

### BSc\_Biotechnology

Title of the Course	HINDI I										
Course Code	AEC II (T)										
Part A											
Year	1st	Semester	2nd	Credits	L	Т	P	С			
rear	150	Semester	210	Credits	2	0	0	2			
Course Type	Theory only	ory only									
Course Category	Ability Enhancement	bility Enhancement Courses									
Pre-Requisite/s	हिंदी भाषा का मूल गया इ	तान होना आवश्यक है		Co-Requisite/s							
Course Outcomes & Bloom's Level	CO1- संपर्क भाषा के रू CO2- ज्ञान को अर्थपूर्णत CO3- छात्र , भाषा को सु CO4- हिंदी भाषा एवं नैति	प में हिंदी को समझना। सांस्कृतिक, एवं राष्ट्रिय एकता बनाये र I देने में भाषा एक सशक्त आधार है।(BLZ-Understand) न कर अर्थ ग्रहण कर सकें ,शुद्ध -स्पष्ट लिख सकें एवं वक्ता के केक मूल्यों को समझना।(BL4-Analyze)	खना भाषा के माध्यम से संम्भव है। पाठ्यक्रम में व्याकरण मनोभावों को समझकर भावानुभूति कर सकें। (BL3-Ap	. एवं लेखन परम्परा का बोध करना (BL1-Remember) ply)							
Coures Elements	Skill Development   Entrepreneurship X Employability   Professsonal Ethics 3 Gender X Human Values   Environment X	<b>«</b>	SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education)							

	Part B									
Modules	Contents	Pedagogy								
1	स्वतंत्रता पुकारती (कविता)जयशंकर प्रसाद पुष्प की अभिलाषा (कविता) माखनलाल चतुर्वेदी वाक्य संरचना और अशुद्धियाँ (संकलित )	lecture method, group discussion, story telling,	8							
II	एक थे राजा भोज { निबंध }त्रिभुवननाथ शुक्त २ पर्यायवाची , विलोम , एकार्थी ,अनेकार्थी एवं शब्दयुम्म शब्द (संकलित } ३ वह तोड़ती पत्थर -सूर्यकन्त त्रिपाठी निराला ४ वर्ण -विचार (स्वर ,व्यंजन ,वर्गीकरण ,उच्चारण स्थान }	lecture method, group discussion, story telling, role play	6							
III	१ भगवान् बुद्ध} { निबंध }स्वामी विवेकानंद २ लोकतंत्र एक धर्म है{ निबंधडॉ सर्वपल्ली राधा कृष्णन ३ पल्लवन	lecture method, group discussion, story telling, role play	6							
IV	अफसर{ निबंध -शरद जोशी २ संक्षेपण {संकलित } ३ नारीत्व का अभिशाप ४ विराम -चिह्न (संकलित }	lecture method, group discussion, story telling, role play	6							
v	नैतिक मूल्य परिचय एवं वर्गीकरण( आलेख )डॉ शशि राय २ अंतर्ज्ञान और नैतिक जीवन(लेखडॉ सर्वपल्ली राधाक ३ अप्प दीपोभव (लेख ) .स्वामी श्रद्धा	lecture method, group discussion, story telling, role play	6							

 Part D[Marks Distribution)

 Theory

 Total Marks
 Minimum Passing Marks
 External Evaluation
 Min. External Evaluation
 Internal Evaluation
 Min. Internal Evaluation

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 Total Marks
 Minimum Passing Marks
 External Evaluation
 Minimum External Evaluation
 Internal Evaluation
 Minimum Evaluation

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	Part E.
Books	हिंदी भाषा और नैतिक मूल्य : मध्य प्रदेश शासन
Articles	https://www.cvs.edu.in/upload/IMG-20200323-WA0003.pdf
References Books	
MOOC Courses	https://onlinecourses.swayam2.ac.in/cec20_lg05/preview
Videos	https://onlinecourses.swayam2.ac.in/cec20_lg05/preview

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1	2	2	-	-	-	-	-	-	-	-	2	=
CO2	2	3	1	2	2	-	-	-	-	-	-	-	-	2	-
CO3	2	2	1	1	1	=	-	=	-	-	-	=	-	2	=
CO4	1	2	-	-	-	-	-	-	-	-	-	=	-	1	-
CO5	-	1	-	-	-	-	-	-	-	-	-	=	-	1	-
CO6	-	-	-	-	-	-	-	-	-	-	-	=	-	-	-



### BSc\_FoodTechnology

Title of the Course	English II [T]	nglish II [T]									
Course Code	AEC III	EC II									
Part A											
Year	2nd	Semester	3rd	Credits	L	Т	P	С			
Total	2.110	Comester	0.0	Siculo	2	0	0	2			
Course Type	Theory only	Theory only									
Course Category	Discipline Electiv	iscipline Electives									
Pre-Requisite/s	1.Basic Languaç Willingness to Le	ge Proficiency 2.Educational Back earn Time Commitment 4.Technol	ground 3.Motivation and logy Proficiency	Co-Requisite/s	Communication Skills Workshop 2 Emotional Intelligence Training 3 Conflict Resolution Seminar     Leadership Development Program 5 Cross-Cultural Competency Training 6 Career Development     Workshops						
Course Outcomes & Bloom's Level	CO2- Elaborate CO3- Examine a CO4- Justify app	interpersonal skills and be an eff creativity and lateral thinking.(BL: attitudes, emotional intelligence ar proaches to conflict resolution(BL- poal setting, management, decision	2-Understand) nd understand its influence on b 4-Analyze)	pehavior.(BL3-Apply)							
Coures Elements	Skill Developme Entrepreneurshi Employability X Professsonal Ett Gender X Human Values V Environment X	p X nics X	SDG (Goals)	SDG4(Quality education) SDG8(Decent work and economic growth)							
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### Part B

Modules	Contents	Pedagogy	Hours
1	Self Analysis - SWOT Analysis, who am I, Attributes, Importance of Self Confidence, Self Esteem. Interpersonal Skills - Grattude Understanding the relationship between Leadership Networking & Teamwork. Assessing Interpersonal Skills Situation description of Interpersonal Skill Teamwork. Necessity of Team Work Personally, Socially and Educationally	Lecture method	6
2	Creativity - Out of box thinking, Lateral Thinking.Leadership - Skills for a Good Leader, Assessment of Leadership Skills	PPT, Audio Video Mode	6
3	Attitude- Factors influencing Attitude, Challenges, and lessons from Attitude, Etiquette. Emotional Intelligence What is Emotional Intelligence, emotional quotient why Emotional Intelligence matters, Emotion Scales. Managing Emotions.	Mind Maps	6
4	Motivation - Factors of motivation, Self-talk, Intrinsic & Extrinsic Motivators. Conflict Resolution - Conflicts in Human Relations - Reasons Case Studies, Approaches to conflict resolution.	Lecture method, Audio Video Mode	8
5	Goal Setting - Wish List, SMART Goals, Blueprint for success, Short Term, Long Term, Lifetime Goals. Time Management Value of time, Diagnosing Time Management, Weekly Planner To-do list, Prioritizing work. Extempore Decision Making Importance and necessity (Decision Making, Process and practical way of Decision Making, Weighing Positives & Negatives. Technical Topic Presentation.	Audio Video Mode	10

# Part D(Marks Distribution)

	Theory										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	40	60	18	40	0						
	Practical Practical										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
0	0	0	0	0	0						

# Part E

Books	Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998. ThomasA Harris, I am ok, You are ok, New York-Harper and Row, 1972
Articles	https://www.frontiersin.org/articles/10.3389/feduc.2019.00087/full https://www.di.co.uk/media/6158020/a-useful-guide-to-swot-analysis.pdf http://www.mmmut.ac.in/News_content/35141/pnews_10142020.pdf
	Covey Sean, Seven Habit of Highly Effective Teens, New York, Fireside Publishers, 1998. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1999. Thomas A Harris, I am ok, You are ok, New York-Harper and Row, 1972 Daniel Coleman, Emotional Intelligence, Bantam Book, 2006
MOOC Courses	https://www.edx.org/learn/leadership/catalyst-leading-with-effective-communication-inclusive-leadership-training?hs_analytics_source=referrais&utm_source=mocc.org&utm_medium=referrai&utm_campaign=mocc.org-course-list https://www.edx.org/learn/writing/university-of-california-berkeley-academic-and-business-writing?hs_analytics_source=referrais&utm_source=mocc.org&utm_medium=referrai&utm_campaign=mocc.org-course-list
Videos	https://www.youtube.com/watch?v=fq88P9N9Hbg https://www.youtube.com/watch?v=uA5YeqgsjmYhttps://www.youtube.com/watch?v=eBSeCp_xhl

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	2	-	-	-	-	-	2	-	-	-	1	-	2
CO2	-	2	1	-	-	-	-	-	-	-	-	-	3	-	2
CO3	-	3	-	-	-	-	-	-	-	-	2	-	-	2	-
CO4	-	-	-	-	-	-	2	-	3	-	-	-	-	-	-
CO5	-	2	-	2	-	-	-	-	-	-	-	-	2	-	3
CO6	-	3	-	3	-	-	-	-	-	-	-	-	-	3	-



### BSc\_FoodTechnology

Title of the Course	Hindi II [T]									
Course Code	AEC IV [T]									
			Part A							
Year	2nd	Semester	4th	Credits	L	Т	P	С		
Tear	ZIIU	Semester	- HII	Credits	2	0	0	2		
Course Type	Theory only	ory only								
Course Category	Ability Enhancement Cour	ty Enhancement Courses								
Pre-Requisite/s		Co-Requisite/s								
Course Outcomes & Bloom's Level										
Coures Elements	Skill Development ✓ Entrepreneurship X Employability X Professsonal Ethics X Gender X Human Values ✓ Environment X		SDG (Goals)	SDG4(Quality education)						

Modules	Contents	Pedagogy	Hours
1	<ol> <li>समसामिय क सं दर्भः श्रीमद्भगवद्गीता-कर्मया 2. सूर्यकांत त्रि पाठी नि रासा-पिर चय पाठ:- जागो फि र एकबार (दो) कवि ता 3. अमरकांत - पिर चय पाठ दोपहर का भोजन (कहानी) 4 महादेवी वर्मा:- पिर चय पाठ:- ि एलु(रेखांकि त)</li> </ol>	Audio/Video clips, group discussion, lecture with ppt, quiz	4
2	1. हजारी प्रसाद द्वि वेदी, - परि चय पाठ :- नाखून क्यों बढ़तेहैं, लिल त नि बं ध) 2. मध्य प्रदेश की लोक कलाएँ (सं किल त) 3. मध्य प्रदेश का लोक- साहि त्य (सं किल त)	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	4
3	1. मुहावरेऔर कहावते(भाषा) 2. समास : परि भाषा और भेद (शब्द रचना / व्याकरण) 3. बीज शब्द. (Keywords) अवधारणा मूलक शब्द उद्योग, सभ्यता, सं स्कृति , श्रि क्षा, सूचना-समाज	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	5
4	1.मंडव (यात्रा वृतांत): पं रामनारायण उपाध्याय २ शि रीष के फूल (नि बं ध):- आचार्य हजारी प्रसाद द्वि वेदी 3. जवानी (काव्ये): श्रीमाखनलाल चतुर्वेदी	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	5
5	1. मध्यप्रदेश के पर्यटन स्थल 2. उसनेकहा था (कहानी): श्री चन्द्रधर शर्मा - गुलेरी" 3. जनजातीय जीवन,	Audio/Video clips, group discussion, lecture with ppt, Review Analysis D.TEXT BOOKS:	4

### Part D(Marks Distribution)

	Theory											
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation							
100	40	60	18	40	0							
	Practical Practical											
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation							
	0											

### Part E

Books	भाषा और संस्कृति- मध्य प्रदेश शासन
Articles	
References Books	भाषा और संस्कृति- मध्य प्रदेश शासन
MOOC Courses	https://nptel.ac.in/courses/128104007
Videos	

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	1	-	2	-	3	-		3	1	1
CO2	3	1	1	1	1	1	-	2	-	3	-		3	1	1
CO3	3	1	1	1	1	1	-	2	-	3	-		3	1	1
CO4	3	1	1	1	1	1	-	2	-	3	-		3	1	2
CO5	3	1	1	1	1	1	-	2	-	3	-		3	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-		-	-	-



### BSc\_FoodTechnology

Title of the Course	Health and Welln	alth and Wellness							
Course Code	AEC-1 [T]	C-1[T]							
	Part A								
Year	1st	Semester	1st	Credits	L	T	P	С	
100	100	Comodo	100	Sidalis	2	0	0	2	
Course Type	Theory only	ory only							
Course Category	Ability Enhancem	bility Enhancement Courses							
Pre-Requisite/s	knowledge of cor	ncept and nature of health, wellness and	its various implications	Co-Requisite/s	knowledge of concep	ot and nature of health,	vellness and its various i	mplications	
Course Outcomes & Bloom's Level	CO2- To introduct CO3- To introduct	the the learners to the concept of health a the the learners to the relation between m the learners to health behavior and promote the adequate knowledge on well-being an	ind-body and its relevance.(BL2-Und tion of human strengths for well-being	erstand) g. (BL3-Apply)	•				
Coures Elements	Skill Developmer Entrepreneurship Employability ✓ Professsonal Eth Gender ✓ Human Values ✓ Environment X	o X ics X	SDG (Goals)	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG12(Responsible consuption and production)					

Part B

Modules	Contents	Pedagogy	Hours
1	INTRODUCTION TO HEALTH & WELLNESS -Definition of health- WHO definition; Importance of health in everyday life; Components of health- physical, social, mental, spiritual and its relevance	Lecture method	5
2	Concept of wellness;Mental Health & wellness Determinants of health behaviours Using the mass media for health promotion	Lecture method, quiz, seminar	8
3	MIND – BODY AND WELL-BEING- Mind- Body connection in health- concept and relation; pt and relation Implications of mind-body connections; Wellbeing- why it matters?	Lecture method, quiz, seminar, group discussion	8
4	Digital wellbeing; Understanding health beliefs, and perspectives of indigenous people pertaining to Assam and North East India	adudi/video lectures, seminars, expert lectures	6
5	Promoting Human strengths and life enhancement: Classification of human strengths and virtues; cultivating inner strengths: Hope and optimism	adudi/video lectures, seminars, expert lectures	6

# Part D(Marks Distribution)

	Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation	
100	40	60	18	40		
	Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation	

### Part E

Books	Carr, A. (2004). Positive Psychology: The science of happiness and human strength. UK: Routledge.		
Articles			
References Books Forshaw, M. (2003). Advanced psychology: Health psychology. London: Hodder and Stoughton.			
MOOC Courses			
Videos			

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	2	1	-	1	-	1	-	1	-	1	1	1
CO2	2	1	1	2	1	1	-	2	-	-	-	-	2	2	2
CO3	2	2	2	2	-	1	-	-	1	1	-	-	3	2	3
CO4	3	2	2	2	1	-	1	-	-	-	-	-	3	2	3
CO5	3	3	2	3	-	-	1	2	1	-	1	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_FoodTechnology

Title of the Course	Englis	glish I [T]							
Course Code	AEC-I	C-ITI							
	Part A								
Year	1st	Semester	1st	Credits	L	Т	P	С	
1641	101	Semester	100	Ciedita	2	0	0	2	
Course Type	Theor	ry only							
Course Category	Found	dation core							
Pre-Requisite/s				Co-Requisite/s	Opportunities for students to develop their reading and writing skills over the course of the semester through practices such as portfolios, revision assignments, collaborative work, and low-stakes assignments				
Course Outcomes & Bloom's Level	CO2- CO3- CO4-	Classify and for Create cohesive Paraphrase text	mulate the ele e technical par t(s) and use ap	characteristics & various structural principles prerequisite to Tec mentary intricacies of Scientific and Technical Writing using app agraphs & text.(BL3-Apphy) propriate referencing styles(BL4-Analyze) ment, decision-making skilis.(BL5-Evaluate)	chnical Communication( <b>BL1-Rememt</b> licative grammar construct.□( <b>BL2-Ur</b>	per) iderstand)			
Coures Elements	Skill Development of Entrepreneurship X Employability X Professional Ethics X Goden X Human Values of Environment X								
				D-→ D					

Part B

Modules	Contents	Pedagogy	Hours
Module 1	Introduction to Communication Definition, Process, Principles and Types Forms & Grapevine Barriers & Noise	Classroom Lecture, PPts, Videoes	4
Module 2	Language Know-how Common Errors Learning through examples Functional Grammar & Contemporary usage	Classroom Lecture, PPts,	6
Module 3	Paragraph Development Techniques Principles & Methods Instruments for Cohesive Writing Creating Mind Maps and Infographics	Classroom Lecture, PPts,	8
Module 4	Writing skills Introduction to writing skills. Tone, Orientation, Altitude, Formal vs Informal, general writing, technical writing - Letter/Application/e-mail, Format, and content Indianisms in Email Writing Writing for the Web: Do's & Don'ts of Email Writing, Netiquette	Classroom Lecture, PPts,	6
Module 5	Writing skills, Introduction to writing skills. Tone Orientation, Attitude Formal vs Informal,general writing technical writing -tetler/ Application/e-mail, Format, andcontent - Indianismsin Email Writing -Writing for the Web Do's & Don'ts of Email Writing, Neiquette	Classroom Lecture, PPts,	6

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
NA	NA .	PBL		NA

Part D(Marks Distribution)

	Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation	
100	40	60	18	40		
			Practical			
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation	
0	0	0	0	0	0	

Part E

Books	Prasad, V., "Advanced Communication Skills", Atma Ram Publications, New Delhi			
Articles https://www.worldwidejournals.com/indian-journal-of-applied-research-(UAR)/recent_issues_pdf/2020/February/communication-skills-and-personality-development_February_2020_1580551794_4219373.pdf http://ijirar.com/upload_issuefijrar_issue_140.pdf				
References Books	Rutherford, Andrea, J., "Basic Communication Skills for Technology", Pearson Education Asia			
MOOC Courses	https://mptel.ac.in/courses/109103020			
Videos	https://www.youtube.com/watch?v=DSaj9qMwvLI https://www.youtube.com/watch?v=pJ7RgUCEd5M			

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	2	2	1	2	2	2	-	-	-	2	-	-	1	-	3
CO3	2	1	1	-	1	-	-	-	-	2	-	-	3	2	3
CO4	3	2	-	2	1	-	-	-	-	2	-	-	2	3	3
CO5	3	2	-	2	1	-	-	-	-	2	-	-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_FoodTechnology

Title of the Course	Hindi I [T]											
Course Code	AEC-II [T]											
	Part A											
Year	1st	Credits	L	Т	P	С						
Itali	101	Semester	2nd	Oredita	2	0	0	2				
Course Type	Theory only											
Course Category	Ability Enhancement	ancement Courses										
Pre-Requisite/s				Co-Requisite/s								
Course Outcomes & Bloom's Level	CO1- भारतीय ज्ञान परम CO2- उत्कृष्ट साहि त्यि र CO3- सांस्कृति क चेतना CO4- भाषा-ज्ञान(BL2-L CO5- सामान्य शब्दावर्ल	परा सेवि द्वार्थि यर्थि ों को अवगत कराना(BL1-Remembe) क पाठों के अध्ययन सेरूचि का वि कास करना(BL2-Under) । और राष्ट्रीय भावना का वि कास करना ((BL3-Apply) Inderstand) । और वि शेष शब्दा वली के अध्ययन द्वा रा भा षा एवं संस्कृति	r) stand) बो ध का वि का स करना(BL5-Evaluate)									
Coures Elements	Skill Development   Entrepreneurship X Employability X Professsonal Ethics: Gender X Human Values   Environment X		SDG (Goals)	SDG3(Good health and well-being)								

Part B

Modules	Contents	Pedagogy	Hours
1	1 स्वतंत्रता पुकारती 2. पुष्प की अभि ला 3. वा क्य संरचना और अशुद्धि याँषा	Lecture method, audio/video clips, group discussion, quiz	5
2	पर्या यवा ची वि लो म, एकार्थी , अनेकार्थी , शब्दयुग्म शब्द ३. वह तो इती पत्थर, ४. वर्ण-वि चा र (स्वर व्यंजन वर्गी करण उच्चा रण स्था न)	Lecture method, audio/video clips, group discussion, Review Analysis	4
3	भगवा न बुद्ध:- स्वामी वि वेकानंद 2. लो क तंत्र एक धर्म है.है 3. पल्लवन	lecture method, audio/video clips, group discussion, Review Analysis	5
4	1.अफसर 2 संक्षेपण 3 ना री त्व का अभि शा प 4. वि रा म चि ह्र	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	4
5	1.नैति क मूल्य परि चय एवं वर्गी करण २. अंतर्ज्ञा न और नैति क जी वन, ३. अप्प दी पो भव	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	5

Part D(Marks Distribution)

	Theory										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	40	60	18	40							
	•	•	Practical	•	•						
Total Marks Minimum Passing Marks		External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						

Part E

Books	हिंदी भाषा एवं नीतक गूल- मध्य प्रदेश शासन
Articles	
References Books	हिंदी भाषा एवं नैतिक मूल्य- मध्य प्रदेश शासन
MOOC Courses	https://hptel.ac.in/courses/109106201
Videos	https://youtu.be/ghthOMNYYQXY?si=ZWLQBB-UwudAXFVm

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	1	-	2	-	3	-	-	3	1	1
CO2	3	1	1	1	1	1	-	2	-	3	-	-	3	1	1
CO3	3	1	1	1	1	1	-	2	-	3	-	-	3	1	1
CO4	3	1	1	1	1	1	-	2	-	3	-	-	3	1	2
CO5	3	1	1	1	1	1	-	2	-	3	-	-	3	1	2
CO6	-	-	-	-	-	=	=	=	-	-	-	i	i	-	-



