FOUR YEAR UNDERGRADUATE PROGRAM (NEP-2020)

Program: Bachelor in Science (2024 -28)
DISCIPLINE – ZOOLOGY

Session – 2024 -25

	Session -	- 2024 -25		
	DSC -01 to 08	DSE -01 to 12		
Code	Title	Code	Title	
ZOSC -01T	Life on Earth and Unique Attributes of Animal Kingdom	ZOSE -01T	Parasitology	
ZOSC -01P	Life on Earth and Unique Attributes of Animal Kingdom	ZOSE -01P	Parasitology	
ZOSC -02T	Cell Biology and Histology	ZOSE -02T	Ecology and Wild life Conservation & Management	
ZOSC -02P	Cell Biology and Histology	ZOSE -02P	Ecology and Wild life Conservation & Management	
ZOSC -03T	Diversity of Invertebrates	ZOSE -03T	Biochemistry	
ZOSC -03P	Diversity of Invertebrates	ZOSE -03P	Biochemistry	
ZOSC -04T	Diversity of Chordates and Comparative Anatomy	ZOSE -04T	Evolutionary Biology	
ZOSC -04P	Diversity of Chordates and Comparative Anatomy	ZOSE -04P	Evolutionary Biology	
ZOSC -05T	Vertebrate Physiology	ZOSE -05T	Endocrinology	
ZOSC -05P	Vertebrate Physiology	ZOSE -05P	Endocrinology	
ZOSC -06T	Genetics .	ZOSE -06T	Immunology	
ZOSC -06P	Genetics	ZOSE -06P-	Immunology	
ZOSC -07T	Biosystematics and Taxonomy	ZOSE -07T	Biotechnology and Genetic Engineering	
ZOSC -07P	Biosystematics and Taxonomy	ZOSE -07P	Biotechnology and Genetic Engineering	
ZOSC -08T	Biotechniques	ZOSE -08T	Applied Zoology	
ZOSC -08P	Biotechniques	ZOSE -08P	Applied Zoology	
	7,	ZOSE -09T	Basics of Computer & Biostatistics	
		ZOSE -09P `	Basics of Computer & Biostatistics	
		ZOSE -10T	Behaviour & Chronobiology	
		ZOSE -10P	Behaviour & Chronobiology	
	•	ZOSE -11T	Developmental Biology	
		ZOSE -11P	Developmental Biology	
		ZOSE -12T	Molecular Biology	
		ZOSE -12P	Molecular Biology	
	GE -01 & 02		VAC	
ZOGE -01T	Life on Earth and Unique Attributes of Animal Kingdom	ZOVAC-01	Public health and Hygiene	
ZOGE -01P	Life on Earth and Unique Attributes of Animal Kingdom		SEC	
ZOGE -02T	Cell Biology and Histology	ZOSEC-01	Vermiculture	
ZOGE -02P	Cell Biology and Histology			

Program Outcomes (PO):

- > Demonstrate and apply the fundamental knowledge of the basic principles of major fields of Zoology and Modern tools and techniques
- > Analyse complex interactions among the various animals of different phyla, their distribution and their relationship with the environment.
- Gain knowledge of small scale industries like sericulture, fish farming, bee keeping, aquaculture, animal husbandry, poultry farm.
- Apply the knowledge and understanding of Zoology to one's own life and work.
- > Develops empathy and love towards the animals and consciousness for wild life conservation

Program Specific Outcomes (PSO):

- Perform procedures as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, Applied Zoology, Behaviour, Endocrinology, Immunology, Biostatistics, Parasitology, Biochemistry, Evolution, Developmental Biology, Animal biotechnology, Tools and Techniques of Zoology.
- > Understand the applications of biological sciences in Apiculture, Aquaculture, Sericulture, Animal Husbandry, Poultry Farm.
- > Understand the applications of Zoology in Medicine and daily life
- > Contributes the knowledge for Nation building and sustainable development

Officer-In-Charge (Academic)
Shaheed Nandkumar Patel
Vishwavidyalaya, Raigarh (C.G.)

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eed Nandkumar Patel

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF ZOOLOGY

Progr	ram: Bachelor in Life	duction					
Cern	ficate / Diploma / Degre	e/Honore)	Sen	nester - I	Sacriam, 2024 202	_	
1	Course Code	ZOSC-01T			Session: 2024-202	5	
2	Course Title	Life on Forth	171				
	Course Type	Discipling C	nd Unique	Attributes of	Animal Kingdom		
4	Pre-requisite (if, any)	Discipline Speci	lie Course				
	requisite (ii, any)			As per p	rogram		
5	Course Learning, Outcomes (CLO)	After successfully completing this course, the students will be a Develop an understanding of concepts, mechanisms, e significance and relevance of Origin of life. > Understand General Idea about Invertebrate and Vertebrate and special reference and their specific qualities. > Understand and appreciate diversity of life forms. > Apply the knowledge about animals Sciences in daily life.					
6	Credit Value	Tippiy me	Miowledge (about animals S	ciences in daily life.		
7	Total Marks	Total Marks Credit = 15 Hours - learning & Observation					
PAR		Max. Marks:	100		Min Passing Marks: 40		
		the Course					
	Total No. of Teac	ning-learning P	eriods (01	Hr. per perio	od) - 45 Periods (45 Hour	<u>c)</u>	
Unit		To	nics (Con	rse contents	, 10 10 110 110 110 110 110 110 110 110	No. 01	
I	Origin of life: Theorie	e of Oninia cris			ch),Theory of Panspermia or	Dania	
Spontaneous Generation (Abiogenesis or Autogenesis), Theory of Biogenesis: Redi's and Pasture's Experiment. Modern Theory: Origin of Universe: Big Bang Hypothes Origin of Solar System and The Earth: Nebular hypothesis, Atomosphere an Sources on Primitive Earth, Biochemical Origin of Life: Oparin and Halda Chemogeny: Formation of simple and complex organic compounds (Stanely Miller Experiment), Formation of Coacervates, Nucleic Acids. Biogeny: Origin of primitive cell. Evolution of modes of Nutrition: Chemohetertrophs, Anaerobic an Systematics & Unique attributes of Life.					parin and Haldane Theory, is (Stanely Miller and Ure's rigin of primitive prokaryotic Anaerobic and Aerobic	12	
III	Systematics & Unique attributes of Invertebrate and Vertebrate animals with special reference to Coelentrata, Mollusca and Pisces: Definition and difference between Invertebrate and Vertebrate. Nomenclature: Binomial and Trinomial Nomenclature and International code of Nomenclature Corals: Meaning of Coral, Structure of Coral polyp, Coral Skeleton, Types of corals: Hydrozoan Coral, Example-Millipora, Octocorallian Coral, Example-Alcyonium, Hexacorallian Corals, Example-Gorgonia. Torsion in Mollusca: Definition, Mechanism of Torsion, Effects of Torsion, Salmon fish and Parental care in fishes: By nest formation, Coiling round eggs, Attachment to body, Integumentary cups, Shelter in mouth, Brood pouch, Mermaids purses, Viviparity.						
IV	Parental care in Amphibia: by Nest, by Nursery or Shelter and by Parents Neoteny in Amphibia: Definition, Partial and Total Neotony, Factors Affecting Neotony, Examples-Axolotal larva, Necturus and Siren. Reptilia: Venomous & Non-venomous Snakes: Unique attributes of Vertebrote animals.						
1 4	Birds: Flight Adaptation	on, Migration and F	orening wie	chanism, Flight	ess Birds (Morphology and rds are glorified reptiles:		

Officer-In-Charge (Automis)
Shaheed Nandkumar Patel
Vishwavidyalaya, Raigarh (C.G.)

andkumar Patel idyalaya, Raigarh (C.G

Text Books Recommended

- E. J. W. Barrington, Invertebrate structure and function, English Language Book Society UK
- Robert Barnes, Invertebrate Zoology, Robert Barnes IVth edition Holt Saunders International Edition Japan
- Park Haswell, Marshall and Williams, A textbook on Zoology Invertebrate, AITBS Publishing and Distributers, Delhi
- Park Haswell, Marshall and Williams, A textbook on Zoology Vertebrate, AITBS Publishing and Distributers, Delhi

Reference Books Recommended

- Prof R. L. Kotpal, Protozoa to Echinodermata, Rastogi Publication Meerut
- E.L. Jordan, Dr. P. S. Verma, Invertebrate Zoology, S. Chand Publications, New Delhi
- N. Arumugam, N. C. Nair S. Invertebrate Zoology, Saras Publication.
- N. Arumugam, N. C. Nair S. vertebrate Zoology, Saras Publication.
- Barrington E. J. W., Invertebrate Structure and Function, Nelson London
- Barnes, R. D., Invertebrate Zoology Saunders Philadelphia
- R. L. Kotpal, Invertebrate, Rastogi Publications
- R. L. Kotpal, Vertebrate, Rastogi Publications
- H. S. Bhampah, KavitaJuneja, Recent trends in vertebrates vol 1 9, Anmol Publication
- S. N. Prasad, Life of invertebrates, Vikash Publication House Pvt Ltd New Delhi
- G. S. Sandhu, HarshwardhanBhagskar Advanced invertebrate zoology Campus books international

Online Resources-

- > https://www.coursera.org/lecture/emergence-of-life/4-5-invertebrates-successes-of-lifewithout-a-backbone-WQHqS
- > https://www.shiksha.com/online-courses/introduction-to-biology-biodiversity-coursecourl5385
- > https://www.youtube.com/watch?v=k121Qv6loBA
- > https://www.youtube.com/watch?v=uK-Xx OCYcI
- > https://www.youtube.com/watch?v=vybbBil5Elk
- > https://www.youtube.com/watch?v=WxMSckEeio4

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Internal Test / Quiz-(2): 20 +20 Assignment / Seminar -Assessment (CIA): Total Marks -(By Course Teacher) 30

Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks .

End Semester

Two section - A & B

Exam (ESE):

Section A: Q1. Objective – 10 x1 = 10 Mark; Q2. Short answer type- 5x4 = 20 MarksSection B: Descriptive answer type qts., 1 out of 2 from each unit-4x10=40 Marks

Signature of Convener & Members (CBoS):

dkumar Patel /alaya, Raigarh (C.G.)

Officer-In-Charge (Appl 1996) Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DPARTMENT OF ZOOLOGY COURSE CURRICULUM

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Officer-In-Charge (Academic) Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.)

Text Books, Reference Books and Others

Text Books Recommended -

- > S.S. Lal, Practical Zoology, Invertebrate. 12th Edition Rastogi Publications, Meerut, o New Delhi.
- A manual of practical Zoology. Dr. P.S Verma, S. Chand Publication, New Delhi Reference Books Recommended -
 - > Park Haswell, Marshall and Williams, A textbook on Zoology Invertebrate, AITBS Publishing and Distributers, Delhi
 - > Park Haswell, Marshall and Williams, A textbook on Zoology Vertebrate, AITBS Publishing and Distributers, Delhi

Online Resources-

- http://ndl.iitkgp.ac.in/he_document/swayamprabha/swayam_prabha/gc5ua6m873i?e=3|*||
- > https://www.youtube.com/watch?v=JUdp3U6A1EA

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:

50 Marks

Continuous Internal Assessment (CIA):

15 Marks

End Semester Exam (ESE):

35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)

Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05

Better marks out of the two Test / Quiz + obtained marks in Assignment shall be

Total Marks -15

considered against 15 Marks

End Semester

Laboratory / Field Skill Performance: On spot Assessment

Managed by

Exam (ESE):

A. Performed the Task based on lab. work B. Spotting based on tools & technology (written) - 10 Marks as per lab. status C. Viva-voce (based on principle/technology)

- 20 Marks Course teacher

Name and Signature of Convener & Members of CBoS:

ndkumar Patel lyalaya, Raigarh (C.G.

Officer-In-Charge (Auadamic) Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF ZOOLOGY COURSE CURRICULUM

		ntroduction		Γ	
	ogram: Bachelor in ertificate / Diploma / De	1	Semester - II	Session: 2024-	2025
1	Course Code	ZOSC- 02T			
2	Course Title	Cell Biology and	Histology		
3	Course Type	Discipline Specif	ic Course		
4	Pre-requisite (if, any)		As per Pr	ogram	
5	Course Learning Outcomes (CLO)	After successfully completing this course, the students will be all Acquire knowledge of Cell membrane and function > Understand the functioning of nucleus and extra nuclear organel understand the intricate cellular mechanisms involved. > Gain Knowledge of key processes like cell division, > Learn about various tissues of body their structural significance			
6	Credit Value	3 Credits		- learning & Observa	
7	Total Marks	Max. Marks:			40
ΊΑ	RT -B: Conter	nt of the Cou		-	
	Total No. of Teac	hing-learning Pe	riods (01 Hr; per period	d) - 45 Periods (45 Ho	urs)
Uni			cs (Course contents)	, , , , , , , , , , , , , , , , , , , ,	No. o
Ī			nd Extra Nuclear Cell	Organelles: General	Perio
II	Model and Fluid m Specialization of of Desmosome, plasm Ultra structure and	ipid Bilayer Mode osaic model), chen cell membrane: mi nodesmata, tight an functions of Endon	ryotes. Cell membrane of the composition and function and function and function. Extra Number of the composition and Gold associated and fulltra structure and further structure structures are structured as a structure and structure structures are structured as a structure and structure structures are structured as a structure and structured as a structure and structured as a structure and structured as a	Model, Unit Membrane action of cell membrane, emidesmosome, Septate aclear Cell Organelles:	
TTT	Lysosome, Peroxiso	omes, Mitochondria	a: Origin structure and for	nction	11
Ш	interphase nucleus. general organization Cell cycle, Cell div regulation. Program	Nuclear Organization and Cell Division: Size, shape, structure and functions of interphase nucleus. Ultra structure of nuclear membrane and pore complex. Nucleolus: general organization, chemical composition and functions, Chromosome Morphology, Cell cycle, Cell division- Mitosis and Meiosis. Cell division checks points and their regulation. Programmed cell death (Apontosis)			
137	modifications. Basement membrane: structure and characteristics. Connective tissue cells. Structure and function of loose, dense and adipose tissue. Cartilage and bone: classification, and fine structure. Blood: plasma, blood cells, lymph— their structure and function. Bone marrow and haemopoesis. Structure and function of spleen. Muscular tissue: ultrastructure of smooth, skeletal and cardiac muscles. Muscle-tendon attachment. Structure and classification of neurons.				
IV	cells. Structure and classification, and f and function. Bone Muscular tissue: ultrattachment. Structure	function of loose, ine structure. Block marrow and had astructure of smooth and classification.	dense and characterist dense and adipose tissu d: plasma, blood cells, emopoesis. Structure and th, skeletal and cardiac m	tics. Connective tissue e. Cartilage and bone: lymph— their structure d function of spleen. uscles. Muscle-tendon	11
IV	cells. Structure and classification, and f and function. Bone Muscular tissue: ultrattachment. Structure Cell Biology, Cell Membi	function of loose, ine structure. Bloc marrow and has astructure of smooth and classification trane, Cell organelle.	dense and adipose tissu dense and adipose tissu de plasma, blood cells, emopoesis. Structure and th, skeletal and cardiac mof neurons. Nucleus endoplasmia retio	tics. Connective tissue e. Cartilage and bone: lymph— their structure d function of spleen. uscles. Muscle-tendon	
vords	cells. Structure and classification, and f and function. Bone Muscular tissue: ultrattachment. Structure	function of loose, function of loose, ine structure. Block marrow and had astructure of smook and classification rane, Cell organelle, exisomes, Mitochondo	dense and adipose tissued: plasma, blood cells, emopoesis. Structure and th, skeletal and cardiac mof neurons. Nucleus, endoplasmic retication, tissues.	tics. Connective tissue e. Cartilage and bone: lymph— their structure d function of spleen. uscles. Muscle-tendon	
vords	cells. Structure and classification, and f and function. Bone Muscular tissue: ultrattachment. Structure Cell Biology, Cell Membribosome, lysosome, pero	function of loose, function of loose, ine structure. Block marrow and had astructure of smook and classification rane, Cell organelle, exisomes, Mitochondo	dense and adipose tissued: plasma, blood cells, emopoesis. Structure and th, skeletal and cardiac mof neurons. Nucleus, endoplasmic retication, tissues.	tics. Connective tissue e. Cartilage and bone: lymph— their structure d function of spleen. uscles. Muscle-tendon	

ec Kardkumar Patel dyalaya, Raigarh (C.G.

