FOUR YEAR UNDERGRADUATE PROGRAM (NEP 2020) PROGRAM: BACHELOR OF SCIENCE (2024-28) DISCIPLENE: MICROBIOLOGY

Session: 2024-25

DSC- 01 to 08		DS	SE- 01 to 12	DGE- 01 to 02		
MBSC- 01 T	Introductory Microbiology and Microbial Techniques	MBSE- 01 T	Microbial Enzyme Technology	MBGE- 01 T	Introductory Microbiology and Microbial Techniques	
MBSC- 01 P	Lab Course	MBSE- 01 P	Lab Course	MBGE- 01 P	Lab Course	
MBSC- 02 T	Bacteriology, Virology and Protozoology	MBSE- 02 T	Industrial Microbiology	MBGE- 02	Bacteriology, Virology and Protozoology	
MBSC- 02 P	Lab Course	MBSE- 02 P	Lab Course	MBGE- 02 P	Lab Course	
MBSC- 03 T	Cell Biology and Biochemistry	MBSE- 03 T	Food and Dairy Microbiology			
MBSC-03 P	Lab Course	MBSE- 03 P	Lab Course			
MBSC- 04 T	Bioinstrumentation and Biostatistics	MBSE- 04 T	Microbial Biotechnology			
MBSC-04P	Lab Course	MBSE- 04 P	Lab Course			
MBSC- 05 T	Microbial Physiology and Metabolism	MBSE- 05 T	Medical Microbiology	1279		
MBSC-05P	Lab Course	MBSE- 05 P	Lab Course	SEC		
MBSC-06 T	Molecular Biology and Microbial Genetics	MBSE- 06 T	Mycology and Plant Pathology	MBSEC- 01	Mushroom Cultivation	
MBSC-06 P	Lab Course	MBSE- 06 P	Lab Course			
MBSC- 07 T	Immunology	MBSE- 07 T	Agriculture and Veterinary Microbiology			
MBSC- 07 P	Lab Course	MBSE-07 P	Lab Course		VAC	
MBSC- 08 T	Environmental Microbiology and Microbial Ecology	MBSE- 08 T	Fermentation Technology	MBVAC- 01	Microbes and Human Health	
MBSC-08 P	Lab Course	MBSE- 08 P	Lab Course			
		MBSE- 09 T	Clinical Microbiology			
	,	MBSE- 09 P	Lab Course			
,	,	MBSE- 10 T	Pharmaceutical Microbiology			
		MBSF- 10 P	Lab Course			
		MBSE- 11 T	Metagenomics, Basic Computer and Bioinformatics			
		MBSE-11 P	Lab Course			
			Biosafety and Intellectual Property Rights	ੰ Stud	airman ies	
		MBSE- 12 P	Lab Course	eed N	andkumar Patel	

Name and Signature of Convener and Members of CBoS

Vishwavidyalaya, Raigarh (C.G.)

PART	-A:	Introduct	COURSE CURRIC	ULUM					
Progran (Certifi 1	n: Bachelor cate/Diplom Course Co	in Life Science	Semeste	er - I '	Session	2024-25			
2	Course Ti	tle							
3	Course Ty	/pe	Introductory Microbiology and Microbial techniques						
4		_							
5	Course Lo Outcomes Credit Va	Course Learning At the end of this course, the students will be able to— relate the development and scope of Microbiology relate the contributions made by prominent scient including Indian Vedic Knowledge on microbiology demonstrate the nomenclature and characteristics of differ types of microorganisms identify the basic techniques in microbiology explain the methods of microbial control Credit Value O3 Credits Credit = 15 Hours - Learning & Observation Cotal Marks Max, Marks: 100 Minimum Passing marks: 40							
PART Total I Unit			riods (01 Hr. per per pics (Course conte		Periods (45 Hours)	No. of			
r	Leeuwent	and scope of mic logy, Golden era noek, Louis Paster	erobiology - History, of microbiology, C	developr	ons of Anton von	Period 12			
п	classificat classificat features a	Jenner, The Forgotten Past of Microbiology in Indian Vedic Knowledge. Systems of classification — Binomial nomenclature, principles of microbial classification, Whittaker's five kingdom and Carl Woese's three domain classification systems and their utility, Major groups of microorganisms; General features and structure of bacteria, virus, fungi, algae and protozoa.							
ш	streaking, preservati cultivatio applicatio staining,	al culture and si , serial dilution and ion/stocking of p n of fungi, actin ons of Simple stain acid fast staining.	faining techniques — d plating; types of cul- ure cultures; cultiva omycetes and algae, ing, negative staining;	Obtainir ture medition of Princip Different	ag pure culture by a, maintenance and anacrobic bacteria, ble, procedure and al staining- Gram's	11			
ΙΫ	Tyndalliz Radiation	staining, acid fast staining. Microbial control — Sterilization: Physical Agents — Heat: Boiling, Tyndallization, Steam under pressure (Autoclave), incineration, hot air Oven. Radiations: Ionizing and non-ionizing radiations. Filtration, Chemical agents — Disinfection, Antiseptic, Germicide, Sanitizer, Principle and application of Laminar airflow, Biological agents - Antibiotics							
	Laminar a	airnow, Biological	agents - Antibiotics oc, Nomenclature, Pur		Ev.				

Name and Signature of Convener and Members of CBoS

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

Part - C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- 1. Microbiology: P. D. Sharma, Rastogi Publications.
- 2. A textbook of Microbiology: R. C. Dubey and Maheshwari, S Chand publications.
- 3. General Microbiology, Vol. II, C. B. Powar and Daginawala
- 4. Fundamentals of Microbiology and Immunology, Ajit Kr. Banerjee and Nirmalya Banerji, Central publication,

Reference Books:

- 1. Microbiology: Pelczar, MJ Chan ECS and Krieg NR, McGraw-Hill.
- 2. Microbiology: 5th Edition Prescot, M.J., Harley, J.P. and Klein, D.A. WCB Mc Graw Hill, New York.
- 3. Microbiology: An Introduction: Pearson Education Tortora, G.J., Funke, B.R. and Case, C.L.,
- 4. Fundamentals of Microbiology: VI Edition Alcomo, I.E., Jones and Bartlett Publishers. Sudbury. Massachusetts, (2001).

Online Resources - e-Resources/ e-Books and e- learning portals

- https://www.jsscacs.edu.in/sites/default/files/Department%20Files/History%20of%20Microbiology.pdf
- https://www.britannica.com/science/microbiology
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7810802/
- https://www.slideshare.net/HarinathaReddyA/methods-for-isolation-of-pure-culture
- https://microbenotes-com.webpkgcache.com/doc/-/s/microbenotes.com/sterilization-physical-andchemical-methods/

Part - D: Assessment and Evaluation

Maximum Marks:

100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE):

70 Marks

Continuous Internal

Internal Test / Ouiz - (2): 20+20 Assignment/ Seminar -10 Better marks out of the two Test/ Quiz

Assessment (CIA):

+ obtained marks in Assignment shall be

(By Course Teacher)

Total Marks -

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

30

Name and Signature of Convener and Members of CBoS

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

7 (8)	-71			COURSE	CURRICU	T.TIM				
	RT-A:		Introducti		COMIGEO	DOM				
Prog	ram: Bac	helor in L	ife Science		Semester	7	<u> </u>			
1 (Ce	Cours	e Code	egree/Honors)	MADOG	Semester I Session: 2024-25 MBSC- 01 P					
2	10.00	e Title	-							
3		е Турс			se – MBSC	-01				
4	_	quisite (If	Ann	Laborator		,				
5			• /	As per pro					,	
3	(CLO	e Learnir V	g Outcomes	At the end	of this cou	rse, the stude	nts will be a	ble to -	.,	
	(020)	,		> det	ine the basic	laboratory pr	actices and s	afety meas	ures	
}				> sele	ect the prope	ciple, working	g and applica	itions of In	struments	
	-			> ide	ntify differer	r culture med it microorgan	ia ior microb	nal growth		
6		t Value		1 Credit	Credit = 30	Hours. Labor	atory or Field	learning/	Training	
DAT	1 Total	Marks		M	lax. Marks:	50		assing mar		
Tota	IN B:	Conten	t of the Cours	e .				- Bonie		
Tota	1140.01	carning-	Fraining/ Perfor	mance Peri	ods: 30 Per	iods (30 Hou	rs)			
M	odule				Course con				No. of	
	Field	1. Good	Laboratory Pract	ices and Dia s	ofoto in Mi	111		,	Period	
Train	ning/ riment	103	tudy the brincinie	and annligation	and af with a la	obiology.	ROD incubat	on hat also		
	ents of	Oven	, laminar air flow,	light microsco	ope.	· · · · · · · · · · · · · · · · · · ·	DOD Incubati	or, not air		
-Cour		4. Isola	aration of culture n	nedia (liquid &	& solid), steríl	ization and ass	essment of ste	rility		
1		techi	nique.	Pring HOIII CIIA	monthineur ph t	our plate, strea	k plate and sp	read plate	1	
		5. Obse	ervation of microon	rganisms - cy	anobacteria, p	rotozoa, fungi.	veasts and a	lage from	30	
1		6. Obse	ral habitats. ervation of bacteria	hu Carrei i		, , ,	, p.i.a /a	.gao man	4	
		7. Stud	y of common fung	i, algae and nr	ning technique	B,	. f			
PAI	RT - C	Learn	ing Resources	, p and pr		temporary / pe	rmanent mou	nts.		
Lexi	BOOKS.	Reference	Rooks and Oth	040					71.	
Text	ROOKS K	ecommend	led:					9.1		
1	Exper	iments in	microbiology, pla	ant pathology	and biotech	nology: K P	\ maia			
	ne Resou		piology: R C Dub	ey and DK	Maheshwari.	'	nieja			
· Onn	TC TCSUL	r ces;	tube.com/watch?							
•	https:	//www.you	tube.com/watch?	v=UndcMyuI v=CbMCr0m	EXS					
PAJ	RT – D	Assess	ment and Eva	I	I V Z W					
Suga	gested C	Ontinuous	Evaluation Met	ination						
IVIAX	muum ly	larks:	51	N/1	š. ≥. t					
. Cont	tinuous Ir	ternal Ass	essment (CTA). 1	5 Marks					*	
Lilly	Semester ntinuous	Exam (E)	SE): 3	5 Marks	I Justine		•	ε,	, Te	
- Ass	essment ((CIA):	Internal Test/ C Assignment/ Ser	uiz → (2):	10 & 10	Better Mark	s out of the t	Wo Test/ O	niz	
(Ву	Course	Teacher)	Total Marks:	muar T Atte	ndance: 05 15	. Tobtained;	marks in Ass	ignment sh	all be	
Enc	l Semest	er Exam	Laboratory/Fie	ld Skill Parfo	rmanass O-	considered	against 15 M	arks	an 06	
(ES	E);					spot Assessme	nt ,	Managed	by	
-			D. Spoume pas	Sed on toole &	toobnolo		Marks Marks	course tea	cher as	
	.0							per lab. st	atus	
(9)	Il Dar	λ. 	Name and Sig	mature of Co	invener and	Members of	CBoS	Λ		

Offiscr-In-Charge (Academic) Shahood Nanchumar Patel Vishwavidyalaya, Raigarh (C.G.)