### BSc\_FoodTechnology

Title of the Course	Public health and hy	alth and hygiene [T]									
Course Code	AEC-III [T]	п									
Part A											
Year	2nd	Semester	3rd	Credits	L	Т	P	С			
1001	2110	Semester	314	oreurs	2	0	0	2			
Course Type	Theory only										
Course Category	Ability Enhancement	y Enhancement Courses									
Pre-Requisite/s	Knowledge of food	handling and hygiene		Co-Requisite/s	Basic hygiene p	oractices					
Course Outcomes & Bloom's Level	CO2- To critically u	d and apply the emerging concepts and iss nderstand the present scenario of health h design hygiene promotion and education p	ygiene in Indian and Northeast (BL3-Ap	ply)	•						
Coures Elements	Skill Development : Entrepreneurship > Employability X Professsonal Ethics Gender X Human Values ✓ Environment X	(	SDG (Goals)	SDC3/(Good health and well-being) SD64/(Quality education) SD642(Responsible consuption and production)							
			D-+D								

Pedagogy

Hours

Contents

Modules

	Part D(Marks Distribution)										
	Theory										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						

### Part E

Books	
Articles	A. Jiménez et al. infrastructure function and hygiene. Journal of Epidemiology and Community Health, 65, 432–437. doi:10.1136/jech.2009.091637 Baille, R. S. et al. (2011). Evaluation of an Australian indigenous housing programme: Community level impact on crowding, 288
References Books	Public Health and Hygiene- V. Kumaresan, R. Sorna Raj,
MOOC Courses	
Videos	

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	-	1	1	-	1	2	-	-	1	1	1
CO2	2	2	2	1	-	1	-	-	1	-	2	-	2	2	1
CO3	2	3	2	-	1	-	-	2	-	1	-	-	3	3	1
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	=	-	-	-	-



BSc\_PCM

Title of the Course	Hindi[T]											
Course Code	AEC0101	_										
			Part A									
Year	1st	Semester	1st	Credits	L	Т	P	С				
1601	101	Gledita	2	0	0	2						
Course Type	Theory only											
Course Category	Foundation core											
Pre-Requisite/s	varn gyan , shabd gyan	1		Co-Requisite/s	lipi , samajo	dari						
Course Outcomes & Bloom's Level	CO2- सांस्कृतिक ,एवं राष्ट्रि CO3- भाषा अध्ययन एवं अ	ा सेवि द्यार्थि यर्थि ों को अवगत कराना(BL1-Remember) य एकता।(BL3-Apply) ध्यायन का उद्देश विद्यार्थियों के सर्वांगीण विकास में सहायक है। छाड ण ,सामान्य तथा पारम्परिक साहित्य , लेखन परम्परा का बोध करना प	a जीविकोपार्जन के लक्ष्यों का सहज संधान कर सके । जीविको रवं समग्र व्यक्तित्व का विकास करना है। (BL3-Apply)	गार्जन के लक्ष्यों का सहज संधान कर सके । (BL2-Understand)	•							
Coures Elements	Skill Development ✓ Entrepreneurship X Employability X Professsonal Ethics X Gender X Human Values ✓ Environment X		SDG (Goals)									

Part B

Modules	Contents	Pedagogy				
1	स्वतंत्रता पुकारती (कविता) वाक्य संरचना और अशुद्धियाँ (३ संकवित ) जयशंकर प्रसाद वाक्य संरचना और अशुद्धियाँ (३ संकवित ) जयशंकर प्रसाद वाक्य संरचना और अशुद्धियाँ (३ संकवित ) जयशंकर प्रसाद पुष्प की अभिलाषा२ (कविता)	Audio/Video clips, group discussion, lecture with PPTs, quiz	5			
2	१ नमक का दरोगा) ( कहानी) —प्रेमचंद २ एक थे राजा भोज { निबंध } —त्रिभुवननाथ शुक्त ३ पर्यायवाची , विलोम , एकार्थी ,अनेकार्थी एवं शब्दयुम्म शब्द (संकलित }	Audio/Video clips, group discussion, lecture with ppt, quiz	4			
3	} { निबंध } —स्वा1मी विवेकानंद २ लोकतंत्र एक धर्म है{ निबंध —डॉ सर्वपल्ली राधा कृष्णन ३ नहीं रूकती है नदी —हीरालाल बाछोतिया ४ पल्लवन १ भगवान बुद्ध	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	5			
4	अफसर{ निबंध -शरद जोशी २ हमारी सांस्कृतिक एकता संग्रह में -भारत एक है{ निबंध -रामधारी सिंह दिनकर ३ संक्षेपण {संकलित }	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	4			
5	नैतिक मृत्य परिचय एवं वर्गीकरण( आलेख ) -डॉ शशि राय २ आचरण की सभ्यतासरदार पूर्ण सिंह ३ अंतर्ज्ञान और नैतिक जीवन(लेखडॉ सर्वपल्ली राधाक ४ अप्प दीपोभव (लेख ) -स्वामी श्रद्धानन्द	Audio/Video clips, group discussion, lecture with ppt	5			

Part D(Marks Distribution)

	Theory										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	40	40	12	60							
Practical Practical											
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						

Part E

Books	hindi bhasha aur naltik mulay
Articles	
References Books	hindi bhasha aur naitik mulay
MOOC Courses	
Videos	

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	2	-	-	-	-	2	-	-	-	-	=	-
CO2	-	2	-	-	-	2	=	1	-	-	-	-	-	-	-
CO3	2	-	-	1	-	-	-	-	-	2	-	-	-		-
CO4	2	-	-	-	-	2	-	-	1	-	-	-	-		-
CO5	1	-	-	-	1	-	-	2	-	-	-	-	-		-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	=	-	-



### BSc\_ComputerScience

Title of the Course	Hindi											
Course Code	AEC0101[T]											
	Part A											
Year	1st	Semester	1st	Credits	L	Т	Р	С				
Teal	101	Selliester	100	Gredita	2	0	0	2				
Course Type	Theory only	y										
Course Category	Foundation core	undation core										
Pre-Requisite/s	varn gyan , shabd gyan	1		Co-Requisite/s	lipi , samaji	dari						
Course Outcomes & Bloom's Level	CO2- सांस्कृतिक ,एवं राष्ट्रि CO3- भाषा अध्ययन एवं अ	ा सेवि द्यार्थि वर्षि ों को अवगत कराना(BL1-Remember) य एकता।(BL3-Apply) ध्यापन का उद्देश विद्यार्थियों के सर्वांगीण विकास में सहायक है। छात्र ण ,सामान्य तथा पारम्परिक साहित्य , लेखन परम्परा का बोध करना ए	। जीविकोपार्जन के लक्ष्यों का सहज संधान कर सके । जीविकोप वं समग्र व्यक्तित्व का विकास करना है। (BL3-Apply)	गार्जन के लक्ष्यों का सहज संधान कर सके । (BL2-Understand)	•							
Coures Elements	Skill Development ✓ Entrepreneurship X Employability X Professsonal Ethics X Gender X Human Values ✓ Environment X		SDG (Goals)									

Part B

Modules	Contents	Pedagogy				
1	स्वतंत्रता पुकारती (कविता) वाक्य संरचना और अशुद्धियाँ (३ संकवित ) जयशंकर प्रसाद वाक्य संरचना और अशुद्धियाँ (३ संकवित ) जयशंकर प्रसाद वाक्य संरचना और अशुद्धियाँ (३ संकवित ) जयशंकर प्रसाद पुष्प की अभिलाषा२ (कविता)	Audio/Video clips, group discussion, lecture with PPTs, quiz	5			
2	१ नमक का दरोगा) ( कहानी) —प्रेमचंद २ एक थे राजा भोज { निबंध } —त्रिभुवननाथ शुक्त ३ पर्यायवाची , विलोम , एकार्थी ,अनेकार्थी एवं शब्दयुम्म शब्द (संकलित }	Audio/Video clips, group discussion, lecture with ppt, quiz	4			
3	} { निबंध } —स्वा1मी विवेकानंद २ लोकतंत्र एक धर्म है{ निबंध —डॉ सर्वपल्ली राधा कृष्णन ३ नहीं रूकती है नदी —हीरालाल बाछोतिया ४ पल्लवन १ भगवान बुद्ध	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	5			
4	अफसर{ निबंध -शरद जोशी २ हमारी सांस्कृतिक एकता संग्रह में -भारत एक है{ निबंध -रामधारी सिंह दिनकर ३ संक्षेपण {संकलित }	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	4			
5	नैतिक मृत्य परिचय एवं वर्गीकरण( आलेख ) -डॉ शशि राय २ आचरण की सभ्यतासरदार पूर्ण सिंह ३ अंतर्ज्ञान और नैतिक जीवन(लेखडॉ सर्वपल्ली राधाक ४ अप्प दीपोभव (लेख ) -स्वामी श्रद्धानन्द	Audio/Video clips, group discussion, lecture with ppt	5			

Part D(Marks Distribution)

Theory									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
100	40	40	12	60					
			Practical						
Total Marks	Minimum Passing Marks External Evaluation		Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				

Part E

Books	hindi bhasha aur nalitik mulay
Articles	
References Books	hindi bhasha aur naitik mulay
MOOC Courses	
Videos	

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	2	-	-	-	-	2	-	-	-	-	-	
CO2	-	2	-	-	-	2	-	1	-	-	-	-	-	-	-
CO3	2	-	-	1	-	-	-	-	-	2	-	-	-	-	-
CO4	2	-	-	-	-	2	-	-	1	-	-	-	-	-	-
C05	1	-	-	-	1	-	-	2	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_ComputerScience

Title of the Course	English-I	glish-I										
Course Code	AEC0201[T]	E0201[T]										
	Part A											
Year	1st Semester		2nd	Credits	L	Т	Р	С				
	1			-11-11-1	2	0	0	2				
Course Type	Theory only	heory only										
Course Category	Ability Enhancement Courses											
Pre-Requisite/s	The students have a b	pasic knowledge and understanding of the English lan	guage and communication.	Co-Requisite/s	Co-Requisite/s Communication skills, Leadership development etc.							
Course Outcomes & Bloom's Level	CO1- Determine interpersonal skills and be an effective goal-oriented team player(BL1-Remember) CO2- Elaborate creativity and lateral thinking(BL2-Understand) CO3- Examine attitudes, emotional intelligence and understand its influence on behavior(BL3-Apply) CO4- Justify approaches to conflict resolution.(BL4-Analyze) CO5- Evaluate goal setting, management, decision-making skills (BL5-Evaluate)											
Skill Development ✓ Entrepreneurship × Employability ✓ Professonal Ethics ✓ Gender × Human Values ✓ Environment ×												

Part B

Modules	Contents	Pedagogy	Hours
Module 1	Where the Mind is Without Fear, The Tryst with Destiny The Hero, Indian Weavers The Portrait of a Lady The Solitary Reaper	Classroom Lecture, PPts, Videoes	10
Module 2	Basic Language Skills Synonyms, Antonyms, Homonyms, Word Formation, Prefix, Suffix	Classroom Lecture, PPts,	6
Module 3	Uncountable Noun, Verb, Tense, Adverb	Classroom Lecture, PPts,	6
Module 4	Trading Comprehension, Unseen Passage	Classroom Lecture, PPts, Videos	4
	Introduction to Report Writing, Major Objectives of Writing Reports, Significance of Business/Technical, Types and Forms of Reports, Sylves of Writing Reports – Printed format, Memo Format, Letter Format, Book/Letter Text Format, Layout and Structure of Reports, Components of Report Writing and Structure of Reports, Components of Report Writing A	Classroom Lecture, PPts, Videos	5

Part D(Marks Distribution)

	Theory									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
100	40	40	12	60						
	Practical Practical									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					

Part E

Books	C. Muralikrishna and S. Mishra (2011) Communication Skills for Engineers, Pearson education. ISBN: 9788131733844
Articles	Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998.
References Books	Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi.
MOOC Courses	https://nptel.ac.in/courses/109103020
Videos	https://hptel.ac.in/courses/109103020

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	2	2	1	2	2	2	-	-	-	2	-	-	1	-	3
CO3	2	1	1	-	1	-	-	-	-	2	-	-	3	2	3
CO4	3	2	-	2	1	-	-	-	-	2		-	2	3	3
C05	3	2	-	2	1	-	-	-	-	2		-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



BSc\_PCM

Title of the Course	English-I											
Course Code	AEC0201[T]											
			Part A									
Year	1st	Semester	2nd	Credits	L	Т	P	С				
1001	150	Comoto	210	Siculo	2	0	0	2				
Course Type	Theory only											
Course Category	Ability Enhancement	ancement Courses										
Pre-Requisite/s	The students have a l	pasic knowledge and understanding of the English lan	guage and communication.	Co-Requisite/s	Communication	on skills, Leader	ship developmer	nt etc.				
Course Outcomes & Bloom's Level	CO2- Elaborate creati CO3- Examine attitud CO4- Justify approact	personal skills and be an effective goal-oriented team vity and lateral thinking(BL2-Understand) es, emotional intelligence and understand its influence tes to conflict resolution.(BL4-Analyze) etting, management, decision-making skills.			•							
Cours Elements	Skill Development ✓ Entrepreneurship X Employability ✓ Professsonal Ethics ✓ Gender X Human Values ✓ Environment X	,	SDG (Goals)	SDG4(Quality education)								

Part B

Modules	Contents	Pedagogy	Hours
Module 1	Where the Mind is Without Fear, The Tryst with Destiny The Hero, Indian Weavers The Portrait of a Lady The Solitary Reaper	Classroom Lecture, PPts, Videoes	10
Module 2	Basic Language Skills Synonyms, Antonyms, Homonyms, Word Formation, Prefix, Suffix	Classroom Lecture, PPts,	6
Module 3	Uncountable Noun, Verb, Tense, Adverb	Classroom Lecture, PPts,	6
Module 4	Trading Comprehension, Unseen Passage	Classroom Lecture, PPts, Videos	4
	Introduction to Report Writing, Major Objectives of Writing Reports, Significance of Business/Technical, Types and Forms of Reports, Styles of Writing Reports – Printed format, Memo Format, Letter Format, Book/Letter Text Format, Layout and Structure of Reports, Components of Report Writing	Classroom Lecture, PPts, Videos	5

Part D(Marks Distribution)

	Theory												
Total Marks	arks Minimum Passing Marks External Evaluation Min. External Evaluation Internal Evaluation Min. Internal Evaluation												
100	40	40	12	60									
			Practical										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								

Part E

Books	C. Muralikrishna and S. Mishra (2011) Communication Skills for Engineers, Pearson education. ISBN: 9788131733844
Articles	Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998.
References Books	Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi.
MOOC Courses	https://nptel.ac.in/courses/109103020
Videos	https://nptel.ac.in/courses/109103020

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	2	2	1	2	2	2	-	-	-	2	-	-	1	-	3
CO3	2	1	1	•	1	•	•	-	•	2	-	-	3	2	3
CO4	3	2	-	2	1	-	-	-		2		-	2	3	3
CO5	3	2	-	2	1	-	-	-		2		-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_ComputerScience

Title of the Course	AEC-IV											
Course Code	AEC0401[T]											
			Р	art A								
Year	2nd	Semester	4th	Credits	L	Т	P	С				
					2	0	0	2				
Course Type	Theory only											
Course Category	Foundation core	on core										
Pre-Requisite/s	Bhasha gyan	asha gyan Co-Requisite/s shabd gyan , varn gyan, samajik samaj										
Course Outcomes & Bloom's Level	CO1- हिंदी भाषा एव CO2- सांस्कृतिक ,ए CO3- भाषा अध्ययन CO4- पाठ्यक्रम में व	वं नैतिक मूर्त्यों को समझना(BL1-Remembe १वं राष्ट्रिय एकता।।() १ एवं अध्यापन का उद्देश्य विद्यार्थियों के सर्वांगी व्याकरण ,सामान्य तथा पारम्परिक साहित्य , हं	or) ण विकास में सहायक है। छात्र जीविकोपार्जन खन परम्परा का बोध करना एवं समग्र व्यक्ति	१ के लक्ष्यों का सहज़ संधान कर सके । जीविकोपार्जन के लक्ष्यों का सहज़ सं इत्य का विकास करना है। ()	वान कर सके । ()							
Coures Elements	Skill Developmen Entrepreneurship Employability X Professsonal Ethi Gender X Human Values V Environment X	×	SDG (Goals)	SDG3(Good health and well-being)								

D--+ D

Modules	Contents	Pedagogy	Hours
1	वर्ण-विन्यास - डॉ विश्वनाथ मिश्रसांकृत्यायन पत्थर (कविता) - सूर्यकांत त्रिपाठी निराला दिमागी गुलामी (निबंध) - राहुल ह तोड़ती व	Audio/Video clips, group discussion, lecture with ppt, quiz	5
2	नारीत्व का अभिशाप (निबंध) -महादेवी वर्मा चीफ की दावत (कहानी) - भीष्म साहनी विराम चिन्ह (संकलित)	Audio/Video clips, group discussion, lecture with ppt, quiz	4
3	चली फगुनहट बौरे आम (ललित निबंध) - विवेकी राय इंद्रधनुष का रहस्य (वैज्ञानिक लेख) - डॉ कपूरमल जैन संधि (संकलित)	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	5
	सपनो की उड़ान (प्रेरक निबंध) - ए पी जे अब्दुल कलाम हमारा सौर मंडल (संकलित) प्रमुख वैज्ञानिक अविष्कार और हमारा जीवन (संकलित) समास- संरचना और प्रकार (संकलित)	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	4
5	शिकागो व्याख्यान (व्याख्यान) - स्वामी विवेकानंद धर्म और राष्ट्रवाद (लेख) - महर्षि ऑरबिंदो सादगी (आत्मकथा) -महात्मा गाँधी चित्त जहां भयविहीन (कविता) - रबिन्द्र टैगोर	Audio/Video clips, group discussion, lecture with ppt	5

# Part D(Marks Distribution)

	Theory												
Total Marks	Minimum Passing Marks	Minimum Passing Marks External Evaluation		Internal Evaluation	Min. Internal Evaluation								
100	40 40		12	60									
			Practical										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								

### Part E

Books	evm sha Hindi bhasha naltik mulayha
Articles	
References Books	evm sha Hindi nalitk mulayha
MOOC Courses	
Videos	

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
CO1	2	-	-	-	1	-	-	-	3	-	-	-	-	-	-
CO2	-	-	3	-	-	-	2	1	-	-	-	-	-	-	-
CO3	-	1	-	-	2	-	-	-	2	-	-	-	-	-	-
CO4	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO5	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-
COS															



### BSc\_Biotechnology

Title of the Course	NCC*		g and creative thinking (BL1-Remember) di ssues (BL2-Understand) citional fixedness (BL3-Apphy)							
Course Code	BSBT 204 (T)									
		Par	tA							
Year	1st	Semester	2nd	Credits	L	Т	Р	С		
				Co-Requisite/s  Co-Requisite/s  SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality)	0	2	4			
Course Type	Theory only									
Course Category	Generic Elective									
Pre-Requisite/s	Should be acquainted with t	with the basics knowledge of General Awareness about Leadership Quality, Personality Development, Defense system etc.  Co-Requisite/s								
Course Outcomes & Bloom's Level	CO2- To think critically about CO3- Think divergently and	oning, critical thinking and creative thinking.(BL1-Remember) at different life related issues.(BL2-Understand) will try to break functional fixedness.(BL3-Apply) I-life problems.(BL4-Analyze)			•					
Coures Elements	Skill Development ✓ Entrepreneurship X Employability ✓ Professsonal Ethics X Gender X Human Values ✓ Environment X		SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG8(Decent work and economic growth)						

# Part B

Modules	Contents	Pedagogy	Hours
Unit 1. Personality Development-I	Thinking-Meaning and Concept of thinking, Reasoning, Process of thinking. Critical Thinking-Meaning & concept of critical thinking, Features of critical thinking, Process of critical thinking.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5
Unit 2. Personality Development-II	Creative thinking- Meaning & concept of creative thinking, Features of creative thinking, Process of creative thinking, levels of Creativity, Characteristics of creative person.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5
Unit 3. Leadership Development-I	Leadership capsule. Important Leadership traits, Indicators of leadership and evaluation.	Whiteboard, PPT, Video Case Study, Project Based Activity, Application Based Activity	5
Unit 4. Leadership Development-II	Motivation- Meaning & concept, Types of motivation. Factors affecting motivation. Ethics and Honor codes.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5
Unit 5. Social Service and Community Development	(i) Protection of Children & Women Safety. (ii) Road/Rail Safety. (iii) New Government Initiatives. (iv) Cyber and mobile Security Awareness.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5

# Part D(Marks Distribution)

Theory									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
0	0	0	0	0	0				
Practical									
Total Marks	Minimum Passing Marks	External Evaluation	External Evaluation Min. External Evaluation		Min. Internal Evaluation				

### Part E

Books	R Gupta; NCC National Cadet Corps A, B & C Certificate Examination Book; Ramesh Publishing House, 2016.		
Articles	https://indiancc.mygov.in/activity/snehahoro/article-on-ncc-camp-and-training/		
References Books Cadets training handbook common subjects (2017), D.G NCC Delhi-110030			
MOOC Courses			
Videos	https://www.youtube.com/watch?v=N7nNupMdS6c		

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-		-	-		-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_Biotechnology

Title of the Course	NCC*										
Course Code	BSBT 304 (T)										
		Part A									
Year	2nd	Semester 3rd Credits									
Course Type	Theory only										
Course Category	Generic Elective	re									
Pre-Requisite/s	Should be acquainted with the b	be acquainted with the basics knowledge of General Awareness about Leadership Quality, Personality Development, Defense system etc Co-Requisite/s									
Course Outcomes & Bloom's Level	CO2- To think critically about diff CO3- Think divergently and will CO4- Creatively in their real-life CO5- Understand the organizati	try to break functional fixedness.()		•							
Coures Elements	Skill Development ✓ Entrepreneurship X Employability ✓ Professonal Ethics X Gender X Human Values ✓ Environment ✓		SDG (Goals)	SDG4(Quality education) SDG6(Clean water and sanitation) SDG13(Climate action) SDG15(Life on land)							

	Part B									
Modules	Contents	Pedagogy	Hours							
Unit 1. Personality Development	(i) Group Discussions - Change your Mindset (ii) Public Speaking.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5							
Unit 2. Leadership Development	Case Studies – APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murthy.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5							
Unit 3. Disaster management	(i) Disaster Management Capsule. (ii) Organisation. (iii) Types of Disasters. (iv) Essential Services. (v) Assistance. (vi) Civil Defence Organisation.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5							
Unit 4. Border & Coastal Areas	History, Geography & Topography of Border/ Coastal Areas.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5							
Unit 5. Adventure	Adventure activities.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5							

