FOUR YEAR UNDERGRADUATE PROGRAM (NEP-2020) Program: Bachelor in Science (2024 - 28) **DISCIPLINE – ZOOLOGY** Session - 2024 - 25

		- 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
	t,	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 -021 ZOGE -02P	Cell Biology and Histology	LOOLC-01	vermculture

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 ۶ 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. 8

> 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. ۶
- Þ Understand the applications of Zoology in Medicine and daily life
- Contributes the knowledge for Nation building and sustainable development Þ

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

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

DA		Co	urse Curriculum					
	RT-A: Intro	duction						
Prog	ram: Bachelor in Life	Saionas						
(Cen	ificate / Diploma / Degree	(Honors)	Semester - I	Session: 2024-202	5			
1	Course Code	ZOSC-01T	OSC-01T					
2	Course Title	Life on Earth a	nd Unique Att 1					
3	Course Type	Discipline Speci	nd Unique Attributes of A	Animal Kingdom	a 10			
4	Pre-requisite (if, any)	opeci	ne course					
			As per pr	ogram				
		Develop	fully completing this cour	se, the students will be abl	e to-			
	Course Learning.				lutionar			
5	Outcomes (OLO)	> Understan	ce and relevance of Origin of	life.				
	Outcomes (CLO)	special re	ference and their specific qua	tebrate and Vertebrate anim	als wit			
		> Understan	id and appreciate diversity of	lities.				
6	C. N. H.	Apply the	knowledge about animals Sc	ine forms.				
7	Credit Value	- oreans	Credit = 15 How	rs - learning & Observation				
	Total Marks	Max. Marks:	100	Min Proving & Observation				
PAR	RT-B: Content of	the Course		Min Passing Marks: 40				
	Total No. of Teac	hing-learning P	Periode (01 H					
Uni	t	8 1000 100	erious (01 HF. per perio	d) - 45 Periods (45 Hour	s)			
I		10	DICS (Course contents)		No. of			
I	Origin of life: Theories	Cof Oniain - Clic			Period			
	Cosmozoic Theory Theo	ory of Special Cre	ation (Mythological approac	h),Theory of Panspermia or				
	Spontaneous Generativ	Theory of Direct	ed Panspermia, Theory of	h), Theory of Panspermia or Catastrophism, Theory of	-			
	and Pasture's Experim	ent Madam mi	Beneois), Theory of Bi	ogenesis: Redi's Experiment				
	Urigin of Solar Syst	am and The D	e Bill of Ontreise. Di	g bang Hypothesis in Brief				
	Sources on Primitiv	e Forth Dial	in pouresis, F	tomosphere and Enearoy	12			
	Chemogeny: Formati	on of simple and	ongin of Life. Of	parin and Haldane Theory				
	Experiment) Formatic	n of Concernation	a game compound	Stanely Miller and Ure's				
	Cell, Evolution of	modes of Nut	rition: Chemohetertrophs	gin of primitive prokaryotic Anaerobic and Aerobic				
II	Photoautotrophs. Evolu	ution of Eukaryote	<u>S.</u>	Anacione and Aerobic				
	reference to Coelentra	e attributes of Ir	s. overtebrate and Vertebrate Piscos	e animals with special				
	Definition and differ	ance batware I	isco.	-				
	Trinomial Nomenclatu	are and Internation	ertebrate and Vertebrate. No	menclature: Binomial and				
	Structure of Coral	John Const CL	the second secon	orals: Meaning of Coral	•			
	Millipora, Octocoral	lian Coral Ene	in spes of colais. Hy	drozoan Coral, Example-	11			
	Gorgonia. Torsion i	n Mollusca: Def	nple- Alcyonium, Hexacon Inition, Mechanism of Tor	sion Effects, Example-	11			
	Significance of Torsic	on. Pisces: Migrat	inition, Mechanism of Tor ion in fishes: Catadromous: By nest formation, Colling	Fel fish and And I				
	body Interruptent	ntal care in fishes	By nest formation, Coiling buth, Brood pouch, Mermaide	round eggs Attachment to				
III	Unique attributes of V	cups, Shelter in mo	by nest formation, Coiling buth, Brood pouch, Mermaids	purses. Viviparity				
	Parental care in Ar	unhibian by Mast	with special reference to A	mphibia & Rentilia:				
	Amphibia: Definitio	n Partial and Ta	s of itersery of Shelter an	d by Parents Neoteny in				
	Axolotal larva Nec	turus and Siran	Dent'l'	ing Neotony, Examples-	11			
	Identification, Poison	apparatus: Poison	Glanda Data	Non-venomous Snakes:				
IV	Unique attributes of V	artabrata animali	in Far	gs, Biting Mechanism				
	Birds: Flight Adaptatio	on, Migration and I	with special reference to A Perching Mechanism, Flightle and Penguins) Discuss Pic	ves and Mammals:				
	Special Characters of	Emu, Ostrich	and Penguins), Discuss-Bir ing mammals: Morphology	ds are classified and				
	Archaeopteryx. Monot	remes or Egg lay	and Penguins), Discuss-Bir ing mammals: Morphology ic Mammals: Morphology	and Special Character a	11			
	Whale and Dalahin M	l platypus. Aquat	ing mammals: Morphology ic Mammals: Morphology Iammals: Morphology and s	and Special Characters of				
tyword	b Origin of life Invertebra	ammais: Flying N	Ic Mammals: Morphology and S Iammals: Morphology and S s, Torsion, parental core, New	pecial Characters of Pat				
_	ture of Convener & Me	mbers (CRoS)	s, Torsion, parental care, Neoto	ny, Fangs, Aves. Manunals				
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			idyalaya, Raigar	11(0.6				

L CAL D	T–C: Learning Resources 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 an Distributers, Delhi				
Refer	ence Books Recommended				
•	Prof R. L. Kotpal, Protozoa to Echinodermata, Rastogi Publication Meerut				
•	N. Arumugam, N. C. Nair S Invertebrate Zoology, Saras Publications, New Delhi				
• N. Arumugam, N. C. Nair S vertebrate Zoology Saras Publication					
• Darington E. J. W., Invertebrate Structure and Function Nelson London					
• Dames, R. D., Invertebrate Zoology – Saunders Philadelphia					
The Difference invertebrate, Rasiographications					
reiter al, vertebrate, Rastogi Plinications					
•	H. S. Bhampah, KavitaJuneja, Recent trends in vertebrates vol 1 – 9, Anmol Publication				
•	of the frashed, Die of invertebrates. Vikash Publication House Dut Ltd New Dath:				
	G. S. Sandhu, HarshwardhanBhagskar – Advanced invertebrate zoology –Campus books international				
Onlin	e Resources-				
\checkmark	https://www.coursera.org/lecture/emergence-of-life/4-5-invertebrates-successes-of-life- without-a-backbone-WOHaS				
4	https://www.shiksha.com/online-courses/introduction-to-biology-biodiversity-course-				
	0001100003				
×	https://www.youtube.com/watch?v=k121Qv6loBA				
	https://www.youtube.com/watch?v=uK-Xx OCYcI				
5	https://www.youtube.com/watch?v=vybbBil5Elk				
DAD	https://www.youtube.com/watch?v=WxMSckEeio4				
F AR	RT -D: Assessment and Evaluation				
Maxi	ested Continuous Evaluation Methods: imum Marks: 100 Marks				
	200 Huins				
	Detter marks out of the two Test / Ouiz -				
Con	Someth (CIA). I solution of So				
Con Asse	Total Maulus				
Con Asse (By C	Course Teacher) Total Marks - 30 considered against 30 Marks				
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Signature of Convener & Members (CBoS) :