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PART-A: Introduction Program: Bachelor in Life Science Session: 2024-25 Semester - II (Certificate/Diploma/Degree/Honors) Course Code MBSC-02 T 2 Course Title Bacteriology, Virology and Protozoology Course Type 3 DSC 4 Prerequisite (If Any) As per program 5 Course Learning At the end of this course, the students will be able to -Outcomes (CLO) > recall the ultrastructure of bacteria relate ecological distribution of microorganism and their significances for society illustrate the essential and current knowledge of bacteria Identify virus, protozog and archaebacteria with their special characteristics outline the beneficial & harmful behavior of viruses, bacteria, protozoan and other microbes 6 Credit Value 03 Credits | Credit = 15 Hours - Learning & Observation Total Marks Max. Marks: 100 Minimum Passing marks: 40 PART-B: Content of the Course Total No. of Teaching-Learning Periods (01 Hr. per period) - 45 Periods (45 Hours) No. of UNIT **TOPIC** (Course Contents) Period Morphology and Ultra structure of Bacteria: Cell size, shape and arrangements. Composition, structure and function of cell membrane, cell wall of gram-positive, I 12 gram-negative bacteria, capsule, flagella, pili, ribosomes, inclusions, nucleoid, plasmids. Structure and stages of spore formation. Gram negative, positive bacteria & Archaebacteria: Gram negative and positive bacteria; characteristics and examples - Gram negative (nonproteobacteria-Deinococcus, Spirochetes. Alpha proteobacteria, Rhizobium, Agrobacterium. Gamma proteo-bacteria- Escherichia, Pseudomonas). Gram m 11 positive low G+C; Bacillus, Clostridium, Staphylococcus. High G+C: Streptomyces, Frankia. General characteristics, Ecological significance and economic importance of Archaea: Methanogens, thermophiles (Thermococcus, pyrococcus, thermoplasma) and halophiles (halobacteria and halococcus). Morphology, ultrastructure, Classification & multiplication of viruses: General introduction, morphology and ultra- structure of viruses, capsid, envelopes. Types of Viral genome. Viral related forms -virions, viroids, virusoids, III 11 and prions. Classification of viruses. Salient features and life cycle of viruses: Bacteriophages (T4 & Lambda), Plant (TMV & CMV), Animal (Adenovirus & Pox virus). Introduction to protozoa; Occurrence and classification of protozoa. Structure, reproduction, life cycle and diseases caused by important protozoans - Entamoeba, Uhairi Giardia, Leishmania, Trypanosoma and Plasmodium Key Words Bacteria, Archaea, Virus, Bacteriophage, Prions, Protozoan

Name and Signature of Convener and Members of CBoS

Dant June Roshmi Dacho

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Oniser-In-Charge (Auarlemus) Shahood Nandkumar Patei Vishwavidyalaya, Raigarh (C.G.)

Part – C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- 1. General Microbiology; Vol I & II, Powar C.B. and Daginawala H. I., Himalay Pub. House, Bombay.
- 2. A Text Book of Microbiology; Dubey & Malieshwari.
- 3. A Text Book of Microbiology; R. P. Singh.
- 4. Fundamentals of Microbiology and Immunology, Ajit Kr. Bancrjee and Nirmalya Bancrji, Central publication.
- 5. Parasitology; H.S. Singh and P. Rastogi, First Edition, Rastogi Publications.

Reference Books:

- 6. Prescott's Microbiology. Wiley J M, Sherwood L M and Woolverton C J.
- 7. Microbiology. Pelczar M J, Chan E C S and Krieg N R.
- 8. General Microbiology. Stanier R Y, Ingraham J L, Wheelis M L, and Painter P R.
- 9. Microbiology: An Introduction. Tortora G J, Funke B R and Case C L.

Online Resources - e-Resources/ e-Books and e- learning portals

- https://www.ncbi.nlm.nih.gov/books/NBK8477 /
- https://www.britannica.com/science/archaea
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7150055/
- https://nios.ac.in/media/documents/dmlt/Microbiology/Lesson-53.pdf
- http://ecoursesonline.iasri.res.in/Courses/Agricultural%20Microbiology/

Part-D: Assessment and Evaluation

Sygnostad	Continuous	Estalonation	37.41. 1
Suggested	Communuous	Evaluation	wiethods:

Maximum Marks:

100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE):

70 Marks

Continuous	Interna
Assessment	(CIA):

Internal Test / Quiz - (2): 20+20 Assignment/Seminar -10 Better marks out of the two Test/ Quiz

Total Marks -

+ obtained marks in Assignment shall

be considered against 30 Marks

(By Course Teacher) **End Semester**

Exam (ESE):

Two Section - A & B

Section A: Q1. Objective $10 \times 1 = 10 \text{ Mark}$; Q2. Short answer type $-5 \times 4 = 20$

30

Marks

Section B: Descriptive answer type qts., 1 out of 2 from each unit - 4X10 = 40

Name and Signature of Convener and Members of CBoS

Vishwavidyalaya, Raigarh (C.G.)

*	No. Assay No.	COURSE CORRECTED				
PART-	A: Introdu			2024.25		
Certificat	achelor in Life Science te/Diploma/Degree/Honors)	Semester - II	Sessi	on: 2024-25		
1 Co	ourse Code	MBSC-02 P	,			
2 Co	ourse Title	Lab. Course - MBSC-02	- In the second			
3 Cc	ourse Type	Laboratory Course				
4 Pr	erequisite (If Any)	As per program				
	ourse Learning utcomes (CLO)	At the end of this course, the students will be able to — > culture microorganisms and get the knowledge about their morphological features > illustrate different staining procedures > identify bacteria and protozoa from different samples > get practice of identification of colonics on different culture media				
6 C	redit Value	1 Credit Credit = 30 H	Hours. Laboratory or Fiel	d learning/Training		
7 T	otal Marks	Max. Marks: 50	Min. Passing	g marks: 20		
PART-	-B: Content of the C	Course				
Total No	o. of learning-Training/Po	erformance Periods: 30 Peri	ods (30 Hours)			
Module	4	Topics (Course conten		No. of Period		
• ***	The second secon	erization of bacteria by colony cl				
Training Experiments Course	of 4. Differential Staining 5. Special Staining Tec 6. Study of cytopathic 7. Observation of protes	edia — Nutrient agar and Nutrient media — Blood agar, Chocolate a Techniques: Gram staining and a Inniques: Negative staining and E effects of viruses using photograph coa from different samples.	gar, Maconkey's, and EM acid-fast staining indospore staining hs.	B agar. 30		
		ı, Staining Techniques, Cytopat	hic effects, Protozoa			
PART			1.			
	ooks, Reference Books and	1 Others	With the state of			
1. Lab 2. Prac 3. Lab Online	ctical Microbiology: R. C. Do oratory Manual in Microbiolo Resources:	gy: P. Gunasekaran.	, , , , , , , , , , , , , , , , , , ,			
	https://books.google.co.in/bo	oks?id=Wh9OTbjcsfUC&prints	sec= age&q&l=lalse			
PART		d Evaluation	· · · · · · · · · · · · · · · · · · ·	7 500 000		
Maximu Continu	ed Continuous Evaluation ım Marks: ous Internal Assessment (CI nester Exam (ESE):	50 Marks				
Contin	uous Internal Internal Te	est/Quiz – (2): 10 & 10 t/Seminar + Attendance: 05 ks – 15	Better Marks out of the + obtained marks in a considered against 15	Assignment shall be		
End Se Exam (mester (ESE): Laborator A. Perfor B. Spottin C. Viva-v	y/ Field Skill Performance: On med the Task based on lab. wor ng based on tools & technology oce (based on principle/ technol	spot Assessment k – 20 Marks (written) – 10 Marks logy) – 05 Marks	Managed by a course teacher a per labi status		
(D)	Name and	Signature of Convener and	Members of CBoS	lan On ic		

Officer-In-Charge (Auademic) Shahood Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.)