### Part D(Marks Distribution)

	Theory									
Total Marks	otal Marks Minimum Passing Marks External Evaluation		Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
0	0	0		0	0					
	Practical									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					

### Part E

Books	R Gupta ; NCC National Cadet Corps A, B & C Certificate Examination Book; Ramesh Publishing House, 2018.
Articles	
References Books	Singh, Neeraj; A Hand Book of NCC; Kanti Prakashan Publisher
MOOC Courses	
Videos	https://www.youtube.com/watch?v=kvdDHFALpTw

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	=	-	-	-	-	-	-	-



### BSc\_Biotechnology

Title of the Course	Genetic Engineering	netic Engineering								
Course Code	BSBT 401 (T)	3BT 401 (T)								
Part A										
Year	2nd	Semester	4th	Credits	L	Т	P	С		
122					3	0	1	4		
Course Type	Embedded theory and	d lab								
Course Category	Disciplinary Major									
Pre-Requisite/s	Student must have th	e detailed knowledge of Gene expression and	d hereditary information	Co-Requisite/s Detailed study of genomics, proteomics and metabolomics tool						
Course Outcomes & Bloom's Level	CO2- To understand t CO3- To understand t CO4- To evaluate the	ne role of all the enzymes used in the DNA ed the method of creating new molecules such a the importance Nucleic acid editing tools(BL2 applications of in various fields such as rese- derstanding of creation of new DNA, RNA &	s DNA & RNA( <b>BL2-Understand)</b> :- <b>Understand)</b> arch. Agriculture. Pharmaceutical industries(	BL5-Evaluate) pply)						
Skill Development   Entrepreneurship   Coures Elements  Professonal Ethics   Gender X  Human Values   Environment   Environment   Environment   SDG (Goals)  SDG4(Quality education)										

Part B

Modules	Contents	Pedagogy	Hours
1	introduction to gene cloning and its necessity: DNA modifying enzymes: Restriction enzymes (RE)-structure function and types, polymerase, kinases, ligase, alkaline phosphatase, exonuclease etc Cloning methods. linkers and adaptors.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
2	Methods of introduction of DNA into living cells, E.coli, plant and animal cells, Genetic transformation in plants.Agrobacteriun mediated transformation in plants, structure and features of Ti and Ri plasmids.Genomic libraries and cDNA libraries.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
3	Cloning vectors: Plasmids and Bacteriophages, Phagemids, Cosmids, Artificial chromosomes (BAC and YAC) for E.coli, yeast. Strategies for identification of recombinant clones containing cloned genes: Nucleic acid hybridization, immune screening etc. Expression vectors for E.coli and Yed	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
4	Tools for RDT: Restriction mapping, Southern and northern blotting, Forensic application of biotechnology: DNA fingerprinting and its applications, forensic medicine Molecular Pharming: Application	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
5	Applications of RDT, Production of recombinant protein (Insulin, Growth hormone), production of Recombinant vaccine.  Golden rice, Artifical seed production, biofertilizers and biopesticide production GM crops and GM food	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Preparation of stock and buffer solutions for DNA isolation	Experiments	BL3-Apply	2
2	Isolation of DNA from yeast cells.	Experiments	BL3-Apply	2
3	Isolation of DNA from Plant cell.	Experiments	BL3-Apply	2
4	Isolation of plasmid DNA	Experiments	BL3-Apply	2
5	Agarose gel electrophoresis of Genomic DNA	Experiments	BL4-Analyze	2
6	Isolation of RNA	Experiments	BL4-Analyze	2
7	Quantification of DNA by spectrophotometer(260/280nm)	Experiments	BL4-Analyze	2
8	To isolate the Auxotrophic mutants from the mixed culture sample of Microorganism	PBL	BL5-Evaluate	3 days

Part D(Marks Distribution)

Theory									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
100	40	60	18	40					
	Practical								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
100	50	60	30	40					

Part E

Books	TA Brown, Gene cloning 4 edition
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3078015/
References Books	James D watson.Molecular Biology Of gene, 4 edition
MOOC Courses	https://mptel.ac.in/courses/102103074
Videos	https://nptel.ac.in/courses/102103074

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	-		2	-	-	-	-	-	-	1	-	3
CO2	1	2	3	-		1	-	-	-	-	-	-	1	-	2
CO3	1	2	3	-		-	3	-	-	-	-	-	3	1	-
CO4	1	2	3	-		-	-	-	-	-	-	-	2	-	-
CO5	1	2	3	-		2	-	-	-	-	-	-	-	-	1
CO6	-		-	=		-	i.	-	-	-	i	i	-	-	-



### BSc\_Biotechnology

Title of the course	NGC /WIGGG								
Course Code	BSBT 404 (T)								
		Part A							
Year	2nd	Semester	4th	Credits	L T P C 2 0 2 4				
Course Type	Theory only								
Course Category	Generic Elective	:lective							
Pre-Requisite/s	Should be acquainted with the ba	asics knowledge of General Awareness about Leadership Quality, F	Co-Requisite/s						
Course Outcomes & Bloom's Level	C01 - Develop the qualities of social skills () C02 - Imbbe headership qualities. (In the property of the prop								
Coures Elements	Skill Development ✓ Entrepreneurship X Employability ✓ Professsonal Ethics X Gender X Human Values ✓ Environment ✓		SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education) SDG4(Quality water and sanitation) SDG4(Guan water and sanitation) SDG15(Life on land)					

	Part B									
Modules	Contents	Pedagogy	Hours							
Unit 1. Personality Development	Group Discussions – Social Skills & Time management.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5							
Unit 2. Leadership Development	Case Studies – Case Studies – Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965 war.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5							
Unit 3. Disaster management	(i) Initiative Trg, Organising Skills. (ii) Dos and Don'ts. (iii) Natural Disasters. (iv) Man Made Disasters. (v) Fire Services and Fire Fighting.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5							
Unit-4.Environmental Awareness	Adventure Environmental Awareness and Conservation, Local and global approaches to conserve nature.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5							
Unit 5. General Awareness & Armed Forces	General Awareness, Army, Navy, Air Force and Central Armed Police Forces.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5							

### Part D(Marks Distribution)

Theory								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation			
0	0 0		0	0	0			
	Practical Practical							
Total Marks	Minimum Passing Marks	External Evaluation Min. External Evaluation Internal Evaluation		Min. Internal Evaluation				

# Part E

Books	R Gupta; NCC National Cadet Corps A, B & C Certificate Examination Book; Ramesh Publishing House, 2018.		
Articles https://indiancc.mygov.in/			
References Books Singh, Neeraj: A Hand Book of NCC; Kanti Prakashan Publisher Cadet training hand book specialised subjects (2017)			
MOOC Courses			
Videos	https://www.youtube.com/watch?v=eBA54iepAA		

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_Biotechnology

Title of the Course	Animal Tissue Culture	mal Tissue Culture									
Course Code	BSBT 601 (T)	aT 601 (T)									
Part A											
Year	3rd	Semester	6th	Credits	L	Т	Р	С			
				3	0	1	4				
Course Type	Embedded theory and lab										
Course Category	Disciplinary Major	ciplinary Major									
Pre-Requisite/s	Student must be aware of co	udent must be aware of cell,tissues, culture media for the in vitro regeneration of cell organs.  Co-Requisite/s									
Course Outcomes & Bloom's Level											
Coures Elements	Skill Development   Entrepreneurship   Employability   Professsonal Ethics   Gender   Human Values   Environment   Environment		SDG (Gonle)	SDG3(Good health and well-being) SDG4(Quality education)							

D--+ D

Modules	Contents	Pedagogy	Hours
1	Introducción: History Cell culture enchiques, Equipment, and sterilization methodology. Introduction to animal cell cultures: Nutritional and physiological: Growth factors and growth parameters	Lecture methods, demonstrations, experiments, field visit, Activity based learning	8
II	Primary cell cultures, Establishment and maintenance of primary cell cultures of adherent and non-adherent cell lines, fibroblasts, endothelia colls, embryonic cell lines and stem cells. Organ culture: Methods, behavior of organ explants and utility of organ culture, whole embryo culture.	Lecture methods, demonstrations, experiments, field visit, Activity based learning, Project based learning	9
Ш	Secondary cell cultures, □Establishment and maintenance of secondary mammalian and insect cell lines, Characterization of cell lines, □Karyotyping, biochemical and genetic characterization of cell lines	Lecture methods, demonstrations, experiments, field visit, Activity based learning, Project based learning	8
IV	Production of the vaccine in animal cells: □use of Hybridoma for production of monoclonal antibodies Cell cloning and selection. Transfection 8 transformation of cell. Commercial scale production of animal cells, stem and their application. Application of animal cell culture for in vitro testing of drugs, Testing of toxicity of environmental pollutions in cell.	Lecture methods, demonstrations, experiments, field visit, Activity based learning, Project based learning	9
v	Scale-up: Scale-up in suspension: Rotating chambers; Perfused suspension cultures; Fluidized bed reactors for suspension culture. Scale-up in monolayers: Multisurface propagators, Multiarray disks, spirals, and tubes; Roller culture, Microcarriers; Perfused monolayer cultures; Membrane perfusion; Hollow fiber perfusion; Matrix perfusion; Microencapsulation; Growth monitoring	Lecture methods, demonstrations, experiments, field visit, Activity based learning, Project based learning	9

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	Introdcution to animal tissue culture lab.	Experiments	BL2-Understand	2
II	Prerparation of Hank's Balanace salt solution	Experiments	BL3-Apply	2
III	To culture the animal tissue in the prpeared media	Experiments	BL3-Apply	3
IV	To check the viability of the cell and count the cell number	Experiments	BL4-Analyze	3
V	Observation of polymorpho nuclear monocytes	Experiments	BL4-Analyze	2
VI	To perform skin grafting	Internships	BL6-Create	1 month
VII	To observed the various cell lines and tissues under culture media for its growth and development	PBL	BL4-Analyze	1 week

Part D(Marks Distribution)

	Theory										
Total Marks	Minimum Passing Marks	m Passing Marks External Evaluation Min. External Evaluation		Internal Evaluation	Min. Internal Evaluation						
100	40	60	18	40							
	Practical										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	50	60	30	40							

Part E

Videos	https://hptel.ac.in/courses/102106081			
MOOC Courses	https://hptel.ac.in/courses/102106081			
References Books Culture of Animal Cells: A Manual of Basic Technique (6th Edition) R. Ian Freshney. REQUIRED. It is in your best interest to bring this book or the required chapters to class.				
Articles https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7325846/				
Books	Freshney, Wiley-Liss, Culture of Animal Cells, 5th Edition-2005			

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	3	-	2	2	3	-	-	-	-	-	1	2	2
CO2	2	2	1	1	3	2	-	-	-	-	-	-	-	3	2
CO3	3	2	-	1	3	2	1	-	-	-	-	2	1	1	1
CO4	1	1	1	1	1	1	3	-	-	-	-	-	2	3	2
CO5	1	1	2	1	1	1	3	-	-	-	-	-	2	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



BSc\_Biotechnology

Title of the Course	Drug designing	Drug designing									
Course Code	BSBT 701 (T)	USBT 701 (T)									
Part A											
Year	4th	Semester	7th	Credits	L	Т	P	С			
1001	401	ouncie:		5754115	2	0	1	3			
Course Type	Embedded theory and lab										
Course Category	Discipline Specific	Discipline Specific Elective									
Pre-Requisite/s	The students will be highly motivated to this branch of biotechnology and will be acquainted with the different drug design processes, strategies to design and develop some important industrial lead molecules.			Co-Requisite/s	The students should be familiar with the basics of drug design, its databases, softwares, strategies adopted for drug design as well as the different methods used for drug design						
Course Outcomes & Bloom's Level	CO2- They unders CO3- The course p	orepares the student to understand the basic of tand the different CADD techniques and their provides various strategies to design and deve e aware about the working with molecular mo	applications(BL2-Understand) lop new drug like molecules (BL3-Apply	)							
Coures Elements	Skill Development Entrepreneurship 3 Employability ✓ Professsonal Ethic Gender X Human Values ✓ Environment ✓	×	SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education)							

		Part B									
Modules	Contents	Pedagogy	Hours								
Unit-I	Introduction to Drug Discovery and Development: Stages of drug discovery and development Lead discovery and Analog Based Drug Design Rational approaches to lead discovery based on traditional medicine, Random screening, Non-random screening, serendipitous drug discovery, lead discovery based on drug metabolism, lead discovery based on clinical observation	lecture method, collaborative learning, Field visits, ABL	8								
Unit-II	Quantitative Structure Activity Relationship (QSAR) SAR versus QSAR, History and development of QSAR. Types of hybiocohemical parameters, experimental and theoretical approaches for the determination of physicochemical parameters such as partition coefficient. Hammet's substitution constant and Tafts steric constant, 3D QSAR approaches like COMFA and COMSIA.	lecture method, collaborative learning, Field visits, ABL, softwares, PBL	8								
Unit-III	Molecular Modeling and virtual screening techniques Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening, Molecular docking: Rigid docking, flexible docking, manual docking. Docking based screening. De novo drug design.	lecture method, collaborative learning, Field visits, ABL, softwares, PBL	8								
Unit-IV	Informatics & Methods in drug design Introduction to Bioinformatics, Chemoinformatics, ADME databases, chemical, biochemical and pharmaceutical databases	lecture method, collaborative learning, Field visits, ABL, softwares, PBL	8								
Unit-V	Molecular Modeling: Introduction to molecular mechanics and quantum mechanics. Energy Minimization methods and Conformational Analysis, global conformational minima determination.	lecture method, collaborative learning, Field visits, ABL, softwares, PBL	8								

	Pai	tC		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Stages of drug discovery	Case Study	BL2-Understand	2
2	Analog based drug design and its applications	Case Study	BL2-Understand	2
3	Quantitative structure activity relationship (QSAR)	Case Study	BL3-Apply	2
4	Methods of drug design	Case Study	BL3-Apply	2
5	Molecular modeling approaches	Case Study	BL3-Apply	2
6	Molecular Docking	Case Study	BL3-Apply	2

	Theory									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
100	40	40	12	60	30					
			Practical							
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
100	50	40	20	60	30					

Part E							
Books 1. Computational and structural approaches to drug discovery, Robert M Stroud and Janet.F Moore, RCS Publishers. 2. Introduction to Quantitative Drug Design by Y.C. Martin, CRC Press, Taylor & Francis group.							
Articles	https://onlinecourses.niptel.ac.in						
References Books	1. Drug Design by Ariens Volume 1 to 10, Academic Press, 1975, Elsevier Publishers. 2. Principles of Drug Design by Smith and Williams, CRC Press, Taylor & Francis. 3. The Organic Chemistry of the Drug Design and Drug action by Richard B. Silverman, Elsevier Publishers.						
MOOC Courses	https://onlinecourses.niptel.ac.in https://nptel.ac.in/courses/102106070						
Videos	https://inptel.ac.in/courses/10/2106770 https://inptel.ac.in/courses/10/2106770						

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	-	-	-	-	-	-	-	-	-	1	2
CO2	1	2	2	1	-	-	-	-	-	-	-	-	-	1	1
CO3	1	1	2	2	-	-	-	-	-	-	-	-	-	3	1
CO4	1	2	1	2	-	-	-	-	-	-	-	-	-	2	2
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_Biotechnology

Title of the Course	Hindi II	rdi II								
Course Code	BSBT AEC IV	SBT AEC IV								
Part A										
Year	2nd	Semester	4th	Credits	L	Т	Р	С		
Total	Liid	Compact		Sidaks	2	0	0	2		
Course Type	Theory only	y only								
Course Category	Ability Enhancement Co	ty Enhancement Courses								
Pre-Requisite/s		Co-Requisite/s								
Course Outcomes & Bloom's Level	CO1- हिंदी भाषा एवं नैतिब CO2- सांस्कृतिक ,एवं राष्ट्रि CO3- छात्र जीविकोपार्जन CO4- पाठ्यक्रम में व्याकर	o मूल्यों को समझना(BL1-Remember) य एकता बनाये रखना भाषा के माध्यम से संम्भव है।(BL2- के लक्ष्यों का सहज संधान कर सके।(BL3-Apply) ण ,सामान्य तथा पारम्परिक साहित्य ,लोक कलाएं ,स्थापत्य	Understand) एवं लेखन परम्परा का बोध करना एवं समग्र व्यक्तित्व का	विकास करना है।(BL2-Understand)	•					
Coures Elements	Skill Development ✓ Entrepreneurship × Employability × Professsonal Ethics × Gender × Human Values ✓ Environment ×		SDG (Goals)	SDG1(No prverty) SDG3(Good health and well-being) SDG4(Quality education)						

D--+ D

Modules	Contents	Pedagogy	Hours
1	मध्य प्रदेश की लोक -कलाएं (संकलित) इंद्रधनुष का रहस्य लोकोक्तियां एवं मुहावरे (संकलित संधि (संकलित }	lecture method, group discussion, story telling,	5
2	जनसंचार माध्यम -प्रिंट ,इलेक्ट्रॉनिक ,सोशल सपनों की उड़ान प्रमुख वैज्ञानिक आविष्कार संक्षिप्तियां (संकलित )	lecture method, collaborative learning, Field visits, ABL, PBL	4
3	पत्रकारिता के विविध आयाम (संकलित ) मध्य प्रदेश का लोक साहित्य (संकलित ) पत्र -लेखनआवेदन ,प्रारूपण ,आदेश ,परिपत्र ,श्रापन ,अनुस्मारक (संकलित ) समास (संकलित )	lecture method, group discussion, story telling, role play	5
4	हिंदी की शब्द सम्पदा (संकलित } राज भाषा हिंदी (संकलित }- हिंदी की संवैधानिक स्थिति एवं व्यवहारिक स्थिति दूरभाष और मोबाइल (संकलित } अनुताद -अर्थ ,प्रकार एवं अभ्यास	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	4
5	विश्व के प्रमुख धर्म एवं नैतिक विशेषताएं -हिन्दू ,जैन ,बौद्ध ,सिक्ख ,ईसाई ,इस्लाम धर्म सत्य के साथ मेरे प्रयोग -[महात्मा गाँधी की आत्मकथा का	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	5

# Part D(Marks Distribution)

	Theory									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
100	40	60	18	40						
	Practical Practical									
Total Marks	Total Marks Minimum Passing Marks External Evaluation		Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
0	0	0	0	0	0					

Part E

Books	भाषा एवं नेतिक मृत्यों,Madhy Pradesh hindi granth acadmi, bhopal
Articles	https://leverageedu.com/blog/hi/%E0%A4%A9%E0%A5%8B%E0%A4%A4%E0%A4%BF%E0%A4%B6%E0%A4%B6%E0%A4%B6%E0%A4%B6%E0%A4%BF
References Books	
MOOC Courses	https:///liphtml5.com/jhnr/hnsm/basic
Videos	https://liphtml5.com/jhnr/hnsm/basic

							Cou	rse Articulation	Matrix						
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	3	2	2	-	-	-	-	-	-	3	2	3
CO2	2	1	2	2	-	3	-	-	-	-	-	-	2	2	2
CO3	2	2	2	3	3	2	-	-	-	-	-	-	-	2	3
CO4	1	2	3	2	2	-	-	-	-	-	-	-	3	2	1
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_Biotechnology

Title of the Course	Bioethics and	Biosafety							
Course Code	BSBT SEC IV	BT SEC IV							
				Part A					
Year	2nd	Semester	4th	Credits	P	С			
1001	Ziid	Jeniestei	401	Ciedita	2	0	0	2	
Course Type	Theory only								
Course Category	Skill Enhance	II Enhancement Courses							
Pre-Requisite/s	scientific com	nmunication approaches for Bioe	thics and Biosafety	Co-Requisite/s	concept of containment le	evel and Good Laboratory Pr	actices (GLP) and Good Man	ufacturing Practices (GMP).	
Course Outcomes & Bloom's Level	CO2- To undo biotechnology CO3- To dest CO4- To prov Analyze) CO5- To app	11- To remember the hasic concepts and view of professional and scientific communication approaches for Bloethics and Blosafety (BL1-Remember) 2- To understand the Introduction to science, bechnology and society, issues of access-Case sutdiselesperiences from developing and developed countries. Ownership, monopoly and an environmental sustainability, public vs. private funding, 12- To understand the Introduction to science, because of a section of the Very of the Introduction of the Very of th						y) col for biosafety (BL4-	
Coures Elements	Skill Develop Entrepreneur Employability Professsonal Gender X Human Value Environment	rship X √√   Ethics X	SDG (Goals)	SDG4(Quality education)					

		Part B			
Modules	Contents	Pedagogy			
1	Biotechnology And Society: Infroduction to science, technology and society, issues of access-Case studies/experiences from developing and developed countries. Ownership, monopoly, traditional knowledge, biodiversity, benefit sharing, environmental sustainability, public vs. private funding, biotechnology in international relations, globalization, and development divide.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	6		
2	Public acceptance issues for biotechnology: Biotechnology and hunger: Challenges for the Indian Biotechnological research and industries Bioethics - Necessity of Bioethics, different paradigms of Bioethics - National & International. Ethical issues against the molecular technologies	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8		
3	Biosafety—Introduction to biosafety and health hazards concerning biotechnology. Introduction to the concept of containment level and Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP). Cartagena Protocol for biosafety	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	6		
4	Biosafety assessment procedures in India and abroad. International dimensions in biosafety, bioterrorism, and convention on biological weapons. Social and ethical implications of biological weapons.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	6		
_	Principles of bioethics: Legality, morality and ethics, autonomy, human rights, beneficence, privacy, justice, equity etc. The		_		

### Part D(Marks Distribution)

	Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation	
100	40	60	18	40		
	Practical Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation	
0	0	0	0	0	0	

# Part E

Books Thomas J.ABiotechnology and Safety Assessment Thomas J.A., Fuch R.L. Academic Press 3rd Edition 2002-ASM Press 3rd. ed. 2000				
	https://www.ndcebios.in/v1n1/2021010110.pdf https://www.researchgate.net/publication/353346609_ON_BIOETHICS_AND_BUSINESS_ETHICS			
References Books Fleming D.A., Hunt DBiological safety Principles and practices-ASM Press 3rd. ed. 2000				
MOOC Courses	https://hptel.ac.in/courses/109106092			
Videos	https://hptel.ac.in/courses/109106092			