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

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

			Life Science	Semest	tor – I	Santian 2024 2	025
	Certificate / Diploma / Degree / Honors)			Semes	ler - 1	Session: 2024-2	025
	Course	e Code	ZOSC-01P				
	Course		Life on Earth an	d Unique Att	ributes of A	Animal Kingdom	and which solve a descent
	Course	e Type	Discipline Specif	ic Lab Cours	e		
4	Pre-re	equisite (if, any)			As per Pr	ogram	and beautions and
5 Course Learning Outcomes (CLO) After successfully completing this course, the students will be able to- by theses regarding the origin of life on Earth, 5 Course Learning Outcomes (CLO) > To demonstrate comprehensive understanding of the current theories and 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 6 Credit Value 1 Credits 7 Total Marks Max. Marks: 50							
7			Max. Marks:	50		Min Passing Marks:	20
PA	RT -E		nt of the Co				
		Total No. o	of learning-Train	ing / perform	ance Perio	ds: 30 Periods (30 Hours)	
Mo	dule		Тс	opics (Cours	se Conten	ts)	No. o Perio
Tra Expo Co of C	o./Field iining/ eriment ntents Course	 museum diagnostic lehthyoph Viper (pir and Peng Preparatic Non-vend Study of Study of An "Anin cut outs, Study of the anima Group di in Theory 	specimens in the c features: Mil his (Female), Alyt t & Pitless), Sea S uins, Echidna and on and Demonstra omous snakes. Coral Reefs throug Fossils through ch mal album or Pra with appropriate v some videos to d als salient features scussion/Viva or y paper.	e laboratory o lipora, Alcyc es (Male), Axc snake, Rattle S Duck bill plat ation of Key f gh Models, Phe art/ Models actical Record vrite up about t evelop underst as mentioned Seminar prese	with details onium, Go olotal larva, nake, Archa ypus, Whale or Identification otographs " containing the above m tanding and above. ntation on r	ation of Venomous and g sketches, photographs, entioned taxa. acquired knowledge on related topics mentioned	30
	ywords				Venomous a	nnd Non-venomous, Seminar	
Nan		0 2	ener & Members of	f CBoS:			
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cer-	In-Cha	rge (Acadamic) ndkumar Patel					

PART-C: Learning Resources

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 As	ssessment (CIA): 15 Marks				
End Semester Exam (E	SE): 35 Marks				
Continuous Internal		Better marks out of the two Test / Quiz			
Assessment (CIA):	Assignment/Seminar +Attendance - 05	+ obtained marks in Assignment shall be			
(By Course Teacher)	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 - 20 Marks Course teacher			
().	B. Spotting based on tools & technology (written) - 10 Marks as per lab. status				
	C. Viva-voce (based on principle/tech	nology) - 05 Marks			

Name and Signature of Convener & Members of CBoS:

rman ndkumar Patel dyalaya, 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**

	ART- A: I ogram: Bachelor in	ntroduction n Life Science		*-		
	rtificate / Diploma / De		Semester	- 11	Session: 2024-	2025
1	Course Code	ZOSC- 02T				
2	Course Title	Cell Biology and	l Histology		****	
3	Course Type	Discipline Speci			******	
4	Pre-requisite (if, any)			per Pr	ogram	
5	Course Learning Outcomes (CLO)	 Acquire kno Understand to understand to Gain Knowle 	Ily completing the wledge of Cell me the functioning of the intricate cellula edge of key proces	nis cours embrane nucleus ar mecha sses like	e, the students will be and function and extra nuclear organ nisms involved. cell division,	elles and
6	Credit Value	3 Credits			eir structural significance	
	Credit Value3 CreditsCredit = 15 Hours - learning & ObservationTotal MarksMax. Marks:100Min Passing Marks:40					
PAR	RT -B: Conter	it of the Co		·	ini i assing marks.	40
				r neriod	l) - 45 Periods (45 Ho	ure)
Unit					.) 10 I CHIOUS (40 110)	No. of
I	Cell Structure, C		ics (Course cor		Organelles: General	Period
II	Specialization of c Desmosome, plasm Ultra structure and Extra Nuclear C	osaic model), cher cell membrane: m nodesmata, tight ar functions of Endo Cell Organelles:	nical composition icrovilli desmoso nd gap junction. E plasmic reticulum Ultra structure	and fun mes, He xtra Nu and Gol	actions of Dihassan	11
III	Lysosome, Peroxis	omes, Mitochondri	a: Origin, structur	e and fu	nction	11
-	general organization Cell cycle, Cell div regulation. Program	n, chemical compo vision- Mitosis and med cell death (Au	nuclear membrane osition and functio d Meiosis. Cell di poptosis).	e and por ons, Chro ivision c	cture and functions of re complex. Nucleolus: pmosome Morphology, hecks points and their	12
IV	cells. Structure and classification, and f and function. Bone Muscular tissue: ultr attachment. Structure	function of loose ine structure. Blo marrow and ha astructure of smoote and classification	structure and cha , dense and adipc od: plasma, blooc emopoesis. Struc oth, skeletal and ca	aracterist ose tissue d cells, l ture and ardiac m	characteristics. surface ics. Connective tissue e. Cartilage and bone: ymph- their structure f function of spleen. uscles. Muscle-tendon	11
ords	Cell Biology, Cell Membr	ane, Cell organelle	Nucleus, endonlas	mic retic	ulum and Golgi apparatus,	
	ribosome, lysosome, pero d Signature of Convener	moonico, milochonu	I IA. USSUES		5 7 F	
	- NIM			17)	
	& Conarti	A	1 hund	-	Jonth alling	Err
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ment/Qkh4R2FGU	ILDNIZ:E	DSINW
ment/Qkh4R2FGU	ILDNIZ:E	DOINW
ment/Qkh4R2FGU	ILDNIZ:E	DOINW
ment/Qkh4R2FGU	ILDNIZ:E	DOINW
ment/Qkh4R2FGU	ILDNIT:E	CILLUM OOL TREAME
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Test / $Ouiz_{(2)}$: 2	$\frac{11}{10} \pm 20$	Detter
nent / Seminar -		Better marks out of the two Test / Quiz
arks -		+ obtained marks in Assignment shall be
ction A & D		considered against 30 Marks
A: 01 Objective 1	10 -1- 10	Mark; Q2. Short answer type- 5x4 =20 Marks
	ion Methods: 100 M 100 M 10	ion Methods: 100 Marks nt (CIA): 30 Marks 70 Marks 1 Test / Quiz-(2): 20 +20 ment / Seminar - 10 larks - 30 ection - A & B