	The Introduction	URSE CURRICULUM				
Conti	: Bachelor in Life Calan					
(Certi	licate/Diploma/Degree/Honore)	Semester - I	Session	ı: 2024-25		
4	Course Code	MBGE-01 T				
2	Course Title	Introductory Microbiology a	nd Microbial	techniques		
3	Course Type	Generic Elective (GE) As per Program				
4	Prerequisite (If Any)					
5	Course Learning Outcomes At the end of this course, the students will b					
	(CLO)	> relate the development				
	(CLO)	illustrate the contribution				
•		scientists including Indi				
في :			an venic Kliov	vicugo on		
		microbiology		natoviation o		
		> demonstrate the nomeno		acteristics o		
		different types of micro	organisms			
		identify the basic techni	ques in microb	iology		
	G 111-5 3	> explain the methods of a				
6	Credit Value	03 Credits Credit = 15 Hou	rs - Learning &	Observation		
7	Total Marks	Max. Marks: 100 · M	inimum Passin	g marks: 4		
<u> </u>	Γ-B: Content of the Cou	se				
Total I	No. of Teaching-Learning Period	se s (01 Hr. per period) - 45 Period		No. of		
<u> </u>	No. of Teaching-Learning Period Topics	se (01 Hr. per period) - 45 Period (Course contents)	Is (45 Hours)			
Total I	No. of Teaching-Learning Period Topics History and scope of microb	se (01 Hr. per period) - 45 Period (Course contents)	As (45 Hours) and Scope of	No. of		
Total I Unit	Topics History and scope of microbiology, Contributions of A	(Course contents) Tology - History, development Anton von Leeuwenhoek, Louis P	Is (45 Hours) and Scope of asteur, Robert	No. of		
Total I	Topics History and scope of microbiology, Contributions of Koch, Alexander Fleming and	(Course contents) fology - History, development Anton von Leeuwenhoek, Louis Pd Edward Jenner, The Forgo	Is (45 Hours) and Scope of asteur, Robert	No. of Period		
Total I Unit	Topics History and scope of microbi Microbiology, Contributions of A Koch, Alexander Fleming an Microbiology in Indian Vedic Kr	(Course contents) cology – History, development anton you Leeuwenhoek, Louis Pd Edward Jenner, The Forgonowledge.	and Scope of asteur, Robert often Past of	No. of Period		
Total I Unit	Topics History and scope of microbi Microbiology, Contributions of A Koch, Alexander Fleming an Microbiology in Indian Vedic Kn Nomenclature and General	(Course contents)	and Scope of Pasteur, Robert often Past of	No. of Period		
Total I Unit	Topics History and scope of microbiology, Contributions of A Koch, Alexander Fleming an Microbiology in Indian Vedic Kr. Nomenclature and General nomenclature, principles of	(Course contents) (Course contents) (Course contents) (Anton von Leeuwenhoek, Louis Pd Edward Jenner, The Forgonowledge. features of microorganisms microbial classification, Major	and Scope of Pasteur, Robert of Binomial regroups of	No. of Period		
Total I Unit	Topics History and scope of microbi Microbiology, Contributions of A Koch, Alexander Fleming an Microbiology in Indian Vedic Kn Nomenclature and General	(Course contents) (Course contents) (Course contents) (Anton von Leeuwenhoek, Louis Pd Edward Jenner, The Forgonowledge. features of microorganisms microbial classification, Major	and Scope of Pasteur, Robert of Binomial regroups of	No. of Period		
Total I Unit	Topics History and scope of microbiology, Contributions of A Koch, Alexander Fleming an Microbiology in Indian Vedic Kr. Nomenclature and General nomenclature, principles of microorganisms; General feature and protozoa.	(Course contents) (Course contents) (Course contents) (Index of the contents) (Index of the course of the cour	and Scope of asteur, Robert of the Past of Binomial regroups of s, fungi, algae	No. of Period		
Total? Unit I	Topics History and scope of microbiology, Contributions of A Koch, Alexander Fleming an Microbiology in Indian Vedic Kn Nomenclature and General nomenclature, principles of microorganisms; General feature and protozoa. Microbial culture and stain	(Course contents) (Course contents) (Course contents) (Index of the contents) (Index of the course of the cour	and Scope of asteur, Robert of Binomial r groups of s, fungi, algae e techniques:	No. of Period		
Total? Unit I	Topics History and scope of microbiology, Contributions of A Koch, Alexander Fleming an Microbiology in Indian Vedic Knomenclature and General nomenclature, principles of microorganisms; General feature and protozoa. Microbial culture and stain streaking, serial dilution and plate	(Course contents) (Course contents) (Course contents) (Index of the contents) (Index of the course of the cour	and Scope of asteur, Robert of the Past of Binomial regroups of s, fungi, algae techniques: ration of fungi	No. of Period 12		
Total? Unit I	Topics History and scope of microbiology, Contributions of A Koch, Alexander Fleming and Microbiology in Indian Vedic Knomenclature and General nomenclature, principles of microorganisms; General feature and protozoa. Microbial culture and stain streaking, serial dilution and plat and algae. Principle, procedure	(Course contents) (Course conte	and Scope of asteur, Robert of the Past of Binomial regroups of s, fungi, algae techniques: ration of fungi	No. of Period		
Total? Unit I	Topics History and scope of microbiology, Contributions of A Koch, Alexander Fleming an Microbiology in Indian Vedic Knomenclature and General nomenclature, principles of microorganisms; General feature and protozoa. Microbial culture and stain streaking, serial dilution and plate	(Course contents) (Course conte	and Scope of asteur, Robert of the Past of Binomial regroups of s, fungi, algae techniques: ration of fungi	No. of Period 12		
Total? Unit I	Topics History and scope of microbiology, Contributions of A Koch, Alexander Fleming and Microbiology in Indian Vedic Knomenclature and General nomenclature, principles of microorganisms; General feature and protozoa. Microbial culture and stain streaking, serial dilution and plat and algae. Principle, procedure	(Course contents) (Course conte	and Scope of asteur, Robert of Past of Binomial regroups of s, fungi, algae e techniques: ration of fungining, negative	No. of Period 12		
Total? Unit I II	Topics History and scope of microbiology, Contributions of A Koch, Alexander Fleming an Microbiology in Indian Vedic Knomenclature and General nomenclature, principles of microorganisms; General feature and protozoa. Microbial culture and stain streaking, serial dilution and plat and algae. Principle, procedure staining; Differential staining- Grimicrobial control — Steriliz Tyndallization, Steam under pre	(Course contents) (Course conte	and Scope of asteur, Robert of Past of Binomial regroups of s, fungi, algae e techniques: ration of fungining, negative eat: Boiling, hot air Oyen.	No. of Period 12		
Total? Unit I	Topics History and scope of microbiology, Contributions of A Koch, Alexander Fleming an Microbiology in Indian Vedic Knomenclature and General nomenclature, principles of microorganisms; General feature and protozoa. Microbial culture and stain streaking, serial dilution and plat and algae. Principle, procedure staining; Differential staining- Grimicrobial control — Steriliz Tyndallization, Steam under pre	(Course contents) (Course conte	and Scope of asteur, Robert of Past of Binomial regroups of s, fungi, algae e techniques: ration of fungining, negative eat: Boiling, hot air Oyen.	No. of Period 12		
Total? Unit I II	Topics History and scope of microbiology, Contributions of A Koch, Alexander Fleming an Microbiology in Indian Vedic Kr. Nomenclature and General nomenclature, principles of microorganisms; General feature and protozoa. Microbial culture and stain streaking, serial dilution and plat and algae. Principle, procedure staining; Differential staining-Gi. Microbial control — Steriliz Tyndallization, Steam under pre Radiations: Ionizing and non-ion	(Course contents) (Anton von Leeuwenhoek, Louis Particulation of Edward Jenner, The Forgonomic of Edward Jenner, The Forgonomic of Edward Jenner, The Forgonomic of Edward Jenner, Major of Edward Structure of Bacteria, virus of Edward Structure of Bacteria, virus of Edward Structure of Simple stain and applications of Simple stain am's staining, acid fast staining, ation: Physical Agents - Hossure (Autoclave), incineration, izing radiations. Filtration, Chemical Structure of Particulation of Simple stain am's staining, acid fast staining.	and Scope of asteur, Robert of the Past of Binomial regroups of strong, algae techniques: ration of funging, negative eat: Boiling, hot air Oven.	No. of Period 12		
Total? Unit I II	Topics History and scope of microbiology, Contributions of A Koch, Alexander Fleming an Microbiology in Indian Vedic Knomenclature and General nomenclature, principles of microorganisms; General feature and protozoa. Microbial culture and stain streaking, serial dilution and plat and algae. Principle, procedure staining; Differential staining- Grimicrobial control — Steriliz Tyndallization, Steam under pre	(Course contents) (Anton von Leeuwenhoek, Louis Particulation of Edward Jenner, The Forgonomic of Edward Jenner, The Forgonomic of Edward Jenner, The Forgonomic of Edward Jenner, Major of Edward Structure of Bacteria, virus of Edward Structure of Bacteria, virus of Edward Structure of Simple stain and applications of Simple stain am's staining, acid fast staining, ation: Physical Agents - Hossure (Autoclave), incineration, izing radiations. Filtration, Chemical Structure of Particulation of Simple stain am's staining, acid fast staining.	and Scope of asteur, Robert of the Past of Binomial regroups of s, fungi, algae techniques: ration of fungining, negative teat: Boiling, hot air Oven. mical agents in application of	No. of Period 12 11		
Total? Unit I II III	Topics History and scope of microbiology, Contributions of A Koch, Alexander Fleming an Microbiology in Indian Vedic Kromenclature and General nomenclature, principles of microorganisms; General feature and protozoa. Microbial culture and stain streaking, serial dilution and plate and algae. Principle, procedure staining; Differential staining- Gromicrobial control — Steriliz Tyndallization, Steam under pre Radiations: Ionizing and non-ior types, Disinfection, Antiseptic, Gromicrobiology.	(Course contents) (Anton von Leeuwenhoek, Louis Particulation of Edward Jenner, The Forgonomic of Edward Jenner, The Forgonomic of Edward Jenner, The Forgonomic of Edward Jenner, Major of Edward Structure of Bacteria, virus of Edward Structure of Bacteria, virus of Edward Structure of Simple stain and applications of Simple stain am's staining, acid fast staining, ation: Physical Agents - Hossure (Autoclave), incineration, izing radiations. Filtration, Chemical Structure of Particulation of Simple stain am's staining, acid fast staining.	and Scope of asteur, Robert of Past of Binomial regroups of s, fungi, algae etechniques: ration of fungining, negative eat: Boiling, hot air Oven. mical agents in application of	No. of Period 12 11 11		

Name and Signature of Convener and Members of CBoS

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

part - C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. Microbiology: P. D. Sharma, Rastogi Publications.

2. A textbook of Microbiology: R. C. Dubey and Maheshwari, S Chand publications.

3. General Microbiology, Vol. II, C. B. Powar and Daginawala

4. Fundamentals of Microbiology and Immunology, Ajit Kr. Banerjee and Nirmalya Banerji, Central publication.

Reference Books:

1. Microbiology: Pelczar, MJ Chan ECS and Krieg NR, McGraw-Hill.

2. Microbiology: 5th Edition Prescot, M.J., Harley, J.P. and Klein, D.A. WCB Mc Graw Hill, New York.

3. Microbiology: An Introduction: Pearson Education Tortora, G.J., Funke, B.R. and Case, C.L., Singapore.

4. Fundamentals of Microbiology: VI Edition Alcomo, I.E., Jones and Bartlett Publishers. Sudbury. Massachusetts, (2001).

Online Resources - e-Resources/ e-Books and e-learning portals

https://www.jsscacs.edu.in/sites/default/files/Department%20Files/History%20of%20Microbiology.pdf

https://www.britannica.com/science/microbiology

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7810802/

https://www.slideshare.net/HarinathaReddyA/methods-for-isolation-of-pure-culture

https://microbenotes-com.webpkgcache.com/doc/-/s/microbenotes.com/sterilization-physical-andchemical-methods/

Part - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

100 Marks Maximum Marks:

Continuous Internal Assessment (CIA): 30 Marks

70 Marks End Semester Exam (ESE):

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

Better marks out of the two Test/ Quiz + obtained marks in Assignment shall be Assignment/ Seminar -Assessment (CIA): considered against 30 Marks 30

Total Marks -(By Course Teacher) Two Section - A & B

End Semester Exam (ESE):

Section A: Q1. Objective 10 X 1 = 10 Mark; Q2. Short answer type - 5X4= 20 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit - 4X10 = 40 Marks

Name and Signature of Convener and Members of CBoS

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

- LOM	A	COURSE CURRICULUM						
PART.		etion						
Program (Certific	: Bachelor in Life Science cate/Diploma/Degree/Honors)	Semester	I	Session: 2024- 25				
1	Course Code	MBGE- 01 P	MBGE-01 P					
.2	Course Title	Lab. Course - MBGE- 01		1				
3	Course Type	Laboratory Course						
4	Prerequisite (If Any)	As per Program						
5	Course Learning Outcomes (CLO)	At the end of this course, to define the basic labo microbiology laborat explain the principle, Instruments > select the proper cult	At the end of this course, the students will be able to — > define the basic laboratory practices and safety measures i microbiology laboratory > explain the principle, working and applications of laborator Instruments > select the proper culture media for microbial growth					
6	Credit Value	1 Credit Credit = 30 Hours	s Laboratory or Fi	ield learning/Training				
7	Total Marks	Max, Marks:		Min. Passing marks: 20				
PART	-B: Content of the Cou	rse						
Total N	No. of learning-Training/Per	ormance Periods: 30 Period	s (30 Hours)	No. of				
Mod		Topics (Course contents)		Period				
Course	sterility 4. Isolation of microo spread plate technic	rganisms from environment by pour plate, streak plate and ue. oorganisms-fungi, yeasts and algae from natural habitats. eria by Gram staining technique.						
PAR'	Γ-C: Learning Resource		v.					
Text F	Books, Reference Books and C	thers						
Text I	Books Recommended: Experiments in microbiology, Practical microbiology: R C D	plant pathology and biotechnology	ogy; K R Aneja					
	e Resources: https://www.youtube.com/watc https://www.youtube.com/watc	h?v=IIndcMyuEXs						
PAR'	T-D: Assessment and E	valuation	,					
Sugge Maxir Contin	sted Continuous Evaluation N num Marks: nuous Internal Assessment (CIA) emester Exam (ESE):	Iethods: 50 Marks : 15 Marks 35 Marks						
Asses (By (Course Teacher) Total Marks:	Seminar + Attendance: 05 + 15 b	obtained marks in e considered again	f the two Test/ Quiz n Assignment shall nst 15 Marks				
End (ESE	A. Performed B. Spotting be C. Viva-voce	ield Skill Performance: On spot the Task based on lab, work — ised on tools & technology (writ based on principle/ technology)	20 Marks ten) - 10 Marks – 05 Marks	Managed by course teacher as per lab. status				
	Name and Sig	nature of Convener and Men	nbers of CBoS	Cyliman Cyliman				

Officer-In-Charge (Acade unc)
Shahood Nandkumar Patel
Vishwavidyalaya, Raigarh (C.G.)