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3	1	3	3	3	1	2	3	1	3	2	3
CO2	1	1	2	3	1	3	3	3	2	1	3	2	1	1	2
CO3	3	3	2	1	3	3	3	2	1	1	3	2	2	3	2
CO4	3	3	3	3	2	2	3	3	1	1	3	2	3	3	2
CO5	3	3	2	2	1	3	3	3	1	1	3	2	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_Biotechnology

Title of the Course	Environemental Issues and Sustainable De	invironemental Issues and Sustainable Development							
Course Code	BSBT VAC IV	SBT VAC IV							
	Part A								
Year	2nd Semester	Semester 4th Credits L T P C							
Teal	Zild Selliestei	401	Ciedita	2	0	0	2		
Course Type	Theory only								
Course Category	Community Enganement and Service	ommunity Enganement and Service							
Pre-Requisite/s	Basic Knowledge of Environmental Issues Development	and Sustainable	Co-Requisite/s	Goals and Targets of Sustainable Development Goals. Strategies for the implementation of Sustainable Development goals					
Course Outcomes & Bloom's Level	CO2- CO2. To acquire analytical skills/met CO3- CO3. Ability to design sustainability CO4- CO4. Acquire expertise and skills to	CO1- CO1. To develop sentiments and sensitize them towards environmental challenges and concept of sustainable development. (BL2-Understand) CO2- CO2. To acquire analytical skills/methods in assessing environmental impacts through a multidisciplinary approach, (BL4-Analyze) CO3- CO3. Ability to design sustainability performance methic to assess the impact on community's sustainable development(BL5-Evaluate) CO4- CO4. Acquire experties and skills to evaluate feedback systems that can readjust the pathways of processes and procedures to ensure success in implementing sustainable development initiatives. (BL1-Remember) CO5- CO5. Students acquire skills to communicate, prepare, plan and implement the sustainable development project to achieve milestone of SDGs. (BL3-Appty)							
Coures Elements	Skill Development ✓ Entrepreneurship × Employability ✓ Professonal Ethics × Gender × Human Values ✓ Environment ✓	SDG (Goals)	SDG4(Quality education) SDG5(Gender equality) SDG12(Responsible consuption and production) SDG13(Climate action)						

Modules	Contents	Pedagogy	Hours
1	History and emergence of the concept of Sustainable Development, Environmental issues and crisis. Resource degradation, greenhouse gases and Effects, desertification, social insecurity, industrialization, Globalization and Environment. Dimensions of Sustainable Development, Principles of Su	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, discussion (questions & answers section)	8
2	Sustainable Development Goals: Capacity Building for Sustainable Environment, Sustainable Land Management. Global and regional progress on SD, Individual and collective actions for SD, Sustainable Mountain development, Clean air for Climate Mitigation and Human Health, Sustainable Corporate Practices, Sendai Framework for Disaster Risk Reduction, Conservation and Management of Global Forest Ecosystem	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
3	Society, environment, culture and economy; current challenges - natural, political, socio-economic imbalance; sustainable development initiatives and policies of various countries; global, regional, national, local; needs of present and future generation - political, economic, and environmental.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
4	GSD-2019, GSD 2023. Implementation Progress: SDG Progress report, Sustainability and development indicators and SDGs, UN's outlook of sustainable development and efforts	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
5	Case Studies & Projects on Rural Sustainable Development (Indian village perspectives) - Village resources (broad perspectives); current challenges and thematic areas; village social hierarchy; village economy; needs of present and future generation; conflicts - sustainability and rural culture & tradition; road to achieving sustainable development goals - bridging conflicts and way forward.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion. Field visits. Industrial Visit (MSW/BMW/STP/ETP)	8

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
	Sustainable development aims to use natural resources and the environment to raise the standard of living while preserving future generations' capacity to meet their own needs	PBL	BL3-Apply	2 MONTHS
	Analyze the current situation to identify specific challenges and opportunities in the targeted area or community in order to Assess environmental, economic, and social factors.	Internships	BL4-Analyze	1 MONTHS
III	Monitor energy production and savings, and assess environmental impact.	Field work	BL4-Analyze	1 MONTHS
IV	Plan a community solar farm where residents can buy or lease solar panels	Field work	BL3-Apply	2 MONTHS

## Part D(Marks Distribution)

	Theory						
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation		
100	40	60	18	40			
			Practical				
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation		
	0						

# Part E

Videos	https://nptel.ac.in/courses/109106200
MOOC Courses	https://nptel.ac.in/courses/109106200
References Books	1. Elliott, Jennifer. 2012. An Introduction to Sustainable Development. 4th Ed. Routledge, London. 2. Rogers, Peter P., Kazi F. Jalal, and John A. Boyd. "An introduction to sustainable development." (2012).
	1. Nhamo, Godwell, and Vuyo Mjimba. Sustainable Development Goals and institutions of higher education. Springer, 2020. 2. Bell, Simon, and Stephen Morse. Sustainability indicators: measuring the immeasurable? Routledge, 2012. 3. Sørensen, Bent. Energy, Resources and Welferre. Exploration of Social Frameworks for Sustainable Development. Academic Press, 2016. 4. Dent, David, Olivier Dubois, and Barry Dalai-Clayfon. Rural planning in developing countries: supporting natural resource management and sustainable intellinous. Routledge, 2013. 4. Sala, Serenella, Biegio Cutifo, and Peter Nijkamp. "A systemic framework for sustainability assessment." Ecological Economics 119 (2015) 314-325.
Books	1. Chriss, D. D and Régandid, J. P. (2010), Natural Resource Conservation: Management for a Sustainable E-turn 10th edition, Upper Saddler, M. J. Edwards (1997), Natural Resource Conservation: Management for a Sustainable E-turn 10th edition, Upper Saddler, M. J. Edwards (1997), Sources, Art Edition, Well Publisher (ELBS) 3. William Chunningham Error (1997), Natural Resource Conservation: Management for a Sustainable E-turn 10th edition, Upper Saddler, M. J. Edwards (1997), Sources, Art Edition, Well Publisher (ELBS) 3. William Profession 2. John W. Invited and Anthony D. (2015). Renewable E-nergy Sources, Art Edition, Well Publisher (ELBS) 3. William Profession 2. John W. Invited and Anthony D. (2015). Renewable E-nergy Sources, Art Edition (1997), Art Editio

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-1	3	2	-	-	-	1	-	1	-	-	-	2	2	3
CO2	1	3	2	-	-	•	2	-	1	-	-	-	1	2	3
CO3	3	2	1	-	-	•	3	-	2	-	-	-	1	2	-
CO4	2	3	1	-	-	-	3	-	2	-	-	-	-	3	1
C05	2	3	1	-	-	-	3	-	3	-	-	-	1	-	-
CO6	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_Biotechnology

Title of the Course	NCC				
Course Code	BSBT104[T]				
		Part A			
Year	1st	Semester	1st	Credits	L T P C 2 0 2 4
Course Type	Theory only				
Course Category	Generic Elective				
Pre-Requisite/s	Should be acquainted with the	ne basics knowledge of General Awareness about Leadership Quality, P	ersonality Development, Defense system etc.	Co-Requisite/s	
Course Outcomes & Bloom's Level	CO2- To Understand the con CO3- To Acquire knowledge CO4- To analyze the concept	ne history of NCC, its organization, and incentives of NCC for their cares coept of critical & creative thinking and the concept of self-awareness an of duties and conduct of NCC cadets (BL3-Appty) t of team and its functioning (BL4-Analyze) so of decision making & problems solving (BL5-Evaluate)	r prospects and the concept of national integration and its import d emotional intelligence. (BL2-Understand)	2 0  Co-Requisite/s	
Cours Elements	Skill Development \( \square\) Entrepreneurship \( \times\) Employability \( \times\) Professsonal Ethics \( \times\) Gender \( \times\) Human Values \( \square\) Environment \( \square\)		SDG (Goals)	SDG6(Clean water and sanitation) SDG13(Climate action) SDG14(Life below water)	

Part B

Modules	Contents	Pedagogy	Hours
Unit 1- NCC General (N)	History of NCC, Aims and Objectives of NCC. Organization &Training. NCC Song, Motto of NCC - Motivation of Cadets.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, discussion (questions & answers section)	6
Unit 2- NCC Organization	NCC as Organization, Incentives of NCC, Duties of NCC Cadet. NCC Camps: Types & Conduct. Preparation and participation. Rank of officers and cadets.	Whiteboard, PPT, Video Case Study, Project Based Activity, Application Based Activity	6
Unit 3- National Integration (NI) & Awareness	National Integration: Importance & Necessity, Factors Affecting National Integration, Unity in Diversity & Role of NCC in Nation Building, Threats to National Security	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	6
Unit 4- Personality Development	Intra & Interpersonal skills - Self-Awareness-&Analysis, Empathy, Critical & creative thinking, Decision making and problem solving.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	6
Unit 5- Social Service and Community Development	Basics of social service and its need, Types of social service activities, Objectives of rural development programs and its importance, NGO's and their contribution in social welfare, contribution of youth and NCC in Social welfare.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	6

### Part D(Marks Distribution)

	Theory												
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
0	0	0	0	0	0								
			Practical										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
0	0	0	0	0	0								

### Part E

Books	Cadets training handbook common subjects (2017), D.G NCC Delhi-110030						
Articles	https://indiancc.mygov.in/activity/snehahoro/article-on-ncc-camp-and-training/						
References Books	C Training directive						
MOOC Courses							
Videos	https://www.youtube.com/watch?v=Am1Cs0DHMZ4						

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_FoodTechnology

Title of the Course	Food Safety Man	Safety Management [T]											
Course Code	BSFT-0503 [T]	0503 [T]											
	Part A												
Year	Year         3rd         Semester         5th         Credits         L         T         P         C												
					4	0	0	4					
Course Type	Theory only	nly											
Course Category	Discipline Core	ne Core											
Pre-Requisite/s	Student should h	dent should have studied food laws and regulations in previous semester.  Co-Requisite/s  Student should have basic knowledge of food born safety and handling principles											
Course Outcomes & Bloom's Level	CO2- CO2: Cond CO3- CO3: Reco CO4- CO4: Illust	prehend the practical application of foc duct the quality assessment of food pro ognize the sensory evaluation techniqu trate the detection methods of the adult itor the implementation of HACCP.(BLS	ducts using various instruments(BL2 es(BL3-Apply) erants in food products(BL4-Analyze	·	•								
Coures Elements	Skill Development X Enterpeneurship X Employability X Professonal Efilics  Gender X Human Values  Environment X												

Part B

Modules	Contents	Pedagogy	Hours
1	Food Quality: Introduction to food quality management – Definition, quality concepts & attributes-safety, health, sensory, shelf life, extrinsic attributes, factors affecting food behavior, their measurement and evaluation; Sensory and instrumental methods for testing quality Food adulteration and food safety.	Lecture method, class presentation, quiz	8
2	Quality assurance, Total Quality Management; GMP, GHP, GLP, GAP, Sanitary and hygienic practices; Food Safety and Quality Requirements = BRC, HACCP - critical control points, reliability and recall; Quality manuals, Risk assessment, Contamination and Illness. Handling of food, Process validation.	Lecture method, quiz, Illustrate with analogies	8
3	Indian & International quality systems and standards like ISO; ISO-9000, ISO-22000, ISO-14000, ISO certification, planning, application, implementation criteria, requirements, benefits, structure etc.	Lecture method, expert Lecture	8
4	Food Safety and Standards Act of India, 2006; FSS Rules and Regulations, Global Food safety Initiative; inspection, traceability and authentication, certification and quality assurance, documentation and audits	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	International Food Control Systems Laws, Regulations and Standards Guidelines with regard to Food Safety- (i) Overview of CODEX Alimentarius. Commission (Members, Standard setting and Advisory mechanisms: JECFA, JEMRA, JMPR): EFSA, WTO agreements (SPS/TBT).	Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part D(Marks Distribution)

	Theory											
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation							
100	40	60	18	40	0							
	•	•	Practical	•	•							
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation							
	0											

Part E

Books	Luning, P. A., & Marcelis, W. J. (2020, January 1). Food Quality Management. Brill Wageningen Academic.
Articles	
References Books	Branen, A. L., Davidson, P. M., Salminen, S., & Thomgate, J. (2001, November 1). Food Additives. CRC Press. Fortin, N. D. (2016, October 25). Food Regulation. John Wiley & Sons.
MOOC Courses	https://nptel.ac.in/courses/110101010
Videos	https://youtu.be/h5NpTku5BGe?si=yJ2v17colx6fR5cr

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	1	-	1	-	1	1	1	3	1	1
CO2	3	1	1	-	-	1	-	-	-	1	-	-	3	1	1
CO3	3	2	1	1	1	1	1	-	1	1	-	-	3	1	1
CO4	3	2	2	-	-	2	-	-	-	1	-	-	3	1	2
CO5	3	2	2	1	1	2	1	1	1	1	1	-	3	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	=	-	-



### BSc\_FoodTechnology

Title of the Course	Research met	arch methodology [T]												
Course Code	BSFT-0704 [T	-0704 [T]												
	Part A													
Year	4th	Semester	7th	Credits	L	Т	P	С						
					2	0	0	2						
Course Type	Theory only	only												
Course Category	Interdisciplina	lisciplinary Major												
Pre-Requisite/s	The student n	e student must have completed 3 years BSc in Food Technology Co-Requisite/s Student should have basic knowledge of mean, median mode, sampling methods and probability												
Course Outcomes & Bloom's Level	CO2- To desc CO3- To prov CO4- To prov	cribe the basic concepts of each a ride experimental basis, and to en-	nd every division of the subject able students to acquire a spec- tions of Research Methodology	ions in experimental design and data collect as well as analysis. along with its technical writing aspects(BL2-Understand) ialized knowledge and understanding of data and its application in various fields of research and industries (BL4-Analyze) projes (BL5-Evaluate)		n.(BL3-Apply)								
Cours Elements	Skill Development  Entrepreneurship X Entrepreneurship X Entrepreneurship X Entrepreneurship X Entrepreneurship X Professsonal Ethics  Gender X Human Values  Entreprenent X Entreprenent X													

Part B Modules Pedagogy Contents Hours Research: Definition and types, components and steps; Research Question, Research Problem identification, guidelines for selecting meaningful problem; Research Objective: Definition, broad and specific objectives, Hypothesis: Meaning and sources of research hypothesis Enchnology transfer: Introduction and procedure. Research Method: Principle, Scientific methods, steps in experimental research, types and problems in experimentation; Importance of survey method, Comparison of survey method with other methods Sampling – steps, size, types, merits and demerits, Data Collection: Sources and types of Data: Ways of data organization and summarization. Standard operating procedure (S.O.P): Introduction and procedure Lecture methods, Audio/Video-clips 08 Data analysis: Estimation of population parameters, mean value, standard error, and variance analysis: Probability Theories; Estimation of population parameters, mean value, standard error, and variance analysis: Probability Theories; Hypothesis friests, One Sample Test. Two Sample Tests / Chi. Square Test, Hest, Completely Randomized Design,

Computer application: Use of MS-Office and Excel, Library documentation and Scientific literature searching, Appropriate Statistical and other relevant packages. Research proposal and thesis writing; Purpose of research proposal, Academic/Project/Case study proposals (Steps for the preparing proposal and Common mistakes

Methods selecting relevant literature, Features of thesis, Structure of Thesis, Steps in thesis writing, Citation and Referencing: Different ways of work clatation, Features of the article; Difference between general and research article. 08 09

Part D(Marks Distribution)

05

Theory									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
100	40	60	18	40					
Practical Practical									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
	0								

Part E

Books	Kothari, C. R. (2004, January 1). Research Methodology. New Age International.
Articles	
References Books	Pannerselvam, R. (2014, April 4), RESEARCH METHODOLOGY. PHI Learning P.L. Ltd. Wilkinson, T. S., & Bhandarkar, P. L. (2003, January 1), Methodology and Techniques of Social Research. Young, P. V. (1986, January 1). Scientific Social Surveys and Research. Englewood Cills, N.J.: Prentice-Hall.
MOOC Courses	https://hptel.ac.in/courses/110105091
Videos	https://youtu_be/oXnjR00tfBI

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	2	2	-	-	-	-	-	1	3	1	1
CO2	2	2	3	2	1	1	-	-	-	1	-	-	3	1	1
CO3	2	2	2	1	2	2	-	-	-	-	-	-	3	1	1
CO4	1	1	2	2	1	2	-	-	-	-	-	1	3	3	3
CO5	1	3	3	2	3	2	1	-	-	-	1	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	=	-	-



### Bsc\_Microbiology

Title of the Course	Immunology	munology										
Course Code	BSMB 202(T)											
	Part A											
Year	1st	Semester	2nd	Credits		Т	P	С				
					3	0	1	4				
Course Type	Embedded the	mbedded theory and lab										
Course Category	Discipline Core	cipline Core										
Pre-Requisite/s	This course will and diagnosis	introduce to the applied aspects of im	munology in disease detection	Co-Requisite/s	The students should be well versed with different types of immune responses which show different types of changes.							
Course Outcomes & Bloom's Level	CO2- To under CO3- To under CO4- To apply	nber the structure of various Immunolostand the Different cells & proteins invostand the connection of immune system the use of Proteins & receptors in antite the applications of Antigens & Antib	olved in Immune system(BL2-Under m failure & disorders.(BL2-Unders body formation(BL3-Apply)	erstand) tand)								
Coures Elements	Skill Development  Entrepreneurship  Employability  Profosssonal Ethics × Gender × Human Values  Environment ×  SDG (Goals)  SDG4(Quality education)											

		Part B			
Modules	Contents	Pedagogy			
1	Introduction to the immune system, Cells and organs of the immune system, Hematopoietic development and mediators of the process. Sign and symptoms and mechanism involved in inflammatory response.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8		
2	Innate and Adaptive immune responses: Anatomical and Physiological barriers of the innate immunity. Receptors of Innate immune system. Connection between finate and adaptive immune response and its mechanism.Antigens& immunogens and its properties, Epitopes and CDRS	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8		
3	Structure, classification and functions of Antibody, Antigen-antibody reactions: Precipitation and agglutination reactions, Organization and expression of Immunoglobulin genes, Monoclonal antibodies: production and application	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8		
4	Major histocompatibility complex (MHC), Types of MHC and Display of antigenic peptide, Role of MHC in antigen processing and presentation. Complement system: component, activation pathway , Complement deficiency diseases	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8		
5	Hypersensitivity. Allergens and its types, types of hypersensitivity and There mechanism, introduction to Autoimmune disorders(Central and peripheral Tolerance). Immunization: active and passive immunization, types of vaccines and their production strategy.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8		

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours	
1	Anatomical view of mammalian thymus and various immune organs	Experiments	BL3-Apply	2	
VIII	Study about Covaxin vaccine administration in local area and effect visualized	Internships	BL4-Analyze	15 DAYS	
4	To perform Radial immune diffusion	Experiments	BL3-Apply	2	
5	To perform Double immuno diffusion	Experiments	BL3-Apply	2	
6	Haemoglobin detection by given Blood Sample	Experiments	BL3-Apply	2	
VII	Detection of Hb% of human population in locality and relate to their nutrition diet.	PBL	BL4-Analyze	5	

	Part D(Marks Distribution)										
Theory											
Total Marks	Marks Minimum Passing Marks External Evaluation Min. External Evaluation Internal Evaluation Min. Internal Evaluation										
100	40	60	18	40							
			Practical								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	50	60	30	40	20						

	Part E								
Books	Immunology by Kindt, Goldsby, Osborne, 4th Edition								
Articles	Articles https://njms.rutgers.edu/sgs/otc/mci/prot/2009/i+/persensitiv/tiles09.pdf								
References Books	Essentials Immunology, Ivam M Roitt, 12th Edition								
MOOC Courses	https://mptel.ac.in/courses/104108055								
Videos	https://hptel.ac.in/courses/104108055								

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	2	2	-	1	-	-	-	-	-	1	2	2
CO2	1	2	2	3	1	3	1	-	-	=	=	=	1	2	2
CO3	1	2	1	2	1	2	2	-	-	=	=	=	1	2	2
CO4	1	2	1	2	1	2	2	-	-	=	=	=	3	3	3
CO5	1	2	2	1	2	-	2	-	-	-	=	=	3	2	3
CO6		_	_	_	_	_	_	_	_	_	_	_	_	_	_



### Bsc\_Microbiology

Title of the Course	Microbial Quality Control in	Food and Pharmaceutical Industries								
Course Code	BSMB 801 (T)									
			Part A							
Year	4th	Semester 8th		Credits		T	Р	С		
1						0	0	3		
Course Type	Theory only	only								
Course Category	Disciplinary Major	sciplinary Major								
Pre-Requisite/s	Student must be aware wi	th the basic laboratory rules and regulations, safety measures	and bioethics.	Co-Requisite/s						
Course Outcomes & Bloom's Level	CO2- To understand Basic CO3- To Design SOPs and	nowledge about the different types of microorganisms and their concept of microbiological quality control(BL2-Understand) of related laboratory infrastructure(BL3-Apply) ological quality control(BL3-Apply)	significance.(BL1-Remember)	•	-					
Coures Elements	Skill Development ✓ Entrepreneurship X Employability ✓ Professsonal Ethics X Gender X Human Values ✓ Environment ✓		SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth)						