Name and Signature of Convener & Members of CBoS: aut

Chairman dyalaya, Raigarh (C.G

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

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

PAI	RT-A: Intr	oduction					
Prog	ram: Bachelor in	Company of the local data and th					
(Certi	ficate / Diploma / De	gree / Honors)	Semester - II	Session: 2024	-2025		
	Course Code ZOSC-02P						
	course Title	Cell Biology ar	nd Histology				
4	ourse Type	rse Type Discipline Specific Lab Course					
4 P	Pre-requisite (if, any) As per Program						
0	 After successfully completing this course, the students will be able to- Understand ultra structure of prokaryote and Eukaryote cell, undertake microscopic study to gain knowledge learn to identify cell organelles Explain and demonstrate mitosis and meiosis division in onion root tip, Grass hopper testis, etc Gain knowledge of Microtemy. 						
	redit Value	unt value I Credits Credit = 30 Hours Laboratory or Field Level model					
Max. Marks: 50 Min Possing Monther 20							
ARI		the Course					
	Total No. of	f learning-Train	ing/performance Period	ls: 30 Periods (30 Hours)	<u> </u>		
Module	e	Το	pics (Course content	(2)	No. of		
ab./Fiel	d 1. Study of prokary	otic and eukaruoti			Period		
raining	2. Separation and is	solation of cells by	sedimentation velocity in u	nit gravity.	1. 		
ontent	s nuclei	is, isolation and id	entification of subcellular co	omponents, isolation of	•6 P		
f Cours	 e 4. Isolation of mitodehydrogenase in 5. Chromosome seg 6. Preparation of ch Mitosis 7. Preparation of stag 8. Isolation and estin 9. Study of types of the Nervous etc. 10. Preparation of Pration of Pratical Pratical	ochondria by diffe the mitochondrial regation in mitosis promosome squash chromosome squa ges of meiosis. nation of DNA. tissue through perr actical Record Viva or Seminar p	erential centrifugation and pellet. s and meiosis. es from Onion Root tip for ashes from grasshopper/co nanent slides: epithelial, con resentation on related topics	identification of succinic observation of stages of ockroach testes for the nnective, muscular,	30		
ywords	Prokaryote, Eukaryot	e, cell division, M	itosis, Meiosis, DNA Separa				
	Microtomy.		, inclosis, DIVA Separa	tion, Histology of Tissue,			
unure	of Convener & Mem	bers (CBoS) :	<i>î</i> l				
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TUN

V Nandkumar Patel dyalaya, Raigarh (C.G

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

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended -

- 1. 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 –

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

Online Resources– National Digital Library

<u>http://ndl.iitkgp.ac.in/he_document/inflibnet_epgp/inflibnet_epgp/IN</u>	ΙοΡΡ	1
<u>Z 51296 P 1 P o e 51600 M 0 P g 51604 51605?e=13 * </u>		<u> </u>

PART -D: Assessment and Evaluation					
Suggested Continuous Evaluation Methods:					
Maximum Marks: 50 Marks					
Continuous Internal A	Continuous Internal Assessment (CIA): 15 Marks				
End Semester Exam (ESE): 35 Marks					
	Internal Test / Quiz-(2): 10 & 10 Better marks out of the two Test / Quiz				
Assessment (CIA):	Assignment/Seminar +Attendance - 05 + obtained marks in Ass	two lest / Quiz			
(By Course Teacher)	Total Marks - 15 considered against 15 Marks				
End Semester	Laboratory / Field Skill Performance: On snot 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 as ner lab status				
	C. Viva-voce (based on principle/technology) - 05 Marks				

Name and Signature of Convener & Members of BoS :