Officer-In-Charge (Academic) Shaheed Nandkumar Patel Shwavidyalaya, Raigarh (C.G.)

Text Books, Reference Books and Others

Text Books Recommended -

- 1. Gupta P.K. Cell and Molecular Biology, Himalaya Publication
- 2. Arumugam.N, Cell biology and Molecular Biology, Saras Publication
- 3. Rastogi V.B. Cell Biology, Rastogi Publication
- 4. Verma P.S. and Agrawal Cell Biology, S. Chand Publication

Reference Books Recommended -

- 5. Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments (6th edition) John Wiley & Sons. Inc.
- 6. De Robertis, E.D.P. and De Robertis, E.M.F. (2006) Cell and Molecular Biology (8th edition) Lippincott Williams and Wilkins, Philadelphia.
- 7. Cooper, G.M. and Hausman, R.E. (2009) The Cell: A Molecular Approach. (5th edition) ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
- 8. Becker, W.M.; Kleinsmith, L.J.; Hardin. J. and Bertoni, G. P. (2009) The World of the Cell. (7th edition) Pearson Benjamin Cummings Publishing, San Francisco. Practical

Online Resources-

1. National digital Library.-

http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loY0poaUVtYlByc1BZNX k3TnZMWVFzQXpZNjhhQUplR1BTOERHelZXZUp5Nw

2. http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loZFJyVGFmaDFwbXpBS 0kwNi9tbi91UGYxaFl6OC9Sb25QWUIXLzF1V3NUZw

3. https://www.youtube.com/watch?v=GYY627IeAKg

4. E-PG Pathshala.

https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=2rAs1Puvga4LW93zMe83aA===

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Internal Test / Quiz-(2): 20 +20 Assessment (CIA): Assignment / Seminar -

10 Total Marks -(By Course Teacher)

Better marks out of the two Test / Quiz + obtained marks in Assignment shall be 30 considered against 30 Marks

End Semester

Two section - A & B

Section A: Q1. Objective – $10 \times 1 = 10$ Mark; Q2. Short answer type- $5 \times 4 = 20$ Marks Exam (ESE): Section B: Descriptive answer type qts., 1 out of 2 from each unit-4x10=40 Marks

Name and Signature of Convener & Members of CBoS:

dkumar Patel laya, Raigarh (C.G.

Officer-In-Charge (Authoritie) Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) Department of ZOOLOGY Course Curriculum

10	Program: Bachelor Certificate / Diploma / L	legree / University	Semester - II	Session: 2024	2025		
1	Course Code	ZOSC-02P					
2	Course Title		·				
3	Course Type		Cell Biology and Histology Discipline Specific Lab Course				
4) Discipline Speci					
5	As per Program After successfully completing this course, the students will be able Understand ultra structure of prokaryote and Eukaryote cell, under microscopic study to gain knowledge learn to identify cell organelles Explain and demonstrate mitosis and meiosis division in onion root Grass hopper testis, etc Gain knowledge of Microtomy						
6	Credit Value	1 Credits	Credit = 30 Hours I al				
7	Total Marks	Max. Marks:	50	ratory or Field learning/			
A	RT-B: Content o	f the Course		Min Passing Marks:			
	Total No.	of learning-Traini	ng/performance Perio	ds: 30 Periods (30 Hours)			
Lab.	./Field 1. Study of proka	To	pics (Course conten	ts)	No. of Period		
xpe Con	3. Disruption of conuclei. ourse 4. Isolation of midehydrogenase in 5. Chromosome se	ells, isolation and ide tochondria by differ the mitochondrial p	entification of subcellular crential centrifugation and bellet.	chart, slide and video. Init gravity. omponents, isolation of identification of succinic r observation of stages of			

(9) Nandkumar Patel dyalaya, Raigarh (C.G

Officer-In-Charge (Academic)
Shaheed Nandkumar Patel
Vishwavidyalaya, Raigarh (C.G.)

Text Books, Reference Books and Others

Text Books Recommended -

- Debarati Das Essential Practical Handbook of Cell Biology & Genetics, Biometry & Microbiology, A Laboratory Manual, Academic Publishers.
- 2. Mohan P Arora Cytogenetics:, Himalayan Publishing House

Reference Books Recommended -

3. Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments (6th edition) John Wiley & Sons. Inc.

Online Resources-National Digital Library

http://ndl.iitkgp.ac.in/he document/inflibnet epgp/inflibnet epgp/IN I e P P 1 Z 51296 P 1 P o e 51600 M 0 P g 51604 51605?e=13|*|||

PART -D: Assessment and Evaluation							
Suggested Continuous	Suggested Continuous Evaluation Methods:						
Maximum Marks:	50 Marks						
Continuous Internal A	ssessment (CIA): 15 Marks						
End Semester Exam (E	ESE): 35 Marks						
	Internal Test / Quiz-(2): 10 & 10	Dotton montes out of the Thirt Co.					
Assessment (CIA):	Assignment/Seminar +Attendance - 05	The state of the thought out					
(By Course Teacher)	Total Marks - 15	+ obtained marks in Assignment shall be considered against 15 Marks					
End Semester	Laboratory / Field Skill Performan	considered against 15 Marks					
Exam (ESE):	A. Performed the Task based on lat	ce: On spot Assessment Managed by					
~ (ESE).	B. Spotting based on tools & techno	o. work - 20 Marks Course teacher logy (written) - 10 Marks as per lab. status					
	C. Viva-voce (based on principle/ted	chnology) - 05 Marks as per lab. status					

Name and Signature of Convener & Members of BoS:

Mindkumar Patel Iyalaya, Raigarh (C.G.

Officer-In-Charge (Academic)
Shaheed Nandkumar Patel
Vishwavidyalaya, Raigarh (C.G.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 - 28) DEPARTMENT OF ZOOLOGY

Course Curriculum

			urse Curriculum					
PART- A: Introduction								
	gram: Bachelor in Life dificate / Diploma / Degre		Semester - I	Session: 2024-202	5			
1	Course Code	ZOGE - 01T						
2	Course Title		nd Unique Attributes of A	Animal Kingdom				
3	Course Type	General Elective						
4	Pre-requisite (if, any)		As per pro	ogram				
	Tre requisite (ii, any)	4.64	C. H Isting this course	the students will be ab	le to-			
5	Course Learning Outcomes (CLO) Develop an understanding of concepts, mechanisms, every significance and relevance of Origin of life. Understand General Idea about Invertebrate and Vertebrate animals special reference and their specific qualities. Understand and appreciate diversity of life forms.							
6	Credit Value	3 Credits	Credit = 15 Hours	s - learning & Observation				
7	Total Marks	Max. Marks:	100	Min Passing Marks: 40				
PAR	T-B: Content of	the Course		1. 1. (45 Hour	(c)			
	Total No. of Teacl	ning-learning Po	eriods (01 Hr. per period) - 45 Periods (45 Hour	No. of			
Unit		Ton	ics (Course contents)		Period			
I								
	Origin of life: Theories of Origin of life: Ancient Theory Theory of Special Creation (Mythological approach), Theory of Panspermia or Cosmozoic Theory, Theory of Directed Panspermia, Theory of Catastrophism, Theory of Spontaneous Generation (Abiogenesis or Autogenesis), Theory of Biogenesis: Redi's Experiment and Pasture's Experiment. Modern Theory: Origin of Universe: Big Bang Hypothesis in Brief, and Pasture's Experiment. Modern Theory: Origin of Universe: Big Bang Hypothesis in Brief, and Pasture's Sources and The Earth: Nebular hypothesis, Atomosphere and Eneargy Origin of Solar System and The Earth: Nebular hypothesis, Atomosphere and Eneargy Sources on Primitive Earth, Biochemical Origin of Life: Oparin and Haldane Theory, Chemogeny: Formation of simple and complex organic compounds (Stanely Miller and Ure's Experiment), Formation of Coacervates, Nucleic Acids. Biogeny: Origin of primitive prokaryotic cell. Evolution of modes of Nutrition: Chemohetertrophs, Anaerobic and Aerobic							
п	Photoautotrophs. Evolution of Eukaryotes. Systematics & Unique attributes of Invertebrate and Vertebrate animals with special reference to Coelentrata, Mollusca and Pisces: Definition and difference between Invertebrate and Vertebrate. Nomenclature: Binomial and Trinomial Nomenclature and International code of Nomenclature Corals: Meaning of Coral, Structure of Coral polyp, Coral Skeleton, Types of corals: Hydrozoan Coral, Example-Millipora, Octocorallian Coral, Example-Alcyonium, Hexacorallian Corals, Example-Gorgonia. Torsion in Mollusca: Definition, Mechanism of Torsion, Effects of Torsion, Significance of Torsion. Pisces: Migration in fishes: Catadromous: Eel fish and Anadromous: Selmon fish and Parental care in fishes: By nest formation, Coiling round eggs, Attachment to							
Ш	body, Integumentary cups, Shelter in mouth, Brood pouch, Mermaids purses, Viviparity. Unique attributes of Vertebrate animals with special reference to Amphibia & Reptilia: Parental care in Amphibia: by Nest, by Nursery or Shelter and by Parents Neoteny in Amphibia: Definition, Partial and Total Neotony, Factors Affecting Neotony, Examples-Axolotal larva, Necturus and Siren. Reptilia: Venomous & Non-venomous Snakes: Identification, Poison apparatus: Poison Glands, Poison ducts and Fangs, Biting Mechanism.							
IV	Unique attributes of Vertebrate animals with special reference to Aves and Mammals: Birds: Flight Adaptation, Migration and Perching Mechanism, Flightless Birds (Morphology and Special Characters of Emu, Ostrich and Penguins), Discuss-Birds are glorified reptiles: Archaeopteryx. Monotremes or Egg laying mammals: Morphology and Special Characters of Echidna and Duck bill platypus. Aquatic Mammals: Morphology and Special Characters of Whale and Dolphin. Mammals: Flying Mammals: Morphology and Special Characters of Bat.							
ywords			orsion, parental care, Neolony,	rangs, Aves, Mammais				
ignatu	re of Convener & Memb	ers (CBOS):						
il dialin of my								

inchumar Patel Pa, Raigarh (C.G.)

Officer-In-Charge (Mandados)
Shaheed Nandkumar Patel
Vishwavidyalaya, Raigarh (C.G.)

Text Books Recommended

- E. J. W. Barrington, Invertebrate structure and function, English Language Book Society UK
- Robert Barnes, Invertebrate Zoology, Robert Barnes IVth edition Holt Saunders International Edition Japan
- Park Haswell, Marshall and Williams, A textbook on Zoology Invertebrate, AITBS Publishing and Distributers, Delhi
- Park Haswell, Marshall and Williams, A textbook on Zoology Vertebrate, AITBS Publishing and Distributers, Delhi

Reference Books Recommended

- Prof R. L. Kotpal, Protozoa to Echinodermata, Rastogi Publication Meerut
- E.L. Jordan, Dr. P. S. Verma, Invertebrate Zoology, S. Chand Publications, New Delhi
- N. Arumugam, N. C. Nair S. Invertebrate Zoology, Saras Publication.
- N. Arumugam, N. C. Nair S. vertebrate Zoology, Saras Publication.
- Barrington E. J. W., Invertebrate Structure and Function, Nelson London
- Barnes, R. D., Invertebrate Zoology Saunders Philadelphia
- R. L. Kotpal, Invertebrate, Rastogi Publications
- R. L. Kotpal, Vertebrate, Rastogi Publications
- H. S. Bhampah, KavitaJuneja, Recent trends in vertebrates vol 1 9, Anmol Publication
- S. N. Prasad, Life of invertebrates, Vikash Publication House Pvt Ltd New Delhi
- G. S. Sandhu, HarshwardhanBhagskar Advanced invertebrate zoology Campus books international

Online Resources-

- > https://www.coursera.org/lecture/emergence-of-life/4-5-invertebrates-successes-of-lifewithout-a-backbone-WQHqS
- > https://www.shiksha.com/online-courses/introduction-to-biology-biodiversity-coursecourl5385
- https://www.youtube.com/watch?v=k121Qv6loBA
- > https://www.youtube.com/watch?v=uK-Xx OCYcI
- > https://www.youtube.com/watch?v=vybbBil5Elk
- https://www.youtube.com/watch?v=WxMSckEeio4

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods: 100 Marks Maximum Marks: Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (E	SE): 70 Mai	rks	
Continuous Internal	Internal Test / Quiz-(2): 20	+20	Better marks out of the two Test / Quiz +
Assessment (CIA):	Assignment / Seminar -	10	obtained marks in Assignment shall be
(By Course Teacher)	Total Marks -	30	considered against 30 Marks
End Semester	Two section - A & B		

Exam (ESE):

Section A: Q1. Objective -10 x1 = 10 Mark; Q2. Short answer type- 5x4 = 20 MarksSection B: Descriptive answer type qts., 1 out of 2 from each unit-4x10=40 Marks

Signature of Convener & Members (CBoS:

Wkumar Patel

valayà, Raigarh (C.G.) Gifficer-In-Charge 🔿

Shaheed Nandkumar Patel fishwayidyalaya, Raigarh (C.G.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 - 28) DPARTMENT OF ZOOLOGY