umar Palel a, Raigarh (C.G

		COURSE CUR	RICULUM						
ART-									
	Bachelor in Life Science	Se	mester - II	Session	1: 2024-25				
	cate/Diploma/Degree/Honors) Course Code		inester II						
	Course Title	MBGE-02 T							
	Course Type	Bacteriology, Virology and Protozoology							
			Generic Elective (GE) As per Program						
	Prerequisite (If Any)	As per Program	m the students	will be able to	0 -				
5	Course Learning Outcomes (CLO)		is course, the students	Will be able to					
	Outcomes (CLO)	> relate eco	 recall the ultrastructure of bacteria relate ecological distribution of microorganism and their significances for society 						
		1	it and curren	nt knowledge	of bacteria				
		> identify v	irus, protozoa and archaeo	acteria with the	eir speciai				
		character	istics e beneficial & harmful b	ehavior of viru	ses, bacteria,				
,	2 1	protozoar	and other microbes						
6	Credit Value	03 Credits	Credit = 15 Hours - Lea	rning & Obse	rvation				
7	Total Marks		arks: 100 Min	imum Passin	g marks: 40				
Ann	Contant of the C	Ource							
Cotal	No. of Teaching-Learning Pe	riods (01 Hr. per	period) - 45 Periods (4	45 Hours)					
			`		No. of				
IINU	T	OPIC (Course	Contents)		Period				
1	Morphology and Ultra structure and gram-negative bacteria, cap				12				
,	plasmids. Eubacteria & Archaebe proteobacteria—Deinococcu Agrobacterium. Gamma positive-Characteristics of	s, Spirocheies. proteo-bacteria- low G+C: Bacilli	Escherichia, Pseudom is, Clostridium, Staphylo	onas. Gram	11				
π	G+C: Streptomyces, Franki Ecological significance an thermophiles (Thermococ	d economic imp cus, Pyrococcus)	ortance of Archaea: N and halophiles (halo	Methanogens, bacteria and	-				
m	viruses: Bacteriophages (Te	capsid, envelopes usoids, and prior 4), Plant Virus (ns. Salient features and rMV), Animal Virus (Po	life cycle of ox virus).					
IV	Leishmania, Trypanosoma	diseases caused t and <i>Plasmodium</i>	y important protozoans -	Entamoeva,	Chairmar Studio 11				
Key '	Words Bacteria, Archaea,	irus, Bacteriop	hage, Prions, Protozos	TRoS	Augusta 12				
	Name and Signal	mature of Conv	Poshor 10.6.27	Awaii.	Drie Drie Nellan Xel				
	Dr. Roder Clark	y Ton	6 by	e (Acadamic)					

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

Part - C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- 1. General Microbiology; Vol I & II, Powar C.B. and Daginawala H. I., Himalay Pub. House, Bombay.
- 2. A Text Book of Microbiology; Dubcy & Malicshwari.
- 3. A Text Book of Microbiology; R. P. Singh. 4. Fundamentals of Microbiology and Immunology, Ajit Kr. Banerjee and Nirmalya Banerji, Central
- publication. 5. Parasitology; H.S. Singh and P. Rastogi, First Edition, Rastogi Publications.

Reference Books:

- 6. Prescott's Microbiology. Wiley J.M, Sherwood L M and Woolverton C J.
- 7. Microbiology. Pelczar M J, Chan E C S and Krieg N R.
- 8. General Microbiology. Stanier R Y, Ingraham J L, Wheelis M L, and Painter P R.
- 9. Microbiology: An Introduction. Tortora G J, Funke B R and Case C L.

Online Resources - e-Resources/ e-Books and e- learning portals

- https://www.ncbi.nlm.nih.gov/books/NBK8477 /
- https://www.britannica.com/science/archaea
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7150055/
- https://nios.ac.in/media/documents/dmlt/Microbiology/Lesson-53.pdf
- http://ecoursesonline.insri.res.in/Courses/Agricultural%20Microbiology/

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 10 Better marks out of the two Test/ Quiz

Assessment (CIA):

Assignment/ Seminar -30 + obtained marks in Assignment shall be

considered against 30 Marks

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

Total Marks -Two Section - A & B

Section A: Q1. Objective 10 X 1 = 10 Mark; Q2. Short answer type - 5X4= 20 Marks

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

Name and Signature of Convener and Members of CBoS

Vishwavidyalaya, Raigarh (C.G:)

		COURSE	CURRICUL	UM '				
PART - A:		ction						
	ielor in Life Science Diploma/Degree/Honors)		Semester - :	ίΙ	Session: 202	24-25		
	se Code	MBGE-02	P					
2 Cours	sc Title	Lab. Cours	se - MBGE-02	,				
3 Cours	ве Туре	Laborator	***************************************		, , , , , , , , , , , , , , , , , , , ,			
4 Prere	quisite (If Any)	As per Program						
5 Cour (CLC	se Learning Outcomes	At the end of this course, the students will be able to— > culture microorganisms and get the knowledge about their morphological features > illustrate different staining procedures > identify bacteria and protozoa from different samples > get practice of identification of colonies on different culture						
(Creati	it Value	media 1 Credit	Credit = 30 H	ours. Laborat	ory or Field learning.	Training		
			Marks: 50	M	in. Passing marks:	20		
	Marks		Marks. 20					
raki - B	: Content of the Co learning-Training/Per	Common D.	eriods: 30 Pe	riods (30 Ho	urs)	37F		
Total No. of	learning-Training/ Per	Tormance P	ci ious. Jo i o	-4-1		No. of Period		
Module	1. Isolation and character	" Topics (Course conte	nts)		Lond		
Experiment contents of Course Key Words PART - C	 Differential Staining T Special Staining Techn Study of cytopathic eff Observation of protozo Isolation, Identification, Learning Resour 	edia — Blood a cechniques: Graiques: Negativets of viruses a from different staining Technics	am staining and ve staining and using photogra	acid-fast stain Endospore stai phs.	ning	30		
Text Books I	Reference Books and C Recommended: y Manual of Microbiolog Microbiology: R. C. Dube y Manual in Microbiology:	y and Biotech	Janeshwaii.	K. R				
	urces: //books.google.co.in/books	?id=Wh9OTI	ojesfUC&print	sec= age&q&	<u>f=false</u>	· ·		
PART-D	Assessment and	Evaluation		···········				
Suggested Co	ntinuous Evaluation M arks: ternal Assessment (CIA): Exam (ESE): nternal Internal Test/ Assignment/ S Cacher) Total Marks: Laboratory/ F A. Performe B. Spotting	ethods: 50 Marks 15 Marks 35 Marks Quiz — (2): Seminar + Att ield Skill Period the Task ba	10 & 10 endance: 05 15	+ obtained be consider spot Assessment rk - 20 v (written) - 10	Marks course to	ent shall ks d by acher as		
Band Of	Name and Signal	nature of Co	Roshmin 10.6.24	Members of C	ONCLOR IN	W Walt		

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

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

				COURSE C	URRICUI	LUM			
AR	Γ-A:		Introduc	ction					
_			n Life Science ma/Degree)	Semester	· - II/ IV/	V/VI	Session: 2024	1-25	
1	Course		ли, в св. со)	MBSEC-01					
2	Course	e Title Mushroom Cultivation							
3	Course			Skill Enhand	cement Co	urse (SE	C)		
4	Prereq	uisite ((If Any)	As nor Prog	rām		4.		
5	Course Learning Outcomes (CLO)			> explain i > relate the > examine > attain ex	types of i the metho pertise usions	mushroom ds of culti ng differen	einal values of mushrooms and their spawn preply vation and economic and Agro-residues for cultural transfer of mushrooms	aration spects Itivation o	
				> observe	Cuadit =	15 Hrs. T	heoretical Learning an	z and	
6	Credit	Value		02 Credits (1C + 1C)	= 30 Hrs	. Laborate	ory or fletti teat to be		
7	Total I	Marks		Max. Mar	ks: 50	Mi	nimum Passing mark	rks: 20	
	Theory	– 15 Pe	eriods (15 Hrs.)	No. of Teachin and Lab. or Fi	eld Learm	ng / man	ning 30 Periods (30 Ho	No. of Period	
M	odule			Topics (Co	urse Conte	ents)	i dilia and	Periou	
	heory ntents	noned mush of m (Calo mush Princ mediu	room cultivation. ushrooms; Butto cybe indica), Oy room (Volvariella iples and Requi	Taxonomic poson mushroom ster mushroom volvacea). (Obsites: Sterilizati	ition and I (Agaricus (Pleurotus	Life cycle biporus) s sajor ka	cation of edible and mushroom, Scope of of mushroom. Types of Milky mushroom (ju) and paddy straw of substrates, growth maintenance.	15	
(Observation) Techniques of Cultiva			onal and Green in huts, Compos ning (Observati	n house mating, bed a on).	and polyth	iene dag preparation,			
Tra	o./Field aining	1.Prep 2.Bas 3.Ster 4.Ider 5.Prep	paration of laboration aboration aboration and sani attification and sani attification of ediboration of Mother	tory Glassware out autoclave, h tation of mushre le and poisonou	(Chemical ot air oven oom house is mushroo	i, laminar i , instrume ms.	cleaning and drying). air flow nts etc. ion, Inoculation, and	30	
	ntents	7.Cult 10.Ha	paration of differe	oom using com -harvest manag	post/ paddy ement of c	y straw/ag rops. (Obs	Chairman ricultural wastes ervation & Practice)	Pitsl	
1	Key Wor	us	Name and Sig					-	

Danielly Delivy Japanes June 24

Officer-In-Charge (Acade Inte)
Shahood Nandkumar Patel
Vishwavidyalaya, Haigarh (C.G.)

Part - C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- 1. Nita Bhal. (2000). Hand book on Mushrooms. 2nded. Vol. I and II. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
- 2. Tewari, S. C., Pankaj Kapoor, (1988). Mushroom Cultivation. Mittal Publication, New Delhi.
- 3. Biotechnology, V. Kumaresan.

1. Stamets, Paul, and J.S. Chilton. 1983. The Mushroom Cultivator. Agarikon Press, Olympia, WA. 415 p. Reference Books:

Online Resources - e-Resources/ e-Books and e-learning portals

- https://nios.ac.in/media/documents/vocational/mushroom production (revised)(618)/Lesson
 - https://agriportal.cg.nic.in/horticulture/PDF/Download/Mushroom%20Project Part%201.pdf
 - http://nhb.gov.in/pdf/Cultivation.pdf

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):

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

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

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

End Semester

Laboratory/Field Skill Performance: On spot Assessment

20 Marks

Managed by Coordinator as per skilling

Exam (ESE):

A. Performed the Task based on lab. work-B. Spotting based on tools & technology (written) - 10 Marks

05 Marks

C. Viva-voce (based on principle/ technology) -Name and Signature of Convener and Members of CBoS

Shaheod Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.)

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

(छत्तीसगढ़ विश्वविद्यालय अधिशियम १९७३ द्वारा रथापित राजकीय विश्वविद्यालय)



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

माइक्रोबायोगीजी

FOUR YEAR UNDERGRADUATE PROGRAM (NEP 2020) PROGRAM: BACHELOR OF SCIENCE (2024-28) DISCIPLENE: MICROBIOLOGY

Session: 2024-25

5.0°	C- 01 to 08	DS	SE- 01 to 12	DG	E- 01 to 02
MBSC- 01 T	Introductory Microbiology and Microbial Techniques	MBSE- 01 T.	Microblal Enzyme Technology	MBGE- 01 T	Introductory Microbiology and Microbial Techniques
MBSC- 01 P	Lab Course	MBSE-01 P	Lab Course	MBGE- 01 P	Lab Course
MBSC- 02 T	Bacteriology, Virology and Protozoology	MBSE- 02 T	Industrial Microbiology	MBGE- 02	Bacteriology, Virology
MBSC- 02 P	Lab Course	MBSE- 02 P	Lab Course	MBGE- 02 P	and Protozoology Lab Course
MBSC- 03 T	Cell Biology and Biochemistry	MBSE- 03 T	Food and Dairy Microbiology	WDG2-021	Lab Course
MBSC- 03 P	Lab Course	MBSE- 03 P	Lab Course		
MBSC-04T	Bioinstrumentation and Biostatistics	MBSE- 04 T	Microbial Biotechnology		
MBSC-04 P	Lab Course	MBSE- 04 P	Lab Course		
MBSC- 05 T	Microbial Physiology and Metabolism	MBSE- 05 T	Medical Microbiology		
MBSC-05P	Lab Course	MBSE- 05 P	Lab Course		SEC
MBSC- 06 T	Molecular Biology and Microbial Genetics	MBSE- 06 T	Mycology and Plant Pathology	MBSEC- 01	Mushroom
MBSC-06 P	Lab Course	MBSE-06 P	Lab Course		Cultivation
MBSC- 07 T	Immunology	MBSE- 07 T	Agriculture and Veterinary Microbiology		
MBSC-07 P	Lab Course	MBSE- 07 P	Lab Course		VAC
MBSC- 08 T	Environmental Microbiology and Microbial Ecology	MBSE- 08 T	Fermentation Technology	MBVAC- 01	Microbes and Human Health
MBSC-08 P	Lab Course	MBSE- 08 P	Lab Course		
		MBSE- 09 T	Clinical Microbiology		
	7110	MBSE- 09 P	Lab Course		(n.
		MBSE- 10 T	Pharmaceutical Microbiology		
	The second secon	MBSF-10 P	Lab Course		1
		MBSE- 11 T	Metagenomics, Basic Computer and Bioinformatics		
		MBSE-11 P	Lab Course		1) to chil
		MBSE- 12 T	Biosafety and Intellectual Property Rights	Cha Studie	man Prichard
		MBSE-12 P	Lab Course	ead Nar	ndkumar Paxil

Name and Signature of Convener and Members of CBoS

Shaheed Nandkurnal Feel Vishwavidyalaya, Raigarh (C.G.)