halles

Surt HUD

kumar Patel alaya, 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

5 Course Learning Outcomes (CLO) > Significance and relevance of Origin of Itic. 5 Outcomes (CLO) > Understand and appreciate diversity of life forms. 6 Credit Value 3 Credits Credit = 15 Hours - learning & Observation 7 Total Marks Max. Marks: 100 Min Passing Marks: 40 PART -B: Content of the Course Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours) Unit Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours) Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours) Unit Topics (Course contents) Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours) 1 Origin of life: Theories of Origin of life: Ancient Theory of Special Creation (Mythological approach), Theory of Panspermia or Ancient Theory Theory of Directed Panspermia, Theory of Catastrophism, Theory of Cosmozoic Theory, Theory of Directed Panspermia, Theory of Biogenesis: Redi's Experiment and Pasture's Experiment. Modern Theory: Origin of Life: Oparin and Haldane Theory, Sources on Primitive Earth, Biochemical Origin of Life: Oparin and Haldane Theory, Chemogeny: Formation of Coacervates, Nucleic Acids. Biogeny: Origin of primitive prokaryotic experiment), Formation of Coacervates, Nucleic Acids. Biogeny: Origin of primitive prokaryotic cell. Evolution of modes of Nutrition: Chemohetertrophs, Anaerobic and Aerobic Photoautorphs. Evolution of Eukaryotes. 11						
Corrificate / Diploma / Degree/ Honors) Semester - 1 Session: 2024-2025 1 Course Code ZOGE - 01T Senester - 1 Session: 2024-2025 2 Course Title Life on Earth and Unique Attributes of Animal Kingdom 3 Course Type General Elective As per program 4 Pre-requisite (if, any) As per program 5 Course Learning Outestand General Idea about Invertebrate and Vertebrate anima special reference and their specific qualities. 5 Doutestand General Idea about Invertebrate and Vertebrate anima special reference and their specific qualities. 6 Credit Value 3 Credits 7 Total Marks Max Marks: 100 7 Total Mor of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours) 10 Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours) 11 Origin of life: Theories of Origin of life: 12 Ancient Theory Theory of Special Creation (Mythological approach),Theory of Panspermia or Ancient Theory Theory of Special Creation (Mythological approach),Theory of Panspermia or Ancient Theory, Theory of Special Creation (Mythological approach),Theory of Panspermia or Ancient Theory System and The Earth and Bearedy on Properiod of Lastrophism, Theory of Cosmozoic Theory, Theo				duction	RT-A: Intro	PA
ICourse Code ZOGE - 01T Course Type General Elective Course Type General Elective Pre-requisite (if, any) After successfully completing this course, the students will be able Course Learning After successfully completing this course, the students will be able Course Learning After successfully completing this course, the students will be able Course Learning Understand General Idea about Invertebrate and Vertebrate anima special reference and their specific qualities. Understand and appreciate diversity of life forms. > Understand and appreciate diversity of life forms. Apply the knowledge about animals Sciences in daily life. Apply the knowledge about animals Sciences in daily life. Total Marks Max. Marks: 100 Min Passing Marks: 40 PART -B: Content of the Course Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours) Unit Total No. of Teaching-learning Periods (Mythological approach), Theory of Panspermia or Accent they profin of Universe: Big Bang Hypothesis in Brief, and Pasture's Experiment, Modern Theory: Origin of Life: Oparin and Haldaer Theory. Sources on Primitive Earth, Biochemical Origin of Life: Oparin and Haldaer Theory. Chemogeny: Formation of Subje ad conplex organic compounds (Stanely Miller and Urely Chemogeny: Primity Bang Advancytotic cell. Evolution of Eukaryotes. Surces on Primitive Earth, Biochemited Netrebrate	5	Session: 2024-2025	Somostor I			
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3 Course Type General Elective 4 Pre-requisite (if, any) As per program 4 Pre-requisite (if, any) After successfully completing this course, the students will be able > Develop an understanding of concepts, mechanisms, evolus significance and relevance of Origin of life. 5 Course Learning > Develop an understanding of concepts, mechanisms, evolus significance and relevance of Origin of life. 6 Credit Value 3 Credits Credit elevanti of the forms. > Apply the knowledge about animals Sciences in daily life. 0 Marks 7 Total Marks Max. Marks: 100 Min Passing Marks: 40 PART -B: Content of the Course Marks Marks: 100 Vinit Topics (Course contents) I Origin of life: Theories of Origin of life: Ancient Theory of Origin of Universe: Big Bang Hyothesis in Brief, and Pasture's Experiment. Modern Theory: Origin of Universe: Big Bang Hyothesis in Brief, and Pasture's Experiment. Modern Theory: Origin of Life: Oparin and Haldane Theory. Sources on Primitive Earth. Biochemical Origin of Life: Oparin and Haldane Theory. Chemogeny: Fordin of Ongenes: regin of Componeys: Formation of Subert and Paretrebrate and Vertebrate. Analer Aerobic Photosutotrophs. Evolution of Eukaryotes. 9 Systematics & Unique attributes of Invertebrate and Vertebrate. Namendature: Biomail and Trinomial Addifference between Invertebrate and Vertebrate. Namenial and Trinomial Addifferen						
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 Origin of life: Theories of Origin of life: Ancient Theory Theory of Special Creation (Mythological approach), Theory of Panspermia or Ancient Theory, Theory of Directed Panspermia, Theory of Catastrophism, Theory of Somozoic Theory, Theory of Directed Panspermia, Theory of Biogenesis: Redi's Experiment Spontaneous Generation (Abiogenesis or Autogenesis), Theory of Biogenesis: Redi'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, 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 Chemogeny: Formation of Coacervates, Nucleic Acids. Biogeny: Origin of primitive prokaryotic expl. Evolution of modes of Nutrition: Chemohetertrophs, Anaerobic and Aerobic 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, Hexacoralian Corals, Example- Gorgonia. Torsion in Mollusca: Definition, Mechanism of Torsion, Effects of Torsion, Significance of Vertebrate animals with special reference to Amphibia & Reptilia: Parental care in fishes: By nest formation, Coiling round eggs, Attachment to 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 Nusrey or Shelter and by Parents Neoteny in Amphibia: Definiti	No. of Period		(Constanta)	ing-teating x	Total No. of Teach	
 Ancient Theory Theory of Special Creation (Mythological apploach, Interry of Statistrophism, Theory of Cosmozoic Theory, Theory of Directed Panspermia, Theory of Biogenesis: Redi's Experiment 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, Sources on Primitive Earth, Biochemical Origin of Life: Oparin and Haldane Theory, 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 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 Coral, Example-Gorgonia. Torsion in Mollusca: Definition, Mechanism of Torsion, Effects of Torsion, Significance of Torsion. Pisces: Migration in fishes: Catadromous: Eel fish and Anadromous: 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. Unique attributes of Vertebrate animals with special reference to Amphibia: Definition, Partial and Total Neotony, Factors Affecting Neotony, Examples-Axolotal larva, Necturus and Siren. R		^	ics (Course contents)			Unit
 II Systematics & Unique attributes of Invertebrate and Vertebrate annuals with Specific 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: 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. III 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, Example-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 Whale and Dolphin. Mammals: Flying Mammals: Morphology and Special Characters of Bat. 	12	enesis: Redi's Experiment Bang Hypothesis in Brief, omosphere and Eneargy in and Haldane Theory, Stanely Miller and Ure's n of primitive prokaryotic Anaerobic and Aerobic	Autogenesis), Theory of Biog y: Origin of Universe: Big n: Nebular hypothesis, Ato nical Origin of Life: Opan omplex organic compounds (ucleic Acids. Biogeny: Origin tion: Chemohetertrophs, A	heory of Directed n (Abiogenesis of A ent. Modern Theorem and The Earth Earth, Biocher n of simple and co n of Coacervates, N modes of Nutrition of Eukarvates	Cosmozoic Theory, T Spontaneous Generatio and Pasture's Experime Origin of Solar Syste Sources on Primitive Chemogeny: Formatio Experiment), Formation cell. Evolution of	
 III 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 Bat. 	11	enclature: Binomial and als: Meaning of Coral, pzoan Coral, Example- ian Corals, Example- n, Effects of Torsion, l fish and Anadromous: and eggs, Attachment to	sces: tebrate and Vertebrate. Nom code of Nomenclature Cora on, Types of corals: Hydro le- Alcyonium, Hexacorall ition, Mechanism of Torsic n in fishes: Catadromous: Ee By nest formation, Coiling roo	attributes of Inv a, Mollusca and Pi nce between Inver e and International olyp, Coral Skelet an Coral, Examp Mollusca: Defin h Pisces: Migratio tal care in fishes: I	Systematics & Unique reference to Coelentrata Definition and differe Trinomial Nomenclatur Structure of Coral po Millipora, Octocoralli Gorgonia. Torsion in Significance of Torsion Salmon fish and Parent	II
 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. 	11	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.				
	11	and Mammals: Birds (Morphology and are glorified reptiles: d Special Characters of Special Characters of cial Characters of Bat.	th special reference to Aves ching Mechanism, Flightless d Penguins), Discuss-Birds mammals: Morphology an Mammals: Morphology and mals: Morphology and Spec	ebrate animals wi Migration and Per Emu, Ostrich and mes or Egg laying latypus. Aquatic l mals: Flying Man	Unique attributes of Vert Birds: Flight Adaptation, Special Characters of Archaeopteryx. Monotree Echidna and Duck bill p Whale and Dolphin. Mam	V
		Fangs, Aves, Mammals	orsion, parental care, Neotony,			ords
nature of Convener & Members (CBoS) :			/ 1	ers (CBoS) :	e of Convener & Memb	natu
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ART-C: Learning	Resources				
ext Books Recommende	ed				
 E. J. W. Barrington Robert Barnes, Inve Edition Japan 	, Invertebrate structure and function ertebrate Zoology, Robert Barnes IV	n, English Language Book Society UK /th edition Holt Saunders International			
 Park Haswell, Mars and Distributers, D 	shall and Williams, A textbook on Z elhi	coology Invertebrate, AITBS Publishing			
Distributers, Delhi		oology Vertebrate, AITBS Publishing and			
eference Books Recomm	mended				
 E.L. Jordan, Dr. P. N. Arumugam, N. N. Arumugam, N. Barrington E. J. W Barnes, R. D., Inv 	Protozoa to Echinodermata, Rastogi S. Verma, Invertebrate Zoology, S. C. Nair S Invertebrate Zoology, Sa C. Nair S vertebrate Zoology, Sara ., Invertebrate Structure and Functio ertebrate Zoology –Saunders Philade rtebrate, Rastogi Publications	Chand Publications, New Delhi aras Publication. as Publication. on, Nelson London			
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.cour.	sera.org/lecture/emergence-of-life/4	4-5-invertebrates-successes-of-life-			
without-a-backbone-WOHaS					
	sha.com/online-courses/introduction	n-to-biology-biodiversity-course-			
<u>courl5385</u>					
► https://www.youtube.com/watch?v=k121Qv6loBA					
► https://www.youtube.com/watch?v=uK-Xx OCYcI					
<u>https://www.youtube.com/watch?v=vybbBil5Elk</u>					
<u>https://www.youtube.com/watch?v=WxMSckEeio4</u>					
PART -D: Assessment and Evaluation					
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Marks					
Continuous Internal Assessment (CIA): 30 Marks					
End Semester Exam (E		Potton months out of the two Test / Out-			
	Internal Test / Quiz-(2): 20 +20 Assignment / Seminar - 10	Better marks out of the two Test / Quiz +			
Assessment (CIA):	Total Marks - 30	obtained marks in Assignment shall be considered against 30 Marks			
(By Course Teacher)		considered against 50 Marks			
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.,				

Signature of Convener & Members (CBoS :

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Difficer-In-Charge (Shaheed Nandkumar Patel) Shaheed Nandkumar Patel fichwavidyalaya, Raigarh (C.G.)