Course Title Life on Earth and Unique Attributes of Animal Kingdom Course Type General Elective As per Program After successfully completing this course, the students will be able to- To demonstrate comprehensive understanding of the current theories an hypotheses regarding the origin of life on Earth, Understand diversity of life forms Identify some distinctive invertebrate and vertebrate animals Apply this Understanding to broader context of life Credit Value 1 Credits Credit = 30 Hours Laboratory or Field learning/Training Total Marks Max. Marks: 50 Min Passing Marks: 20 PART -B: Content of the Course Total No. of learning-Training / performance Periods: 30 Periods (30 Hours) Module Topics (Course Contents) Study of origin of life through chart and models Study of different Invertebrates and Vertebrates animals through models and museum specimens in the laboratory with details of biogeography and diagnostic features: Millipora, Alcyonium, Gorgonia, Hippocampus, Ichthyophis (Female), Alytes (Male), Axolotal larva, Necturus, Siren, Cobra, Viper (pit & Pitless), Sea Snake, Rattle Snake, Archaeopteryx, Emu, Ostrich and Penguins, Echidna and Duck bill platypus, Whale, Dolphin, Bat. Preparation and Demonstration of Key for Identification of Venomous and Non-venomous snakes. Study of Coral Reefs through Models, Photographs 30				Cours	E CURRICULUM				
Course Code ZOGE - 01P	PA	ART-	A: II	ntroductio	n				
Course Title Life on Earth and Unique Attributes of Animal Kingdom Course Type General Elective As per Program After successfully completing this course, the students will be able to- To demonstrate comprehensive understanding of the current theories an hypotheses regarding the origin of life on Earth, Understand diversity of life forms Identify some distinctive invertebrate and vertebrate animals Apply this Understanding to broader context of life Credit Value 1 Credits Credit = 30 Hours Laboratory or Field learning/Training Total Marks Max. Marks: 50 Min Passing Marks: 20 PART -B: Content of the Course Total No. of learning-Training / performance Periods: 30 Periods (30 Hours) No. of Periods (Course Contents) Study of origin of life through chart and models Study of different Invertebrates and Vertebrates animals through models and museum specimens in the laboratory with details of biogeography and diagnostic features: Millipora, Alcyonium, Gorgonia, Hippocampus, Ichthyophis (Female), Alytes (Male), Axolotal larva, Necturus, Siren, Cobra, Viper (pit & Pitless), Sea Snake, Rattle Snake, Archaeopteryx, Emu, Ostrich and Penguins, Echidna and Duck bill platypus, Whale, Dolphin, Bat. Preparation and Demonstration of Key for Identification of Venomous and Non-venomous snakes. Study of Coral Reefs through Models, Photographs Study of Fossils through chart/ Models An "Animal album or Practical Record" containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa. Study of some videos to develop understanding and acquired knowledge on the animals salient features as mentioned above. Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paper. Keywords Museum specimens, Invertebrates, Vertebrates, Venomous and Non-venomous, Seminar					Semester - I	Session: 2024-2	2025		
Course Type General Elective	1	Cours	se Code						
After successfully completing this course, the students will be able to- To demonstrate comprehensive understanding of the current theories an hypotheses regarding the origin of life on Earth, Understand diversity of life forms Identify some distinctive invertebrate and vertebrate animals Apply this Understanding to broader context of life Credit Value 1 Credits Credit = 30 Hours Laboratory or Field learning/Training Total Marks Max. Marks: 50 Min Passing Marks: 20 PART - B: Content of the Course Total No. of learning-Training / performance Periods: 30 Periods (30 Hours) No. of learning-Training / performance Periods: 30 Periods (30 Hours) Study of origin of life through chart and models Study of different Invertebrates and Vertebrates animals through models and museum specimens in the laboratory with details of biogeography and diagnostic features: Millipora, Alcyonium, Gorgonia, Hippocampus, Ichthyophis (Female), Alytes (Male), Axolotal larva, Necturus, Siren, Cobra, Viper (pit & Pitless), Sea Snake, Rattle Snake, Archaeopteryx, Emu, Ostrich and Penguins, Echidna and Duck bill platypus, Whale, Dolphin, Bat. Preparation and Demonstration of Key for Identification of Venomous and Non-venomous snakes. Study of Fossils through chart/ Models An "Animal album or Practical Record" containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa. Study of some videos to develop understanding and acquired knowledge on the animals salient features as mentioned above. Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paper. Museum specimens, Invertebrates, Vertebrates, Venomous and Non-venomous, Seminar	2	Cours	se Title	Life on Earth a	e on Earth and Unique Attributes of Animal Kingdom				
After successfully completing this course, the students will be able to- To demonstrate comprehensive understanding of the current theories an hypotheses regarding the origin of life on Earth, Understand diversity of life forms Identify some distinctive invertebrate and vertebrate animals Apply this Understanding to broader context of life Credit Value 1 Credits Credit=30 Hours Laboratory or Field learning/Training PART - B: Content of the Course Total No. of learning-Training / performance Periods: 30 Periods (30 Hours) Module Topics (Course Contents) Study of origin of life through chart and models Study of different Invertebrates and Vertebrates animals through models and museum specimens in the laboratory with details of biogeography and diagnostic features: Millipora, Alcyonium, Gorgonia, Hippocampus, Ichthyophis (Female), Alytes (Male), Axolotal larva, Necturus, Siren, Cobra, Viper (pit & Pitless), Sea Snake, Rattle Snake, Archaeopteryx, Emu, Ostrich and Penguins, Echidna and Duck bill platypus, Whale, Dolphin, Bat. Preparation and Demonstration of Key for Identification of Venomous and Non-venomous snakes. Study of Fossils through chart/ Models An "Animal album or Practical Record" containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa. Study of some videos to develop understanding and acquired knowledge on the animals salient features as mentioned above. Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paper. Museum specimens, Invertebrates, Vertebrates, Venomous and Non-venomous, Seminar	3	Cours	se Type	General Electiv	General Elective				
To demonstrate comprehensive understanding of the current intervies and hypotheses regarding the origin of life on Earth, bypotheses regarding the origin of life on Earth, bypotheses regarding the origin of life on Earth, bypotheses regarding the origin of life on Earth, by Understand diversity of life forms Identify some distinctive invertebrate and vertebrate animals Apply this Understanding to broader context of life	4	Pre-r	equisite (if, any)		As per Pi	rogram			
Total Marks Max. Marks: 50 Min Passing Marks: 20 PART -B: Content of the Course Total No. of learning-Training / performance Periods: 30 Periods (30 Hours) Module Topics (Course Contents) No. of Periods Study of origin of life through chart and models Study of different Invertebrates and Vertebrates animals through models and museum specimens in the laboratory with details of biogeography and diagnostic features: Millipora, Alcyonium, Gorgonia, Hippocampus, Ichthyophis (Female), Alytes (Male), Axolotal larva, Necturus, Siren, Cobra, Viper (pit & Pitless), Sea Snake, Rattle Snake, Archaeopteryx, Emu, Ostrich and Penguins, Echidna and Duck bill platypus, Whale, Dolphin, Bat. Preparation and Demonstration of Key for Identification of Venomous and Non-venomous snakes. Study of Coral Reefs through Models, Photographs Study of Fossils through chart/ Models An "Animal album or Practical Record" containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa. Study of some videos to develop understanding and acquired knowledge on the animals salient features as mentioned above. Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paper. Muscum specimens, Invertebrates, Vertebrates, Venomous and Non-venomous, Seminar	5			 ▶ To demonstrate hypotheses register that hypotheses register that hypotheses register that hypotheses that he had not have a supply that he had not have the hypotheses register that he had not have the hypotheses register that he had not h	te comprehensive understan garding the origin of life on l versity of life forms listinctive invertebrate and	iding of the current theological Earth, vertebrate animals otext of life	ries une		
Total Marks Max. Marks: 30 Imm Labeling Max. Marks: 30 PART -B: Content of the Course Total No. of learning-Training / performance Periods: 30 Periods (30 Hours) No. of Periods Topics (Course Contents) No. of Periods Study of origin of life through chart and models Study of different Invertebrates and Vertebrates animals through models and museum specimens in the laboratory with details of biogeography and diagnostic features: Millipora, Aleyonium, Gorgonia, Hippocampus, Ichthyophis (Female), Alytes (Male), Axolotal larva, Necturus, Siren, Cobra, Viper (pit & Pitless), Sea Snake, Rattle Snake, Archaeopteryx, Emu, Ostrich and Penguins, Echidna and Duck bill platypus, Whale, Dolphin, Bat. Preparation and Demonstration of Key for Identification of Venomous and Non-venomous snakes. Study of Coral Reefs through Models, Photographs Study of Fossils through chart/ Models An "Animal album or Practical Record" containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa. Study of some videos to develop understanding and acquired knowledge on the animals salient features as mentioned above. Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paper. Muscum specimens, Invertebrates, Vertebrates, Venomous and Non-venomous, Seminar	6					atory or Field learning/	20		
Module Topics (Course Contents) No. of Periods Study of origin of life through chart and models Study of different Invertebrates and Vertebrates animals through models and museum specimens in the laboratory with details of biogeography and diagnostic features: Millipora, Alcyonium, Gorgonia, Hippocampus, Ichthyophis (Female), Alytes (Male), Axolotal larva, Necturus, Siren, Cobra, Viper (pit & Pitless), Sea Snake, Rattle Snake, Archaeopteryx, Emu, Ostrich and Penguins, Echidna and Duck bill platypus, Whale, Dolphin, Bat. Preparation and Demonstration of Key for Identification of Venomous and Non-venomous snakes. Study of Coral Reefs through Models, Photographs Study of Fossils through chart/ Models An "Animal album or Practical Record" containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa. Study of some videos to develop understanding and acquired knowledge on the animals salient features as mentioned above. Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paper. Museum specimens, Invertebrates, Vertebrates, Venomous and Non-venomous, Seminar	<u> </u>					Min Passing Marks:	20		
Module Topics (Course Contents) Study of origin of life through chart and models Study of different Invertebrates and Vertebrates animals through models and museum specimens in the laboratory with details of biogeography and diagnostic features: Millipora, Alcyonium, Gorgonia, Hippocampus, Ichthyophis (Female), Alytes (Male), Axolotal larva, Necturus, Siren, Cobra, Viper (pit & Pitless), Sea Snake, Rattle Snake, Archaeopteryx, Emu, Ostrich and Penguins, Echidna and Duck bill platypus, Whale, Dolphin, Bat. Preparation and Demonstration of Key for Identification of Venomous and Non-venomous snakes. Study of Coral Reefs through Models, Photographs Study of Fossils through chart/ Models An "Animal album or Practical Record" containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa. Study of some videos to develop understanding and acquired knowledge on the animals salient features as mentioned above. Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paper. Museum specimens, Invertebrates, Vertebrates, Venomous and Non-venomous, Seminar	PΔ	ART -	B: Conte	nt of the Co	ourse				
Study of origin of life through chart and models		•	Total No. o	of learning-Train	ing / performance Period	ds: 30 Periods (30 Hours	No of		
Study of different Invertebrates and Vertebrates animals through models and museum specimens in the laboratory with details of biogeography and diagnostic features: Millipora, Alcyonium, Gorgonia, Hippocampus, Ichthyophis (Female), Alytes (Male), Axolotal larva, Necturus, Siren, Cobra, Viper (pit & Pitless), Sea Snake, Rattle Snake, Archaeopteryx, Emu, Ostrich and Penguins, Echidna and Duck bill platypus, Whale, Dolphin, Bat. Preparation and Demonstration of Key for Identification of Venomous and Non-venomous snakes. Study of Coral Reefs through Models, Photographs Study of Fossils through chart/ Models An "Animal album or Practical Record" containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa. Study of some videos to develop understanding and acquired knowledge on the animals salient features as mentioned above. Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paper. Museum specimens, Invertebrates, Vertebrates, Venomous and Non-venomous, Seminar	M	odule				ts)	Perio		
· ·	 Study of origin of life through chart and models Study of different Invertebrates and Vertebrates animals through models and museum specimens in the laboratory with details of biogeography and diagnostic features: Millipora, Alcyonium, Gorgonia, Hippocampus, Ichthyophis (Female), Alytes (Male), Axolotal larva, Necturus, Siren, Cobra, Viper (pit & Pitless), Sea Snake, Rattle Snake, Archaeopteryx, Emu, Ostrich and Penguins, Echidna and Duck bill platypus, Whale, Dolphin, Bat. Preparation and Demonstration of Key for Identification of Venomous and Non-venomous snakes. Study of Coral Reefs through Models, Photographs Study of Fossils through chart/ Models An "Animal album or Practical Record" containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa. Study of some videos to develop understanding and acquired knowledge on the animals salient features as mentioned above. Group discussion/Viva or Seminar presentation on related topics mentioned 				30				
Name and Signature of Convener & Members of CBoS:	Ke	ywords	Museum spec	imens, Invertebrate	s, Vertebrates, Venomous and	d Non-venomous, Seminar			

dyalaya, Raigarh (C.G. Shaheed Nandkumar Patel Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.)

Text Books, Reference Books and Others

Text Books Recommended -

- > S.S. Lal, Practical Zoology, Invertebrate. 12th Edition Rastogi Publications, Meerut, New Delhi.
- A manual of practical Zoology. Dr. P.S Verma, S. Chand Publication, New Delhi Reference Books Recommended -
 - > Park Haswell, Marshall and Williams, A textbook on Zoology Invertebrate, AITBS Publishing and Distributers, Delhi
 - > Park Haswell, Marshall and Williams, A textbook on Zoology Vertebrate, AITBS Publishing and Distributers, Delhi

Online Resources-

- > http://ndl.iitkgp.ac.in/he_document/swayamprabha/swayam_prabha/gc5ua6m873i?e=3|*||
- ➤ https://www.youtube.com/watch?v=JUdp3U6A1EA

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods: 50 Marks Maximum Marks: Continuous Internal Assessment (CIA): 15 Marks 35 Marks End Semester Exam (ESE): Internal Test / Quiz-(2): 10 & 10 Continuous Internal Assignment/Seminar +Attendance - 05 Assessment (CIA):

Total Marks -

Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks

(By Course Teacher) **End Semester** Exam (ESE):

Laboratory / Field Skill Performance: On spot Assessment A. Performed the Task based on lab. work B. Spotting based on tools & technology (written) - 10 Marks as per lab. status

C. Viva-voce (based on principle/technology)

- 20 Marks

- 05 Marks

Managed by Course teacher

Name and Signature of Convener & Members of CBoS:

ed Nandkurnar Patel idyalaya, Raigarh (C.G.)