### Part B

Modules	Contents	Pedagogy	Hours
I	Microbiological Laboratory and Safe Practices: Good laboratory practices, Good microbiological practices. Biosafety cabinets — Working of biosafety cabinets, using protective clothings, specification for BSL-1, BSL-2, BSL-3. Discarding biohazardous waste — Methodology of Disinfection, Autoclawing & Incineration.	Lecture method, group discussions, demonstartions, experiments, industrial visits, ABL, PBL	8
II	Determining Microbes in Food / Pharmaceutical Samples: Culture and microscopic methods - Standard plate count, Most probable numbers Direct microscopic counts, Biochemical and immunological methods: Limulus lysate test for endotoxin, geldiffusion, steriflity testing for pharmaceutical products.	Lecture method, group discussions, demonstartions, experiments, industrial visits, ABL, PBL	9
Ш	Pathogenic Microorganisms of importance in Food & Water:Enrichment culture technique, Detection of specific microorganisms - on XLD agar, Salmonella Shigella Agar, Manitol salt agar, EMB agar, McConkey Agar, Saboraud Agar.	Lecture method, group discussions, demonstartions, experiments, industrial visits, ABL, PBL	8
IV	Ascertaining microbial quality of milk by MBRT, Rapid detection methods of microbiological quality of milk at milk collection centres (COB, 10 min Resazurin assay).	Lecture method, group discussions, demonstartions, experiments, industrial visits, ABL, PBL	9
v	HACCP for Food Safety and Microbial Standards: Hazard analysis of critical control point (HACCP) - Principles, flow diagrams, limitations Microbial Standards for Different Foods and Water – BIS standards for common foods and drinking water.	Lecture method, group discussions, demonstartions, experiments, industrial visits, ABL, PBL	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	Design of a quality control Laboratory	PBL	BL3-Apply	3
II	SOP designing and hands on Practice	PBL	BL3-Apply	7
III	Bioburden test, sterility test, environmental monitoring, detection of specific pathogens, personal hygiene Monitoring	PBL	BL4-Analyze	15 days
IV	To learn Good Laboratory Practice (GLP), Major drug and food regulatory agencies	Industrial Visit	BL2-Understand	5

### Part D(Marks Distribution)

	Theory						
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation		
100	40	60	18	40			
			Practical				
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation		

## Part E

Books  Harrigan WF (1998)Laboratory Methods in Food Microbiology, 3rd ed. Academic Press.  Garg N, Garg KL and Mukerji KG (2010) Laboratory Manual of Food Microbiology I K International Publishing House Pvt. Ltd.			
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3624724#%text=Quality%20control%20(QC)%20lin%20diagnostic,identification%20and%20andbacterial%20susceptibility%20testing.		
References Books	Jay JM, Loessner MJ, Golden DA (2005) Modern Food Microbiology, 7th edition. Springer Baird RM, Hodges NA and Denyer SP (2005) Handbook of Microbiological Quality control in Pharmaceutical and Medical Devices, Taylor and Francis Inc.		
MOOC Courses	https://nptel.ac.in/courses/112107259		
Videos	https://nptel.ac.in/courses/112107259		

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	-	-	2	2	-	-	-	-	-	1	2	2
CO2	1	2	3	2	2	1	-	-	-	-	-	-	2	2	1
CO3	1	1	1	1	2	1	1		•	-	-	1	-	-	1
CO4	2	-	1	1	1	1	-	-		-	-	-	1	1	3
CO5	-	-	-	-	-	-	-	-		-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-		-	-	-	-	-	-



### Bsc\_Microbiology

Title of the Course	Hindi I								
Course Code	BSMB AECII (T)								
		Part A							
Year	1st Semester	2nd	Credits	L	Т	P	С		
1001	- Commenter	210	Sidalb	2	0	0	2		
Course Type	Theory only								
Course Category	Foundation core								
Pre-Requisite/s	हिंदी भाषा का मूल गया ज्ञान होना आवश्यक है		Co-Requisite/s						
Course Outcomes & Bloom's Level									
Coures Elements	Skill Development ✓ Entepreneurship X Entepreneurship X Entepreneurship X Professoral Efficis X Gender ✓ Human Values ✓ Environment X	SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education)						

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		rail D	
Modules	Contents	Pedagogy	Hours
I	स्वतंत्रता पुकारती (कविता)जयशंकर प्रसाद पुष्प की अभिलाषा (कविता) माखनलाल चतुर्वेदी वाक्य संरचना और अशुद्धियाँ (संकलित )	lecture method, group discussion, story telling,	8
II	एक थे राजा भोज { निबंध }त्रिभुतननाथ शुक्त २ पर्यायवाची , विलोम , एकार्यी , अनेकार्थी एवं शब्दयुम्म शब्द (संकलित } ३ वह तोड़ती पत्थर -सूर्यकान्त त्रिपाठी निराला ४ वर्ण -विचार (स्वर ,व्यंजन ,वर्गीकरण ,उच्चारण स्थान }	lecture method, group discussion, story telling, role play	6
III	१ भगवान् बुद्ध} { निबंध }स्वामी विवेकानंद २ लोकतंत्र एक धर्म है{ निबंधडॉ सर्वपल्ली राधा कृष्णन ३ पल्लवन	lecture method, group discussion, story telling, role play	6
IV	अफसर{ निबंध -शरद जोशी २ संक्षेपण {संकलित } ३ नारीत्व का अभिशाप ४ विराम -चिह्न (संकलित }	lecture method, group discussion, story telling, role play	6
v	नैतिक मूल्य परिचय एवं वर्गीकरण( आलेख )डॉ शशि राय २ अंतर्ज्ञान और नैतिक जीवन(लेखडॉ सर्वपल्ली राधाक ३ अप्प दीपोभव (लेख } -स्वामी श्रद्धा	lecture method, group discussion, story telling, role play	6

# Part D(Marks Distribution)

	Theory						
Total Marks	Minimum Passing Marks	External Evaluation Min. External Evaluation Internal Evaluation Min. Internal Evaluation					
100	40	40	12	60			
	•	•	Practical	•	•		
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation		
0	0	0	0	0	0		

Part E

Books हिंदी भाषा और नैतिक मूल्य : मध्य प्रदेश शासन	
Articles https://www.cvs.edu.in/upload/IMG-20200323-WA0003.pdf	
References Books	
MOOC Courses	https://onlinecourses.swayam2.ac.in/cec20_lg05/preview
Videos	https://onlinecourses.swayam2.ac.in/ce20_lg05/preview

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	P09	PO10	PO11	PO12	PS01	PSO2	PSO3
CO1	2	3	1	2	2	-	-	-	-	-	-	-	-	2	-
CO2	2	3	1	2	2	-	-	-	-	-	-	-	-	2	-
CO3	2	2	1	1	1	-	-	-	-	-	-	-	-	2	-
CO4	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-
CO5	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-
CO6	-	-	-	-	i e	-	-	i e	i	-		-	-	-	-



### Bsc\_Microbiology

Title of the Course	English II	English II								
Course Code	BSMB AECIII (	BSMB AECIII (T)								
				Part A						
Year	2nd	Semester	3rd	Credits	L	Т	P	С		
1001	Liid	Comodo	0.4	Sistant	2	0	0	2		
Course Type	Theory only									
Course Category	Ability Enhance	ement Courses								
Pre-Requisite/s	1 Basic Language Proficiency 2 Educational Background 3 Motivation and Willingness to Learn Time Commitment 4.Technology Proficiency  1. Communication Skills Workshop 2 Emotional Intelligence Training 3. Conflict Resolution Seminar 4. Leadership Development Program 5. Cross-Cultural Competency Training 6. Career Development Workshops									
Course Outcomes & Bloom's Level	CO1- Determine interpersonal skills and be an effective goal-oriented team player (BL1-Remember) CO2- They will be able to analyze and improve their speaking ability in English both in terms of fluency and comprehensibility (BL2-Understand) CO3- They will be able to evaluate themselves by gling oral presentations and will receive feedback on their performances (BL3-Appty) CO4- They will be able to develop their reading speed and comprehension of academic articles (BL4-Analyze) CO5- They will be able to compare their reading fuency skills (BL5-Evaluate)									
Coures Elements	Skill Development   Entrepreneurship X Employability Professional Efrics X Gender X Human Values   Environment X									

Part B

Modules	Contents	Pedagogy	Hours
Module 1	Unit I: Introduction: Theory of communication, types and modes of communication, effective communication, barriers of communication, strategies to overcome the barriers.	lecture methods, collaborative learning, videos,group discussions, debates	10
Module 2	Unit II: Professional Skills: Social skills - Small talks and leading the conversation, conducting debate and discussions, public speaking, public speaking, public speaking, public speaking, public speaking, professional skills and meeting efiguettes, business communication, group discussion and interview skills, rittical conversations.	lecture methods, collaborative learning, videos,group discussions, debates	6
Module 3	Unit III: Cross Cultural Communication: Contextual conversation, do's and don'ts of cross cultural communication, verbal and non verbal communication, bias and prejudice body language.	lecture methods, collaborative learning, videos,group discussions, debates	6
Module 4	Unit IV: Internet Etiquettes: Email writing, social media articles/ blogs, notes, memos, reports & proposal writing, writing letters, formal and informal. Self profiling: Making job resume/ CV. elevator pitch (3 minutes self- introduction during interviews), Twitfer/ Face book long.	tecture methods, collaborative learning, videos,group discussions, debates	6
Module 5	Unit V: Critical Thinking: • Where the Mind is without Fear - Rabindranath Tagore. • The Portrait of a Lady - Khushwant Singh. • On the Rule of the Road - AG Gardiner. • Cherry Tree - Ruskin Bond. • Close Reading, Comprehension, analysis and interpretation, prarphrasing and summary.	lecture methods, collaborative learning, videos,group discussions, debates	8

### Part D(Marks Distribution)

	Theory						
Total Marks	Minimum Passing Marks	External Evaluation Min. External Evaluation Internal Evaluation Min. Internal					
100	40	60	18	40			
			Practical				
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation		

# Part E

Books	Fluency in English - Part II, 2006, Oxford University Press. • Business English, 2008, Pearson Publication.
Articles https://www.frontiersin.org/articles/10.3389/feduc.2019.00087/full https://www.cii.co.uk/medial6158020ia-useful-guide-to-swot-analysis.pdf http://www.mmmut.ac.in/News_content/35141tpnews_10142020.pdf	
References Books	- Language, Literature and Creativity, 2013, Orient Blackswan John E Warriner, Harcourt, Brace, Jovanovich, Warriner's English Grammar and Composition: Complete Course, 1973.
MOOC Courses	https://www.edx.org/learn/leadership/catalyst-leading-with-effective-communication-inclusive-leadership-training?hs_analytics_source=referals&utm_source=moco.org&utm_medium=referal&utm_campaign=moco.org-course-list https://www.edx.org/learn/writing/university-of-california-berkeley-academic-and-business-writing?hs_analytics_source=referals&utm_source=moco.org&utm_medium=referal&utm_campaign=moco.org-course-list
Videos	https://www.youtube.com/watch?v=fq98F9N9Hbg https://www.youtube.com/watch?v=uA5YeqgsjmYhttps://www.youtube.com/watch?v=eBSeCp_xhll

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	1	2	3	-	-	3	2	=	2	3	2	2	-
CO2	-	2	2	3	-	2	-	2	3	=	-	-	-	-	-
CO3	2	-	3	-	2	2	2	3	2	=	-	-	-	2	1
CO4	2	-	3	-	2	-	3	-	2	=	3	2	-	2	3
CO5	2	-	2	-	-	-	-	-	-	=	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	=	-	-



### Bsc\_Microbiology

Title of the Course	HINDI II											
Course Code	BSMB AECIV											
			Part A									
Year	2nd	Semester	4th	Cradite	L	Т	P	С				
1661	Zilu	Semester	401	Ciedita	3	0	1	4				
Course Type	Theory only			Credits     L     T     P     C       3     0     1     4         Co-Requisite's         करना एवं समग्र व्यक्तित का विकास करना है।(BL2-Understand)         SDG1(No poverty)								
Course Category	Ability Enhancement C	ourses										
Pre-Requisite/s				Co-Requisite/s	site/s							
Course Outcomes & Bloom's Level	CO1- हिंदी भाषा एवं नैतिव CO2- सांस्कृतिक ,एवं राष्ट्रि CO3- छात्र जीविकोपार्जन CO4- पाठ्यक्रम में व्याकर	क मूल्यों को समझना(BL1-Remember) त्य एकता बनाये रखना भाषा के माध्यम से संम्भव है।(BL2- के लक्ष्यों का सहज संधान कर सके।(BL3-Apply) ण ,सामान्य तथा पारम्परिक साहित्य ,लोक कलाएं ,स्थापत्य	Understand) एवं लेखन परम्परा का बोध करना एवं समग्र व्यक्तित्व क	ा विकास करना है।(BL2-Understand)	-							
Coures Elements	Skill Development ✓ Entrepreneurship X Employability X Professsonal Ethics X Gender X Human Values ✓ Environment X		SDG (Goals)	SDG3(Good health and well-being)								

Part B

Modules	Contents	Pedagogy	Hours
1	मध्य प्रदेश की लोक -कलाएं (संकलित) इंद्रधनुष का रहस्य लोकोक्तियां एवं मुहावरे (संकलित संधि (संकलित }	lecture method, group discussion, story telling,	5
2	जनसंचार माध्यम -प्रिंट ,इलेक्ट्रॉनिक ,सोशल सपनों की उड़ान प्रमुख वैज्ञानिक आविष्कार संक्षिप्तियां (संकलित )	lecture method, collaborative learning, Field visits, ABL, PBL	4
3	पत्रकारिता के विविध आयाम (संकलित ) मध्य प्रदेश का लोक साहित्य (संकलित ) पत्र -लेखनआवेदन ,प्रारूपण ,आदेश ,परिपत्र ,श्रापन ,अनुस्मारक (संकलित ) समास (संकलित )	lecture method, group discussion, story telling, role play	5
4	हिंदी की शब्द सम्पदा (संकलित } राज भाषा हिंदी (संकलित }- हिंदी की संवैधानिक स्थिति एवं व्यवहारिक स्थिति दूरभाष और मोबाइल (संकलित } अनुताद -अर्थ ,प्रकार एवं अभ्यास	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	4
5	विश्व के प्रमुख धर्म एवं नैतिक विशेषताएं -हिन्दू ,जैन ,बौद्ध ,सिक्ख ,ईसाई ,इस्लाम धर्म सत्य के साथ मेरे प्रयोग -[महात्मा गाँधी की आत्मकथा का	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	5

# Part D(Marks Distribution)

	Theory													
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation									
100	40	60	18	40										
			Practical											
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation									
0	0	0	0	0	0									

Part E

Books	भाषा एवं नेतिक मृत्यों,Madhy Pradesh hindi granth acadmi, bhopal
Articles	https://leverageedu.com/blog/hi/%E0%A4%A9%E0%A5%8B%E0%A4%A4%E0%A4%BF%E0%A4%B6%E0%A4%B6%E0%A4%B6%E0%A4%B6%E0%A4%BF
References Books	
MOOC Courses	https:///liphtml5.com/jhnr/hnsm/basic
Videos	https://liphtml5.com/jhnr/hnsm/basic

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	3	2	2	-	-	-	-	-	-	3	2	3
CO2	2	1	2	2	-	3	-	-	-	-	-	-	2	2	2
CO3	2	2	2	3	3	2	-	-	-	-	-	-	-	2	3
CO4	1	2	3	2	2	-	-	-	-	-	-	-	3	2	1
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### Bsc\_Microbiology

Title of the Course	Basics of Forensic Science												
Course Code	BSMB SEC II (T)	SECII(T)											
		P	art A										
Year	1st	Credits	L	T	Р	С							
		Semester	2nd	-11-11-1	2	0	0	2					
Course Type	Theory only	only											
Course Category	Discipline Electives	cipline Electives											
Pre-Requisite/s	Pre-Requisite/s Knowledge about basic science and tools used in Biotechnology Co-Requisite/s												
Course Outcomes & Bloom's Level	CO2- To comprehend the h CO3- To understand the im CO4- To provide experimen	tecture of various branches, tools and techniques and causes of cri uman genetics, mutation and DNA typing techniques. [BL2-Under portance of various chromatographic methods and their role in for tall basis, of detection and identification of blood and other semina unding of various identification methods in evaluation in various san	stand) ensic science (BL2-Understand) I fluids (BL4-Analyze)		•								
Cours Elements	Skill Development ✓ Entrepreneurship X Employability X Professsonal Ethics X Gender X Human Values ✓ Environment X		SDG (Goals)	SDG4(Quality education)									

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction and principles of forensic science, forensic science laboratory and its organization and service, tools and techniques in forensic science, branches of forensic science, causes of crime, role of modus operand	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	5
2	Introduction, History of DNA Typing, Human Genetics- Heredity, Alleles, Mutations and Population Genetics, Molecular Biology of DNA, Variations, Podymorphism, DNA Typing Systems- RFLP Analysis, PCR Amplifications, Sequence Polymorphism, Forensic Significance of DNA Profiles	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	4
3	History, Introduction, Definition, Principles of Chromatographic Techniques, Classification of Chromatographic Methods, Adsorption and Partition Chromatography, Application of different Chromatographic Methods in Forensic Science	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	5
4	Detection and identification of blood stains. Determination of blood group systems and species of origin. Techniques for the determination of blood group and stains. Detection of seminal and other body fluids, Red cells enzymes, Serum proteins of forensic significance	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	4
5	Introduction, Basic Principles, Instrumentation & Forensic Applications of various Electrophoresis, Paper Electrophoresis, Celluloss Acetala Membrane Electrophoresis, Gel Electrophoresis, Agenose Gel Electrophoresis, Polyacrylamide Gel Electrophoresis, Sodium dodeoyl sulphate (SDS), Two Dimensional Electrophoresis, Capillary Electrophoresis	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	5

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Detection and Identification of Blood Stains	Seminar	BL3-Apply	2

### Part D(Marks Distribution)

	Theory												
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
100	40	40	12	60									
			Practical										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
0	0	0	0	0	0								

Part E

Books	S.H. James and J.J. Nord by, Forensic Science: An Introduction to Scientific and Investigative Techniques, Forensic Science: An Introduction to Scientific and Investigative Techniques 2nd Edition, CRC Press, Boca Raton (2005)
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7838326/
References Books	Molecular Biotechnology Principles and Applications of recombinant DNA. ASM Press, Washington. Molecular Biotechnology: Principles and Applications of recombinant DNA. 2 Edition ASM Press, Washington  B.B. Nanda and R.K. Twari, Forensic Science in India: A Vision for the Twenty First Century, Forensic Science in India: A Vision for the Twenty First Century, Publishers, New Delhi (2001)  W.G. Eckert and R.K. Wright Introduction to Forensic Sciences, W.G. Eckert (ED.), CRC Press, Boca Alaton (1987), 2nd Edition,  W.G. Tistone, M.L. Hastup and C. Half Fisher's Techniques of Crime Socien investigation, CRC Press, Boca Ration (2013)
MOOC Courses	https://nptel.ac.in/courses/109106408
Videos	https://nptel.ac.in/courses/109106408

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	2	3	2	2	2	2	-	-	-	2	-	-	1	-	3
CO3	3	1	1	-	-	-	-	-	-	-	-	-	3	2	3
CO4	3	2	1	1	-	-	-	-	-	2	-	-	2	3	2
CO5	2	2	1	1	-	-	-	-	-	2	-	-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### Bsc\_Microbiology

Title of the Course	India in 21st Cen	tury										
Course Code	BSMB VAC II (T)											
			Par	tA.								
Year	1st	Semester	2nd	Credits	L	Т	P	С				
1001	101	Geniestei	Zild	Ordulo	2	0	0	2				
Course Type	Theory only											
Course Category	Ability Enhancer	lly Enhancement Courses										
Pre-Requisite/s	concepts is esses includes underst integration. 2. *I-Indian Freedom the Revolt of 18t struggle provide: of Political Move those led by figu cooperation, civi of Indian freedom phases of nation the planned proglobalization. Kn understanding of global concerns and sustainabilit	g of Sociological Concepts* A foundations ristal to grasp the composition of Indian so anding social institutions, cultural environmistorical Background*; Familianity with the institution of the social programment of the content of	siely discussed in Unit I. This ments, and threats to national history of India, particularly the intil II. Knowledge of events such as various phases of the freedom Indian nation-state. 3. "Awareness overhearls in India, particularly amiliarity with concepts like non- nt adds in analyzing the dynamics of the control of the control of the intil V. This includes awareness of pin shift towards liberalization and al groups and regions enriches the bobal Awareness." Unit V delves into n, and movements for democracy n, and movements for democracy n, and movements for democracy n. and movements for democracy to the control of the control of the movement of movement of mov	Co-Requisite/s	institutions, cultural Familiantly with soci interactionism can promote Context of Indias*: - I independence, and evolution of Indian s the transition to india "Understanding of Fatrategies of political prominent leaders, and the role of varter understanding, 4. "Social experience of the promote promote as the Green Revol into contemporary i global trends in are, enhances understat issues like climate c	environments, and three loopical theories such a provide a deeper compriments. From post-independence de- pociety. Understanding pendence enhances in Il movements in I in movements in I in se essential. Awarenes us stakeholders in the amiliarity with Post-Ind political changes in po- ms, and social moveme ution, reservation systes didian society. 5. "Globa sa such as technology, unique of home judical political scannes and social moveme ution, reservation systes sa such as technology, unique of home judical political and society. 5. "Globa sa such as technology, unique of home judical political and judical sa such as technology, unique of home judical sa	velopments, offers conte the socio-economic implessight into contemporary india."- Knowledge of ke ncluding those led by Ge s of the socio-political or struggle for independence pependence Development sindependence India, inthis, is crucial Awaren m, and economic liberall IP erspective and Aware conomics, environment in the global context I de, and human rights m	in is fundamental. theory, and symbolic amics. 2. Historical isl period, the struggle for kt for understanding the acust of colonial rule and acust of colonial rule and acust of colonial rule and dufficult of the structure of the dufficult of the structure of the dufficult of the structure of t				
Course Outcomes & Bloom's Level	CO2- The stude CO3- The stude	nts will have an understanding of making of nts will have an analyse salient features of	f India as a nation .(BL2-Understan modern India .(BL3-Apply)	d and concerned Indian citizen(BL1-Remember) tand) a sense of modern Indian history and culture .(BL4-Analyze)								
Coures Elements	Skill Development   Enterpreneurship × Enterpreneurship × Employability  Professorial Ethics × Gender × Human Values ✓ Environment ✓				SDG1(No poverty) SDG3(Good health and well-being) SDG4(Custle) education) SDG5(Gender equality) SDG1(Reduced inequalities) SDG12(Responsible consuption and production) SDG12(Remained action)							
			Par	t B								