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

P/	ART-	A: II	ntroductio	n				
		: Bachelor in		Semester - I	Session: 2024-2	2025		
		e / Diploma / De	gree / Honors)	Semester - I	DC351011, 2024			
1	Cours	se Code	ZOGE - 01P					
2	Cours	se Title	Life on Earth a	Life on Earth and Unique Attributes of Animal Kingdom				
3	Cours	se Туре	General Elective	e				
4	Pre-requisite (if, any) As per Program				Program			
5 Course Learning Outcomes (CLO)			 To demonstrat hypotheses reg Understand div Identify some d 	e comprehensive understa garding the origin of life on	d vertebrate animals	ries and		
6	Cred	it Value	1 Credits	Credit =30 Hours Labo	pratory or Field learning/	Fraining		
7		l Marks	Max. Marks:	50	Min Passing Marks:	20		
PA	RT -	B: Conte	nt of the Co	ourse				
	•	Total No. o	of learning-Train	ing / performance Peri	ods: 30 Periods (30 Hours)		
M	odule			pics (Course Conter		No. of Period		
Tra Exp Co	b./Field aining/ eriment ntents Course	 Study of a museum diagnostic Ichthyoph Viper (pit and Pengu Preparatio Non-veno Study of C Study of F An "Anim cut outs, w Study of s the animal 	different Invertebr specimens in the features: Mill is (Female), Alyte & Pitless), Sea S ins, Echidna and on and Demonstra mous snakes. Coral Reefs through cossils through cha nal album or Prace with appropriate we ome videos to de s salient features a cussion/Viva or S	e laboratory with detail lipora, Alcyonium, Ge es (Male), Axolotal larva, nake, Rattle Snake, Arch Duck bill platypus, Whal- tion of Key for Identific h Models, Photographs art/ Models ctical Record" containin, rite up about the above m	ation of Venomous and g sketches, photographs, entioned taxa. acquired knowledge on	30		
	words	•	imens, Invertebrate. Ier & Members of (л. — Л.	nd Non-venomous, Seminar			
		Charles Station	ofn	goud they	orden print	/		

idyalaya, Raigarh (C.G Vishwavidyalaya, Raigarh (C.G)

PART-C: Learning Resources

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:						
Maximum Marks:	50 Marks					
Continuous Internal A						
End Semester Exam (E	CSE): 35 Marks	the file two Test / Ouiz				
Assessment (CIA):	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	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 Performan	b. work - 20 Marks Course teacher logy (written) – 10 Marks as per lab. status				

Name and Signature of Convener & Members of CBoS:

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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

P	AR	T- A:	ntroductio	E CURRICULUM		
		am: Bachelor in			[
(Ce	ertif	icate / Diploma / De	gree / Honors)	Semester - II	Session: 2024-2	2025
1	Co	ourse Code	ZOGE - 02T			
2	Co	ourse Title Cell Biology and		d Histology		
3	Co	ourse Type	General Electiv			
4	Pı	Pre-requisite (if, any) As per Program			ogram	
5 Course Learning Outcomes (CLO) ▷			 Acquire known Understand understand to Gain Known 	ally completing this cour owledge of Cell membrand the functioning of nucleus the intricate cellular mech- edge of key processes like various tissues of body th	se, the students will be a e and function s and extra nuclear organe anisms involved. e cell division, eir structural significance	illes and
6	C	redit Value	3 Credits	Credit = 15 Hours	s - learning & Observat	tion
7	T	otal Marks	Max. Marks:	100	Min Passing Marks:	40
PA	RT	-B: Conter	nt of the Co	urse		
		Total No. of Teac	ching-learning F	eriods (01 Hr. per perio	d) - 45 Periods (45 Hol	No. of
Ur	nit		Top	oics (Course contents)		Period
	structure of Prokaryotes and Eukaryotes. Cell membrane organization: Origin structure (Lipid-Lipid Bilayer Model, Dannelli & Davson Model, Unit Membran Model and Fluid mosaic model), chemical composition and function of cell membrane Specialization of cell membrane: microvilli desmosomes, Hemidesmosome, Septat Desmosome, plasmodesmata, tight and gap junction. Extra Nuclear Cell Organelles Ultra structure and functions of Endoplasmic reticulum and Golgi apparatus.				Model, Unit Membrane nction of cell membrane, emidesmosome, Septate uclear Cell Organelles: olgi apparatus.	
I	I	Extra Nuclear (Cell Organelles: Ultra structure and functions of Ribosome, omes. Mitochondria: Origin, structure and function.		11	
I	 Lysosome, Peroxisomes, Mitochondria: Origin, structure and function. 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 			12		
 regulation. Programmed cell death (Apoptosis). Introduction to tissues. Epithelial tissue: types, structure and characteristics. surface 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. 			11			
	r	Cell Biology, Cell Memb ibosome, lysosome, pero I Signature of Convene	orane, Cell organell oxisomes, Mitochor	e, Nucleus, endoplasmic ret dria, tissues.	iculum and Golgi apparatu	<i>S,</i>
		Skahall	in 261	(Greek	alphn www.	
				Chairm		

Officer-In-Charge (Mandatalic) Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.) Nairman Mandkumar Patel Valaya, Raigarh (C.G