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Officer-In-Charge (Academic) Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF ZOOLOGY COURSE CURRICULUM

		COURS	E CURRICULUM				
PART- A: Introduction							
(Certif	ram: Bachelor in icate/Diploma/De	Life Science gree / Honors)	Semester - II	Session: 2024-2	2025		
	ourse Code	ZOGE - 02T		e.			
•	ourse Title	Cell Biology an	d Histology				
	ourse Type	General Electiv	e				
4 P	re-requisite (if, any)	As per Program					
	ourse Learning utcomes (CLO)	 Acquire known Understand understand to Gain Known 	ally completing this course whedge of Cell membrane the functioning of nucleus the intricate cellular mechaledge of key processes like various tissues of body the	se, the students will be a e and function and extra nuclear organd anisms involved. e cell division, eir structural significance	elles and		
6 C	redit Value	3 Credits	Credit = 15 Hours	- learning & Observa	tion		
7 T	otal Marks	Max. Marks:	100	Min Passing Marks:	40		
PAR1	Γ-B: Conter	nt of the Co	urse				
	Total No. of Teac	hing-learning F	eriods (01 Hr. per perio	d) - 45 Periods (45 Ho	urs)		
Unit			oics (Course contents)		No. of Period		
I	Cell Structure, Cell Membrane and Extra Nuclear Cell Organelles: General structure of Prokaryotes and Eukaryotes. Cell membrane organization: Origin, structure (Lipid-Lipid Bilayer Model, Dannelli & Davson Model, Unit Membrane Model and Fluid mosaic model), chemical composition and function of cell membrane, Specialization of cell membrane: microvilli desmosomes, Hemidesmosome, Septate Desmosome, plasmodesmata, tight and gap junction. Extra Nuclear Cell Organelles: Ultra structure and functions of Endoplasmic reticulum and Golgi apparatus.						
II	Extra Nuclear (Cell Organelles: omes, Mitochond	Ultra structure and fi ria: Origin, structure and fi	inctions of Ribosome, unction.			
Ш	Nuclear Organiza interphase nucleus.	tion and Cell I Ultra structure of n, chemical comp vision- Mitosis ar	Division: Size, shape, stru f nuclear membrane and po position and functions, Chand and Meiosis. Cell division	acture and functions of ore complex. Nucleolus: romosome Morphology,	12		
IV							
Keywords	Cell Biology, Cell Memb ibosome, lysosome, perc I Signature of Convene.	oxisomes, Mitochor		culum and Golgi apparatu	ıs,		
		M ().	1/1)			

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Officer-In-Charge (Agadesche) Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.) oo Nandkumar Patel ayalaya, Raigarh (C.G

Text Books, Reference Books and Others

Text Books Recommended -

- 1.Gupta P.K. Cell and Molecular Biology, Himalaya Publication
- 2. Arumugam.N, Cell biology and Molecular Biology, Saras Publication
- 3. Rastogi V.B. Cell Biology, Rastogi Publication
- 4. Verma P.S. and Agrawal Cell Biology, S. Chand Publication

Reference Books Recommended -

- 5. Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments (6th edition) John Wiley & Sons. Inc.
- 6. De Robertis, E.D.P. and De Robertis, E.M.F. (2006) Cell and Molecular Biology (8th edition) Lippincott Williams and Wilkins, Philadelphia.
- 7. Cooper, G.M. and Hausman, R.E. (2009) The Cell: A Molecular Approach. (5th edition) ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
- 8. Becker, W.M.; Kleinsmith, L.J.; Hardin. J. and Bertoni, G. P. (2009) The World of the Cell. (7th edition) Pearson Benjamin Cummings Publishing, San Francisco. Practical

Online Resources-

- National digital Library.- http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loY0poaUVtYlByc1BZNX k3TnZMWVFzQXpZNjhhQUplR1BTOERHelZXZUp5Nw
- 2. http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loZFJyVGFmaDFwbXpBS
 http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loZFJyVGFmaDFwbXpBS
 http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loZFJyVGFmaDFwbXpBS
 http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loZFJyVGFmaDFwbXpBS
 http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loZFJyVGFmaDFwbXpBS
 http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loZFJyVGFmaDFwbXpBS
 <a href="http://ndl.iitkgp.ac.in/document/phase-ac.in/document/pha
- 3. https://www.youtube.com/watch?v=GYY627IeAKg

PART -D: Assessment and Evaluation

FART -D. ASSESSMENT and							
Suggested Continuous Evaluation Methods:							
Maximum Marks:	100	Marks					
Continuous Internal As	ssessment (CIA): 30	Marks					
End Semester Exam (E	SE): 70	Marks					
Continuous Internal	Internal Test / Quiz-(2): 20 +20	Better marks out of the two Test / Quiz				
	Assignment / Seminar	- 10	+ obtained marks in Assignment shall be				
Assessment (CIA):	Total Marks -	30	considered against 30 Marks				
(By Course Teacher)			considered against 0 0 transit				
End Semester	Two section - A & B		5-4-20 Mayles				
Exam (ESE):	Section A: Q1. Objective	e - 10 x = 10 J	Mark; Q2. Short answer type- 5x4 =20 Marks				
Exam (15515).	Section B: Descriptive at	iswer type qts.	,1out of 2 from each unit-4x10=40 Marks				

Name and Signature of Convener & Members of CBoS:

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carrie Pang &

Wis W. Sindkurnar Patel Julaya, Raigarh (C.G

Officer-In-Charge (Academic) Shaheed Nandkumar Patel Ishwavidyalaya, Raigarh (C.G.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) Department of ZOOLOGY

Course Curriculum

			Con	irse Curriculum			
PA	ART	- A: Intr	oduction				
		m: Bachelor in		Semester - II	Session: 2024-2	2025	
1		<i>ate / Diploma / De</i> rse Code					
2			ZOGE -02P				
3		rse Title	Cell Biology an				
4		rse Type	General Electiv				
_	Pre	re-requisite (if, any) As per Program					
5	Course Learning Outcomes (CLO) After successfully completing this course, the students will be abl > Understand ultra structure of prokaryote and Eukaryote cell, under microscopic study to gain knowledge > learn to identify cell organelles > Explain and demonstrate mitosis and meiosis division in onion rook Grass hopper testis, etc > Gain knowledge of Microtomy					root tip,	
6	Cre	dit Value	1 Credits	1 Credits Credit = 30 Hours Laboratory or Field learning/Train			
7 Total Marks Max. Marks: 50				50	Min Passing Marks:	20	
PA	RT -	B: Content of	f the Course	n in	In 20 Devieds (20 Hours)		
Me	odule	Total No. o		ppics (Course content	ls: 30 Periods (30 Hours)	No. of Period	
Lab./Field Training/ Experiment Contents of Course 1. Study of prokaryotic and eukaryotic cell types with the help of chart, slide and video. 2. Separation and isolation of cells by sedimentation velocity in unit gravity. 3. Disruption of cells, isolation and identification of subcellular components, isolation of nuclei. 4. Isolation of mitochondria by differential centrifugation and identification of succinic dehydrogenase in the mitochondrial pellet. 5. Chromosome segregation in mitosis and meiosis. 6. Preparation of chromosome squashes from Onion Root tip for observation of stages of Mitosis 7. Preparation of chromosome squashes from grasshopper/cockroach testes for the observation of stages of meiosis. 8. Isolation and estimation of DNA. 9. Study of types of tissue through permanent slides: epithelial, connective, muscular, Nervous etc. 10. Preparation of Practical Record 11. Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paper					30		
	vords uture c			litosis, Meiosis, DNA Separd	ation, Histology of Tissue,		
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eed (Andkumar Patel idyalaya, Raigarh (C.G.)

Officer-in-Charge (Aยศัสดิทิธ์) Shaheed Nandkumar Patel สะโพชงเป็นลโลหล, Raigarh (C.G.)

Text Books, Reference Books and Others

Text Books Recommended -

- Debarati Das Essential Practical Handbook of Cell Biology & Genetics, Biometry & Microbiology, A Laboratory Manual, Academic Publishers.
- 2. Mohan P Arora Cytogenetics:, Himalayan Publishing House

Reference Books Recommended –

3. Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments (6th edition) John Wiley & Sons. Inc.

Online Resources-National Digital Library

50 cm mm 62				
PART -D: Assessme	nt and Evaluation	on		
Suggested Continuous				
Maximum Marks:	5	50 Marks		
Continuous Internal As	ssessment (CIA):	15 Marks		
End Semester Exam (E	SE):	35 Marks		
Continuous Internal	Internal Test / Quiz-		Better marks out of the	two Test / Quiz
Assessment (CIA):	Assignment/Seminar +		+ obtained marks in Ass	ignment shall be
(By Course Teacher)	Total Marks -	15	considered against	
End Semester	Laboratory / Field	Skill Performane	ce: On spot Assessment	Managed by
	A Performed the	Task based on lab	work - 20 Marks	Course teacher
Exam (ESE):	B. Spotting based	on tools & techno	logy (written) - 10 Marks	as per lab. status
	C Viva-voce (base	ed on principle/tec	hnology) - 05 Marks	

Name and Signature of Convener & Members of BoS:

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C. July

kumar Patel

dyalaya, Raigarh (C.G

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Officer-In-Charge (Acadamia) Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF ZOOLOGY COURSE CURRICULUM

P	AR	T-A: Introdu	otion .	E CURRICULUM		
			ction			
		am:Bachelor		Semester – I/III/V	Session: 2024-	2025
1	Co	<i>cate / Diploma / De</i> urse Code		77117	00001011. 2021	
2			ZOVAC-01			
3		urse Title	Public Health a	nd Hygiene		
		urseType	Value Added C	ourse		
4	Pr	e-requisite(if, any)		As per Pro	gram	
5		ourse Learning. utcomes(CLO)	 Identify currer Aware about t obesity. Create general 	e importance of hygiene. It national and global publiche issues of food safety, was medical awareness in daily leasures to live a healthy life	ter safety, vaccination, a	and
6	C	reditValue	2 Credits	Credit = 15 Hours	-learning & Observat	ion
7	-	otalMarks	Max.Marks:50		Ain Passing Marks:20	
РΔ		-B: Content				
				Periods (01 Hr. per period) - 30 Periods (30 Hou	ırs)
U	nit			oics (Course Contents)		No. of Period
	I II	determinants and fa Radiation hazards: effects and precauti washing methods, I Nutrition and Hea diet. Importance of anomalies: Anaem	actors. Pollution a Network Tower on). Personal hyg deal food keeping Ith: Classification of dietary fibres a (Iron and B12	n of food into micro and ma s. Significance of breast 2 deficiency), Kwashiorka	(recommended levels, all Hygiene, Ideal hand cro nutrients. Balanced feeding. Malnutrition	07
]	II	diseases: measles, ch Communicable back symptoms and pre- causal agents, sym- arthritis, Diabetes, p	ntagious and No icken pox, swine flaterial diseases: to vention). Sexuall ptoms and prevenentic ulcer, obesingtion).	on-Communicable Diseased to (their causal agents, symuloerculosis, typhoid, cholerally transmitted diseases: ention). Non-communicable try, depression and anxiety	ptoms and prevention). (their causal agents, AIDS, Syphilis (their diseases: hypertension, (their causal agents,	09
T	V	Public Health Mar of institutional de Electrocution, Road Cardiopulmonary re Road Safety: Good	liveries, Deworn Accident, Burn, suscitation (CPR) Samaritan, Ger	neral Medical Awareness: ning drive: Use of Alb Lightning Strike, Enveno Donation: Eligibi neral safety precautions Fire Extinguisher Categor	pendazole. First Aid: mation. Importance of lity, Health Screening. on Road and Motion	07
Keyw	ords	Health, Hygiene, Nutri	tion, Disorders, Va	ccination, Safety, Fire, Blood,	Medication.	
Sign	atur	e of Convener & Me.	mbers (CBoS):	()		
		0 . 1		1		

Alahallun Ohn the sound their engin

Officer-In-Charge (No 111 4 (18)) Shaheed Nandkumar Patel hehwavidyalaya, Raigarh (C.G.) Studies Gad Nandkumar Patel Jyalaya, Raigarh (C.G

PART=C:Learning Resources Text Books, Reference Books and Others Fried Arabi Res commendado ₹Xtarx Jane Schneider (2011) Introduction to Public Health.

≽ Martin, V. K. (2014) A Short Hook of Public Health.

Hermanners House Hermanners

をPetels 代 (2017) Oxford Textbook of Public Health (6th edition).

Scittures, M. L. (2014) Public Health Nutrition.

Wong, K.V. (2017) Nunition, Health and Disease.

Online Resources

https://www.fila.gov/drugs.investigational-new-drug-ind-application/general-drug-categories

https://www.ntba.org/news-blogs/and-articles/blogs/2023/08/01/fire-extinguisher-types

https://www.redeross.org/take-a-class/epr/performing-epr/what-isepi#: /text=What%o201s%o20the%o20Purpose%o20of,healtheare%o20workers%o20and%o20eme rgener 2020 responders.

https://unesdoc.unesco.org/arki/48223/pf0000226792

Online Resources

- https://epgp.inflibnet.ac.in/epgpdata/uplonds/epgp_content/S001827/P001833/M029447/ET/15 242000870.21QLpdf
- https://www.nhm.gov.in/images/pdf/programmes/mhs/Training Materials/PDF English/read ing_material.pdf

PART-D:Assessment andEvaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

ContinuousInternal Assessment(CIA):15 Marks

EndSemesterExam(ESE):J5Marks

Continuous

Internal Test / Quiz=(2): 10 & 10 Internal Assessment Assignment Seminar + Attendance- 05

Ibral Marks -15

Better marks out of thetwo Test / Quiz+obtained marks in Assignment shall be considered against 15 Marks

(CIA): (Rt Course Teacher)

End Semester

Two section - A & B

Exam (ESE):

Section A: Q1. Objective = $05 \times 1 = 05$ Mark; Q2. Short answer type- $5 \times 2 = 10$ Marks Section B: Descriptive answer type qts., lout of 2 from each unit-4x05=20Marks

Name and Stenature of Convener & Members of CBoS:

and Nandkumar Patel Walaya, Ralparh (C.G.