Modules	Contents	Pedagogy	Hours
Unit 1	Idea of India in historical perspective a) Indian culture, b) cultural commonness, c)cultural diversities, d)unity in diversity, e) cultural accomodations, f) cultural conflicts, g)Idea of India and British Rule, h) Role of Indian Intelligentsia	lecture method and video clips/films on specific themes/topics, illustrations, classroom discussions, role play	8 hrs
Unit 2	. Emergence and growth of Indian Nationalism a) Anti-colonial basis ,b) Economic Nationalism ,c) communalism and nationalism ,d) revivalism and Indian nationalism ,e)Enlightenment values ,f)European Nationalism and Indian Nationalism	lecture method and video clips/films on specific themes/topics, illustrations, classroom discussions, role play	8 hrs
Unit 3	Social Reform Movements a) British Rule and Indian introspection ,b)Raja Rammohan Roy, c) social reform movements in 19th century , d)Swami Vivekanand ,e)The women issue ,f)Caste system	lecture method and video clips/films on specific themes/topics, illustrations, classroom discussions, role play	8 hrs
Unit 4	Indian National Movement a)Early Revolts and 1857 Revolt, b)Early Nationalists, c) Bang Bhang Movement, d) Gandhi led Mass Movements, e) Socialist and Left trends, i) Princely States and their integration into nation, h)	lecture method and video clips/films on specific themes/topics, illustrations, classroom discussions, role play, debates	8 hrs
Unit 5	India after independence a)Making of Indian Constitution .b) Post Independent Nehru Era , c) India facing Wars , d) Indian econmy-From Planning to LPG ,e) Achievements, f) Challenges in 21st century India.	lecture method and video clips/films on specific themes/topics, illustrations, classroom discussions, role play	8 hrs

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
0	0	Experiments		00

### Part D(Marks Distribution)

	Theory												
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
100	40	40	12	60									
		•	Practical	•	•								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
00	00	00		00									

### Part E

	Bipan Chandra and others: India's Struggle For Independence, Penguine Publishers. Bipan Chandra: History of Modern India, Orient Blackwaru publishers. Sunil Khilnani: The Idea of India, Penguine publishers.
Articles	https://www.youtube.com/watch?v=i8N6YRTJsDk
References Books	Shekhar Bandopadhyay: From Plastic to Partition and After, A History of Modern India, Orient Blackswan publishers. Shekhar Bandopadhyay: From Plastic to Partition and After, A History of Modern India, Orient Blackswan publishers. A R Desai Social Background of Indian Nationalism, Popular Prakashan.  B R Nandar. Mahartina Gandhi A BloggraphyLondon
MOOC Courses	1.https://www.youtube.com/watch?v=l8N6YRTJsDk
Videos	1.https://www.youtube.com/watch?v=i8N6YRT.JsDk 2.https://youtu.be/NWsT7x3qd3E 3.https://youtu.be/NWsT7x3qd3E 3.https://youtu.be/NWsT7x3qd3E 3.https://youtu.be/NWsT7x3qd3E 3.https://youtu.be/PSKQwaZ4dg
,	

	Codisc Paticulation Watrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	1	-	-	1	-	=	-	=	1
CO2	-	-	-	-	-	1	1	-	1	-	-	1	-	-	1
CO3	-	-	-	-	-	1	3	-	-	-	-	-	-	-	=
CO4	-	-	-	-	-	2	-	-	-	1	-	-	-	-	=
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	=
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### Bsc\_Microbiology

Title of the Course	General anatomy & cor	eral anatomy & comparative anatomy of Vertebrates										
Course Code	BSMBGE II (T)											
			Part A									
Year	1st	Semester	2nd	Credits	L	Т	P	С				
1001	100	Selliestei	210	Credita	3	0	1	4				
Course Type	Embedded theory and	ded theory and lab										
Course Category	Discipline Electives											
Pre-Requisite/s	Should be acquainted	should be acquainted with the basics knowledge of Principle of Anatomy and histology of chordate Zoology Co-Requisite/s create basic knowledge about physiology GEIV-										
Course Outcomes & Bloom's Level	CO2- To understand the CO3- To understand the CO4- To provide experions CO5- To evaluate the a	c concepts of anatomy and anatomical structure of the le Anatomy, histology, and comparative anatomy in diffe le importance of Anatomy and its applications (8L3-App imental basis, and to enable students to acquire a spec applications of genetics in various fields such as resear erstanding of analysing the applications of Anatomy an	erent vertebrates(BL2-Understand)  ly)  isialized knowledge and understanding in advanced  th and development, medical science genetic engli	neering etc(BL5-Evaluate)								
Coures Elements	Skill Development X Entrepreneurship X Employability ✓ Professsonal Ethics X Gender X Human Values ✓ Environment X		SDG (Goals)	SDG5(Gender equality)								

Contents Pedagogy

Introduction to General Anatomy Animal Tissues - Epithelium Connective tissue skeletal tissue circulatory tissue and nervous tissue

Tutorials, Collaborative, Demonstrations, Project methods Experiments,

Structure of Heart of mammals Structure of Brain Sense organs & their Structure Skeletal system Blood vessels, Mammals Kidney and Reproductive organs of mammals

Tutorials, Collaborative, Demonstrations, Project methods Experiments,

Tutorials, Collaborative, Demonstrations, Project methods Experiments,

Komey and Reproductive organs of mammals

Comparative account of Integument of vertebrates (Amphibia Reptiles Birds and Mammals) Comparative account of Digestive system of Vertebrates (Amphibia Reptiles Birds and Mammals) Comparative account of Digestive system of Vertebrates (Amphibia Reptiles Birds and Mammals) Comparative account of Experiments,

Tutorials, Collaborative, Demonstrations, Project methods Experiments,

Tutorials, Collaborative, Demonstrations, Project methods Experiments,

8

Comparative account of Repstratory system of Vertebrates (Amphibia Reptiles Birds, and Mammals) Comparative account of Birds, and Mammals, and Mammals) Comparative account of Birds, Collaborative, Demonstrations, Project methods Experiments,

8

Tutorials, Collaborative, Demonstrations, Project methods Experiments,

1

Tutorials, Collaborative,

Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Spotting: based on histology	Experiments	BL2-Understand	8
2	Spotting: Visceral Organs	Experiments	BL2-Understand	8
3	Study of human visceral organs as per syllabus	Experiments	BL4-Analyze	4
4	Osteology and study of fethers	Experiments	BL4-Analyze	4
5	Study of organ system	Experiments	BL5-Evaluate	4
VI	Determination of Blood group and ABH factor in own blood sample	PBL	BL4-Analyze	6

### Part D(Marks Distribution)

	Theory												
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
100	40	40	12	60	0								
	•	•	Practical	•	•								
Total Marks	al Marks Minimum Passing Marks External Evaluation		Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
100	40	40	20	60	0								

Part E

Во		Jordan E.L. & Verma P.S. (2003). Chordate Zoology. S. Chand & Company Ltd. New Delhi. Chaki K.K. Kundu G. & Sarkar S. (2005). Introduction to General Zoology. Vol. 1. New Central Book. Agency (P) Ltd. Kolkata B.D.Chaurasia: handbook of General Anatomy Parker T. J. & Haswell W. (1972). Text Book of Zoology Volume II: Marshall and William (Eds.) 7th Ed. Macmillan Press London
Art	ticles	https://www.nature.com/articles/152088a0
	rences ooks	G.J.Tortora & N.P.anagnostakos: Principal of aaanatomy and Physiology
	OOC urses	No courses found for given search
Vio		https://www.google.com/search? sca_esv=e2da69de12d3bb4c8sca_upv=1&rtz=1C1NMEO_enlN999lN999&q=General.+Anatomy+in+animals&ibm=vid&source=inms&prmd=ivsnbmtz&sa=X&ved=2ahUKEwiklbTljqGAxVw8jgGHU1kBEoQpQJegQIDBAB&biw=1366&bih=825&dpr=1#pstate=ive&vid=cid:bbd084e4.vid:T8pCS4rdm38.st0

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	1	2	2	-	-	-	-	-	-	-	1	2	3
CO2	2	3	1	2	2	-	-	-	-	-	-	-	2	2	3
CO3	2	2	2	1	1	-	-	-	-	-	-	-	2	1	3
CO4	1	2	2	1	1	-	-	-	-	-	-	-	1	1	2
CO5	1	2	1	1	2	-	-	-	-	-	-	-	1	1	2
CO6	1	2	2	-	-	-	-	-	-	-	-	-	-	-	2



### Bsc\_Microbiology

Title of the Course	Bioethics and B	Biosafety										
Course Code	BSMBSECIV (	T)										
				Part A								
Year	2nd	Semester	4th	Credits	L	T	P	С				
Ital	Zilu	Semester	401	Oreato	2	0	0	2				
Course Type	Theory only	ry only										
Course Category	Discipline Elec	ctives										
Pre-Requisite/s	scientific comm	munication approaches for Bioet	thics and Biosafety	Co-Requisite/s	concept of containment le	evel and Good Laboratory Pra	actices (GLP) and Good Man	ufacturing Practices (GMP).				
Course Outcomes & Bloom's Level	CO2- To under biotechnology CO3- To descr CO4- To provid Analyze) CO5- To apply	rstand the Introduction to scienc in international relations, global ribe comprehensive understandi de Theoretical basis, and to enal	ce, technology and society, is: ization and development and ing of Challenges for the India ble students to analyze the ba r, quality control, and legal fra	fits communication approaches for Bioethics and Biosately (BL) use of access-Case studies/experiences from developing and ca their analysis. (BL-2-Understand) an Biotechnological research and industries Bioethics – Necessi asic concepts of the concept of containment level and Good Lab meworksthat impact biotechnology and ethical behaviors that for	developed countries. Owner ty of Bioethics, different par oratory Practices (GLP) and	radigms of Bioethics – Natior d Good Manufacturing Practi	al & International.(BL3-Appl ces (GMP). Cartagena Protoc	y) col for biosafety (BL4-				
Coures Elements	Skill Developm Entrepreneurs Employability: Professsonal E Gender X Human Values Environment >	ship X X Ethics X	SDG (Goals)	SDG4(Quality education)								

F	aı	t	В	

Modules	Contents	Pedagogy	Hours
1	Biotechnology And Society: Introduction to science, technology and society, issues of access-Case studies/experiences from developing and developed countries. Ownership, monopoly, traditional knowledge, biodiversity, benefit sharing, environmental sustainability, public vs. private funding, biotechnology in international relations, globalization, and development divide.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	6
2	Public acceptance issues for biotechnology: Biotechnology and hunger: Challenges for the Indian Biotechnological research and industries Bioethics - Necessity of Bioethics, different paradigms of Bioethics - National & International. Ethical Issues against the molecular technology.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
3	Biosafety- Introduction to biosafety and health hazards concerning biotechnology. Introduction to the concept of containment level and Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP). Cartagena Protocol for biosafety	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	6
4	Biosafety assessment procedures in India and abroad. International dimensions in biosafety, bioterrorism, and convention on biological weapons. Social and ethical implications of biological weapons.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	6
5	Principles of bioethics: Legality, morality and ethics, autonomy, human rights, beneficence, privacy, justice, equity etc. The expanding scope of ethics from biomedical practice to biotechnology, bioethics vs. business ethics	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8

#### Part D(Marks Distribution)

	Theory									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
100	40	40	12	60						
	Practical									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
0	0	0	0	0	0					

# Part E

Books	Thomas J.ABiotechnology and Safety Assessment Thomas J.A., Fuch R.L Academic Press 3rd Edition 2002-ASM Press 3rd. ed. 2000		
	https://www.ndcebios.in/v1n1/2021010110.pdf https://www.researchgate.net/publication/353346609_ON_BIOETHICS_AND_BUSINESS_ETHICS		
References Books Fleming D.A., Hunt DBiological safety Principles and practices-ASM Press 3rd. ed. 2000			
MOOC Courses	https://mptel.ac.in/courses/109106092		
Videos	https://hptel.ac.in/courses/109108092		

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3	1	3	3	3	1	2	3	1	3	2	3
CO2	1	1	2	3	1	3	3	3	2	1	3	2	1	1	2
CO3	3	3	2	1	3	3	3	2	1	1	3	2	2	3	2
CO4	3	3	3	3	2	2	3	3	1	1	3	2	3	3	2
CO5	3	3	2	2	1	3	3	3	1	1	3	2	3	3	3
CO6	_	-	_	_				-	_	-	-			_	-



### Bsc\_Microbiology

Title of the Course	Environmental Issues and Sustainable Dev	vironmental Issues and Sustainable Development									
Course Code	BSMBVACIV (T)	MBVACIV (T)									
PartA											
Year	2nd Semester	4th	Credits	L	Т	P	С				
100	Zind Scillostol	74.1	Sidalis	2	0	0	2				
Course Type	Theory only	ry orly									
Course Category	Community Enganement and Service	mmunity Enganement and Service									
Pre-Requisite/s	Basic Knowledge of Environmental Issues Development	and Sustainable	Co-Requisite/s	Goals and Targets of Sustainable Development Goals. Strategies for the implementation of Sustainable Development goals							
Course Outcomes & Bloom's Level	C01- C01. To develop sentiments and sensitize them towards environmental challenges and concept of sustainable development.(BL2-Understand) C02- C02. To acquire analytical skills/methods in assessing environmental impacts through a multidisciplinary approach;(BL4-Analyze) C03- C03. Ability to design sustainability performance metric to assess the impact on community's sustainable developmentable development analytical science of the community of the community's sustainable development in the community of the community's sustainable development in the community of the community										
Coures Elements	Skill Development ✓ Entrepreneurship × Employability ✓ Professonal Ethics × Gender × Human Values ✓ Environment ✓	SDG (Goals)	SDG4(Quality education) SDG5(Gender equality) SDG12(Responsible consuption and production) SDG13(Climate action)								

Modules	Contents	Pedagogy	Hours
1	History and emergence of the concept of Sustainable Development, Environmental issues and crisis. Resource degradation, greenhouse gases and Effects, desertification, social insecurity, industrialization, Globalization and Environment. Dimensions of Sustainable Development, Phinciples of Su	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, discussion (questions & answers section)	8
2	Sustainable Development Goals: Capacity Building for Sustainable Environment, Sustainable Land Management. Global and regional progress on SD, Individual and collective actions for SD, Sustainable Mountain development, Clean air for Climate Mitigation and Human Health, Sustainable Corporate Practices, Sendal Framework for Disaster Risk Reduction, Conservation and Management of Global Forest Ecosystem	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
3	Society, environment, culture and economy; current challenges - natural, political, socio-economic imbalance; sustainable development initiatives and policies of various countries; global, regional, national, local; needs of present and future generation - political, economic, and environmental.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
4	GSD-2019, GSD 2023. Implementation Progress: SDG Progress report, Sustainability and development indicators and SDGs, UN's outlook of sustainable development and efforts	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
5	Case Studies & Projects on Rural Stutainable Development (Indian Village perspectives). Village resources (troad perspectives), current challenges and thematic areas; village social interactry, village social interactives, village social interactry, village social present and future generation; conflicts and was proward.	Lecture with ppt_Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion. Field visits. Industrial Visit (MSW/BMW/STP/ETF)	8

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
	Sustainable development aims to use natural resources and the environment to raise the standard of living while preserving future generations' capacity to meet their own needs	PBL	BL3-Apply	2 MONTHS
	Analyze the current situation to identify specific challenges and opportunities in the targeted area or community in order to Assess environmental, economic, and social factors.	Internships	BL4-Analyze	1 MONTHS
III	Monitor energy production and savings, and assess environmental impact.	Field work	BL4-Analyze	1 MONTHS
IV	Plan a community solar farm where residents can buy or lease solar panels	Field work	BL3-Apply	2 MONTHS

# Part D(Marks Distribution)

	Theory									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
100	40	60	18	40						
	Practical									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					

### Part E

Books	1. Chiras, D. D and Reganold, J. P. (2010). Natural Resource Conservation: Management for a Sustainable Future 10th edition, Upper Saddle River, N. J. Benjamini/Cumminsi/Pearson. 2. John W. Twidell and Anthony D. (2015). Renewable Energy Sources, 3rd Edition, Weir Publisher (ELBS) 3. William P.Cunningham and Mary A. (2015). Cunningham Environmental Science: A Global Concern, Publisher (Mc-Graw Hill, USA)
	1. Nhamo, Godwell, and Viyo Mjimba. Sustainable Development Goals and institutions of higher education. Springer, 2020. 2. Bell, Simon, and Stephen Morse. Sustainability indicators: measuring the immeasurable?. Routledge, 2012. 3. Serensen, Bent. Energy, Resources and Welfare: Exploration of Social Frameworks for Sustainabile Development. Academic Press, 2016. 4. Dent, David, Oiltive Dubois, and Barry Dalak-Clayton. Rural planning in developing countries: supporting natural resource management and sustainabile intelligences. 2013. 4. Sala, Serensenia, Baiga Coulfo, and Peter Nijkamp. "A systemic framework for sustainability seassement." Ecological Economics 119 (2015) 314-325.
References Books	1. Elliott, Jennifer. 2012. An Introduction to Sustainable Development. 4th Ed. Routledge, London. 2. Rogers, Peter P., Kazi F. Jalal, and John A. Boyd. "An introduction to sustainable development." (2012).
MOOC Courses	https://nptel.ac.in/courses/109106200
Videos	https://nptel.ac.in/courses/109106200

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-1	3	2	-	-	-	1	-	1	-	-	-	2	2	3
CO2	1	3	2	-	-	-	2	-	1	-	-	-	1	2	3
CO3	3	2	1	-	-	-	3	-	2	-	-	-	1	2	=
CO4	2	3	1	-	-	-	3	-	2	-	-	-	-	3	1
CO5	2	3	1	-	-	-	3	-	3	-	-	-	-	-	=
CO6	1	2	3	-	•	-	-	-	-	-	-	-	-	-	-



### MSc\_Biotechnology

Course Outcomes  Bloom's Level  Course Outcomes  Bloom's Level	Title of the Course	Enzyme Technolo	zyme Technology									
Year	Course Code	BT 202 (T)										
Course Type Theory only  Course Category Disciplinary Major  To acquire fundamental knowledge on enzymes and their importance in biological reactions.  Course Outcomes Bloom's Level CO3- to acquire fundamental knowledge on enzymes and their importance in biological reactions (BL1-Remember) CO2- to understand and ability to difference between a chemical catalyst and bio catalyst (BL2-Understand) CO3- to apply the role of enzymes in childure (BL2-Understand) CO3- to apply the role of enzymes in childure (BL2-Understand) CO3- to apply the role of enzymes in childure (BL2-Understand) CO3- to apply the role of enzymes in childure (BL2-Understand) CO3- to apply the role of enzymes in childure (BL2-Understand) CO3- to evaluate the current and future trends of applying enzyme between childure (BL2-Understand) CO3- to develop biotechnological products for the commercialization purpose (BL4-Analyze)  Skill Development   Employability   Employability   Professional Ethics X SDG (Goals) SDG4(Quality education)	Part A											
Course Type Theory only  Course Category Disciplinary Major  To acquire fundamental knowledge on enzymes and their importance in biological reactions.  Course Outcomes Bloom's Level CO3- to acquire fundamental knowledge on enzymes and their importance in biological reactions (BL1-Remember) CO2- to understand and ability to difference between a chemical catalyst and bio catalyst (BL2-Understand) CO3- to apply the role of enzymes in childure (BL2-Understand) CO3- to apply the role of enzymes in childure (BL2-Understand) CO3- to apply the role of enzymes in childure (BL2-Understand) CO3- to apply the role of enzymes in childure (BL2-Understand) CO3- to apply the role of enzymes in childure (BL2-Understand) CO3- to evaluate the current and future trends of applying enzyme between childure (BL2-Understand) CO3- to develop biotechnological products for the commercialization purpose (BL4-Analyze)  Skill Development   Employability   Employability   Professional Ethics X SDG (Goals) SDG4(Quality education)	Year	1st	Semester	2nd	Credits	L	Т	P	С			
Course Category  Disciplinary Major  Pre-Requisite/s  To acquire fundamental knowledge on enzymes and their importance in biological reactions.  CO1- To acquire fundamental knowledge on enzymes and their importance in biological reactions (BL1-Remember) CO2- To understand and ability to difference between a chemical catalyst and bio catalyst, (BL2-Understand) CO3- to apply ther lose for enzymes in clinical diagnosis and industries, (BL2-Understand) CO3- to apply ther lose for enzymes in clinical diagnosis and industries, (BL2-Understand) CO3- to evaluate the current and future trends of applying enzymes (BL2-Understand) CO3- to evaluate the current and future trends of applying enzymes (BL2-Understand) CO3- to develop biotechnological products for the commercialization purpose (BL4-Analyze)  Skill Development  Employability  Employability  Professional Ethics X SDG (Goals) SDG4(Quality education)						0	4					
Pre-Requisite/s  To acquire fundamental knowledge on enzymes and their importance in biological reactions.  Cot. To acquire fundamental knowledge on enzymes and their importance in biological reactions (BL1-Remember) Cot. To understand and ability to difference between a chemical catalyst and bio catalyst, (BL2-Understand) CO3. To understand and ability to difference between a chemical catalyst and bio catalyst, (BL2-Understand) CO3. To understand and ability to difference between a chemical catalyst and bio catalyst, (BL2-Understand) CO3. To understand and ability to difference between a chemical catalyst and bio catalyst, (BL2-Understand) CO3. To understand and ability to difference between a chemical catalyst and bio catalyst, (BL2-Understand) CO3. To evaluate the current and future trends of applying enzyme technology(BL3-Apply) CO4- analyze methods for production, purification, characterization and immobilization of enzymes(BL2-Understand) CO5- To evaluate the current and future trends of applying enzyme technology(BL3-Apply) CO6- To develop biotechnological products for the commercialization purpose (BL4-Analyze)  Skill Development  Emtrepreneurship  Emtrepreneurship  Emtrepreneurship  Employability  Professional Ethics X SDG (Goals) SDG4(Quality education)	Course Type	Theory only	y anly									
reactions.  Course Outcomes & Bloom's Level  Bloom's Level  Course Outcomes & Bloom's Level  Course Outcomes & Bloom's Level  Course Outcomes  See Description of the	Course Category	Disciplinary Majo	linary Major									
Course Outcomes  & Bloom's Level  CO3- To understand and ability to difference between a chemical catalyst and bio calabyst. (BL2-Understand)  CO3- to apply the role of enzymes in clinical diagnosis and industries (BL2-Understand)  CO4- analyze methods for production, purification, characterization and immobilization of enzymes(BL2-Understand)  CO5- To evaluate the current and future treats of applying enzyme technology(BL3-Apply)  Skill Development   Entrepreneurship   Employability   Course Elements  Professional Ethics × SDG (Goals)  SDG4(Quality education)			mental knowledge on enzymes and the	ir importance in biological	Co-Requisite/s		To analyse methods for production, purification, characterization and immobilization of enzymes					
Entrepreneurship  Employability    Course Elements Professonal Ethics X SDG (Goals) SDG4(Quality education)	Course Outcomes & Bloom's Level	CO2- To understa CO3- to apply the CO4- analyze me CO5- To evaluate	02- To understand and ability to difference between a chemical catalyst. (BL2-Understand) 30- to apply the role of enzymes in chinical diagnosis and inustries. (BL2-Understand) 04- analyze methods for production, purification, characterization and immobilization of enzymes (BL2-Understand) 05- To evaluate the current and future trends of apolytic more enzyme technology (BL3-Aupolytic) 10- To evaluate the current and future trends of apolytic more enzyme technology (BL3-Aupolytic)									
Gender X Human Values ✓ Environment X	Coures Elements	Entrepreneurship Employability ✓ Professsonal Eth Gender X Human Values ✓	√	SDG (Goals)	SDG4(Qualify education)							