PART-C: Learn	ing Resources				
Text Books, Referenc	e Books and Others				
Text Books Recommend	led –				
1.Gupta P.K. Cell and	d Molecular Biology, Hima	lava Pub	lication		
2. Arumugam.N, Cel	biology and Molecular Bio	logy Sa	ras Publication		
3. Rastogi V.B. Cell	Biology, Rastogi Publication	n n			
4. Verma P.S. and Ag	grawal Cell Biology, S. Cha	nd Publi	cation		
Reference Books Recon	nmended –				
		Concepts	and Experiments (6th edition) John Wiley		
& Sons, Inc.	8,				
6. De Robertis, E.D.F	. and De Robertis, E.M.F. (2006) Ce	ell and Molecular Biology (8th edition)		
Lippincott Williar	ns and Wilkins, Philadelphia	a.			
7. Cooper, G.M. and	Hausman, R.E. (2009) The	Cell: A N	Aolecular Approach. (5th edition) ASM		
Press & Sunderlan	d Washington DC · Singue	er Associ	ates, MA.		
8. Becker, W.M.; Kle	insmith, L.J.; Hardin. J. and	Bertoni	G. P. (2009) The World of the Cell. (7th		
edition) Pearson B	enjamin Cummings Publishi	ng, San	Francisco. Practical		
Online Resources-					
1. National digital Li	brary	DNITE	ELIWWmpzO2loY0poaLIVtYIBvc1BZNX		
http://ndl.iitkgp.ac	.in/document/Qkh4R2FGUk	IZVZU	cFUvWmpzQ2loY0poaUVtYlByc1BZNX		
k3TnZMWVFzQ2	XpZNjhhQUpIR1BTOERHe	RNZIFI	<u>SIYW</u> cFUvWmpzQ2loZFJyVGFmaDFwbXpBS		
2. <u>http://ndl.iitkgp.ac</u>	xaFl6OC9Sb25QWUIXLzF	IVINU	Zw		
0KWINI9t0191001	be.com/watch?v=GYY6271	eAKg			
A E DG Dathchala			· · · · · ·		
4. E-rOTallishard.	et ac in/Home/ViewSubject?	catid=2r	As1Puvga4LW93zMe83aA==		
mitps://cpgp.minon					
DADT D. Accord	sment and Evalua	tion			
Suggested Continuous	Evoluation Methods				
Maximum Marks:	100 Mar	ks			
Maximum Marks.					
Continuous Internal Assessment (CIA): 30 Marks End Semester Exam (ESE): 70 Marks					
End Semester Exam (E	Internal Test / Quiz-(2): 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)	Two section – A & B				
End Semester	Section A: O1 Objective - 10	x1 = 10 M	Mark; Q2. Short answer type- 5x4 =20 Marks		
Exam (ESE):	Section A. QI. Objective = 10	type ate	,1out of 2 from each unit-4x10=40 Marks		

Name and Signature of Convener & Members of CBoS:

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Officer-In-Charge (Academatic) Shaheed Nandkumar Patel Alshwavidyalaya, Raigarh (C.G.)