Officer-In-Charge (Ac as to a Shaheed Nandkumar Patel nwavidyalaya, Raigarh (C.G.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 - 28) **DEPARTMENT OF ZOOLOGY**

-			Cour	SE CURRICULUM		
P	RT-	A: Introducti	on			
		: Bachelor in Lif			T	
(Certif	icate / Diploma / .	Degree)	Semester – II/IV/V/VI	Session: 2024-202	5
1	Cou	se Code	ZOSEC-01			
2	Cou	rse Title		d Vermicomposting		
3	Cou	rse Type	Skill Enhanceme			
4		-requisite (if, any)		As per Pi	rogram	
		requisite (ii, any)			se, the students will be able to:	
			Learn the identifi	able features of earthworm spe	cies for vermiculture and	
	Cou	irse Learning	vermicomposting			
5	Out	comes (CLO)	Cultivate the skill			
		, ,		nallenges in vermiculture and v		
1				res of different vermicomposti	ng methods.	
	 			urial prospects in this field.	Theoretical learning an	d
6	Cre	ditValue	2 Credits	Credit = 15 Hours	: –Theoretical learning an ory or Field learning/Traini	กร
-	100	120	(1C+1C)	= 30 Hours Laborate	Min Passing Marks:20	
7		al Marks	Max.Marks:50		Will I assing Marianes	
PA	RT -	B: Content of	he Course			
		m1 4 # TO	Total No	of Teaching-learning Per	rious: ning 30 Periods (30 Hours)	
-		Theory-15 Per	ods (15 Hrs) and L		ning 30 Periods (30 Hours)	No. of
Me	odule			Topics (Course contents)		Period
	neory	earthworm. Morph earthworms. Ecolog Ecosystem service vermiculture and ve Vermiculture: De Vermiculture metho and polyculture, me Vermicomposting: and exotic vermic	cology of earthworm gical requirements: s: role played by rmicomposting. Role finition and feature ds: Wormery, breeding and demerits. Ob: Definition and feature omposting earthworks. European earthy	n. Ecological categories: Epi moisture, temperature, light earthworms in soil ecosy of earthworm and vermicomy s. Selective features of ear ing techniques: indoor and ou stacles in Vermiculture: Preve res. Scientific names and dist	athworms for vermiculture. It is a continuous and Management. It is inguishing features of native orms. <i>Perionyx excovatus</i> ,	15
	L /P'-13	Low-cost Floor beds and Biological). P earthworm biomass	s, Grow bags & Tank roducts of vermico (vermiprotein), verm g prospects of Vermi	le of vermicomposting, Me s system. Management during imposting, physiochemical nicompost and vermiwash. H composting in Chhattisgarh a	thods of vermicomposting: vermicomposting (Physical features and their utility: arvesting the vermicompost	

Keywords Earthworm, Vermiculture, Vermicomposting, Vermiwash, Grow Bags, NADEP.

Signature of Convener & Members (CBoS):

Practical Record

Officer-In-Charge (Authorities) Shaheed Nandkumar Patel Thwavidyalaya, Raigarh (C.G.)

d Nandkumar Patel iyalaya, Raigarh (C.G

PART-C:Learning Resources Text Books, Reference Books and Others

Text Books Recommended -

- > Chauhan, A. (2012) Vermitechnology, Vermiculture, Vermicompost and Earthworms: Vermiculture, Vermicomposting, Vermitechnology and Mirobes, Lambert Academic Publishing, Germany.
- National Institute of Industrial Research, (2010): The Complete Technology Book on Vermiculture and Vermicompost, Published by National Institute of Industrial Research, Delhi-7, India.
- > Kumar, A. (2005) Verms and Vermitechnology, APH Publishing.
- ▶ Bhatnagar & Patla,2007. Earthworm vermiculture and vermin-composting, Kalyani Publishers, New Delhi.
- > Sultan Ahmed Ismail, 2005. The Earthworm Book, Second Revised Edition. Other India Press, Goa, India.
- > Panda Himadri: The Complete Technology Book on Vermiculture and Vermicompost (Earthworm) with Manufacturing Process, Machinery Equipment Details & Plant Layout; Asia Pacific Business Press Inc.
- EIRI Board: Hand Book Of Biofertilizers & Vermiculture.

Online Resources-

- > https://agritech.tnau.ac.in/org farm/orgfarm composting.html#:~:text=In%20the%20Banga lore%20method%20of,laid%20over%20the%20moistened%20layer.
- https://www.thepharmajournal.com/archives/2021/vol10issue12/PartAR/11-5-248-926.pdf

Online Resources-

> https://megbrdc.nic.in/publications/fliers-Pamphlets/nadep-composting-english.pdf

PART-D:Assessment andEvaluation Suggested Continuous Evaluation Methods: MaximumMarks: 50 Marks ContinuousInternal Assessment(CIA):15 Marks EndSemesterExam(ESE):35Marks Better marks out of thetwo Test / Quiz Internal Test / Quiz-(2): InternalAssessment(CIA)(|Assignment/Seminar +Attendance- 05 +obtained marks in Assignment shall be

considered against 15 Marks By Course Coordinator) Total Marks -Managed by Laboratory / Field Skill Performance: On spot Assessment **End Semester** Coordinator as A. Performed the Task based on learned skill - 20 Marks Exam (ESE):

- 10 Marks B. Spotting based on tools (written) C. Viva-voce (based on principle/technology) - 05 Marks

Or Shubbarda Roballan American Short Company Short Name and Signature of Convener & Members of CBoS:

per skilling

andkumar Patel ilaya, Raigarh (C.G

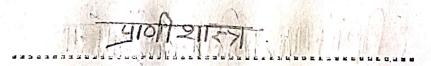
Officer-In-Charge (Academic) Shaheed Nandkumar Patel Gshwavidyalaya, Raigarh (C.G.)

शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

(छत्तीसगढ़ विश्वविद्यालय अधिनियम 1973 द्वारा स्थापित राजकीय विश्वविद्यालय)



राष्ट्रीय शिक्षा नीति – 2020 के तहत तृतीय एवं चतुर्थ सेमेस्टर नवीन पाठ्यक्रम (सत्र 2025–26)



NEP 2020

FOUR YEAR UNDERGRADUATE PROGRAM (NEP-2020)

Program: Bachelor in Science (2024 -28)

DISCIPLINE - ZOOLOGY

FOUR YEAR UNDERGRADUATE PROGRAM (NEP-2020)

Program: Bachelor in Science (2024 -28)
DISCIPLINE - ZOOLOGY

Session - 2024 -25

G. Alexander of the second	DSC -01 to 08	- 2024 -25	DSE -01 to 12
Code	Title	Code	Title
	Life on Earth and Unique Attributes of Animal Kingdom	ZOSE -01T	Parasitology
1,12	Life on Earth and Unique Attributes of Animal Kingdom	ZOSE -01P	Parasitology
	Cell Biology and Histology	ZOSE -02T	Ecology and Wild life Conservation & Management
	Cell Biology and Histology	ZOSE -02P	Ecology and Wild life Conservation & Management
	Diversity of Invertebrates	ZOSE -03T	Biochemistry
	Diversity of Invertebrates	ZOSE -03P	Biochemistry
	Diversity of Chordates and Comparative Anatomy	ZOSE -04T	Evolutionary Biology
	Diversity of Chordates and Comparative Anatomy	ZOSE -04P	Evolutionary Biology
	Vertebrate Physiology	ZOSE -05T	Endocrinology
	Vertebrate Physiology	ZOSE -05P	Endocrinology
	Genetics	ZOSE -06T	Immunology
	Genetics	ZOSE -06P-	Immunology
ZOSC -07T	Biosystematics and Taxonomy	ZOSE -07T	Biotechnology and Genetic Engineering
ZOSC -07P	Biosystematics and Taxonomy	ZOSE -07P	Biotechnology and Genetic Engineering
ZOSC -08T	Biotechniques	ZOSE -08T	Applied Zoology
ZOSC -08P	Biotechniques	ZOSE -08P	Applied Zoology
		ZOSE -09T	Basics of Computer & Biostatistics
		ZOSE -09P	Basics of Computer & Biostatistics
		ZOSE -10T	Behaviour & Chronobiology
		ZOSE -10P	Behaviour & Chronobiology
	[- 마스티에 타르크	ZOSE -11T	Developmental Biology
		ZOSE -11P	Developmental Biology
	· 「「」「「」「「」「「」「「「」「「」「「」「」「「」「」「「」「」「」「」	ZOSE -12T	Molecular Biology
-7 . 3	en and the same encoders.	ZOSE -12P	Molecular Biology
	GE -01 & 02		VAC
F	ife on Earth and Unique Attributes of Animal	ZOVAC-01	Public health and Hygiene
k	ife on Earth and Unique Attributes of Animal Kingdom		SEC
	Cell Biology and Histology	ZOSEC-01	Vermiculture
OGE -02P C	Cell Biology and Histology	7	

Program Outcomes (PO):

- > Demonstrate and apply the fundamental knowledge of the basic principles of major fields of Zoology and Modern tools and techniques
- > Analyse complex interactions among the various animals of different phyla, their distribution and their relationship with the environment.
- > Gain knowledge of small scale industries like sericulture, fish farming, bee keeping, aquaculture, animal husbandry, poultry farm.
- Apply the knowledge and understanding of Zoology to one's own life and work.
- > Develops empathy and love towards the animals and consciousness for wild life conservation

Program Specific Outcomes (PSO):

- Perform procedures as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, Applied Zoology, Behaviour, Endocrinology, Immunology, Biostatistics, Parasitology, Biochemistry, Evolution, Developmental Biology, Animal biotechnology, Tools and Techniques of Zoology.
- Understand the applications of biological sciences in Apiculture, Aquaculture, Sericulture, Animal Husbandry, Poultry Farm.
- Understand the applications of Zoology in Medicine and daily life

Contributes the knowledge for Nation building and sustainable development

Officer-In-Charge (Academic)
Shaheed Nandkumar Patel (Vishwavidyalaya, Raigarh (C.G.)

heed Nandkumar Patel

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF ZOOLOGY COURSE CURRICULUM

P	ART- A:	ntroduction	1		
	ogram: Bachelor in (Diploma / Degree)	Life Science	Semester - III	Session: 2024-	2025
1	Course Code	ZOSC-03T	The state of the s	Alth J. Walley and Transport	
2	Course Title	Diversity of Inve	ertebrates		Part of the same o
3	Course Type	Discipline Speci			
4	Pre-requisite (if, any)		As per Pr	OCHOMA	
5	Course Learning. Outcomes (CLO)	Develop to classifica Develop changed their analy Gain Know animals (Develop un Helminthes Develop un Develop un	ully completing this cours understanding on Inverted tion and Nomenclature. understanding how into multicellular and tomy and physiology. Wiedge of key processes is simple to complex for inderstanding on parasis.	e, the students will be a prate Animals on the basimple/unicellular diploblastic forms like formation of triplom of body plan).	pasis o animals through oblastic cycle o
6	Credit Value	Echinoderr 3 Credits	nata.	- learning & Observa	
7	Total Marks	Max. Marks:		Min Passing Marks:	40
Un	Total No. of Tea		Periods (01 Hr. per perio		
1		Top	ics (Course contents)		No. of
I	Phylum Protozoa up General Characters ar	special features: , to order. Type stud of I Classification of I	to order and Type Study of Protozoa: General Characters: Paramoecium, Protozoa Phylum Porifera up to order.	ers and Classification of and Disease. Porifera:	11
	up to order. Type S order. Type study: Fa study: Pheretima (Ea	enterata - General (tudy: Obelia. Helr asciola. Annelida- urthworm).	Type Study of Phylum Concentration and Classification of Phylum An Classification of Phylum An Classification of Phylum Andreas of Phylum Concentration of Phylum Andreas of Phylum Concentration of Phylum Andreas of Phylum Andreas of Phylum Phylum Concentration of Phylum Andreas of Phylum Phyl	of Phylum Coelenterata hylum Helminthes up to nelida up to order. Type	11
I)	order. Type study: Mollusca up to order.	ua - General Chara Prawn. Mollusc- Type study: Pila.	and Type Study of Phy oters and Classification of P General Characters and C	hylum Arthropoda up to Llassification of Phylum	12
I	Type Study: Aster Hemichordata Type	rias (Starfish). G Study: Balonoglos		inodermata up to order. assification of Phylum	11
(eyw	ords Taxonomy, Non	nenclature, Canal S	ystem, Protozoa, Balanoglo	ossus, Torsion	
-	nature of Convener & Mo	nenclature, Canal S embers (CBoS) :	system, Protozoa, Balanoglo	ossus, Torsion	

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Text Books, Reference Books and Others

Text Books Recommended -

- R.L. Kotpal, Modern Textbook of Zoology Invertebrates. Rastogi Publication, Gangotri, Shivaji Road, Meerut
- V.K. Tiwari, Unified Zoology, Shivlal Agrawal and Company, Pustak Prakashak, Khajuri Bazar, Indore
- Dr. S.M. Saxsen, Zoology, Ist Year, by a, Ram Prasad and Sons, Aagra and Bhopal.
- N. Arumugam, M.G. Ragunathan, T. Murugan, B. Ramnathan, A Textbook of Invertebrates by Saras Publication

Reference Books Recommended -

- Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition. E.L.B.S. and Nelson.
- Boradale, L.A. and Potts, E.A.(1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
- Bushbaum, R. (1964). Animals without Backbones. University of Chicago Press.
- Hyman, L.H. (1940-67). The Invertebrates, Vol. I-VI. McGraw-Hill, New York.

Online Resources-

http://ndl.iitkgp.ac.in/he document/inflibnet epgp/inflibnet epgp/IN I e P P 1 Z 512 96 P 0 B o p 51542 M 1 M L c P D a P o E P 1 51562 51563?e=9|*||

PART -D: Assessment a	and	Evaluation
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Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Internal Test / Quiz-(2): 20 +20
Assessment (CIA): Assignment / Seminar - 10
(By Course Teacher) Total Marks - 30

Better marks out of the two Test / Quiz

+ obtained marks in Assignment shall be
considered against 30 Marks

(By Course Teacher) End Semester

Two section - A & B

Exam (ESE):

Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 = 20 Marks Section B: Descriptive answer type qts.,1out of 2 from each unit-4x10=40 Marks

Name and Signature of Convener & Members of CBoS:

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Juli 2.1.2

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF ZOOLOGY COURSE CURRICII UM

0,72	ART-	The second secon	ntroductio	n		
	ogram <i>iploma</i> ,	n: Bachelor in Degree/ Honor	life Science	Semester - III	Session: 2024-2	025
1	Cours	se Code	ZOSC-03P		2024-2	025
2	Cours	se Title	Diversity of Inv	vertebrates.	Table And Section 1	
3		ве Туре	Discipline Spec	ific Lab Course		
4	Pre-r	equisite (if, any)	13 2 2 2 2	As per 1	Dungum	
5 Course Learning. Outcomes (CLO)		nonchorda in Gain Know their morp in Develop changed f Acquired t	esfully completing lab counderstanding on the diverse of grouping of a whedge of grouping of a chological characteristics critical understanding he from simple form to could be detailed knowledge to the	rse the students will be able versity of life with regard mimals on the basis of . ow animals have omplex body plan.	to-	
6	Credi	it Value	1 Credits	nimai species individual	v.	1 1000
7	Total	Marks	Max. Marks:	50	pratory or Field learning/T	
PA	RT -E	: Conte	nt of the Co		Min Passing Marks:	20
Lab Tra Expe	odule //Field ining/ eriment ntents	Study of dia	To L	opics (Course contentist of labs to be conduct	ed	No. o
	Course	Cnidarians) Histologica Helminthes. Dissection through Alt Dissection of Parts throug Dissection of of dissection dissection. Study of Inv	, Helminthes, Anna I slides of different Crustacea and Ecl of <i>Pheretima</i> to e ernative methods of of <i>Periplaneta</i> to e th Alternative metholf Prawn to expose of <i>Pila</i> to expose No ertebrate animals i	elida, Arthropoda, Mollusca Non chordate Taxa, slides ninodermata xpose Alimentry canal and f dissection. xpose the digestive system	of various larval forms of circum pharyngeal ganglia salivary glands and Mouth through Alternative methods ernative methods of	30
		Group disci Polymorph change, Tre	ussion/Viva or Ser ism, Parasitic adap ee of Life, Marine 2	ninar presentation on two	walatal t	
		An "animal with appropri	album or Practication album or Practication.	al Record" containing sket	ches, photographs, cut outs,	
Keyı	vords	 An "animal with approprious Study of son 	album or Practice iate write up about ne videos to develo	al Record" containing sket	ches, photographs, cut outs,	

अध्ययन मंडल । ज्यान गर्डल शहीद संद्युमार पटल विश्वविद्यालय, रायगढ़ (छ.ग.)