7	m: Bachelor in Life Science	on Semester - III	Session: 20	24.25
1	Diploma/Degree/Honors) Course Code	MBSC-03 T	Session: 20	124-23
2	Course Title	Cell Biology and Biochemistry		
3	Course Type	DSC	· · · · · · · · · · · · · · · · · · ·	
4	Prerequisite (If Any)			,
5		As per program		
5	Course Learning Outcomes (CLO)	At the end of this course, the stuber illustrate the structural organicells interpret cell division classify the biomolecules and relate structure and function interpret the mechanism of e	nization of eukaryotic and pund of the compare their characterists of nucleic acids	
6	Credit Value		15 Hours - Learning & O	bservation
7	Total Marks	Max. Marks: 100	Minimum Passing ma	rks: 40
Tal-IN	7 677 7 7 6 7	7		
Unit	T	tiods (01 Hr. per period) - 45 Perio Topics (Course contents)	ods (45 Hours)	
	History of Cell Biology: Cont Nagaraj, Joyoti Basu, Veena Kr Prokaryotic and Eukaryotic ce	Topics (Course contents)	iochemists: Ramakrishnan Cell Structure: rane, Mitochondria, Golgi	No. of Period
Unit	History of Cell Biology: Cont Nagaraj, Joyoti Basu, Veena Kr Prokaryotic and Eukaryotic ce body, Nucleus, Ribosome, Lyso Carbohydrate: Structure, prop Disaccharides and Polysacchar Proteins: Structure, properties	Topics (Course contents) ribution of Indian Cell biologists and Brishnaji Parnaik. ell, cellular organelles; Plasma membrosome, Endoplasmic reticulum. Cell divorties & classification of carbohydrates	iochemists: Ramakrishnan Cell Structure: rane, Mitochondria, Golgi vision. ; Monosaccharides, are & Classification of	Period
Unit	History of Cell Biology: Cont Nagaraj, Joyoti Basu, Veena Kr Prokaryotic and Eukaryotic ce body, Nucleus, Ribosome, Lyso Carbohydrate: Structure, prop Disaccharides and Polysacchar Proteins: Structure, properties Protein- Primary, secondary; sa Lipid: Structure, properties and Nucleic acids: Structure of pur structure and types: A, B, Z for	Topics (Course contents) ribution of Indian Cell biologists and Bishnaji Parnalk. ell, cellular organelles; Plasma membrosome, Endoplasmic reticulum. Cell diverties & classification of carbohydrates ides. & classification of amino acids. Structulient of α helix, β sheet, tertiary and qualiclassification of lipids. ine and pyrimidine bases, nucleoside arm; RNA - Structure, types and function	iochemists: Ramakrishnan Cell Structure: rane, Mitochondria, Golgi vision. R; Monosaccharides, are & Classification of aternary. and nucleotide; DNA ass.	Period 12
Unit I	History of Cell Biology: Cont Nagaraj, Joyoti Basu, Veena Kr Prokaryotic and Eukaryotic ce body, Nucleus, Ribosome, Lysc Carbohydrate: Structure, prop Disaccharides and Polysacchari Proteins: Structure, properties Protein- Primary, secondary; sa Lipid: Structure, properties and Nucleic acids: Structure of pur structure and types: A, B, Z for Enzymes: Classification of eninduced fit hypothesis. Active s Allosteric enzymes. Enzyme in	Topics (Course contents) ribution of Indian Cell biologists and Bishnaji Parnalk. ell, cellular organelles; Plasma membrosome, Endoplasmic reticulum. Cell diverties & classification of carbohydrates ides. & classification of amino acids. Structulient of α helix, β sheet, tertiary and qualiclessification of lipids. ine and pyrimidine bases, nucleoside and; RNA - Structure, types and function zymes, mechanisms of enzyme action; ite and activation energy, coenzyme, Isohibition; competitive, noncompetitive,	iochemists: Ramakrishnan Cell Structure: rane, Mitochondria, Golgi vision. R; Monosaccharides, are & Classification of aternary. Ind nucleotide; DNA as. Lock and key hypothesis, oenzyme, metal cofactors.; uncompetitive.	Period 12 11
Unit	History of Cell Biology: Cont Nagaraj, Joyoti Basu, Veena Kr Prokaryotic and Eukaryotic ce body, Nucleus, Ribosome, Lyso Carbohydrate: Structure, prop Disaccharides and Polysacchar Proteins: Structure, properties Protein- Primary, secondary; sa Lipid: Structure, properties and Nucleic acids: Structure of pur structure and types: A, B, Z for Enzymes: Classification of en induced fit hypothesis. Active s Allosteric enzymes. Enzyme in	Topics (Course contents) ribution of Indian Cell biologists and Brishnaji Parnaik. Il, cellular organelles; Plasma membrosome, Endoplasmic reticulum. Cell diverties & classification of carbohydrates ides. & classification of amino acids. Structulient of α helix, β sheet, tertiary and qualicular of the content of the	iochemists: Ramakrishnan Cell Structure: rane, Mitochondria, Golgi vision. R; Monosaccharides, are & Classification of aternary. Ind nucleotide; DNA as. Lock and key hypothesis, oenzyme, metal cofactors.; uncompetitive.	11

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was to few David Joles 24 10.6

Officer In-Charge (Academic)
Shahoed Nandkumar Petol
Tehwayldyal ya Haigarh (C.C.)

अध्ययन मंडलशहीद नंदकुमार पटेल विश्वविज्ञालय, श्रयमाद (छ.म.)

Ki.

Part - C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- 1. Cell and molecular biology; P. K. Gupta
- 2. Cell biology; C B Pawar
- Biochemistry; U Satyanarayan and U Chakrapani
- 4. Fundamentals of Biochemistry; JL Jain, Sanjay Jain and Nitin Jain

Reference Books:

- Lehninger's principles of Biochemistry; M.M. Cox, D. L. Nelson and W.H. Freeman,
- Quick Review Biochemistry; Arun Kumar Singhal, AITBS Pub. India

Online Resources - e-Resources/ e-Books and e- learning portals

- https://www.khanacademy.org/science/biology/structure-of-a-cell
- https://microbenotes-com.webpkgcache.com/doc/-/s/microbenotes.com/carbohydrates-classificationstructure-functions/
- https://microbenotes.com/carbohydrates-structure-properties-classification-and-functions/
- https://www.onlinebiologynotes.com/classification-of-protein-on-the-basis-of-structure-composition-andfunction/

Part- D: Assessment and Evaluation

Suggested	Continuous	Frielmotion	M-41 - 1 -
Pappored	Continuous	Lyaiuation	wethous:

Maximum Marks:

100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE):

70 Marks

Continuous	Interna
Assessment	(CIA):

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

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

(By Course Teacher)

Total Marks -

considered against 30 Marks

End Semester Exam (ESE):

Two Section - A & B

Section A: Q1. Objective 10 X 1 = 10 Mark; Q2. Short answer type - 5X4= 20 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit -4X10 = 40 Marks