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

2 Course Title Cell Biology and Histology 3 Course Type General Elective 4 Pre-requisite (if, any) As per Program 5 Course Learning Outcomes (CLO) After successfully completing this course, the students will be able to > Understand ultra structure of prokaryote and Eukaryote cell, undertak microscopic study to gain knowledge 5 Course Learning Outcomes (CLO) > learn to identify cell organelles > Explain and demonstrate mitosis and meiosis division in onion root tip Grass hopper testis, etc > Gain knowledge of Microtomy 6 Credit Value 1 Credits 7 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)				Cou	rse Curriculum				
Certificate / Diploma / Degree / Honors) Semester - II Session: 2024-2025 1 Course Code ZOGE -02P 2 Course Title Cell Biology and Histology 3 Course Type General Elective 4 Pre-requisite (if, any) As per Program 5 Course Learning Outcomes (CLO) After successfully completing this course, the students will be able to > Understand ultra structure of prokaryote and Eukaryote cell, undertak microscopic study to gain knowledge 5 Course Learning Outcomes (CLO) > Understand ultra structure of prokaryote and Eukaryote cell, undertak microscopic study to gain knowledge 5 Course Learning Outcomes (CLO) > Explain and demonstrate mitosis and meiosis division in onion root tip Grass hopper testis, etc 6 Credit Value 1 Credits Credit =30 Hours Laboratory or Field learning/Trainin Grass hopper testis, etc 7 Total Marks Max. Marks: 50 Min Passing Marks: 20 ART -B: Content of the Course Topics (Course contents) No. o 2 Separation and isolation of cells by sedimentation velocity in unit gravity. Sisolation of Sieolation of 3 Disruption of cells, isolation and identification of subcellular components, isolation of muclei. Solation of stages of meiosis.	PA	ART	-A: Intre	oduction					
Certificate / Diploma / Degree / Honors) Semester - II Session: 2024-2025 1 Course Code ZOGE -02P 2 Course Title Cell Biology and Histology 3 Course Type General Elective 4 Pre-requisite (if, any) As per Program 5 Course Learning Outcomes (CLO) After successfully completing this course, the students will be able to > Understand ultra structure of prokaryote and Eukaryote cell, undertak microscopic study to gain knowledge 5 Course Learning Outcomes (CLO) > Understand ultra structure of prokaryote and Eukaryote cell, undertak microscopic study to gain knowledge 5 Course Learning Outcomes (CLO) > Explain and demonstrate mitosis and meiosis division in onion root tip Grass hopper testis, etc 6 Credit Value 1 Credits Credit =30 Hours Laboratory or Field learning/Trainin Grass hopper testis, etc 7 Total Marks Max. Marks: 50 Min Passing Marks: 20 ART -B: Content of the Course Topics (Course contents) No. o 2 Separation and isolation of cells by sedimentation velocity in unit gravity. Sisolation of Sieolation of 3 Disruption of cells, isolation and identification of subcellular components, isolation of muclei. Solation of stages of meiosis.	Pr	ogra	m: Bachelor in	n Life Science		G : 0004 (0.25		
1 Course Code ZOGE -02P 2 Course Title Cell Biology and Histology 3 Course Type General Elective 4 Pre-requisite (if, any) As per Program 5 Course Learning Outcomes (CLO) After successfully completing this course, the students will be able to > Understand ultra structure of prokaryote and Eukaryote cell, undertak microscopic study to gain knowledge 6 Credit Value 1 Credits Credit regrammed 7 Total Marks Max. Marks: 50 Min Passing Marks: 20 PART -B: Content of the Course Topics (Course contents) No. o Module Topics (Course contents) No. o Period AbcJField 1. Study of prokaryotic and eukaryotic cell types with the help of chart, slide and video. Separation and isolation of cells by sedimentation velocity in unit gravity. Solation of micelondria by differential centrifugation and identification of succinic dehydrogenase in the micelondrial pellet. Solation of stages of meiosis. Solation of stages of Micros 6 Preparation of chromosome squashes from grasshopper/cockroach testes for the observation of stages of meiosis. Solation and estimation of DNA. Solation and pericula Record 1. Study of types of tissue through permanent slides: epithelial, connective, muscul					Semester - II	Session: 2024-202			
Course Type General Elective 4 Pre-requisite (if, any) As per Program 5 Course Learning Outcomes (CLO) After successfully completing this course, the students will be able to > Understand ultra structure of prokaryote and Eukaryote cell, undertak microscopic study to gain knowledge 5 Course Learning Outcomes (CLO) > Understand ultra structure of prokaryote and Eukaryote cell, undertak microscopic study to gain knowledge 6 Credit Value 1 Credits Credit =30 Hours Laboratory or Field learning/Trainin Grass hopper testis, etc 6 Credit Value 1 Credits Credit =30 Hours Laboratory or Field learning/Trainin Grass hopper testis, etc 7 Total Marks Max. Marks: 50 Min Passing Marks: 20 ART -B: Content of the Course Topics (Course contents) No. o Perio Carburgieid 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. Solation of muchondria by differential centrifugation and identification of succinic dehydrogenase in the mitochondria pellet. 5. 30 6 Oremation of stages of meiosis. 8. Isolation of Stages of meiosis. 8. Isolation of stages of meiosis. 30 7 Pr	1	Cou	rse Code	ZOGE -02P					
3 Course Type General Elective 4 Pre-requisite (if, any) As per Program 5 Course Learning Outcomes (CLO) After successfully completing this course, the students will be able to > Understand ultra structure of prokaryote and Eukaryote cell, undertak microscopic study to gain knowledge 5 Course Learning Outcomes (CLO) > Understand ultra structure of prokaryote and Eukaryote cell, undertak microscopic study to gain knowledge 6 Credit Value 1 Credits Credit = 30 Hours Laboratory or Field learning/Traintin Grass hopper testis, etc 7 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. o Period Module I. Study of prokaryotic and eukaryotic cell types with the help of chart, slide and video. No. o Period 1. Study of prokaryotic and eukaryotic cell types with the help of chart, slide and video. Solation of mitochondria by differential centrifugation and identification of succinic dehydrogenase in the mitochondrial pellet. Solation of stages of Mitosis No. 7. Preparation of chromosome squashes from Onion Root tip for observation of stages of Mitosis Solation and estimation of DNA. Solady of types of tissue through permanent slides: epithelial, connective, muscular, Nervous etc.	2	Cou	rse Title	Cell Biology an	Cell Biology and Histology				
4 Pre-requisite (if, any) As per Program 5 Course Learning Outcomes (CLO) After successfully completing this course, the students will be able to > Understand ultra structure of prokaryote and Eukaryote cell, undertak microscopic study to gain knowledge 5 Course Learning Outcomes (CLO) > Understand ultra structure of prokaryote and Eukaryote cell, undertak microscopic study to gain knowledge 6 Credit Value 1 Credits Credit = 30 Hours Laboratory or Field learning/Training/ Training/ 7 Total Marks Max. Marks: 50 Min Passing Marks: 20 PART -B: Content of the Course	3	Cou	rse Type						
5 After successfully completing this course, the students will be able to > Understand ultra structure of prokaryote and Eukaryote cell, undertak microscopic study to gain knowledge 5 Course Learning Outcomes (CLO) > Understand ultra structure of prokaryote and Eukaryote cell, undertak microscopic study to gain knowledge 6 Credit Value 1 Credits Credit = 30 Hours Laboratory or Field learning/Trai	4					ogram			
7 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. o Module Topics (Course contents) No. o Lab./Field 1. Study of prokaryotic and eukaryotic cell types with the help of chart, slide and video. No. o 2. Separation and isolation of cells by sedimentation velocity in unit gravity. No. of nuclei. No. of nuclei. 3. Disruption of cells, isolation and identification of subcellular components, isolation of nuclei. No. of nuclei. No. of nuclei. 6f Course 6. Preparation of chromosome squashes from Onion Root tip for observation of stages of Mitosis Study of types of tissue through permanent slides: epithelial, connective, muscular, Nervous etc. 30 9. Study of types of tissue through permanent slides: epithelial, connective, muscular, Nervous etc. Preparation of Practical Record 11. Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paper Verwords Prokaryote, Eukaryote, cell division, Mitosis, Meiosis, DNA Separation, Histology of Tissue, Microtomy.	5			 Understand microscopie learn to ide Explain and Grass hopp 	ully completing this cour l ultra structure of prokaryo c study to gain knowledge ntify cell organelles d demonstrate mitosis and n er testis, etc adge of Microtomy	se, the students will be a ote and Eukaryote cell, u neiosis division in onion	root tip,		
7 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. o Period Lab./Field 1. Study of prokaryotic and eukaryotic cell types with the help of chart, slide and video. No. o Period Contents 3. Disruption of cells, isolation and identification of subcellular components, isolation of nuclei. No. o Period 4. Isolation of mitochondria by differential centrifugation and identification of succinic dehydrogenase in the mitochondrial pellet. S. Chromosome segregation in mitosis and meiosis. 3. Preparation of chromosome squashes from Onion Root tip for observation of stages of Mitosis 30 7. Preparation of chromosome squashes from grasshopper/cockroach testes for the observation of stages of meiosis. 8. Isolation and estimation of DNA. 3. 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 Verwords Prokaryote, Eukaryote, cell division, Mitosis, Meiosis, DNA Separation, Histology of Tissue, Microtomy.	6	Cre	dit Value		Credit =30 Hours Labord	atory or Field learning/I	Training		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours) Module Topics (Course contents) No. o Period 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. 3. Disruption 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 30 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 Prokaryote, Eukaryote, cell division, Mitosis, Meiosis, DNA Separation, Histology of Tissue, Microtomy.	7			Max. Marks:	50	Min Passing Marks:	20		
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ModuleTopics (Course contents)PerioLab./Field1. 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.Superiment3. 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 Mitosis7. Preparation of chromosome squashes from grasshopper/cockroach testes for the observation of stages of meiosis.309. Study of types of tissue through permanent slides: epithelial, connective, muscular, Nervous etc.10. Preparation of Practical Record3011. Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paperProkaryote, Eukaryote, cell division, Mitosis, Meiosis, DNA Separation, Histology of Tissue, Microtomy.			Total No. o	of learning-Train	ing/performance Periods	s: 30 Periods (30 Hours)	No of		
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Reywords Prokaryote, Eukaryote, cell division, Mitosis, Meiosis, DNA Separation, Histology of Tissue, Microtomy.	Tra Expo Coi	nining/ eriment ntents	 Separation and i Disruption of cenuclei. Isolation of midehydrogenase in Chromosome se Preparation of complexity of the second second	isolation of cells by ells, isolation and id tochondria by diffe n the mitochondrial gregation in mitosis chromosome squash chromosome squash chromosome squ ages of meiosis. imation of DNA. f tissue through peri ractical Record	sedimentation velocity in un entification of subcellular co- erential centrifugation and id pellet. s and meiosis. es from Onion Root tip for ashes from grasshopper/co- nanent slides: epithelial, con	It gravity. Imponents, isolation of dentification of succinic observation of stages of ckroach testes for the nective, muscular,	30		
	Keyn	vords	Prokaryote, Eukaryo	ote, cell division, M	itosis, Meiosis, DNA Separa	tion, Histology of Tissue,			
	igna	iture o		mbers (CBoS) :		i.			

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Officer-In-Charge (Acadamic) Shaheed Nandkumar Patel Adwovidyalaya, Raigarh (C.G.)

PART-C: Learning Resources Text Books, Reference Books and Others Text Books Recommended -1. 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 Evaluation Methods:** Maximum Marks: 50 Marks Continuous Internal Assessment (CIA): 15 Marks End Semester Exam (ESE): 35 Marks Better marks out of the two Test / Quiz Continuous Internal Internal Test / Quiz-(2): 10 & 10 + obtained marks in Assignment shall be Assignment/Seminar +Attendance - 05 Assessment (CIA): considered against 15 Marks Total Marks -15 (By Course Teacher) Managed by Laboratory / Field Skill Performance: On spot Assessment **End Semester Course teacher** A. Performed the Task based on lab. work - 20 Marks Exam (ESE): B. Spotting based on tools & technology (written) - 10 Marks as per lab. status C. Viva-voce (based on principle/technology) - 05 Marks

Name and Signature of Convener & Members of BoS:

Roballin Som

 \mathcal{M} kumar Patel

dyalaya, Raigarh (C.G.

