwell Science • Gilbert, S.F. (2010) Developmental Biology (9th edition). Sinauer. • Wolpert, L. (2007) Principles of Developmental Biology (3rd edition). Oxford University Press	

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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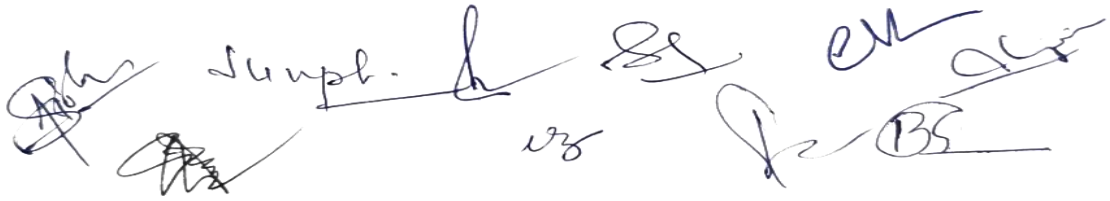

GOVT. DIGVIJAY AUTONOMOUS PG COLLEGE RAJNANDGAON (C.G.)

FYUGP (CBCS and LOCF Pattern)

Department of Zoology

B.Sc. Honours

2025-26

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

Title	**Molecular Biology**
Course Learning Outcome:	• To introduce students to the structure, organization, and functional dynamics of chromosomes and nucleic acids in prokaryotic and eukaryotic systems. • To provide understanding of fundamental molecular mechanisms including DNA replication, transcription, RNA processing, and translation. • To familiarize students with gene expression regulation, mutation, DNA repair systems, RNA silencing, and modern tools like CRISPR technology.
Program Specific Outcome:	• Students will be able to describe the structure and function of chromosomes, DNA, and RNA, including chromatin organization and various forms of nucleic acids. • Students will understand the molecular processes of DNA replication, transcription, RNA processing, and translation in both prokaryotic and eukaryotic cells. • Students will be able to explain gene regulation mechanisms, mutation types, DNA repair, and advanced concepts like RNA silencing and CRISPR technology.

Unit	**Lectures**	**Topics**	**Credits**
I	10	**Chromosomes and Nucleic Acids:** • Chromosomes structure: Chromatin (Euchromatin and heterochromatin), Types of chromosomes. Histones, Histone modifications. • Structure of Nuclic acids: Structure and functions of DNA , DNA forms: Plasmid DNA,Genomic DNA And Repetitive DNA. • DNA polymorphisms. DNA modifications. • Structure and Function of RNA: Ribosomal RNA (rRNA), Transfer RNA (tRNA), Messenger RNA (mRNA) , Noncoding RNA. RNA Induced Silencing Complex and CRISPR Technology. • Mutation: Chromosomal and gene mutation.	0.75
II	10	**Central dogma and DNA replication:** • Central dogma of Molecular Biology. • DNA methylation. DNA - Protein interaction. • DNA Replication , plasmid DNA replication and genomic DNA replication, Centromeric and Telomeric DNA replication, DNA replication and cell cycle regulation. • DNA polymerases. DNA damaging agents. DNA repairing.	0.75
III	10	**Transcription:** • Concept of Transcription, RNA polymerase I, II, III, transcription factors. • RNA processing, splicing of hnRNA into mRNA, 5'capping and 3' polyadenylation of mRNA, rRNA and tRNA modifications and	0.75

		processing. RNA editing, alternative splicing, trans-splicing, miRNA, siRNA, piRNA, lncRNA, RNA-protein complex.	
IV	15	**Translation:** • Structure of Ribosome, Genetic Code, triplet codons, Wobble base , Synonymous codons, degeneracy of codon . • Translation in prokaryotic and Eukaryotic cells (Aminoa cylation of t-RNA, initiation, elongation, peptide bond formation, translocation, Termination, recycling of ribosome). • Post-translational modifications and processing of proteins, large protein-protein complexes and protein trafficking Reregulation of protein synthesis in prokaryotic and eukaryotic cell.	0.75
Lab course	15	**1.** Preparation of ball and stick model for B-DNA molecule (A=T and G=C base pairs). **2.** Preparation of RNA model for tRNA, mRNA and rRNA molecule (A=U and G=C base pairs) **3.** Preparation of Central dogma model with reference to Replication, Transcription and Translation i.e., Linear flow of genetic information. **4.** Isolation of genomic DNA by ethanol precipitation method. **5.** Preparation of model pBR322 **6.** Agarose gel electrophoresis of the plasmid DNA and the genomic DNA. **7.** Chromosomal staining **8.** Temporary slide preparation of Salivary gland chromosome from drosophila larva **9.** Group discussion/Quiz/Seminar presentation on related topics. **10.** Practical Record or Lab assignment.	1
Recommended Books		***Text Books Recommended*** **–** • Chaudhari K, Molecular Biology Text book IFAS Publication • Verma P.S., Agrawal V.K., Molecular Biology S Chand. ***Reference Books Recommended-*** • Watson, J.D. *et al.* (2013) Molecular Biology of the Gene (7th edition) CSHL Press Pearson. • Green, M. R and Sambrook, J. (2012) Molecular Cloning: a Laboratory Protocol (4th edition) CSHL Press. • Walter, P. (2007) Molecular Biology of the Cell (5th edition) Garland Science. • Cell Biology by De Roberties Gene by Lewine 7 th to 11th edition	

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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