Text Books, Reference Books and Others

Text Books Recommended -

- S.S. Lal, Practical Zoology, Invertebrate. 12th Edition Rastogi Publications, Meerut, New Delhi.
- A manual of practical Zoology. Dr. P.S Verma, S. Chand Publication, New Delhi Reference Books Recommended-
 - Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition. E.L.B.S. and Nelson.
 - Hyman, L H. (1940-67). The Invertebrates, Vol. I-VI. McGraw-Hill, New York.

Online Resources-

- > https://www.youtube.com/watch?v=GC5Ua6m873I
- > https://www.youtube.com/watch?v=-qyM2Hskj84

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks End Semester Exam (ESE): 35 Marks

Continuous Internal

Internal Test / Quiz-(2): Assignment/Seminar +Attendance - 05

Better marks out of the two Test / Quiz

Assessment (CIA): (By Course Teacher)

Total Marks -

+ obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):

Laboratory / Field Skill Performance: On spot Assessment A. Performed the Task based on lab, work

- 20 Marks

Managed by Course teacher

B. Spotting based on tools & technology (written) - 10 Marks as per lab. status C. Viva-voce (based on principle/technology)

Name and Signature of Convener & Members of CBoS:

Lyung Lyung

FOUR YEAR UNDERGRADUATE PROGRAM (2024 - 28) **DEPARTMENT OF ZOOLOGY COURSE CURRICULUM**

	ART- A: In ogram: Bachelor in	ntroduction			
1	(Diploma / Degree/	(Honors)	Semester - IV	Session: 2024-2	2025
1	Course Code	ZOSC-04T			
2	Course Title	Diversity of Cho	rdates and Comparative	e Anatomy	
3	Course Type	Discipline Specif	ic Course		
4	Pre-requisite (if, any)	74 .* 20 . e 2	As per Pro		
5	Course Learning. Outcomes (CLO)	 Develop under the organisms relationship bethe Acquire knowleanatomy and further bearing the condigestive system. Understand the respect to differ vertebrates used. Understand the Vertebrates used. Understand the Vertebratend the Vertebratend the 	completing this course, to standing of the characters belonging to different taxative tween the different classes edge and Develop critical anctioning of complex systemparative account of in and Skeletal and Muscule Digestive system and its erent diets and feeding I d in aquatic, terrestrial and evolution of heart, aortic a	used to classify and diff a and the evolutionary his of chordates. understanding of the comems of Pisces to Mammal ategument with its der lar System. Is anatomical specialization habits and respiratory or aerial vertebrates.	erentia tory a parati ia. ivative ons wi
_			gans and urinogenital syste		
6_	Credit Value	3 Credits		s - learning & Observation	
7	Total Marks RT -B: Content of	Max. Marks:	100	Min Passing Marks: 40	
Uı]	Diversity in Protoci	hordates and Cho	opics (Course contents)		
Un	Diversity in Protocl General characteris Cephalochordates	hordates and Chor stics & classificat : Type study – Am		orders with examples. Agnatha: Comparative	
	General characteristic Cephalochordates account of Petromy Structure and function Structure of integulation derivatives fishes to mammals.	hordates and Choostics & classificat: Type study – Amyzon and Myxine tion of integument ment from fishes and their functions. Comparative anatomals. Comparative	rdates: ion of Chordata up to	Agnatha: Comparative imentary canal: count on epidermal and of Axial skeleton from leton: limbs and girdles	No. o Perio
I	General characteristic Cephalochordates account of Petromy I Structure and function Structure of integured dermal derivatives fishes to mammals from fishes from f	hordates and Chorstics & classificates. Type study – Amyzon and Myxine tion of integument ment from fishes and their functionals. Comparative anathemals. Comparative vertebrates. In and functionals Endocrine Glands Lungs, Air sacs and in vertebrates, Evocorine Glands & t	rdates: ion of Chordata up to phioxus and its affinities, and skeletal systems Al to mammals with an acc al significance, Anatomy omy of appendicular ske account with structure	Agnatha: Comparative imentary canal: count on epidermal and of Axial skeleton from leton: limbs and girdles of alimentary canal and ratory organs, Heart ebrates, Structure and and their significance.	Peri
I	General characteristic Cephalochordates account of Petromy I Structure and function Structure of integured dermal derivatives fishes to mammals from fishes to mammals from fishes to mammals from fishes to mammals from fishes and Comparative anatoric Arches and Structure of Gills, evolution of heart in vertebrates. Endo Pancreas and Pituitation Comparative anatoric & Sense Organ: Types and develop	hordates and Choostics & classificat: Type study – Amyzon and Myxine tion of integument ment from fishes and their functional. Comparative anathemals. Comparative vertebrates. Omy and functional Endocrine Glands Lungs, Air sacs and in vertebrates, Evocation of Chands & tary. Omy and functional comparative comparative comparative control of comparative comparativ	rdates: ion of Chordata up to phioxus and its affinities, and skeletal systems Al to mammals with an acc al significance, Anatomy omy of appendicular ske e account with structure al Significance of, Respin s: ad Swim bladder in Verte colution of aortic arches a heir function. Disorders al Significance of Urinog and their ducts in anam	Agnatha: Comparative imentary canal: count on epidermal and of Axial skeleton from leton: limbs and girdles of alimentary canal and ratory organs, Heart ebrates, Structure and and their significance of Thyroid, Adrenal, enital System, Brain	Peri
I I	I Diversity in Protocol General characteristic Cephalochordates account of Petromy I Structure and function Structure of integular dermal derivatives fishes to mammals from fishes to mam digestive glands in Comparative anator Aortic Arches and Structure of Gills, evolution of heart in vertebrates. Endo Pancreas and Pituita V Comparative anator & Sense Organ: Types and develop Nephron-structure, system. Comparative	hordates and Chorstics & classificate: Type study – Amyzon and Myxine tion of integument ment from fishes and their functional. Comparative anatomals. Comparative vertebrates. Omy and functional Endocrine Glands Lungs, Air sacs and in vertebrates, Evocation of Glands & tary. Tomy and functional ment of kidneys and their further types and their further anatomy of Brain edates, Petromyzon and states.	ion of Chordata up to phioxus and its affinities, and skeletal systems Al to mammals with an account significance, Anatomy omy of appendicular skee account with structure at Significance of, Respins: and Swim bladder in Verte plution of aortic arches a heir function. Disorders	Agnatha: Comparative imentary canal: count on epidermal and of Axial skeleton from leton: limbs and girdles of alimentary canal and ratory organs, Heart ebrates, Structure and and their significance of Thyroid, Adrenal, enital System, Brain niotes and amniotes. tomy of Urinogenital of Far and Evo	11 11 11 12

विश्वविद्यालय, रायगढ़ (छ.ग.)

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Text Books, Reference Books and Others

Text Books Recommended -

- Jordan, E. L. and Verma, P. S. (2013) Chordate Zoology (14th edition).
- Saxena, R. K. and Saxena, S. (2015) Comparative Anatomy of Vertebrates (2nd edition).
- R.L. Kotpal, Modern Text Book of Zoology, Vertebrates, Rastogi Publication, Merut
- Tiwari, V.K. Unified Zoology, B.Sc. Part I, Shivlal Agarwal and Company, Indore Reference Books Recommended—
 - Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.
 - Weichert, C.K. (1970) Anatomy of Chordates (4th edition).

Online Resources-

e-Resources / e-books and e-learning portal

- > https://swayamias.com/zoology-optional-coaching/
- > https://www.swayamprabha.gov.in/index.php/program/archive/9
- https://www.acsedu.co.uk/Courses/Environmental/VERTEBRATE-ZOOLOGY-BEN104-528.aspx
- > https://www.nu.edu/degrees/mathematics-and-natural-sciences/courses/bio416/
- > https://www.youtube.com/watch?v=qSY5iXHHi88
- https://www.youtube.com/watch?v=tz8liJXbBCQ https://www.youtube.com/watch?v=mXECx3s8yEQ

PART	-D:	Ass	essme	nt	and	Eval	luatio	n

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Assessment (CIA): Internal Test / Quiz-(2): 20 +20
Assignment / Seminar - 10

Assessment (CIA):

(By Course Teacher)

Assignment / Seminar - 10 + obtained marks in Assignment shall be

End Semester

Exam (ESE):

Two section - A & B

Section A: Q1. Objective - 10 x1= 10 Mark; Q2. Short answer type- 5x4 = 20 Marks

Section B: Descriptive answer type qts.,1out of 2 from each unit-4x10=40 Marks

Name and Signature of Convener & Members of CBoS:

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Better marks out of the two Test / Quiz

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शहीद नद्युमार पटल विश्वविद्यालय, रायगढ़ (छ.ग.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF ZOOLOGY COURSE CURRICULUM

_	ART-		ntroduction			
Pr	іріота	n: Bachelor in /Degree/Hono	Life Science	Semester - IV	Session: 2024-2	2025
1	Cours	se Code	ZOSC-04P			
2		se Title	Diversity of Chor	dates and Comparative An	atomy	
3		se Туре	Discipline Specif	fic Lab Course		y (* 1
4	Pre-r	equisite (if, any)		As per Pro	gram	
5	Cour Outc	se Learning omes (CLO)	classes of v Class	sfully completing lab course erstanding on the diversity vertebrates. dge to identify and classify all characteristics. etailed knowledge about evo different classes of vertebra	e the students will be able of life with regard to d the animals on the basis lutionary history and relates through salient feature	ifferent of the ationsh
6	Cred	it Value	vertebrates. 1 Credits			
7		Marks	Max. Marks:	Credit =30 Hours Labora	ttory or Field learning/	
AI	RT -B:		of the Course	50	Min Passing Marks:	20
(B)				ing/noufour and D : 1		
M	dule	Was got A or to be		ing/performance Periods	With the second	
	./Field		To	pics (Course contents		No. Peri
	инид/	D Children Can:	Li	st of labs to be conducted	g Kalayan Jerri Legisi	15/1/2" ()
Expe Cor	ining/ eriment itents Course	class of Verical Study of Ax study of Ax study of Ax study of Ax study of App and Mamma Comparative help of mode with the help of mode help of mode help of mode of Comparative help of mode Comparative Mammals with the help of mode of Comparative Mammals with the help of mode of Comparative Mammals with the help of mode of Comparative Mammals with Ammal outs, with appoint of Comparative Mammals with the polymer area/College of Coup discussion of Comparative Mammals with the c	mals through model on their classification tebrate. tological slides of distance and skeleton of Ample pendicular skeleton of estudy of heart of Fiels and charts. The estudy of Aortic Arco of models and charts at the study of Urinogenical and charts. The study of Urinogenical and charts and charts and charts and charts. The study of Urinogenical and charts at the help of mode study of Endocrine at the the help of mode study of Endocrine at the study of End	is, slides and museum specimen, biogeography and diagnost on, biogeography and diagnost of the second of the secon	mmals. Comparative mmals. Comparative mphibia, Reptilia, Aves and Mammals with the a, Aves and Mammals with the parameter, Reptilia, Aves and parameter and parameters are of above topics as, photographs, cut	30
Cor Cor Cof C	riment itents	class of Verical Study of his Study of Ax study of Ax study of App and Mamma Comparative help of mode with the help of mode Comparative Mammals with the help of mode Study of Verical Study of Verical An "animal outs, with ap Study of som	mals through model on their classification tebrate. tological slides of distance in the second of the study of heart of Fiels and charts. The study of brain of Fiels and charts.	is, slides and museum specimen, biogeography and diagnost on, biogeography and diagnost of the second of the secon	mmals. Comparative mphibia, Reptilia, Aves and Mammals with the a, Aves and Mammals with the period and Mammals wi	

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PART-C: **Learning Resources** Text Books, Reference Books and Others Text Books Recommended -S.S. Lal, Practical Zoology, Vertebrate. 12th Edition Rastogi Publications, Meerut, New Delhi. A manual of practical Zoology. Dr. P.S Verma, S. Chand Publication, New Delhi

Saxena, R. K. and Saxena, S. (2015) Comparative Anatomy of Vertebrates (2nd edition).

R.L. Kotpal, Modern Text Book of Zoology, Vertebrates, Rastogi Publication, Merut

> Tiwari, V.K. Unified Zoology, B.Sc. Part I, Shivlal Agarwal and Company, Indore Reference Books Recommended -

> Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press. > Weichert, C.K. (1970) Anatomy of Chordates (4th edition).