Part B

Modules	Contents	Pedagogy	Hours
1	Historical aspects, Classification and Nomenclature, Enzyme commission system of Classification; EC Number, Mechanism of enzyme action and specificity, Mechanism of enzyme catalysis and their type	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
2	Enzyme activity: Effects of substrate, temperature, pH and pressure on enzyme activity. Steady state kinetics: Estimation of rate of enzyme catalyzed reaction. Relationship between initial velocity and substrate concentration	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
3	Enzyme assay: Continuous and Sampling techniques coupled kinetic assays; turn over number and specific activity. Enzyme Inhibition: Competitive, Un-competitive and noncompetitive inhibition effect to inhibitors on enzyme kinetics	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	9
4	Enzyme Immobilization: Methods of immobilization of the enzyme. Properties of immobilized enzymes. Advantages and disadvantages of immobilized enzymes. Enzyme Purification techniques: Isolation, purification and, Large-scale production of enzymes.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, Video lectures	8
5	Uses of enzyme in Industries; textiles, leather and food. Therapeutics uses of enzyme. Uses of Enzymes in diagnostics. Enzymes as Biosensors.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, Video lectures	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To quantitative analysis of protease	Experiments	BL3-Apply	3
2	To quantitative and quantitative analysis of protease	Experiments	BL3-Apply	3
3	To quantitative analysis of Urease	Experiments	BL3-Apply	3
4	To quantitative and quantitative analysis of Urease	Experiments	BL3-Apply	3
5	Determination of Km and Vmax of Urease	Experiments	BL4-Analyze	3
6	Determination half life of enzyme	PBL	BL4-Analyze	3

Part D(Marks Distribution)

	Theory												
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
100	40	60	18	40									
			Practical										
Total Marks	Total Marks Minimum Passing Marks External Evaluation		Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
0	0	0	0	0									

Part E

Books David L. Nelson & Michael M. Cox-Lehninger Principles of Biochemistry-3rd Edition								
Articles https://www.ncbi.nlm.nlh.gov/pmc/articles/PMC3962110/								
References Books Palmer T and P L Bonner-Enzymes: Biochemistry Biotechnology, Clinical Chemistry-2nd Edition								
MOOC Courses	https://mptel.ac.in/courses/102103097							
Videos https://pptel.ac.in/courses/102103097								

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	3	3	1	3	2	1	1	1	3	3	1	3	2
CO2	2	1	2	2	1	3	3	1	1	1	3	1	2	2	3
CO3	2	3	1	1	3	3	2	1	3	3	1	2	3	1	2
CO4	2	3	2	3	3	1	1	1	2	1	1	2	1	1	2
CO5	3	1	3	2	1	3	3	1	1	1	1	2	2	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### MSc\_Biotechnology

Title of the Course	Immunotechnol	nunotechnology											
Course Code	BT 204 (T)	204 (T)											
	Part A												
Year	Year         1st         Semester         2nd         Credits         L         T         P         C												
172					3	0	1	4					
Course Type	Embedded thed	edded theory and lab											
Course Category	Disciplinary Ma	jor											
Pre-Requisite/s	Understand bas	sic and advanced concepts of Immuno	ology and body's defense system.	Co-Requisite/s	This course will introde	uce to the applied aspects	of immunology in disease	e detection and diagnosis					
Course Outcomes & Bloom's Level	CO2- To unders CO3- To unders CO4- To apply	nber the structure of various Immunole stand the Different cells & proteins invi- stand the connection of immune syste the use of Proteins & receptors in anti- ate the applications of Antigens & Antit	olved in Immune system(BL2-Underst m failure & disorders(BL2-Underst body formation(BL3-Apply)	erstand) and)	•								
Coures Elements	Skill Developme Entrepreneursh Employability ✓ Professsonal E Gender X Human Values Environment X	nip X r thics X √	SDG (Goals) SDG3(Good health and well-being)										

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to the immune system, innate and adaptive immune response, Lymphatic tissues and migration of immune cells. Physiological and anatomical barriers in immune system. Cells and organs of the immune system, Hematopoetic development and mediators of the process and regulation. Humoral and cell mediated immune response.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
2	Inflammation: sign & Symptoms, cell incolved in inflammation, leucocyte extravasation, TQLL receptors: types and mechanism of action. Antigens and immunogens its properties. Super antigens Adjuvants, haptenese optiopes, active and passive immunity, Structure, classification and functions of Antibody, CDRS and there function., Organization and expression of immunoglobulin genes and Class switching Mechanism of antibody diversity	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	7
3	Major histocompatibility complex (MHC), Types of MHC and Display of antigenic peptide, Role of MHC in antigen processing and presentation. Complement system: component, activation pathway, complement deficiency diseases Activation, maturation and differenciation of 8 and 7 cells, 8 cell receptor complex, 7 cell receptor complex.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments ABL	8
4	CTLs: activation and mechanism of action, NK cells and target cell destruction, Cytokines : Properties, mode of action, cytokine families and A4K-STAT pathway, Hypersensibility: type 1.2.3.4, Immunodefleciency: primary and secondary, Autoimmunity: Organ specific and systemic diseases	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, Video lectures	7
5	Antigen antibody interaction: precipitation, agglutination reaction, RIA,ELISA, Western biotting, Immunofluroscence, CFT. Monocional antibody: Hybridoma Technology and there applications, Antibody engineering, Immunization: active and passive immunization, types of vaccines and their production strategy.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Anatomical view of mammalian thymus and various immune organs	Experiments	BL2-Understand	3
2	Precipitation reaction.	Experiments	BL2-Understand	3
3	Haemoglobin detection by given Blood Sample	Experiments	BL3-Apply	3
4	Double immunodiffusion	Experiments	BL3-Apply	3
5	Radial immuno diffusion	Experiments	BL4-Analyze	3

Part D(Marks Distribution)

	Theory												
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
100	40	60	18	40	09								
			Practical										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
100	50	60	30	40	20								

Part E

Books Kuby Immunology by T. Kindst, R.A. Goldsby and B.A. Osborne 2. Essential Immunology by Ivan Roitt								
Articles https://medcraveonline.com/MOJI/cytokines-and-their-role-in-health-and-disease-a-brief-overview.html								
References Books Immunology understanding the immune system by Klaus D. Eigert 4. Immunology by I. Roit J. Brostoff and D. Male								
MOOC Courses https://hptel.ac.in/courses/102105083								
Videos https://inptel.ac.in/courses/102105083								

	COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PS03
CC	1	1	1	1	3	1	3	1	2	3	1	2	3	1	1	2
CC	2	1	1	2	1	3	2	3	2	3	1	2	3	1	2	3
CC	3	1	2	2	3	4	3	3	1	3	1	2	2	1	2	1
CC	4	2	2	1	2	2	2	2	3	2	2	1	1	2	2	1
CC	5	2	3	3	1	1	3	1	3	1	3	3	1	3	1	1
CC	6	-	-	-	-	-	i	i	-	-	-	-	-	-	-	-



			MSd	_Biotechnology					
Т	itle of the Course	Agriculture Biotechnology ar	nd IPR						
	Course Code	BT 305 (T)							
		1		Part A					
						L	Т	Р	С
	Year	2nd	Semester	3rd	Credits	4	0	0	4
	Course Type	Theory only	1	1	1		-		
(	Course Category	Discipline Core							
	Pre-Requisite/s	Student should have basic i	knowledge of botany and genetic engineering		Co-Requisite/s				
	Course Outcomes & Bloom's Level	CO2- To understand the tec CO3- To define the concept CO4- To apply the knowledge	t the terms agriculture and agricultural biotechnology(BL1-f- hniques, skills, and modern engineering tools necessary for of utilizing plants for production of vaccines and production ge of engineering principles of agriculture biotechnology to lable to develop the relationship between science and society	engineering practice in agriculture biotechnology(BL2-Ur of biofertilizers(BL2-Understand) iving entities for societal welfare(BL3-Apply)	•				
(	Coures Elements	Skill Development   Entrepreneurship   Employability   Professsonal Ethics   Gender   Human Values   Environment		SDG3(Good health and well-being) SDG4(Quality education)					
				Part B					
Modules		Contents	3		Pedagogy				Hours
	Introduction To Agricultural Biotechno heritage; Soil management and its rei water uptake Introduction to plant nut	levance in Pre-modern India. F	s and plant indication, Introduction to Indian Agriculture Review of plant cell structure and function; Review of ake of minerals	Lecture method, demonstrations, field visit, ABL, Case studies, ABL					
	Methods of breeding self-pollinated a Photoperiodism and its significance; Mechanism and significance in crop in	Vernalization and hormonal co	ants; Seed Germination and Seedling Growth; ntrol. Heterosis-Genetic and Molecular basis, Apomixis -	Lecture method, demonstrations, field visit, ABL, Case studies, ABL.					
	changes during ripening; Post harves	t losses-types; Technologies to re respiration and transpiration	; Stages of growth; Maturity indices; Fruit ripening- o control post harvest losses; Respiration and losses; Spoilage of fruit and vegetable, Microbial	Lecture method, demonstrations, field visit, ABL, Case studies, ABL.					
,	nutrient resources and its fortification	Restrictions to nutrient use in	its scope in India; Role of Biotechnology in organic organic farming; Choice of crops and varieties in organic no for the production of industrial enzymes, biodegradable	Lecture method, demonstrations, field visit, ABL, Case si	tudies. ABL.			9	9

Par	t	С
	Т	

Introduction to Intellectual Property Rights Concept and Theories Kinds of Intellectual Property Rights Economic analysis of Intellectual Property Rights Need for Private Rights versus Public Interests Advantages and Disadvantages of IPR. International Regime Relating to IPR TRIPS and other Treates (WIPO-WITO, GATTS)

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	To analyze the soil samples of various locations to check it sfertility.	PBL	BL4-Analyze	1 week
II	To study the mechanism and significance in crop improvement.	Industrial Visit	BL4-Analyze	8 hrs
III	To apply for the patent for a specific product, product developement process or any idea	PBL	BL6-Create	15 days

Part D(Marks Distribution)

Theory											
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	40	60	18	40							
			Practical								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						

Part E

Books	MS Swamynathan,Biotechnology in Agriculture, a Dialogue, 1981 Arun K. Sharma, Hand book of organic farming Agrobios,2002
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8751662/
References Books	Arie Altman Paul Hasegawa, Plant Biotechnology and Agriculture, 2011 K. Lindsey and M.G.K. Jones, Plant biotechnology in Agriculture, 1989
	https://ipple.ac.in/courses/126/105014 https://ipple.ac.in/courses/126/105014 https://ipple.ac.in/courses/126/1050337 https://ipple.ac.in/courses/109/106/128
Videos	https://nptel.ac.in/courses/126105014 https://nptel.ac.in/courses/126105014 https://nptel.ac.in/courses/126105037 https://nptel.ac.in/courses/12610537 https://nptel.ac.in/courses/126106128

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	1	2	-	-	-	-	-	1	2	3	2
CO2	1	-	2	3	-	3	2	-	-	-	-	-	1	2	2
CO3	1	3	1	3	1	1	1	1	-	-	-	-	-	1	2
CO4	2	1	2	2	1	-	2	-	-	-	-	-	2	2	1
CO5	2	3	1	2	2	2	1	-	-	-	-	-	3	2	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### Bsc\_Microbiology

Title of the Course	Agriculture Microbiology													
Course Code	DSE II (T)													
		Pa	rt A											
Year	3rd	Semester	6th	Credits	L	Т	Р	С						
1001	0.0	Commental		Oreuta		0	0	3						
Course Type	Embedded theory and lab													
Course Category	Discipline Core	ipline Core												
Pre-Requisite/s	Basic knowledge of microsco	ope and other microbiological techniques		Co-Requisite/s										
Course Outcomes & Bloom's Level	CO2- Describe the structure CO3- To analyse how micros CO4- To identify specific mic	ccurately apply terminology used in the field of microbiology, and used biology of bacterial cells, including the arrangement and replications and biology of bacterial cells, including regardisms may be detected within various environments, including regardisms important to animals, plants and soil ecosystems, ame addings relating to microbiology and agricultural production(RLS-E	cation of genetic material, and understand the concept of virul how they may be cultivated within the laboratory setting, and d explain why these microorganisms are significant(BL4-Ana)	lence and virulence factors(BL2-Understand) molecular methods of detection(BL3-Apply)	nd proto	zoa(BL1	-Remem	nber)						
Coures Elements	Skill Development   Entrepreneurship   Employability   Professsonal Ethics   Gender   Human Values   Environment   Environment		SDG (Goals)	SDG4(Quality education)										

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction — Soil as an environment for microorganisms. Classification of soil, physical and chemical properties of soil, structure of soil. Microbial interactions - mutualism, commensalism, amensalism, synergism, parasitism, predation and competition. Microbial interactions between plants-phylosphere, mycorhizae, nitrosphere and symbiotic association in root nodules. Biofertilizer – VAM, Rhizobium, Frankia, Azospirillum, Azolobacter, cyanobacteria and Azolia.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, ABL Experiments,	8
2	Soil microbes and fertility of soil. Roles of microbes in biogeochemical cycles, Microorganisms in soil processes, carbon cycle, organic matter decomposition, humus formation, nitrogen cycle, nitrogen fixation, symbiotic, non-symbiotic, associative organisms, ammonification, nitrification, dentification, reactions, organisms involved.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, ABL Experiments,	8
3	Plant protection – phenolics – phytoalexins and related compounds. Bio insecticides – viral, bacterial and fungal, Chemical Pesticide and their adverse effect on agriculture (soil and crop).	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, ABL Experiments,	8
4	Plant pathogenic Microorganisms - Historical Background. Disease symptoms. Mode of Entry of pathogens, Plant Disease Resistance, Physiology of Parasitism, Factors effecting disease Incidence, Algal, Fungal, Viral, Bacterial diseasese. Bacterial diseases of agricultural crops-pathogens, symptoms and control measures with reference to paddy, cotton, maize, tomato, citrus, mango and potatic. Mycoplasma Disease, Nemadod Disease.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, ABL Experiments,	8
5	Microorganisms Harmful to Man and Animal: - Resentence of animal to pathogens, Group of organisms causing disease, Foot mouth disease, Johne's disease, Control of Johne's disease (JD) in cattle, poisoning of livestock by blue-green algae	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, ABL Experiments,	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Enumeration of microbial population in soil; qualitative and quantitative distribution;	PBL	BL3-Apply	1 month
2	isolation of symbiotic nitrogen fixing bacteria -non symbiotic and associative symbiotic bacteria;	Experiments	BL3-Apply	2
3	soil algae ; nitrification	Experiments	BL4-Analyze	4
4	isolation of sulphur and iron bacteria;	Experiments	BL5-Evaluate	2
5	Isolation and study of phosphobacteria and phosphorus solubility	Experiments	BL5-Evaluate	2

#### Part D(Marks Distribution)

	Theory												
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
100	40	60	18	40									
		•	Practical	•	•								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
100	40	40	20	60									

Part E

Books	Martin Alexander 1976. Introduction to soil microbiology Willy Eastern Ltd. New Delhi. Robert LTate III. 1995. Soil Microbiology, John Wiley & Sons, New York, pp 398.
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8313292/
	Subbarso, N.S. 1977. Soil microorganisms and plant growth, Oxford & IBH Publishing Co., New Delhi. Walker, N. 1975. Soil Microbiology, Butterworths, London AGRICULTURAL MICROBIOLOGY By D. J. BAGTARAL, G. RANGASWAMI Alexander M. 1997. Introduction to soil microbiology, John Wiley & Sons, Inc, New York. EcEldowney S., Hardman, D.J. and Walke, S. 1993. Pollution Ecology and Biotreatment-Longman Scientific Technical.
MOOC Courses	https://hptel.ac.in/courses/105107173
Videos	https://hptel.ac.in/courses/105107173

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	-	-	2	-	-	-	2	2	-	2	2	3
CO2	2	1	2	-	-	3	-	-	-	2	1	-	1	2	2
CO3	2	2	2	-	-	1	-	-	-	1	1	-	1	1	2
CO4	1	2	1	-	-	2	-	-	-	1	2	-	3	1	1
CO5	2	2	1	-	-	1	-	-	-	1	-	-	3	2	1
CO6	2	2	3	-	-	3	-	-	-	-	2	-	2	1	1



### Bsc\_Microbiology

Title of the Course	Agriculture Biotechnology	Ilture Biotechnology and Intellectual property rights										
Course Code	DSE II (T)	m										
Part A												
Year	3rd	Semester	6th	Credits		Т	Р	С				
100.	0.0	Connected.				0	0	3				
Course Type	Theory only	ry only										
Course Category	Discipline Specific Elective	cipline Specific Elective										
Pre-Requisite/s	Student should have basic	knowledge of botany and genetic engineering		Co-Requisite/s								
Course Outcomes & Bloom's Level	CO2- To understand the te CO3- To define the concep CO4- To apply the knowled	CO1- To define and contrast the terms agriculture and agricultural biotechnology (BL1-Remember) CO2- To understand the techniques, skills, and modern engineering tools necessary for engineering practice in agriculture biotechnology (BL2-Understand) CO3- To define the concept of utilizing plants for production of vaccines and production of obliderilizers (BL2-Understand) CO3- To apply the knowledge of engineering principles of agriculture biotechnology to living entities for societal welfare(BL3-Understand) CO3- The students will be able to develop the relationship between science and society and will be able to develop the relationship between science and society and will be able to develop the relationship between science and society and will be able to develop the relationship between science and society and will be able to develop the relationship between science and society and will be able to develop the relationship between science and society and will be able to develop the relationship between science and society and will be able to develop the relationship between science and society and will be able to develop the relationship between science and society and will be able to develop the relationship between science and society and will be able to develop the relationship between science and society and will be able to develop the relationship between science and society and will be able to develop the relationship between science and society and the science and the sci										
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✓ Gender X Human Values ✓ Environment ✓		SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education)								

Part B

Modules	Contents	Pedagogy	Hours
ı	Introduction To Agricultural Biotechnology: Origin of cultivated plants and plant indication, Introduction to Indian Agriculture heritage, Soil management and its relevance in Pre-modern India. Review of plant cell structure and function; Review of water uptake infroduction to plant nutrition; Mineral variability—uptake of minerals	Lecture method, demonstrations, field visit, ABL, Case studies, ABL.	8
Ш	Methods of breeding self-pollinated and vegetatively propagated plants; Seed Germination and Seedling Growth; Photoperiodism and its significance; Vermailization and hormonal control. Heterosis-Genetic and Molecular basis, Apomixis – Mechanism and significance in crop improvement.	Lecture method, demonstrations, field visit, ABL, Case studies, ABL.	9
Ш	Post Harvest Birctechnology. Importance of post harvest physiology. Stages of growth; Maluruly indices; Fruit ripening- changes during ripening; Post harvest losses-types; Erchnologies to control post harvest losses. Respiration and transpiration loss, methods to measure respiration and transpiration losses; Spoilage of fruit and vegetable, Microbial contaminants and post-harvest perhology	Lecture method, demonstrations, field visit, ABL, Case studies, ABL.	8
IV	Blotechnology in Organic Farming: Organic farming, principles and its scope in India; Role of Blotechnology in organic nutrient resources and its fortification; Restrictions to nutrient use in organic farming, design farming And its ordification; Restrictions to nutrient use in organic farming, and britogen Freation. Molecular farming for the production of industrial enzymes, biodegradable plastics, polyhydroxybutyeta, antibodies, edible vaccines, Metabolic engineering of plants for the production of faty acids, industrial oils, flavoroidis etc.,	Lecture method, demonstrations, field visit, ABL, Case studies, ABL.	9
v	Introduction to Intellectual Property Rights Concept and Theories Kinds of Intellectual Property Rights Economic analysis of Intellectual Property Rights Need for Private Rights versus Public Interests Advantages and Disadvantages of IPR, International Regime Relating to IPR TRIPS and other Teatels (WIPPO,WTO, GATTS)		8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	To analyze the soil samples of various locations to check it sfertility.	PBL	BL4-Analyze	1 week
II	To study the mechanism and significance in crop improvement.	Industrial Visit	BL4-Analyze	8 hrs
III	To apply for the patent for a specific product, product developement process or any idea	PBL	BL6-Create	15 days

### Part D(Marks Distribution)

Theory												
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation							
100	40	60	18	40								
	Practical Practical											
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation							
100	50	60	30	40								