Name and Signature of Convener and Members of CBoS

30

अध्ययन मंडल

rogra	Γ-A:	Introduct	lon		
	am: Bachelor in	Life Science	7	<u> </u>	
1	(Diploma/Degree Code	ee/Honors)	Semester I	n	Session: 2024-25
2	Course Title		MBSC - 03 P		
3			Lab. Course - MBSC-03		
4	Course Type		Laboratory Course	- 1 N T	
5	Prerequisite	(If Any)	As per program		CONTRACTOR A
3	(CLO)	ning Outcomes	At the end of this course, stu identify the various st quantify the carbohyd determine the Vmax s	ages of cell division rates and protein in a and Km value of enzy	ny sample
6	Credit Value	e	antary bo the effect of c	invironmental factors	on enzyme activity.
7	Total Mark				Field learning/Training
PAR		tent of the Cou	Max. Marks: 50	Min. Pas:	sing marks: 20
Tota	INC SEL	tent of the Cou	rse		reference to the second of
Luia	i i vo, oi learni	ng-Training/Per	formance Periods: 30 Perio	ds (30 Hours)	
	Module		Topics (Course cont	ents)	No. of Period
	/ Field ning/	1. Identification	of different stages of mitosis in	onion root tips.	
	eriment	2. Staining and	visualisation of mitochondria by	Janus green stain.	
	ents of Course	3. Qualitative te	sts for carbohydrates, reducing s	ugars, non-reducing s	sugars.
ćone	ents of Course	4. Qualitative te	sts for lipids and proteins.		30
		6. Study of prot 7. Study of enzy	estimation of proteins by Folin L ein secondary and tertiary struct me kinetics—calculation of Vm	ures with the help of r	nodels.
		8. Study effect of	of temperature, pH and heavy me	etals on enzyme activi	tv
PA	RT-C: Lea		of temperature, pH and heavy mo	etals on enzyme activi	ty.
		arning Resource	es	etals on enzyme activi	ty.
Tex	t Books, Refer	arning Resource rence Books and C	es	etals on enzyme activi	ty.
Tex Boo	t Books, Refer	arning Resource ence Books and Coded:	ces Others	etals on enzyme activi	ty.
Tex Boo	t Books, Refer oks Recommen 1. Practical m	arning Resource Books and Coded:	ces Others Dubey and D K Maheshwari.	etals on enzyme activi	ty.
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Tex Boo	t Books, Referoks Recommend. Practical m. 2. An introduct. Basic conc.	arning Resource Books and Coded: ded: dicrobiology: R C I tion to practical bioupts in clinical Bio	ces Others Dubey and D K Maheshwari.		
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Tex Boo	t Books, Refer oks Recommen 1. Practical m 2. An introduc 3. Basic conc line Resources https://www https://www RT - D: As	arning Resource ence Books and Coded: dicrobiology: R C I tion to practical bioepts in clinical Bioepts in clinical Bioepts in clinical Bioepts w.youtube.com/watw.youtube.com/watwsessment and I	Dubey and D K Maheshwari, chemistry: David T Plummer, ochemistry: A practical guide: ch?v=hqbt7wtznrs tch?v=QacQmS3aaTI		
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On PA	t Books, Referoks Recomment 1. Practical m 2. An introduct 3. Basic concests https://www.https://www.ART - D: Ast ggested Continuaximum Mark	arning Resource ence Books and Coded: dicrobiology: R Code of the practical biosepts in clinical Biosepts in clini	Dubey and D K Maheshwari, chemistry: David T Plummer, ochemistry: A practical guide: ch?v=hqbt7wtznrs ch?v=QacQmS3aaTI Evaluation Methods: 50 Marks		
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On PA Su Co En	t Books, Refer oks Recomment of Practical management of Practical Recommend of Practica	arning Resource ence Books and Conded: dicrobiology: R Condition to practical biousepts in clinical Biousepts in all Assessment (CLinical Assessment (CLinical ESE):	Dubey and D K Maheshwari, chemistry: David T Plummer, ochemistry: A practical guide: ch?v=hqbt7wtznrs ch?v=QacQmS3aaTI Evaluation Methods: 50 Marks A): 15 Marks 35 Marks	Vijay Kumar, Kiran	Dip Gill
On PA Su Ma Co En	t Books, Refer oks Recomment of Practical management of Practical Semester Exactly of Prac	arning Resource ence Books and Conded: dicrobiology: R C I tion to practical biousepts in clinical Assessment (CLinical ESE): That Internal Testing Internal Testing Biousepts in Clinical Biousepts	Dubey and D K Maheshwari, chemistry: David T Plummer, ochemistry: A practical guide: tch?v=hqbt?wtznrs tch?v=QacQmS3aaTI Evaluation Methods: 50 Marks A): 15 Marks 35 Marks st/ Quiz - (2): 10 & 10	Vijay Kumar, Kiran	Dip Gill of the two Test/ Quiz
PA Su Ma Co En C	t Books, Refer oks Recomment oks Recomment of Practical management of Practical management of Practical management of Semester Examinuous International Semester (CIA	arning Resource ence Books and Coded: dicrobiology: R C I tion to practical biosepts in clinical Biosepts in clini	Dubey and D K Maheshwari, chemistry: David T Plummer, ochemistry: A practical guide: ch?v=hqbt7wtznrs ch?v=QacQmS3aaTI Evaluation Methods: 50 Marks A): 15 Marks 35 Marks st/ Quiz - (2): 10 & 10 t/ Seminar + Attendance: 05	Vijay Kumar, Kiran Better Marks out + obtained marks	of the two Test/ Quiz in Assignment shall be
On PA Su Co En C	t Books, Refer oks Recomment oks Recomment of Practical management of Practical management of Semester Exactly Course Teach	arning Resource rence Books and Conded: dicrobiology: R Condedition to practical biousepts in clinical Biousep	Dubey and D K Maheshwari, chemistry: David T Plummer, ochemistry: A practical guide: ch?v=hqbt7wtznrs ch?v=QacQmS3aaTI Evaluation Methods: 50 Marks A): 15 Marks 35 Marks st/ Quiz – (2): 10 & 10 t/ Seminar + Attendance: 05 s – 15	Vijay Kumar, Kiran Better Marks out + obtained marks considered agains	of the two Test/ Quiz in Assignment shall be t 15 Marks
On PA Su Co En CB	t Books, Refer oks Recomment oks Recomment of the Practical management of the Practical management of the Practical management of the Practical management of the Practical Semester Example of Semester Examp	arning Resource rence Books and Conded: dicrobiology: R Condedition to practical biousepts in clinical Biousep	Dubey and D K Maheshwari, chemistry: David T Plummer, ochemistry: A practical guide: ch?v=hqbt?wtznrs ch?v=QacQmS3aaTI Evaluation Methods: 50 Marks A): 15 Marks 35 Marks st/ Quiz – (2): 10 & 10 t/ Seminar + Attendance: 05 s – 15	Better Marks out + obtained marks considered agains spot Assessment	of the two Test/ Quiz in Assignment shall be t 15 Marks Managed by
On PA Su Co En CB	t Books, Refer oks Recomment oks Recomment of Practical management of Practical management of Semester Exactly Course Teach	arning Resource rence Books and Conded: dicrobiology: R Condedition to practical biousepts in clinical Biousep	Dubey and D K Maheshwari, chemistry: David T Plummer, ochemistry: A practical guide: ch?v=hqbt?wtznrs ch?v=QacQmS3aaTI Evaluation Methods: 50 Marks A): 15 Marks 35 Marks st/ Quiz - (2): 10 & 10 t/ Seminar + Attendance: 05 s - 15 t/ Field Skill Performance: On ned the Task based on lab. wor	Better Marks out + obtained marks considered agains spot Assessment k - 20 Marks	of the two Test/ Quiz in Assignment shall be t 15 Marks Managed by course teacher as
On PA Su Co En CB	t Books, Refer oks Recomment oks Recomment of the Practical management of the Practical management of the Practical management of the Practical management of the Practical Semester Example of Semester Examp	arning Resource rence Books and Conded: dicrobiology: R Condition to practical bionepts in clinical Bionepts in cl	Dubey and D K Maheshwari, chemistry: David T Plummer, ochemistry: A practical guide: ch?v=hqbt?wtznrs ch?v=QacQmS3aaTI Evaluation Methods: 50 Marks A): 15 Marks 35 Marks st/ Quiz – (2): 10 & 10 t/ Seminar + Attendance: 05 s – 15	Better Marks out + obtained marks considered agains spot Assessment k - 20 Marks (written) - 10 Marks	of the two Test/ Quiz in Assignment shall be t 15 Marks Managed by course teacher as per lab. status

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अध्ययन मृहल् भू । शहीत चुन्नमार पटेल विकारियालया स्थामक (छ.म.

	-A:	Introduction	n			and the second
(1	Diploma/De	or in Life Science gree/Honors)	Se	mester - IV	Session:	2024-25
	Course Co		MBSC-04	T		
_	Course Tit		Bioinstrum	entation and Biost	atistics	
-	Course Ty	De	DSC			19
4	Prerequisi	te (If Any)	As per Prog	gram		
6 7	Course Le (CLO) Credit Val Total Mar		At the end of recal micro ident micro relate recog illust appli	of this course the s I the principle of mice oscopes for specialize ify the basic analytica obiological manipular e the techniques used gnize the basics of rac trate basic concept of ication	al instruments for perfor	ming botial samples cations p their servation
	Г-В:	Content of the C	ourse		17	g marks: 40
Total	No. of Teac	hing-Learning Per	iods (01 Hr. r	per period) - 45 Per	riods (45 Hours)	
UNIT	Г	TC	OPIC (Cou	rse Contents)	e een webbogs je le	No. of Periods
Ĭ	Confoce Microm pH me	field, Dark field and al microscopy, Scanni letry	l Phase Contr ng and Transm	ast microscope; Flucission Electron Micro	types of microscopes- prescence microscopy, scopy (SEM & TEM).	12
	lornen	nefer	or electrones, la	ectors affecting pH me	easurement, application	
n	Centrid differer Chrom exclusiv Electro Compo	neter. Tugation: Principle an atial, Rate zonal and ul atography: Principle on and affinity chroma phoresis: Principle nents, working and ap	d Types of Ce tracentrifugation and techniques tography. of Agarose plications.	ntrifugal Machines, A on and their applicatio with applications of F and Polyacrylamide	Analytical, Preparatory, ns. Partition, ion-exchange, Gel Electrophoresis,	11
п	Centrid differer Chrom exclusiv Electro Compo Spectr princip Radiol radiation method	neter. Tugation: Principle and all atography: Principle on and affinity chroma ophoresis: Principle nents, working and appophotometry: Electrole, mechanism and appoiology: Radioactivity on exposure, characteds of radioactive detects	d Types of Ce tracentrifugation and techniques tography. of Agarose plications. magnetic spectal plications of Visy, forms of ratiosotion, GM counter	ntrifugal Machines, A on and their application with applications of F and Polyacrylamide rum, Basic principles sible and UV spectrop adioactive emissions, opes and their applicer, Scintillation counte	Analytical, Preparatory, ns. Partition, ion-exchange, Gel Electrophoresis, and Law of absorption; hotometer. biological effects of cations, Principles and er and Autoradiography.	11
	Centrid differer Chrom exclusiv Electro Compo Spectr princip Radiol radiatio method Biosta Statisti Tabula	neter. Tugation: Principle and all atography: Principle on and affinity chroma ophoresis: Principle nents, working and appophotometry: Electrolle, mechanism and appointogy: Radioactivity on exposure, characteds of radioactive detect tistics: Definitions, Bacal inference and pation, Frequency distrib	d Types of Ce tracentrifugation and techniques atography. The of Agarose plications of Visy, forms of raise of radioisotion, GM counters, fragmeters, metution, diagrams	ntrifugal Machines, A on and their application with applications of F and Polyacrylamide rum, Basic principles sible and UV spectrop adioactive emissions, opes and their applicar, Scintillation counter sample and population hods of sampling, C natic and Graphical pr	Analytical, Preparatory, ns. Partition, ion-exchange, Gel Electrophoresis, and Law of absorption; hotometer. biological effects of cations, Principles and	

अध्यक्ष

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

Part - C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- 1. Biophysical Chemistry, Principles and Techniques A. Upadhyay, K. Upadhyay and N. Nath, Himalaya Pub.
- Biotechniques: Theory and Practice S.V.S. Rana, Rastogi Pub.
- Analytical Chemistry G. Chatwal and Anand, Himalaya Pub.
- 4. Statistical Methods; S.P. Gupta
- 5. Fundamentals of Biostatistics; Khan and Khanum, Ukaaz Publications, Hyderabad.

Reference Books:

- 1. Fundamental of light Microscopy & Electron Imaging, 1st Edition, Murphy D.B.
- Fundamentals and techniques of biophysics and molecular biology (2016) Pranay Kumar.
- Techniques and methods in biology PHI publication (2011) K L Ghatak.
- 4. Biostatistics; Sunder Rao

Online Resources - e-Resources/ e-Books and e-learning portals

- https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/SCY2.pdf
- https://faculty.ksu.edu.sa/sites/default/files/instrumental chemical analysis.pdf
- https://www.academia.edu/31125635/Biotechniques Theory and Practice eBook
- https://cbpbu.nc.in/userfiles/file/2020/STUDY MAT/ZOO/PK%20(2).pdf

Part- D:	Ass	essi	men	it 2	and	Ev	alua	tic	n
0				-		_		_	_

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

Better marks out of the two Test/ Quiz

Assessment (CIA): (By Course Teacher)

Assignment/ Seminar -

Total Marks -

10 30

+ obtained marks in Assignment shall

be considered against 30 Marks

End Semester

Exam (ESE):

Two Section - A & B

Section A: Q1. Objective 10 X 1 = 10 Mark; Q2. Short answer type -5X4=20 Marks

Section B: Descriptive answer type qts., 1 out of 2 from each unit -4X10 = 40 Marks