Online Resources-

> https://www.youtube.com/watch?v=W4gQxADcryw

https://www.youtube.com/watch?v=Ts9GsrBviI8

PART -D: Assessment and Evaluation Suggested Continuous Evaluation Methods: Maximum Marks:

50 Marks Continuous Internal Assessment (CIA): 15 Marks End Semester Exam (ESE): 35 Marks

Continuous Internal Internal Test / Quiz-(2): 10 & 10 Assessment (CIA): Assignment/Seminar +Attendance - 05 (By Course Teacher) Total Marks -15

Better marks out of the two Test / Quiz + obtained marks in Assignment shall be

End Semester Exam (ESE):

considered against 15 Marks Laboratory / Field Skill Performance: On spot Assessment A. Performed the Task based on lab. work - 20 Marks

B. Spotting based on tools & technology (written) - 10 Marks as per lab. status C. Viva-voce (based on principle/technology) - 05 Marks

Course teacher

Managed by

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF ZOOLOGY COURSE CURRICULUM

Pro	ART- A: II	ntrad	SE CURRICULUM		
(Dir	ogram: Bachelor in	n Life Science	0		
1	oloma / Degree/Honors Course Code	5)	Semester - III	Session: 2024-2	025
2	Course Code	ZOSE- 01T		2021011. 2024-2	1023
3	Course Title	Parasitology			ye.yring
_	Course Type	Discipline Speci	fic Floating	de tour some will have a	A COLOR
4	Pre-requisite (if, any)	-р-ше оресі	No. of the Control of		
			As per Pro	ogram	127071
5	Course Learning. Outcomes (CLO)	hosts. Gain insights including med pathogenesis. Develop the a parasitic infect	into the interactions betwhen the recognize clinical ions	ween parasites and their , evasion of host defens manifestations associate	efinitiv r hosts es, an
6	Constitution	the public.	effectively about parasition	diseases, including ed	ucatin
	Credit Value	3 Credits	Credit = 15 Hours	- learning & Observat	ion
7	Total Marks	Max. Marks:	100		
PAI	RT -B: Conte	nt of the Co	IIreo	THE LUSSING WILLIAMS:	10
e tre	Total No. of Tea	ching_learning D	Onical- (Of TT		
TT		oning learning I	Periods (01 Hr. per period	d) - 45 Periods (45 Hou	ırs)
Uni		Top	oics (Course contents)		No. o Perio
	account of pathog Host pathogen in secretions. Viral their causative age	nteraction: invasion diseases: hepatitisents, pathogenesis	s, Structure and Classific f history of microbiology: on, antigenic heterogeneit, influenza, AIDS, Covid diagnosis, prophylaxis and	germ theory of disease, y, toxins and enzymes -19 with emphasis on	12
П	bacteria. Bacteria penicillin, diseas Escherichia coli, diseases: Ringwor	al Diseases: Ge al Diseases: A br ses caused by Mycobacterium rm infection, Aspen	neral characters, Structure ief account of pathogenic Streptococcus pneumont tuberculosis, Rickettsia, rgillosis, candidiasis	e and Classification of bacteria, discovery of ia, Salmonella typhi, Spirochaetes Fungal	11
II	parasitism. Parasit medical important Protozoa with refe Trypanosoma gam	ic adaptations. Co ce: Brief account erence to Man, problems, Plasmodium	of protozoa & disease. In ansmission, portals of entendencept of zoonotic diseases of life History, pathogen rophylaxis and treatment: m vivex, Giardia.	ry and implications of s. Protozoan diseases of nicity of the following Entamoeba histolitica,	11
	Helminth parasit	tes: An overview	of Helminthic diseases.	ce to Man prophylavia	11
IV	And treatment. To Wuchereria branro	ofti. Vector insects	histosoma haematobium,		
IV	And treatment. To Wuchereria branro	ofti. Vector insects	histosoma haematobium,		

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अध्ययन मेडेल शहीद नंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.)

Text Books, Reference Books and Others

Text Books Recommended -

> Agrawal Anju Principles of Toxicology

- Parija, S. C. (2013) Textbook of Medical Parasitology, Protozoology & Helminthology (Text and colour Atlas), IV Edition, All India Publishers & Distributers, New Delhi.
- Ichhpujani, 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 and Francis Group.
- Chatterjee, K. D. (2009). Parasitology: 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

Online Resources-

> http://ndl.iitkgp.ac.in/he document/inflibnet epgp/inflibnet epgp/IN I e P P 1 Z 512 96 P 0 B o p 51542 M 1 M L c P D a P o E P 1 51562 51563?e=9|*|

http://ndl.iitkgp.ac.in/he document/inflibnet epgp/inflibnet epgp/IN I e P P 96 P 0 B o p 51542 M 2 P d a p o w b 51594 51595?e=3|*||

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

100 Marks Maximum Marks:

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Internal Test / Quiz-(2): 20 +20

Assessment (CIA): Total Marks -30 (By Course Teacher)

Better marks out of the two Test / Quiz Assignment / Seminar -10 + obtained marks in Assignment shall be considered against 30 Marks

End Semester

Two section - A & B

Exam (ESE):

Section A: O1. Objective $-10 \times 1 = 10 \text{ Mark}$; Q2. Short answer type- $5 \times 4 = 20 \text{ Marks}$ Section B: Descriptive answer type qts.,1out of 2 from each unit-4x10=40 Marks

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF ZOOLOGY COURSE CURRICULUM

P	ART-	A:		ntroduction			
			chelor ir ree/ Honor	Life Science	Semester - III	Session: 2024-2	2025
1		se Cod		ZOSE- 01P			
2	Cours	se Title	e	Parasitology			W. M.
3	T at a situlogy				ic Elective Lab Course	9	
4	Pre-r	Pre-requisite (if, any) As per Program					
5	Course I couring			 ➢ Identify cor ➢ Learn techn ➢ Learn the t samples for 	echniques for examine pathology	a and Helminth. th of bacteria and its stain Sputum, Blood, Urine a	ind Sto
7	Credit Value 1 Credits Credit = 30 Hours Laboratory or Field learning/Trotal Marks Max. Marks: 50 Min Passing Marks:						
2				Max. Marks:	50	Min Passing Marks:	20
PA	RT -E			nt of the Co			
			l'otal No.	of learning-Traini	ng/performance Perio	ds: 30 Periods (30 Hours)	
	odule			A A CONTRACTOR OF THE PARTY OF	pics (Course conten		No. of
Tra Exp Co	o./Field aining/ eriment ntents Course	AAAA A AAA	Pathologica Blood: Ery Staining an Preparation permanent Preparation preparation and Helmin Study Kine Group disc Group disc	al examination of sputhrocyte Sedimentation of Grand identification of Grand thick I slides. In of temporary and and concentration of the eggs for parmaretics of bacterial growns in the seggs of Seminar procession or Seminar procession/quiz/seminar of the eggs for parmaretics of bacterial growns in the eggs for parmaretics	d permanent slides of techniques to identify cys	ol. rit. gative bacteria. Plasmodium infections/ or faecal matter by saline ets of parasitic Protozoans s. elated topics	30
						e and Gram negative	W 3 4

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अध्ययन मंडले शहीद नंदकुमार पटेल

विश्वविद्यालय, रायगढ़ (छ.ग.)

Text Books, Reference Books and Others

Text Books Recommended -

Ghosh Saugala, Panikar's Text book of Parasitology. Jaipyee Brothers

Ananthanarayan and Paniker's Textbook of Microbiology, Twelfth Edition, Universities press

Reference Books Recommended -

K.D. Chattargee, Parasitology . CBS Publisher

Online Resources-

http://ndl.iitkgp.ac.in/he document/swayam ugc moocs/swayam ugc moocs/IN S U M 1 U C 17 A D 4127 M L h o A L w P A o A L 34326 34327?e=7|*||

http://ndl.iitkgp.ac.in/he document/swayam ugc moocs/swayam ugc moocs/IN S U M 1 U C 17 A D 4127 M L h o T s a F h 10250 10251?e=8|*||

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:

50 Marks

Continuous Internal Assessment (CIA):

15 Marks 35 Marks

End Semester Exam (ESE): Continuous Internal

Internal Test / Quiz-(2): 10 & 10 Better marks out of the two Test / Quiz

Assessment (CIA): (By Course Teacher)

Assignment/Seminar +Attendance - 05 Total Marks -

+ obtained marks in Assignment shall be considered against 15 Marks

15 Laboratory / Field Skill Performance: On spot Assessment

End Semester

Managed by Course teacher

Exam (ESE):

A. Performed the Task based on lab. work

C. Viva-voce (based on principle/technology)

- 20 Marks

B. Spotting based on tools & technology (written) - 10 Marks as per lab. status

Name and Signature of Convener & Members of CBoS:

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM PART- A: Introduction Program: Bachelor in Life Science (Diploma / Degree/Honors) Semester -IV Session: 2024-2025 Course Code ZOSE-02T 2 Course Title Ecology and Wildlife Conservation & Management 3 Course Type Discipline Specific Elective 4 Pre-requisite (if, any) As per Program After successfully completing this course, the students will be able to: Understand the concepts of fundamental ecological principles, including energy Course Learning. flow, nutrient cycling, and population dynamics. 5 Apply the knowledge of ecology to understand equilibrium of nature. Outcomes (CLO) Analyze the strategies of Populations to survive and sustain. Evaluate the significance of biodiversity and its conservation. Create awareness about wildlife and nature. 6 Credit Value 3 Credits Credit = 15 Hours - learning & Observation Total Marks Max. Marks: 100 Min Passing Marks: PART -B: **Content of the Course** Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours) Unit No. of **Topics** (Course contents) Period I An overview of Ecology and Biomes: Aims and scope of Ecology. Difference between Autoecology and Synecology. Abiotic & Biotic factors. Ecosystem and Ecological Pyramids. Bio-geo chemical cycles. Energy flow in ecosystem: Trophic levels. Food Chain, Food Web, Food chain in 11 fresh water ecosystem. Laws of limiting factor: Leibig's Law of Minimum, Shelford Law of tolerance. Major Biomes of the world. Biogeographic zones of India. Population ecology: Population characteristics: Density, Measurement of Population Density II (Quadrate method and tagging method) Mortality, Natality, Age Pyramids, Migration and Dispersal. Life tables. Survivorship curves. Population Growth: Types of Population Growth, Growth Curves (S 12 shaped & J shaped), Mathematical Expression of population growth: logistic & stochastic. R and K strategies. Carrying Capacity. Population Regulation: extrinsic & intrinsic factors. III Biotic community and Environmental degradation: Biotic community characteristics and attributes: Stratification; Dominance, diversity, species richness, abundance, Evenness, Similarity. Ecotone and edge effect. Ecological succession. Species interaction: Positive interactions: commensalism, protocooperation and mutualism. Negative interactions: parasitism, Competition: Interspecific and 11 Intraspecifi, Lotka Volterra Model, Gause's Principle. Prey-Predatator Model. Environmental degradation: Air, water and noise pollution and their control. Natural resources: Mineral, water and forest, their significance and conservation. Biodiversity & Wildlife management: Biodiversity: Concept and characteristics. Levels of IV Biodiversity (Genetic Diversity, Species Diversity & Ecosystem Diversity), Hotspots of Biodiversity. Major National Parks of Chhattisgarh and their biodiversity. Endemic animal species of Chhattisgarh. IUCN red list categories and criteria. Conservation of Biodiversity (In Situ, & Ex Situ Conservation). Major international & national treaties, laws and regulations for conserving biodiversity. Important 11 conservation projects undertaken in India: Project Tiger & Project Elephant, Tiger Census and Estimation (Techniques and Findings). Cheetah re-introduction plan. Captive breeding and Propagation: Founder population, rehabilitation, education, utilization, gene banks. GIS and other technologies in Forest & Wild life conservation. Keywords Ecology, Biome, Abiotic, Biotic factors, Nutrient Cycle, Population, Wildlife conservation, In Situ & Ex Situ

Signature of Convener & Members (CBoS):

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Text Books, Reference Books and Others

Text Books Recommended -

- > Sharma, P.D. Ecology and Environment, Rastogi Publication.
- Kumar Pranav, Meena Usha. Fundamentals of Ecology and Environment.
- Mathur Reena. Wildlife Conservation and Management, Rastogi Publication.
- > Singh S.K., Text book of Wildlife Management, CBC Publishers and Distributors

Reference Books Recommended -

- > Chapman, J.L.& M.J. Reiss. 1998. Ecology: Principles and Applications. Cambridge Univ. press. 2nd edition.
- > Odum, E. P. (2004). Fundamentals of Ecology, Oxford and IBH Publishing Co. Pvt. Ltd.
- > Smith, TM and Smith RL 2015. Elements of Ecology, Pearson Education, India.

Online Resources-

- https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000035ZO/P000891/M020617/ ET/1498712980Ecosystemprocesses-IPart-1Quad1.pdf
- https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000035ZO/P000891/M020612/ ET/1498710746CommunitycharacteristicsstratificationPart4Quad1.pdf
- http://ndl.iitkgp.ac.in/he document/swayam prabha/cao2zsydjqu

Online Resources-

- https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1788373
- https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000032SW/P001702/M020403/ ET/14969150701-

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Internal Test / Quiz-(2): 20 +20 Assignment / Seminar -

Assessment (CIA): Total Marks -30 (By Course Teacher)

Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks

End Semester

Two section - A & B

Exam (ESE):

Section A: Q1. Objective $-10 \times 1 = 10 \text{ Mark}$; Q2. Short answer type- $5 \times 4 = 20 \text{ Marks}$ Section B: Descriptive answer type qts., 1 out of 2 from each unit-4x10=40 Marks

·Name and Signature of Convener & Members of CBoS:

विश्यविद्यालय, रायगढ़ (छ.ग.)

FOUR YEAR UNDERGRADUATE PROGRAM(2024 – 28) DEPARTMENT OF ZOOLOGY COURSE CURRICULUM

P /	ART-A: Introdu	ction	SE CURRICULUM			
		the second of th			n a si	
Program:Bachelor in Li Science(Diploma / Degree/		Lile e/ Honors)	Semester -IV	Session:2024-	2025	
١	CourseCode	ZOSE-02P				
	CourseTitle	Ecology and Wildlife Conservation & Management				
3 CourseType		Discipline Specific Elective Lab Course				
4	Pre-requisite(if, any)	As per Program				
Course Learning. Outcomes(CLO)		After successfully completing this course, the students will be able to: > Understand practical fieldwork skills, including sampling techniques, data collection and methods of analysis used in ecological research. > Learn to design and implement ecological experiments. > Understand soil profile and characteristics. > Analyse chemical parameters of various water bodies.				
6	CreditValue	1 Credits	Create awareness about local faunaand evaluate biodiversity of an area.			
7 TotalMarks		1 Credits Credit = 30 Hours Laboratory or Field learning/Trainin Max.Marks: 50 Min Passing Marks: 20				
TotalNo.c			opics(Coursecontents)		No. of Period	
Tr Exp Co	• Study of Determine To determine To study To study To prepare Estimation	a representative ty nation of pH of war mine the transparer the profile of soil the zooplankton care a checklist of bi on of ecological de- method.	ter samples from various water ney of water of Pond ecosyster in the field/ Soil sampling by ommunities in a fresh water ed rds/Insects in and around collected ensity, diversity and frequency	r bodies. n by Secchi disc. V- cut method. cosystem.	30	
	EstimationEstimationStudy of	on of Simpson– bio Strategy for preve Work / Quiz / Poste	Veiner index of a given area. odiversity index of a given are nting and managing human-wier / Model preparation/Viva.	a. ldlife conflicts.		