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

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

PA	AR'	T-A: Introdu		E CURRICULUM		
		am:Bachelor				
		cate / Diploma / De	gree)	Semester – I/III/V	Session: 2024-2	2025
1	Co	urse Code	ZOVAC-01			
2	Co	urse Title	Public Health a	nd Hygiene		
3	Co	urseType	Value Added C			
4	Pr	e-requisite(if, any)		As per Prog	ram	
5	Co	ourse Learning. atcomes(CLO)	 Identify currer Aware about the obesity. Create general 	e importance of hygiene. It national and global public l he issues of food safety, wate medical awareness in daily l teasures to live a healthy life.	health problems. r safety, vaccination, a ife.	
6	C	reditValue	2 Credits	Credit = 15 Hours -l		on
7	To	otalMarks	Max.Marks:50	M	in Passing Marks:20	
PA	RT	-B: Content	oftheCours	e		_
		Total No. of Tea	ching-learning I	Periods (01 Hr. per period)	- 30 Periods (30 Hou	rs)
Uı	nit		Topics (Course Contents)		No. of Perior	
IMaintenance of personal hygien determinants and factors. Pollution a Radiation hazards: Network Tower effects and precaution). Personal hygi washing methods, Ideal food keepingIINutrition and Health: Classification			actors. Pollution a Network Tower on). Personal hyg deal food keeping Ith: Classificatior	and health hazards: Water ar rs and electronic gadgets (jene: Oral hygiene, Menstrua methods.	recommended levels, I Hygiene, Ideal hand ro nutrients. Balanced	07
diet. Importance of delary fiol anomalies: Anaemia (Iron and E Goiter (cause, symptoms, precautioIIICommunicable/Contagious and I diseases: measles, chicken pox, swine Communicable bacterial diseases: symptoms and prevention). Sexua causal agents, symptoms and pre arthritis, Diabetes, peptic ulcer, ob		a (Iron and B12 toms, precaution a ntagious and No icken pox, swine fl terial diseases: tu vention). Sexuall ptoms and preve eptic ulcer, obesi	2 deficiency), Kwashiorkar, and cure). on-Communicable Diseases: lu (their causal agents, sympt uberculosis, typhoid, cholera ly transmitted diseases: A ention). Non-communicable of	Marasmus, Rickets, Communicable viral oms and prevention). (their causal agents, .IDS, Syphilis (their liseases: hypertension,	07	
symptoms and prevention).IVPublic Health Management & General Medical Awareness: Vaccination, Benefits of institutional deliveries, Deworming drive: Use of Albendazole. First Aid: Electrocution, Road Accident, Burn, Lightning Strike, Envenomation. Importance of Cardiopulmonary resuscitation (CPR). Blood Donation: Eligibility, Health Screening. Road Safety: Good Samaritan, General safety precautions on Road and Motion Sickness. Fire Safety: Fire Control and Fire Extinguisher Categories.07					07	
Keyw	ords	Health, Hygiene, Nutri	tion, Disorders, Va	ccination, Safety, Fire, Blood, M	Aedication.	
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Chairman Studies Wandkumar Patel Jyalaya, Raigarh (C.G

Officer-In-Charge (Market) Shaheed Nandkumar Patel Gehwavidyalaya, Raigarh (C.G.)

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Text Books, Reform	tee Hooks and Others	
经上午 华军的合大学 人名英法 安人的的法法法法法	And	
ENTAIN Jame Sidney	der (2011) Introduction to Public Healt	l.
* Muthin V & 1201	4) A Short Book of Public Health.	n,
AND PHENE ALAN NEVER	station for the one of the the freehold.	
1 1111 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Oxford Textbook of Public Health (6th	Billian).
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Mung, N. V. (20	17) Nutrition, Health and Disease.	
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of Studies red Nandkumar Patel syalaya, Raigarh (C.G

Offi**cer-In-Charge** (Automote) Shaheed Nandkumar Patel Shwavidyalaya, Raigarh (C.G.)

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

	gram	: Bachelor in Lif	e Science			-
_(Certif	icate / Diploma / J	Degree)	Semester – II/IV/V/VI	Session: 2024-202	5
1		se Code	ZOSEC-01			
2	Course Title		Vermiculture and Vermicomposting			
3	and the state of t	se Туре	Skill Enhancem	ent Course		
4	Pre-requisite (if, any)			As per Pro		
	Cou	rse Learning	After succ Learn the identify vermicomposting	essfully completing this cours table features of earthworm spec	e, the students will be able to: cies for vermiculture and	
5		comes (CLO)		lls of vermiculture.		
-		(020)	Understand the c	hallenges in vermiculture and ve	ermicomposting.	
				ures of different vermicompostin	ng methods.	
				eurial prospects in this field.	The entired Learning an	<u>d</u>
6	Cre	ditValue	2 Credits	Credit = 15 Hours	–Theoretical learning an ry or Field learning/Traini	u ng
7	Tet	-1 Maulto	(1C + 1C) Max.Marks:50		Min Passing Marks:20	<u> </u>
7		al Marks			trini i ussing triation	
PA	RT -	B: Content of	the Course	o. of Teaching-learning Per	iods:	
		Theory-15 Per	iods (15 Hrs) and l	Lab. or Field learning/Train	ing 30 Periods (30 Hours)	
		Theory-15 Ter	1003 (15 1115) 1110 1	Topics (Course contents)		No.
Th	odule leory ntents	earthworm Mornh	hology of earthworn	nd habit, habitat. Food: Phyt n. Ecological categories: Epi	geic, Endogeic and Anecic	Per
earthworms. Ecolo Ecosystem service vermiculture and ve Vermiculture: De Vermiculture metho and polyculture metho		Ecosystem service vermiculture and ve Vermiculture: De Vermiculture metho and polyculture me	s: role played by rmicomposting. Role finition and feature ods: Wormery, breed rits and demerits. Ob	earthworms in soil ecosy e of earthworm and vermicomp es. Selective features of ear ling techniques: indoor and ou ostacles in Vermiculture: Preve	stem. Difference between bost in growth of plants. thworms for vermiculture. tdoor cultures, monoculture	
			Definition and feature	res. Scientific names and disti	nguishing features of native	1
		and exotic vermic Perionyx ceylanens earthworms. Eudril Low-cost Floor bed and Biological). P earthworm biomass & storage. Marketin	composting earthwo nis, European earth <i>useugeniae</i>), Princip s, Grow bags & Tan Products of vermic (vermiprotein), vern g prospects of Vermi	ares. Scientific names and disting the second second second second second second worms. <i>Eisenia fetida, Eisen</i> ple of vermicomposting, Met k system. Management during omposting, physiochemical nicompost and vermiwash. He icomposting in Chhattisgarh ar	nguishing features of native orms. <i>Perionyx excovatus,</i> <i>nia andrei</i> , South African thods of vermicomposting: vermicomposting (Physical features and their utility: arvesting the vermicompost	1
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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.
- 4 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

Continuous	<u>`</u>	Internal Test / Quiz-(2):	10 & 10	Better marks out of the	
InternalAssessme	nt(CIA)(Assignment/Seminar +Att	endance- 05	+obtained marks in As	
By Course Coordinat	tor)	Total Marks -	15	considered again	
End Semester Exam (ESE):	A. Po B. St	ory / Field Skill Perform erformed the Task based potting based on tools (w iva-voce (based on princi	on learned s ritten)	kill – 20 Marks – 10 Marks	Managed by Coordinator as per skilling
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Name and Signature of Convener & Members of CBoS:

Stubbada of DYM Atment	Sr Agit the born of	(Dr. R.K. Tambeli;
en CD	phome steshram)	Quairman
		Vanckumar Patel Valaya, Raigarh (C.G

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