Name and Signature of Convener and Members of CBoS

शहीद नंदक्मार

DY. Heller

rogran	De De d'	Introduction	n		
	n: Bachelor in I	life Science	Cameral YYY	دري فالمرسان و و	4024.2
	Diploma/Degre	e/Honors)	Semester IV	Sessi	on: 2024-25
1	Course Code	1	MBSC - 04 P	8 J 1977	
2	Course Title		Lab. Course - MBSC-0)4	
3	Course Type	List Control	Laboratory Course		130.67
4	Prerequisite (I	f Any)	As per Program		a complete a large a large
5	Course Learni	ing Outcomes	At the end of this cours	o the ctudent will o	hla to
	(CLO)			misms on the basis of	
		x x 10	relate common an	alytical techniques in i	microbiology
	1 1 1 1 1 1 1 1		infer the concept of		inicioniology
· · · · · · · · · · · · · · · · · · ·	(1 2 2 2 2 2		cance of central tender	ncies
.6.	Credit Value		1 Credit Credit = 30 Ho		
7	Total Marks	3.	Max. Marks: 50		ig marks: 20
PART	-B: Content	of the Cours	e		
Total N	No. of learning-T	raining/Perfor	mance Periods: 30 Perio	de (30 Hours)	
-			munee I crious. So I crio	us (50 Hours)	
Mod	ule		Topics (Course conten	46)	No. of
	2.11			is)	Period
Lab./ F		y of different parts	of microscope.	,	
Trainin	A STATE OF THE STA	rmination of λ ma	x of given coloured solution a	and Confirmation of Bo	eer's law.
Experi conten		ration of compone	ents of a given mixture using	a laboratory scale cent	rifuge.
Course	~~p=	ration of Ink comp	conents/ chlorophyll / Amino cids by Thin Layer Chromato	acids by Paper Chrom	atography, 30
	(- F-		Filtration Chromatography.	grapny,	30
			water and soil samples and n	naintenance of require	leH
			-PAGE and Submarine Gel E		. hir.
			Bar diagrams and Histograms		
ж			Median and Mode from group		
	Vanda Mission	myr Speetronk	otometry, Chromatogra	La Cantalfanatia	n, Electrophoresis
Key V	Vords Microsco	iha, shectrobi	chromatogra	phy, Centrifugatio	n' Fiertiobnolesis
	Presenta	tion of Data, Cal	culation of Central Tendenc	ies Centritugatio	n, Electrobnotesis
PAR'	Presenta	tion of Data, Calo	culation of Central Tendenc	ies —	u, Liectrophoresis
PAR'	Presenta	tion of Data, Calo	culation of Central Tendenc	ies —	u, Electrophoresis
PAR' Text B	Presenta I - C: Learni Books, Reference Books Recomme	tion of Data, Calo ing Resources Books and Oth nded:	culation of Central Tendenc	ies	
PART Text B Text B	Presenta I - C: Learni Books, Reference Books Recomme An Introduction	tion of Data, Caloing Resources Books and Other nded: to practical Bioche	culation of Central Tendence ners emistry; McGraw Hill Publica	ies ition 1987. D.T Plumm	
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PART Text E 1: 2. 3. 4.	Presenta I - C: Learni Books, Reference Books Recomme An Introduction Principles and Te Biotechniques: T Statistical Metho	tion of Data, Calcing Resources Books and Other Med: to practical Bioche chniques in Practical Bioche chniques and Practical Bioche chniques and Practical Bioche chniques in Practical Bioche	eulation of Central Tendenc ners emistry; McGraw Hill Publica cal Biochemistry; Wilson & V	ies ition 1987. D.T Plumm	
PART Text E 1: 2. 3. 4.	Presenta I - C: Learni Books, Reference Books Recomme An Introduction Principles and Te Biotechniques; T Statistical Method Resources:	tion of Data, Calcing Resources Books and Other nded: to practical Bioche echniques in Practic heory and Practic ds; S.P. Gupta	emistry; McGraw Hill Publica cal Biochemistry; Wilson & Ver, S.V.S. Rana, Rastogi Pub.	ics ition 1987. D.T Plumm Walker.	
PART Text E 1: 2. 3. 4.	Presenta I - C: Learni Books, Reference Books Recomme An Introduction Principles and Te Biotechniques: T Statistical Methode Resources: https://books.go	tion of Data, Calcing Resources Books and Other nded: to practical Bioche chniques in Practic heory and Practic ds; S.P. Gupta	enlation of Central Tendence emistry; McGraw Hill Publica cal Biochemistry; Wilson & Ve; S.V.S. Rana, Rastogi Pub.	ics ation 1987. D.T Plumm Walker. acc= age&q&f=false	er.
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अध्ययन मंडल शहीद नंदकुमार पटेल विश्वविद्यालय रायगढ (छ.गः) है।

PART -	-A: Introducti	COURSE CURR on		
(D	Iploma/Degree/Honors) Course Code	Semester	- III	Session: 2024-25
3	Course Title Course Type	MBSE-01 T Microbial Enzym Discipline Specif	ie Technology	/DCH3
5	Prorequisite (If Any) Course Learning	As por Program		(DSE)
	Outcomes (CLO)	motabolic motabolic cxplain the relate enzy identify the	undamentals of reactions e mechanism of mo modifications e applications of	tudents will be able to — cnzymes, enzyme-action and cenzyme action ons of enzymes in various fields arious blochemical techniques
6	Credit Value	03 Credits C	redit = 15 Hour	s - Learning & Observation
7	Total Marks	Max. Marks:	100 N	Ainimum Passing marks: 40
Total		•		
Unit	No. of Teaching-Learning Per	opics (Course co		ods (45 Hours) No. of

Unit	Topics (Course contents)	No. of Period
I	Basic concept of enzymes: Nomenclature, classification, methods for determination of enzyme activity. Enzyme kinetics: Michaelis-Menten equation, effect of pH, substrate concentration, temperature and inhibitors. Iso-enzymes and allosteric enzymes. Enzyme inhibition-competitive and non-competitive inhibition.	4. 11.
11	Mechanism of enzyme action: Action of ribonuclease, chymotrypsin and trypsin. Coenzyme catalysis. Mechanism of action of thiamine pyrophosphate enzyme. Control and regulation of enzyme activity and feedback mechanisms. Metabolic compartmentalization in relation to enzyme, enzymes and secondary metabolites.	11
ım	Enzyme engineering & applications of microbial enzymes: Chemical modification and site-directed mutagenesis structure & function relationship of industrially important enzymes. Microbial enzymes in textile, leather, wood industries and detergents.	11 00000
IV	Blochemical techniques: Determination of molecular weights, purity, General methods of extraction-salting out, use of organic solvents; Purification; analysis of proteins - mass determination- GC-MS; structure determination-X-ray diffraction.	11
Key Words	Enzyme, Enzyme action, Enzyme inhibition, Enzyme engineering, Biochemical	techniques,

Name and Signature of Convener and Members of CBoS

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Part-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- 1. A Text Book of Microbiology: R. C. Dubey & D. K. Maheshwari
- 2. A text book of Industrial Microbiology, 2nd edition. Panima Publishing Company, New Delhi.
- 3. Industrial Microbiology: Patel A H. (1996).1st edition, MacMillan India Limited Publishing Company Ltd. New Delhi, India.
- 4. Fundamentals of Biochemistry; Dr. J.L. Jain, Dr. Sanjay Jain, Nitin Jain, S. Chand Publication Reference Books:
 - 1. Principles of Biochemistry and molecular biology: Wilson & Walker
 - 2. Lehninger Principles ob Biochemistry, 8th Edition, David L. Nelson, Micheal M. Cox
 - 3. Biotechnology: Crueger Wand Crueger A. (2000).

Online Resources - e-Resources/ e-Books and e-learning portals

- https://www.britannica.com/science/enzyme
- https://sist.sathyabama.ac.in/sist coursematerial/uploads/SBB2204.pdf
- https://www.khanacademy.org/science/ap-biology/cellular-energetics/environmentalimpacts-on-enzyme-function/a/basics-of-enzyme-kinetics-graphs
- https://microbeonline.com/maldi-tof-ms-principle-applications-microbiology/
- https://www.technologynetworks.com/analysis/articles/gc-ms-principle-instrument-and-analyses-and-gc-msms-362513

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Part - D: Assessment	and Evaluation	
Suggested Continuous Ex	aluation Methods:	
Maximum Marks:	100 Marks	
Continuous Internal Asse	essment (CIA): 30 Marks	
End Semester Exam (ES)	E): 70 Marks	1 - 40:
Continuous Internal	Internal Test / Quiz - (2): 20+20	Better marks out of the two Test/ Quiz
3.33.3	Assignment/ Seminar - 10	+ obtained marks in Assignment shall
Assessment (CIA):		be considered against 30 Marks
(By Course Teacher)	Total Marks – 30	be considered against 50 Marks
End Somester Two Ser	ction - A & B	The second of th
Exam (ESE): Section	A: Q1. Objective $10 \times 1 = 10 \text{ Mark}$;	Q2. Short answer type $-5X4=20$ Marks
Section	B: Descriptive answer type qts., 1 ou	t of 2 from each unit $-4X10 = 40$ Marks
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Name and Signature of Convener and Members of CBoS

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mars.	Γ-A:	Introduc	ction			and the same
(1	m: Bachelor in Lil Diploma/Degree/H	le Science	Seme	ster - III	Session: 2024-	25
1	Course Code	-1-1-1	MBSE-01	P		
2	Course Title		Lab. Cour	se - MBSE-01		g rangler ele h
3	Course Type		Laborator			
4	Prerequisite (If	Any)	As per Pro	<u> </u>		
5	Course Learnin	ıg	At the end	of this course,	the students will be able to	-
	Outcomes (CLC	O)	→ sho	w the enzyme pi	roduction by microorganisms	S
			> der	nonstrate the act	ions of different enzymes	
	and the second of		▶ det	ermine various p	arameters of enzyme action	- 00000000
i na					ochemical techniques used for	or enzymic
2				hnology	rs. Laboratory or Field learning	ng/Training
6	Credit Value		1 Credit		rs. Laboratory or Field learning	when 20
7	Total Marks			x. Marks: 50	Min. Passing ma	TRS: 20
	T-B: Content					
Total	No. of learning-7	Training/Per	formance P	eriods: 30 Peri	ods (30 Hours)	1 374
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						1 6110
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Train	ing/ 2. Dem	onstrations of	enzyme act	ivity: Phosphatas	e and Calalase	30
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शहीद नंदकु मार्रीपर्टल

	m: Bachelor in Life Science iploma/Degrec/Honors)	Semester -]	IV	Session	2024-25		
1	Course Code	MBSE-02 T					
2	Course Title	Industrial Microbiolog					
3	Course Type	Discipline Specific Ele					
4	Prerequisite (If Any)	As per Program					
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to— > define the role of microorganism in industry > explain the processing of the best microbial strains for the industry > outline the fundamentals of fermenters and fermentation processes > relate metabolic pathways for industrial products > identify the production of various industrially important products					
6	Credit Value		Credit = 15 H	ours - Learning	& Observation		
7	Total Marks	otal Marks Max. Marks: 100 Minimum Passing n					
PĀT	T-R: Content of the		.00	Minimum Pass	ing marks: 40		
	T-B: Content of the INo. of Teaching-Learning it	e Course	od) - 45 Period		No. of		
Tota	Multidisciplinary nature History, ancient Indian useful microorganisms. Upstream and Down-stream and Purification Scale up. Screening	Periods (01 Hr. per periods (01 Hr. per periods (Course contente of Industrial microperspective, important contente on, storage and packaging and Strain Developments	od) - 45 Period ints) biology: Intro characteristics tion and assay methods. nent Strateg	duction, brief of industrially of the product, ies: Industrial			
Tota Un	Multidisciplinary nature History, ancient Indian useful microorganisms. Upstream and Down-stream and Purification Scale up, Screening sterilization, Isolation, Production Media and Recobic and anaerobic Heaville Scale up Screening sterilization, Isolation, Production Media and Recobic and anaerobic Heaville Scale up Screening sterilization, Isolation, Production Media and Recobic and anaerobic Heaville Scale up Screening sterilization, Isolation, Production Media and Recobic and anaerobic Heaville Scale up Screening Scale up Screening Scale up Sc	Periods (01 Hr. per periods (01 Hr. per periods (Course contente of Industrial microperspective, important of tream processing: Detection, storage and packaging and Strain Developm preservation and mainted was materials, Fermenter of Batch, fed-batch and Continuations.	od) - 45 Period nts) biology: Intro characteristics tion and assay methods. nent Strategenance of inclesign. Types on	oduction, brief of industrially of the product, ies: Industrial strains of fermentation: ation.	No. of Period		
Tota Un 1	Multidisciplinary nature History, ancient Indian useful microorganisms. Upstream and Downst Recovery and Purification Scale up, Screening sterilization, Isolation, Production Media and Reposition Acrobic and anaerobic Metabolic pathways: In acid, Glutamic acid. Vaccines and Hormon	Periods (01 Hr. per periods (01 Hr. per periods (Topics (Course contemperated in the perspective, important of the perspective in the perspect	od) - 45 Period nts) biology: Intro characteristics tion and assay methods. nent Strategenance of inclesign. Types of nuous ferment ric acid, acetic ies vaccine, inc	duction, brief of industrially of the product, ies: Industrial strains of fermentation: acid, Lactic sulin.	No. of Period		

Name and Signature of Convener and Members of CBoS

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Dr. Mellor

Part - C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- 1. Industrial Microbiology: Patel A. H. (1996). I edition, MacMillan India Limited publishing company Ltd New Delhi, India.
- 2. A Text Book of Microbiology: R. C. Dubey & D. K. Maheshwari
- 3. Industrial Microbiology by Prescott & Dunns, AVI Publishing Company Inc.
- 4. Biotechnology; V. Kumaresan, Saras Publications

Reference Books:

- 1. Modern Industrial Microbiology and Biotechnology: Okafor N. (2007).1st edition. Bios Scientific Publishers Limited, USA.
- 2. Industrial Microbiology: Casida LE, New age International (P) Ltd.