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शिश्व गंदकुमार पटेल विश्वविद्यालय, रायगढ़ (छ.ग.) James 24

Text Books, Reference Books and Others

Text BooksRecommended -

- Yadaw Vikas, YadawParul; 2022 Modern Practical Zoology; Kedar Nath Ram Nath.
- Verma P.S. A Manual of Practical Zoology Chordates, S.Chand.
- Lal S.S. Practical Zoology Vertebrate; Rastogi Publications.
- > Jayasurya, Arumugam N.: Practical Zoology: Saras Publication.

Reference BooksRecommended -

- Odum, E.P. 1971Fundamentals of Ecology; W.B. Sounders
- ➤ Beard, J.M. 2013Environmental Chemistry in Society (2nd Edition). CRC Press.

Online Resources-

- https://www.statology.org/simpsons-diversity-index/
- > https://www.statology.org/shannon-diversity-index/

Online Resources-

https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000014ER/P000280/M026066/E T/1520505951paper10 Module27 etext.pdf

PART-D:Assessment and Evaluation

Suggested Continuous Evaluation Methods:

MaximumMarks: 50 Marks

ContinuousInternal	Assessment(CIA):15 Marks				
EndSemesterExam((ESE):35Marks				
Continuous	Internal Test / Quiz-(2): 10 &10	Better marks out of thetwo Test / Quiz			
InternalAssessmen	t(C Assignment/Seminar +Attendance- 05	+obtained marks in Assignment shall be			
IA):	Total Marks -15 considered against				
(By Course Teacher)					
End Semester	Laboratory / Field Skill Performan	ce: On spot Assessment	Managed by		
Exam (ESE):	A. Performed the Task based on lab. work -20 Marks Course teacher				
		B. Spotting based on tools& technology (written) - 10 Marks			
	C. Viva-voce (based on principle/tec	hnology) - 05 Marks			

Name and Signature of Convener & Members of CBoS:

विश्वविद्यालय, रायगढ़ (छ.ग.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF ZOOLOGY COURSE CURRICULUM

	ogram:Bachelor		A STATE OF THE STATE OF		
(Ce	rtificate / Diploma / De	gree) So	emester – I/III/V	Session: 2024-	2025
1	Course Code	ZOVAC-01			
2	Course Title	Public Health and I	Ivaiana		
3	CourseType	ourseType Value Added Course			
4	Pre-requisite(if, any)	quisite(if any)			ALL A
5	Course Learning. Outcomes(CLO)	 Aware about the issobesity. Create general med 	As per Progressional and global public has used of food safety, water ical awareness in daily li	nealth problems. r safety, vaccination, a	nd
6	CreditValue	Analyze the measur	res to live a healthy life.		
7	TotalMarks	2 Credits Max.Marks:50	Credit = 15 Hours -le		on
Α	RT -B: Content	Sah Colonia	Mi	n Passing Marks:20	
	Total No. of Tead	hing learning Paris	J- (01 YY		
Un	:4		ds (01 Hr. per period)	- 30 Periods (30 Hou	
	and the second	Topics ((Course Contents)		No. o
I	determinants and fa	ersonal hygiene: In	ntroduction to public h	nealth and hygiene:	
TY	effects and precaution washing methods, Id	n). Personal hygiene: eal food keeping meth	lealth hazards: Water and d electronic gadgets (re Oral hygiene, Menstrual ands	d air borne diseases. ecommended levels, Hygiene, Ideal hand	07
II	effects and precautic washing methods, Id Nutrition and Heal diet. Importance canomalies: Anaemi Goiter (cause, symptom)	n). Personal hygiene: eal food keeping methath: Classification of for f dietary fibres. Signal (Iron and B12 def	lealth hazards: Water and electronic gadgets (red) Oral hygiene, Menstrual mods. Dood into micro and macro gnificance of breast fer iciency), Kwashiorkar,	d air borne diseases. ecommended levels, Hygiene, Ideal hand o nutrients. Balanced eding. Malnutrition Marasmus, Rickets,	07
II	reffects and precautic washing methods, Id Nutrition and Heal diet. Importance of anomalies: Anaemi. Goiter (cause, symptoms and preventile) Gommunicable bact symptoms and preventile.	Network Towers an in). Personal hygiene: eal food keeping methth: Classification of for dietary fibres. Sign (Iron and B12 deforms, precaution and cutagious and Non-Cocken pox, swine flu (the crial diseases: tubercutention). Sexually tratoms and prevention ptic ulcer, obesity, dution).	dealth hazards: Water and electronic gadgets (red) Oral hygiene, Menstrual ands. Dod into micro and macro gaificance of breast fer iciency), Kwashiorkar, are). Dommunicable Diseases: Pricausal agents, sympto alosis, typhoid, cholera (the insmitted diseases: AI). Non-communicable diseases (the icinamicable diseases and anxiety (the icinamicable diseases).	d air borne diseases. ecommended levels, Hygiene, Ideal hand o nutrients. Balanced eding. Malnutrition Marasmus, Rickets, Communicable viral oms and prevention). their causal agents, DS, Syphilis (their iseases: hypertension, heir causal agents,	
IV	effects and precautic washing methods, Id Nutrition and Heal diet. Importance of anomalies: Anaemi Goiter (cause, symptoms and prevecausal agents, symptoms and prevecausal agents, posymptoms and prevecausal agents.	Network Towers an in). Personal hygiene: eal food keeping methat: Classification of for dietary fibres. Sign (Iron and B12 deforms, precaution and cutagious and Non-Cocken pox, swine flu (the crial diseases: tubercutention). Sexually tratems and prevention priculcer, obesity, dution). Ingement & General veries, Deworming Accident, Burn, Light uscitation (CPR). Blo Samaritan, General Fire Control and Fire	dealth hazards: Water and electronic gadgets (red) Oral hygiene, Menstrual gods. Dood into micro and macro gnificance of breast fericiency), Kwashiorkar, ure). Dommunicable Diseases: eir causal agents, symptoglosis, typhoid, cholera (tensmitted diseases: AI	d air borne diseases. ecommended levels, Hygiene, Ideal hand on nutrients. Balanced seding. Malnutrition Marasmus, Rickets, Communicable viral oms and prevention). their causal agents, DS, Syphilis (their seases: hypertension, heir causal agents, laccination, Benefits dazole. First Aid: tion. Importance of the Health Screening. Road and Motion	07

Alahallum Obn be sund with crosm hund

Officer-In-Charge (Acuta अध्ययन मिंडिंग रिप्त पटेल Shaheed Nandkumar Patel Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.)

Text Books, Reference Books and Others

Text BooksRecommended -

- Mary Jane Schneider (2011) Introduction to Public Health.
- >Muthu, V.K. (2014) A Short Book of Public Health.

Reference Books Recommended

- Detels, R. (2017) Oxford Textbook of Public Health (6th edition).
- ➤ Gibney, M.J. (2013) Public Health Nutrition.
- ➤ Wong, K.V. (2017) Nutrition, Health and Disease.

Online Resources-

- > https://www.fda.gov/drugs/investigational-new-drug-ind-application/general-drug-categories
- https://www.nfpa.org/news-blogs-and-articles/blogs/2023/08/01/fire-extinguisher-types
- > https://www.redcross.org/take-a-class/cpr/performing-cpr/what-iscpr#:~:text=What%20Is%20the%20Purpose%20of,healthcare%20workers%20and%20eme rgency%20responders.
- https://unesdoc.unesco.org/ark:/48223/pf0000226792

Online Resources-

- > https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S001827/P001833/M029447/ET/15 245666876.21Q1.pdf
- > https://www.nhm.gov.in/images/pdf/programmes/mhs/Training Materials/PDF English/read ing material.pdf

PART-D:Assessment andEvaluation

Suggested Continuous Evaluation Methods:

MaximumMarks: 50 Marks

ContinuousInternal Assessment(CIA):15 Marks

EndSemesterExam(ESE):35Marks

Internal Test / Quiz-(2): 10 &10 Continuous InternalAssessment | Assignment/Seminar + Attendance- 05 Total Marks -15 (CIA):

Better marks out of thetwo Test / Ouiz+obtained marks in Assignment shall be considered against 15 Marks

(By Course Teacher) **End Semester**

Two section - A & B

Exam (ESE):

Section A: Q1. Objective $-05 \times 1 = 05$ Mark; Q2. Short answer type- $5 \times 2 = 10$ Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit-4x05=20Marks

Name and Signature of Convener & Members of CBoS:

of Studies

heed Nandkumar Patel

dyalaya, Raigarh (C.G

Officer-In-Charge (Academic) Shaheed Nandkumar Patel /ishwavidyalaya, Raigarh (C.G.)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28) DEPARTMENT OF ZOOLOGY

DA	ADTALL	Cour	RSE CURRICULUM	and the second s	
	ART-A: Introduct				
Pro	ogram: Bachelor in L	ife Science	Company HANAGAM	0	
{	Certificate / Diploma /	Degree)	Semester – II/IV/V/VI	Session: 2024-202	25
1	Course Code	ZOSEC-01	and the country thereof		- 7
2	Course Title Vermiculture and Vermicomposting				1. 18
3	Course Type Skill Enhancement Course				
4	Pre-requisite (if, any	,)	As per Progr	ranı	
	Course Learning	After successive Learn the identification vermicomposting	essfully completing this course, the able features of earthworm species to	he students will be able to:	
5	Outcomes (CLO)	Cultivate the skil	is of vermiculture. nallenges in vermiculture and vermi	icomposting	
July Jak	a 241	Understand the cl	res of different vermicomposting m	ethods.	
			urial prospects in this field.	,	
6	CreditValue	2 Credits	Credit = 15 Hours -T = 30 Hours Laboratory of	heoretical learning an	d
		(1C+1C)	= 30 Hours Laboratory 0	n Passing Marks:20	
7	Total Marks	Max.Marks:50	IVII.	II Fassing Maiks.20	7.7
PAI	RT -B: Content of				
		Total No.	of Teaching-learning Periods	S:	
	Theory-15 Per	iods (15 Hrs) and L	ab. or Field learning/Training	30 Periods (30 Hours)	No. o
Mod	dule		Topics (Course contents)		Perio
	Ecosystem services vermiculture and ver Vermiculture: Def Vermiculture metho and polyculture, mer Vermicomposting: and exotic vermice Perionyx ceylanens earthworms. Eudrill Low-cost Floor beds and Biological). Prearthworm biomass (& storage. Marketing	s: role played by micomposting. Role inition and features ds: Wormery, breedings and demerits. Obs Definition and features mposting earthworks, European earthwaseugeniae), Principle, Grow bags & Tank roducts of vermicon (vermiprotein), verming prospects of Vermice prospects of Vermice in the prospects of Vermice in the prosp	moisture, temperature, light, phearthworms in soil ecosystem of earthworm and vermicompost it. Selective features of earthworm getechniques: indoor and outdoo tacles in Vermiculture: Preventent es. Scientific names and distinguins (Native Indian earthworms orms. Eisenia fetida, Eisenia de of vermicomposting, Methods system. Management during verm posting, physiochemical feature compost and vermiwash. Harvestomposting in Chhattisgarh and Indian earthworms.	in Difference between in growth of plants. orms for vermiculture, or cultures, monoculture tion and Management. shing features of native. Perionyx excovatus, andrei, South African is of vermicomposting: micomposting (Physical ares and their utility: sting the vermicompost	15
rain	Study of systemati Study of Life stage Culture of earthwo Study of devices a Preparation of veri Study the effects o Study of different Coimbatore Metho Creation of set up f Field Visit to Ver	naterials/waste productic position, habits, and es & development of orms in Grow Bags. In dinstruments of Vermibed, maintenance of vermicompost & vet methods of vermid & Indore Method). For vermiwash collect miculture & Vermiculture & Vermiculture & Vermiculture & Vermiculture was an establishment of the collect miculture & Vermiculture & Vermicultu	ets for vermiculture and vermicomed habitat & External characters of Eisenia fetida. rmiculture and Vermicomposting of vermicompost & management of rmiwash on any two short duratic composting (NADEP Composti	Eisenia fetida. of climatic conditions. on plants. ng, Bangalore Method,	30
	 personnel engaged Projects/ Assignme Practical Record 	ents/ Chart/ Model pre			
yword	 personnel engaged Projects/ Assignme Practical Record 	ents/ Chart/ Model pre	eparation. g, Vermiwash, Grow Bags, NAD	EP.	<i>(</i> 1)

Officer-In-Charge (Academic) Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.)

विश्वी.....अध्ययन म eed Nandkumar Patel भारी dyalaya, Raigarh (C.G.

Text Books, Reference Books and Others

Text Books Recommended –

- > Chauhan, A. (2012) Vermitechnology, Vermiculture, Vermicompost and Earthworms: Vermiculture, Vermicomposting, Vermitechnology and Mirobes, Lambert Academic Publishing, Germany.
- National Institute of Industrial Research, (2010): The Complete Technology Book on Vermiculture and Vermicompost, Published by National Institute of Industrial Research, Delhi-7, India.
- Kumar, A. (2005) Verms and Vermitechnology, APH Publishing.
- > Bhatnagar & Patla, 2007. Earthworm vermiculture and vermin-composting, Kalyani Publishers, New Delhi.
- > Sultan Ahmed Ismail, 2005. The Earthworm Book, Second Revised Edition. Other India Press, Goa, India.
- ➤ Panda Himadri: The Complete Technology Book on Vermiculture and Vermicompost (Earthworm) with Manufacturing Process, Machinery Equipment Details & Plant Layout; Asia Pacific Business Press Inc.
- EIRI Board: Hand Book Of Biofertilizers & Vermiculture.

Online Resources-

- https://agritech.tnau.ac.in/org farm/orgfarm composting.html#:~:text=In%20the%20Banga lore%20method%20of,laid%20over%20the%20moistened%20layer.
- https://www.thepharmajournal.com/archives/2021/vol10issue12/PartAR/11-5-248-926.pdf

Online Resources-

> https://megbrdc.nic.in/publications/fliers-Pamphlets/nadep-composting-english.pdf

PART-D:Assessment andEvaluation

Suggested Continuous Evaluation Methods:

50 Marks MaximumMarks:

ContinuousInternal Assessment(CIA):15 Marks

EndSemesterExam(ESE):35Marks

10 & 10 Internal Test / Quiz-(2): Continuous InternalAssessment(CIA)(|Assignment/Seminar +Attendance- 05

Total Marks -

Better marks out of thetwo Test / Quiz +obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):

By Course Coordinator)

Laboratory / Field Skill Performance: On spot Assessment A. Performed the Task based on learned skill - 20 Marks

B. Spotting based on tools (written)

 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks

Managed by Coordinator as per skilling

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DriRK. Tambeli;

dandkumar Patel alaya, Raigarh (C.G

Officer-In-Charge (Academic) Shaheed Nandkumar Patel /ishwavidyalaya, Raigarh (C.G.)

विश्वविद्यालय, रायगढ़ (छ.ग.)