Online Resources - e-Resources/ e-Books and e-learning portals

- https://bookarchive.net/pdf/industrial-microbiology-by-i-e-casida-jr/
- http://foodhaccp.com/foodsafetymicro/onlineindex.html
- https://sist.sathyyabama@ac.in/sist coursematerial/uploads/SMB2203.pdf
- http://www.cpe.rutgers.ed/courses/current/If0401wa.html
- https://www.classcentral.com/course/swayam-food-microbiology-and-food-safety-17609

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 Assessment (CIA):

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

10

Better marks out of the two Test/ Quiz + 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 X 1 = 10 Mark; Q2. Short answer type - 5X4= 20 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit -4X10 = 40 Marks

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	7 7	COURSE	CURRICULUM	*2 to 2 to 3		
PART – A:	Introduct	tion				
rogram: Bachelor in Life (Diploma/Degree/Ho		Sem	ester IV	Session:	2024-25	
1 Course Code	M	BSE-02 P			(A)	
2 Course Title	L	Lab. Course - MBSE-02				
3 Course Type	L	Laboratory course				
4 Prerequisite (If	Any) A	As ner Program				
5 Course Learnin	Grant Y LANGE AND A STATE POWERS the students will be able to -					
Outcomes (CLC		 recall Laboratory discipline, instrumentation and techniques involved in industrial microbiology develop skill to culture and identify industrially important microbes relate about design of Fermenter 				
6 Credit Value		1 Credit	Credit = 30 Hor	irs. Laboratory or rieia	tearning Transition	
7 Total Marks			Marks: 50	Min. Passing	g marks: 20	
	- Cales Cou		1			
PART – B: Content Total No. of learning-	of the Cou	formance P	eriods: 30 Perio	ds (30 Hours)		
Module	raining/ rer.	Topics	(Course conten	ts)	No. of Period	
6. Produ	iction of ethano action of Citric fer, Bioreacto ing Resource e Books and ended:	of by Yeast, acid by Asper or, Industria ces Others	I Microorganism	s, Production, Preserv	any. Pyt. Ltd.	
• littp://www.onl		lecember/vir	tual-resources-to-	each-microlology-techn	iques	
• http://www.vla	h amrita edu			· ·		
PART - D: Asses	ment and	Evaluation	1			
Suggested Continuou	re Evaluation	Methods:				
THE THE PARTY NAMED TO		DO TATION VI				
Continuous Internal A	ssessment (CI	A): 15 Mark	S			
End Semester Exam (1	ESED:	JJ WIATA	23 23 23 23	Better Marks out of	he two Test/ Quiz	
Continuous Internal		est/Quiz – (2		+ obtained marks in	Assignment shall	
Assessment (CIA):	Assignmen	it Seminar +	Attendance: 05	considered against 15	5 Marks	
(By Course Teacher)	Total Mark	na:		anot Assessment	Managed	
End Semester Exam (ESE):	A. Perfor B. Spotting	med the Tasl		(written) - 10 Marks blogy) - 05 Marks	course teacher per lab. status	
	Name and	Signature of	of Convener and	Members of CBoS	Male New John No. 18	
the Extelle	and were	Lung 12	Roshmi /	ALBERT SY NOT	New Yes Da	

Specification 24 Br. Wells Comment

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PART – A:	Introduc		URRECU				
Program: Bachelo (Certificate/Di	or in Life Science ploma/Degree)	Semeste	r - II/ IV	/V/VI	Session: 2024	4-25	
	2 Course Title			i		- 10	
2 Course Tit			MBSEC-01 Mushroom Cultivation Skill Enhancement Course (SEC)				
3 Course Ty							
4 Prerequisi	te (If Any)	As non Program					
5 Course Les Outcomes	Course Learning Outcomes (CLO)		At the end of this course, the students will be able to— > explain nutritional and medicinal values of mushroom > relate the types of mushrooms and their spawn preparation > examine the methods of cultivation and economic aspects > attain expertise using different Agro-residues for cultivation of mushrooms > observe post-harvest management of mushrooms				
6 Credit Val	ue	02 Credits (1C+1C)	= 30 Hrs	Laborato	ry or stetu tearness		
7 Total Marl	ζ S	Max. Mar	ks: 50	Min	nimum Passing mark		
	Call Co	urse				1 0 pm 1 m m	
PART - B: C	Total	No. of Teachin	g-Learnin	g Periods:	20 Poriode (30 H	ours)	
Theory - 15	Periods (15 Hrs.) a	nd Lab. or Ele	eld Learm	ng / II	ing 30 Periods (30 H	No. of Period	
Module Intr	oduction and Life edible mushrooms. I hroom cultivation. I	Topics (Concepts of Concepts o	fication and I	d identific value of r	eation of edible and nushroom, Scope of of mushroom. Types Milky mushroom	TCHOC	
Theory Contents (Cal mus. Prin med. (Obs	hroom (Volvariella viciples and Requisitium, isolation, tervation)	tes: Sterilizati spawn	servation). on and dis producti	infection of	of substrates, growth d maintenance.	15	
huts,	layout of Tradition in mushroom	hal and Green huts, Composi	ing, bed a	nd polythe	one bag preparation,		
1.Pre 2.Bas 3.Ste	paration of laboratoric information about the information about the information and sanital and information of adible.	ry Glassware (it autoclave, ho tion of mushro	chemical of air oven, om house, mushroor	instrumen	is etc.	30	
Training 5.Pre incub 6.Pre	paration of Mother ation. paration of different fivation of Mushroo	types of bed f	vn- media or cultivat ost/ paddy	preparation, ion, straw/agri	on, Inoculation, and Chairman cultural wastes rvation & Practice)	<u> </u>	
Key Words	Mushroom, Spay	vning, Compo	st, Harve	iting	dyalaya, Hailya	1111	

Name and Signature of Convener and Members of CBoS

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

part - C: Learning Resources Text Books, Reference Books and Others Text Books Recommended: 1. Nita Bhal. (2000). Hand book on Mushrooms. 2nded. Vol. I and II. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. 2. Tewari, S. C., Pankaj Kapoor, (1988). Mushroom Cultivation. Mittal Publication, New Delhi. 3. Biotechnology, V. Kumaresan. Reference Books: 1. Stamets, Paul, and J.S. Chilton. 1983. The Mushroom Cultivator. Agarikon Press, Olympia, WA. 415 p. Online Resources - e-Resources/ e-Books and e-learning portals https://nios.ac.in/media/documents/vocational/mushroom production (revised)(618)/Lesson-01.pdf https://agriportal.cg.nic.in/horticulture/PDF/Download/Mushroom%20Project Part%201.pdf http://nhb.gov.in/pdf/Cultivation.pdf PART: D ASSESSMENT AND EVALUATION Suggested Continuous Evaluation Methods: Maximum Marks: 50 Marks Continuous Internal Assessment (CIA): 15 Marks Better Marks out of the two Test/ Quiz 35 Marks End Semester Exam (ESE): 10 & 10 Internal Test/ Quiz - (2): Continuous Internal + obtained marks in Assignment shall Assignment/Seminar + Attendance: 05 Assessment (CIA): be considered against 15 Marks Total Marks: (By Course Teacher) Managed by Laboratory/ Field Skill Performance: On spot Assessment **End Semester** Coordinator as per 20 Marks

C. Viva-voce (based on principle/ technology) -Name and Signature of Convener and Members of CBoS

B. Spotting based on tools & technology (written) - 10 Marks

05 Marks

A. Performed the Task based on lab. work-

Exam (ESE):

skilling

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

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

ngram. (I	Bachelor in Life Science Diploma/Degree)	Semest	er - III/IV	Session: 202	4-25
1 0	Course Code	MBVAC-01			
	Course Title	Microbes and Human Health			
3 (Course Type		Course (VAC)	te.	
	rerequisite (If Any) As per Program				
	At the end of this course, the students will be able to define the basic concept of Infection and disease explain various serological tests illustrate the basic knowledge of Immune status of he identify various infectious diseases		uman body		
6 (Credit Value	02 Credits		s - Léarning & Observa Minimum Pass n	narks: 20
7 7	Total Marks	Max.	Marks: 50	William	
	- B: Content of the Co Total No. of Teaching-Lea	Topics (Co	urse contents)		No. of Periods
Unit	Infection & Disease: terminologies along winfection, contagious subclinical infection, 20	Difference be with suitable e infection, nos conoses, vector	tween infection and examples; primary socomial infection borne infection.	pidemic, endemic and	. 08
n	Routes of entry and transmission of disease: Portal of entry, Portal of exit, Reservoir, susceptible host. Direct contact, indirect contact, Airborne, vector				08
m	standard precautions, expanded precautions of serological reactions, blood cell Serological reactions: Basic concept of serological reactions, Widal test, serving Agglutination, precipitation, Blood group determination, Widal test, Differential				

Ohnsor-In-Charge (Adademie) Shaheed Nandkumar Patel Vishwavidyalaya, Raigarh (C.G.)

PART-C: Learning Resources Text Books, Reference Books and Others Text Books Recommended: 1. A Text Book of Microbiology; Dubey & Maheshwari. 2. General Microbiology; Vol I & II, Powar C.B. and Daginawala H.I., Himalayn Pub. House, Bombay. 3. Text book of Microbiology; Ananthanarayan R. and Paniker C.K.J. (2009). 8th edition, University Press Publication 4. A Text Book of Microbiology; P. Chakraborthy, 3rd Edn, New Central book Agency (P) Ltd, Kolkata, India 2005. Reference Books: 1. Preventive and Social Medicine, Park and Park https://sist.sathyabama.ac.in/sist coursematerial/uploads/SBMA1302.pdf https://www.news-medical.net/health/Modes-of-Transmission.aspx https://courses.lumenlearning.com/suny-microbiology/chapter/how-pathogens-cause-disease/ PART - D: Assessment and Evaluation Suggested Continuous Evaluation Methods: 50 Marks Maximum Marks: Continuous Internal Assessment (CIA): 15 Marks Better Marks out of the two Test/ Quiz 35 Marks End Semester Exam (ESE): 10 & 10 + obtained marks in Assignment shall be Internal Test/ Quiz - (2): Continuous Internal Assignment/ Seminar + Attendance: 05 Assessment (CIA): considered against 15 Marks 15 Total Marks: (By Course Teacher) Section A: Q1. Objective $05 \times 1 = 05 \text{ Mark}$; Q2. Short answer type $-5 \times 2 = 10 \text{ Marks}$ Two Section - A & B **End Semester**

Exam (ESE):

Section B: Descriptive answer type qts., 1 out of 2 from each unit - 4X05

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