Part E

Books	MS Swamynathan, Biotechnology in Agriculture, a Dialogue, 1981 Arun K. Sharma, Hand book of organic farming Agrobios, 2002
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8751662/
References Books	Arie Altman Paul Hasegawa, Plant Biotechnology and Agriculture, 2011 K. Lindsey and M.G.K. Jones, Plant biotechnology in Agriculture, 1989
MOOC Courses	https://nptel.ac.in/courses/128105014 https://nptel.ac.in/courses/128105337 https://nptel.ac.in/courses/129105337 https://nptel.ac.in/courses/129106128
Videos	https://nptel.ac.in/courses/126105014 https://nptel.ac.in/courses/12610537 https://nptel.ac.in/courses/126105337 https://nptel.ac.in/courses/120105337 https://nptel.ac.in/courses/12010512 https://

	Course Afficulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	1	2	-	-	-	-	-	1	2	3	2
CO2	1	-	2	3	-	3	2	-	-	-	-	-	1	2	2
CO3	1	3	1	3	1	1	1	1	-	-	-	-	-	1	2
CO4	2	1	2	2	1	-	2	-	-	-	-	-	2	2	1
CO5	2	3	1	2	2	2	1	-	-	-	-	-	3	2	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_Biotechnology

Title of the Course	Agriculture Biotechnology	culture Biotechnology and Intellectual property rights											
Course Code	DSE II (T)												
Part A													
Year	3rd	Semester	6th	Credits		Т	Р	С					
1641	Sid	Semester	out	Ciedita	3	0	0	3					
Course Type	Theory only	ory only											
Course Category	Discipline Core	scipline Core											
Pre-Requisite/s	Student should have basic	knowledge of botany and genetic engineering	Co-Requisite/s										
Course Outcomes & Bloom's Level	CO2- To understand the te CO3- To define the concep CO4- To apply the knowled	ist the terms agriculture and agricultural biotechnology(BL1-Rechniques, skills, and modern engineering tools necessary for ot of utilizing plants for production of vaccines and production tige of engineering principles of agriculture biotechnology to the todeword principles of agriculture biotechnology to table to develop the relationship between science and society	engineering practice in agriculture biotechnology(BL2-Ur of biofertilizers(BL2-Understand) ving entities for societal welfare(BL3-Apply)	•	•								
Coures Elements	Skill Development   Entrepreneurship   Employability   Professsonal Ethics   Gender   Human Values   Environment		SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education)									
			Part B										

Modules	Contents	Pedagogy	Hours
I	Introduction To Agricultural Biotechnology: Origin of cultivated plants and plant indication, introduction to Indian Agriculture hertlage; Soil management and its relevance in Pre-modern India. Review of plant cell structure and function, Review of water uptake introduction to plant nutrition; Mineral availability, uptake of minerals	Lecture method, demonstrations, field visit, ABL, Case studies, ABL.	8
П	Methods of breeding self-pollinated and vegetatively propagated plants; Seed Germination and Seedling Growth; Photoperiodism and is significance; Vernalization and hormonal control. Heterosis-Genetic and Molecular basis, Apomixis - Mechanism and significance in crop improvement.	Lecture method, demonstrations, field visit, ABL, Case studies, ABL.	9
Ш	Post Harvest Biotechnology: Importance of post harvest physiology; Stages of growth; Maturity Indices; Fruit ripening- changes during ripening; Post harvest lossest-lypes; Erchnologies to control post harvest lossese; Respiration and transpiration loss, methods to measure respiration and transpiration losses; Spollage of fruit and vegetable, Microbial contaminants and post-harvest pathology	Lecture method, demonstrations, field visit, ABL, Case studies, ABL.	8
IV	Biotechnology in Organic Farming: Organic farming, principles and its scope in India; Role of Biotechnology in organic nutrient resources and its fortification; Restrictions to nutrient use in organic farming; Choice of crops and varieties in organic farming; Molecular Farming and Notecular Farming and influence in Farming and Notecular Farming and influence in Indiatrial enzymes, biotegradable plastics, polyhydroxybuyrate, antibodies, edible vaccines; Metabolic engineering of plants for the production of fatty acids, industrial oils, flavoroids etc	Lecture method, demonstrations, field visit, ABL, Case studies, ABL.	9
v	Introduction to Intellectual Property Rights Concept and Theories Kinds of Intellectual Property Rights Economic analysis of Intellectual Property Rights Need for Private Rights versus Public Interests Advantages and Disadvantages of IPR, International Regime Relating to IPR TRIPS and other Treates (WIPC,WITO, GATTS)		8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	To analyze the soil samples of various locations to check it sfertility.	PBL	BL4-Analyze	1 week
II	To study the mechanism and significance in crop improvement.	Industrial Visit	BL4-Analyze	8 hrs
III	To apply for the patent for a specific product, product developement process or any idea	PBL	BL6-Create	15 days

### Part D(Marks Distribution)

Theory											
Total Marks	Minimum Passing Marks	External Evaluation	External Evaluation Min. External Evaluation		Min. Internal Evaluation						
100	40	60	18	40							
	Practical										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						

Part E

Books	MS Swamynathan,Biotechnology in Agriculture, a Dialogue, 1981 Arun K. Sharma, Hand book of organic farming Agrobios,2002
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8751662/
References Books	Arie Altman Paul Hasegawa, Plant Biotechnology and Agriculture, 2011 K. Lindsey and M.G.K. Jones, Plant biotechnology in Agriculture, 1989
	https://ipple.ac.in/courses/126/105014 https://ipple.ac.in/courses/126/105014 https://ipple.ac.in/courses/126/1050337 https://ipple.ac.in/courses/109/106/128
Videos	https://nptel.ac.in/courses/126105014 https://nptel.ac.in/courses/126105014 https://nptel.ac.in/courses/126105037 https://nptel.ac.in/courses/12610537 https://nptel.ac.in/courses/126106128

co	Os	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	2	2	2	1	2	-	-	-	-	-	1	2	3	2
CO2		1	-	2	3	-	3	2	-	-	-	-	-	1	2	2
соз		1	3	1	3	1	1	1	1	-	-	-	-	-	1	2
CO4		2	1	2	2	1	-	2	-	-	-	-	-	2	2	1
CO5		2	3	1	2	2	2	1	-	-	-	-	-	3	2	1
CO6		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_Biotechnology

Title of the Course	Molecular Diagnostics	Recular Diagnostics										
Course Code	DSE IV (T)	IV (T)										
Part A												
Year	3rd	Semester	6th	Credits	L	Т	P	С				
				3	0	0	3					
Course Type	Embedded theory and la	bedded theory and lab										
Course Category	Discipline Specific Electi	ipine Specific Elective										
Pre-Requisite/s	Student must be aware of	of basic immulogy and immunological assays.		Co-Requisite/s								
Course Outcomes & Bloom's Level												
Coures Elements	Skill Development  Enterpreneurship  Enterpreneurship  Employabitity  Professonal Efficie X Gender  Human Values  Environment X			SDG3(Good health and well-being) SDG4(Quality education) SDG6(Decent work and economic growth)	(Quality education)							

Part B

Modules	Contents	Pedagogy	Hours
I	Enzyme Immunoassays: Comparison of enzymes available for enzyme immunoassays, conjugation of enzymes. Solid phases used in enzyme immunoassays. Homogeneous and heterogeneous enzyme immunoassays Enzyme immunoassays after immuno blotting.	lecture method,Demonstrations, experiments, ABL, PBL , case studies	6
П	Enzyme immuno histochemical techniques: Use of polydonal or monocional antibodies in enzymes immuno assays. Applications of enzyme immunosassys in diagnostic microbiology, Mobeular methods in clinical microbiology, Applications of PCR, RFLP, Nuclear hybridization methods, Single nucleotide polymorphism and plasmid finger printing in clinical microbiology	tecture method.Demonstrations, experiments, ABL, PBL, case studies	7
Ш	Laboratory tests in chemotherapy: Susceptibility tests: Micro-dilution and macro-dilution broth procedures. Susceptibility tests: Diffusion test procedures. Susceptibility tests: Tests for bactericidal activity. Automated procedures for antimicrobial susceptibility tests.	lecture method,Demonstrations, experiments, ABL, PBL , case studies	8
IV	Automation and rapid diagnostic approach: Automation in microbial diagnosis, rapid diagnostic approach including technical purification and standardization of antigen and specific antibodies.	lecture method,Demonstrations, experiments, ABL, PBL, case studies	8
v	Idiotypes and immunodiagnostic: Concepts and methods in idiotypes.Immunodiagnostic tests-Immuno florescence. Radioimmunoassay. Diagnostic tools: HPLC, Electron microscopy, flow cytometry and cell sorting.	lecture method,Demonstrations, experiments, ABL, PBL, case studies	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	To isolate genomic DNA from the animal sample	Experiments	BL3-Apply	6
II	To anlayse immunological activity using various assays	PBL	BL3-Apply	7
III	To perform ELISA test	PBL	BL5-Evaluate	6
IV	To preform radial immunodiffsion	Experiments	BL3-Apply	5
V	To analyse the AIDS patients through immunological assays and moelcular markers	Case Study	BL5-Evaluate	1 week
VI	Detection and identification of microorganisms using molecular techniques	PBL	BL3-Apply	1 week

Part D(Marks Distribution)

Theory										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
100	40	60	18	40						
			Practical							
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
100	50	60	30	40						

Part E

Books	Williams, Bethany Jill, Chloe Knowles, and Darren Treanor. "Maintaining quality diagnosis with digital pathology: a practical guide to ISO 15189 accreditation." Journal of clinical pathology 72.10 (2019): 663-668. Modern Approaches to Quality Control. Croatia, IntechOpen, 2011.
Articles	https://www.ncbi.nlm.nih.gov/pmc/articlesi/PMC1214554/
	Moumtzoglou, Anastasius, ed. Laboratory Management Information Systems: Current Requirements and Future Perspectives: Current Requirements and Future Perspectives. IGI Global, 2014. Burnett, David. A Practical Guide to ISO 15189 in Laboratory Medicine. United Kingdom, ACB Venture Publications, 2013.
MOOC Courses	https://nptel.ac.in/courses/127105391
Videos	https://nptel.ac.in/courses/127105391

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1	1		1	-	-	-	-	-	-	3	3	1
CO2	1	3	2	2	1	3	-	-	-	-	-	-	2	2	1
CO3	1	1	2	-	1	3	-	-	-	-	-	-	2	2	1
CO4	2	1	2	1	3	1	-	-	-	-	-	-	2	1	3
CO5	1	1	-	1	1	1	-	-	-	-	-	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### Bsc\_Microbiology

Little of the Course	Molecular Diagnostics										
Course Code	DSE IV (T)	IV (T)									
			Part A								
Year	3rd	Semester	6th	Credits	L	Т	Р	С			
1001	0.0	- Comosto	out.	ordata	3	0	0	3			
Course Type	Embedded theory and la	ab									
Course Category	Discipline Specific Elect	ive									
Pre-Requisite/s	Student must be aware	of basic immulogy and immunological assays.		Co-Requisite/s							
Course Outcomes & Bloom's Level	CO2- Demonstrate an u CO3- Demonstrate an u CO4- Apply molecular d	the basic principles and clinical significance of laboratory nderstanding of basic molecular diagnostic techniques(E nderstanding of electrophoresis in the separation of DNA iagnostic techniques to the identification and diagnosis asics in quality control and quality assurance(BL2-Under	BL2-Understand) A fragments() of diseases(BL3-Apply)	member)							
Coures Elements	Skill Development ✓ Entrepreneurship × Employability ✓ Professsonal Ethics ✓ Gender × Human Values ✓ Environment ×		SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth)							

Part B

Modules	Contents	Pedagogy	Hours
1	Enzyme Immunoassays: Comparison of enzymes available for enzyme immunoassays, conjugation of enzymes. Solid phases used in enzyme immunoassays. Homogeneous and heterogeneous enzyme immunoassays Enzyme immunoassays after immuno blotting.	lecture method,Demonstrations, experiments, ABL, PBL , case studies	6
II	Enzyme immuno histochemical techniques: Use of polydonal or monocional antibodies in enzymes immuno assays. Applications of enzyme immunosassys in diagnostic microbiology, Mobeular methods in clinical microbiology, Applications of PCR, RFLP, Nuclear hybridization methods, Single nucleotide polymorphism and plasmid finger printing in clinical microbiology	lecture method,Demonstrations, experiments, ABL, PBL , case studies	7
Ш	Laboratory tests in chemotherapy: Susceptibility tests: Micro-dilution and macro-dilution broth procedures. Susceptibility tests: Diffusion test procedures. Susceptibility tests: Tests for bactericidal activity. Automated procedures for antimicrobial susceptibility tests.	lecture method,Demonstrations, experiments, ABL, PBL , case studies	8
IV	Automation and rapid diagnostic approach: Automation in microbial diagnosis, rapid diagnostic approach including technical purification and standardization of antigen and specific antibodies.	lecture method,Demonstrations, experiments, ABL, PBL, case studies	8
v	Idiotypes and immunodiagnostic: Concepts and methods in idiotypes.Immunodiagnostic tests-Immuno florescence. Radioimmunoassay. Diagnostic tools: HPLC, Electron microscopy, flow cytometry and cell sorting.	lecture method,Demonstrations, experiments, ABL, PBL, case studies	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	To isolate genomic DNA from the animal sample	Experiments	BL3-Apply	6
II	To anlayse immunological activity using various assays	PBL	BL3-Apply	7
III	To perform ELISA test	PBL	BL5-Evaluate	6
IV	To preform radial immunodiffsion	Experiments	BL3-Apply	5
V	To analyse the AIDS patients through immunological assays and moelcular markers	Case Study	BL5-Evaluate	1 week
VI	Detection and identification of microorganisms using molecular techniques	PBL	BL3-Apply	1 week

Part D(Marks Distribution)

Theory										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
100	40	60	18	40						
			Practical							
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation					
100	50	60	30	40						

Part E

	iliams, Bethany Jill, Chioe Knowles, and Darren Treanor. "Maintaining quality diagnosis with digital pathology: a practical guide to ISO 15189 accreditation." Journal of clinical pathology 72.10 (2019): 663-668. dem Approaches to Quality Control. Croatia, IntechOpen, 2011.								
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1214554/								
References Books	Moumizogiou, Anastasius, ed. Laboratory Management Information Systems: Current Requirements and Future Perspectives: Current Requirements and Future Perspectives. IGI Global, 2014. Burnett, David. A Practical Guide to ISO 15189 in Laboratory Medicine. United Kingdom, ACB Venture Publications, 2013.								
MOOC Courses	https://mptel.ac.in/courses/127105391								
Videos	https://inptel.ac.in/courses/127105391								

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1	1		1	-	-	-	-	-	-	3	3	1
CO2	1	3	2	2	1	3	-	-	-	-	-	-	2	2	1
CO3	1	1	2	-	1	3	-	-	-	-	-	-	2	2	1
CO4	2	1	2	1	3	1	-	-	-	-	-	-	2	1	3
CO5	1	1	-	1	1	1	-	-	-	-	-	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_Biotechnology

Title of the Course	Frontiers in Biotechnology & Mic	crobiology						
Course Code	DSE IV (T)							
		Part A						
Year	3rd	Semester	6th	Credits	-		_	-
Course Type	Theory only							
Course Category	Discipline Specific Elective							
Pre-Requisite/s	To be familiar with the basics of	biomolecules, physiology and genetic composition of prokaryotic and	eukaryotic cell.	Co-Requisite/s				
Course Outcomes & Bloom's Level	CO2- To understand and apply CO3- To analyze the gene beha CO4- To identify the genetic and	ovement.(BL3-Apply) -Analyze) nber)						
Coures Elements	Skill Development ✓ Entrepreneurship X Employability ✓ Professsonal Ethics ✓ Gender X Human Values ✓ Environment X		SDG (Goals)	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
I	Artificial Seed – Definition, Techniques, factors affecting, applications limitations, Germplasm preservation- Introduction, principle, Long term, storage, factors affecting, short/medium storage techniques, applications , limitations, GM Crops - Herbicide resistance, bacterial, fungal, virus, insert, Molecular farming.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
Ш	Biofertilizers and Biopesticide: Biofertilizers – Definition, Principle advantages. Mass production and field application – Rhizobium Azolobacter, Azospiritum, Aecobacter, Azospiritum, Aecobacter, Azola, Cyanobacteria, PSB, VAM, Green manure and compost, Principle and applications of bacterial, Mngal, viral and plant origin pesticides	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
Ш	Stem cells : unipotent, pleurepotent and totipotent stem cells, fertilization: Process, types and application, Gene therapy: Types - Somatic, Germ line, Augmentation. Gene therapy strategies for cancer Gene therapy: Types - Somatic, Germ line, Augmentation. Gene therapy strategies for cancer Gene therapy: Types - Somatic, Germ line, Augmentation.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	9
IV	Forensic medicine: Preparation of DNA sample, Approaches of DNA analysis, Public Health: Epidemiology, Diagnosis of infectious diseases, Diagnosis of genetic diseases. Diagnosis of cancer.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	9
V	Structure -based drug designing: Introduction , Structure based- drug designing approaches, , Target identification and validation , Homology modelling and protein folding, pharmacophore mapping.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	Application of molecular markers in sex determination of various plants	Internships	BL5-Evaluate	30 days
II	Production of Artificial seeds and its preservation	PBL	BL5-Evaluate	6 days

Part D(Marks Distribution)

Theory											
Total Marks	Minimum Passing Marks	External Evaluation	External Evaluation Min. External Evaluation		Min. Internal Evaluation						
100	40	60	18	40							
	•	•	Practical	•	•						
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	50	60	30	40							

Part E

Books	Gupta.P.K.;Biotechnology and Genomics
Articles	https://www.ncbi.nim.nih.gov/pmc/articles/PMC6488131/
References Books	Kumar.J.Pharmaceutical Biotechnology
MOOC Courses	https://nptel.ac.in/courses/102103041 https://nptel.ac.in/courses/102106070 https://nptel.ac.in/courses/102103013 https://nptel.ac.in/courses/102103074
Videos	https://nptel.ac.in/courses/102103041 https://nptel.ac.in/courses/102106070 https://nptel.ac.in/courses/102103013 https://nptel.ac.in/courses/102103074

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2	1	2	-	-	-	-	-	-	1	2	2
CO2	3	2	2	2	2	-	2	-	-	-	-	-	2	2	2
CO3	2	1	3	2	2	1	1	-	-	-	-	-	3	2	3
CO4	1	1	2	2	1	2	2	-	-	-	-	-	3	1	3
CO5	2	-	1	-	2	2	2	-	-	-	-	-	2	3	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_Biotechnology

Title of the Course	Medical Biotechnology										
Course Code	DSE V (T)	v(T)									
		Part A									
Year	4th	Semester 7th Credits									
Course Type	Embedded theory and lab	added theory and lab									
Course Category	Discipline Specific Elective	ipline Specific Elective									
Pre-Requisite/s	Students acquainted with the f	undamental concepts of nanotechnology and develop an understandin	to employ its principles in modern biotechnology applications.	Co-Requisite/s							
Course Outcomes & Bloom's Level	CO2- To understand the role o CO3- To learn about biosensor	iced to the biological revolutions in this field.(BL1-Remember) f biotechnology in the world wide market(BL2-Understand) rs, vaccine production, monoclonal antibodies, nanotechnology and its to demonstrate the use of biotechnology in solving various medical pr	applications.(BL2-Understand) blems(BL3-Apply)		٠						
Coures Elements	Skill Development ✓ Entrepreneurship X Employability ✓ Professsonal Ethics ✓ Gender X Human Values ✓ Environment X		SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education)							

		Part B					
Modules	Contents	Pedagogy					
I	Introduction – Origin, significance & worldwide market of Medical Biotechnology. Revolution in clinical diagnosis, Antibody and Nucleic Acid Hybridization techniques, Imaging techniques (Nanodiagnosis).	Lectue methods, demonstrations, experiments, ABL, PBL, Field visits	8				
II	Genetic & Metabolic Disorders – Introduction, Classification, Impact of genetic diseases on human health - Chromosome errors - Down syndrome, Klinefelter's and Turner's syndrome, Metabolic disorders – Phenyliketonuria, Homcoystinuris, Mucopolysaccharidosis, Gangliciosis, Gaucher's disease, Diabetes, Hemophilia and sickle cell anemia. Treatment of Genetic diseases - prenatal diagnosis, Genetic Counseling - Ethical, Legal and Social Issues	Lectue methods, demonstrations, experiments, ABL, PBL, Field visits	8				
III	Revolution in treatment – Recombinant DNA technology for human insulin, Hepatitis B vaccine. Tissue plasminogen activator, clotting factor VIII. Antibody Engineering and Therapeutic Antibodies. Phage therapy.	Lectue methods, demonstrations, experiments, ABL, PBL, Field visits	8				
IV	Cancer - Molecular, cellular and genetic basis of cancer, tumor virus and oncogenes, tumor suppressor genes and mechanism of action of p53 proteins. Stem Cells - Sources and types of stem cells, Stem cell transplant and its types, Potential targets for stem cell treatment, Therapeutic applications of stem cells, Regenerative medicine and Stem cell ethics. Skin Grafting	Lectue methods, demonstrations, experiments, ABL, PBL, Field visits	8				
v	Gene therapy- basic approaches and types of gene therapy, vectors used in gene therapy, application of gene therapy in medicine. Nanobiotechnology - Introduction, types and situatures of nanoparticles, biosynthesis of nanoparticles, application of nanoparticles in treatment.	Lectue methods, demonstrations, experiments, ABL, PBL, Field visits	8				

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Biochemical test for identification of bacteria	Experiments	BL4-Analyze	3
II	Extraction and separation of Antigen proteins from Bacteria & protozoa	Experiments	BL4-Analyze	3
III	Estimation of blood glucose.	Experiments	BL4-Analyze	2
IV	Estimation of cholesterol in blood.	Experiments	BL4-Analyze	2
V	Estimation of iron in blood.	Experiments	BL5-Evaluate	3
VI	Biological synthesis of nanoparticles	Experiments	BL6-Create	2
VII	Widal test	PBL	BL4-Analyze	5

# Part D(Marks Distribution)

	Theory										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	40	60	18	40							
	Practical										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						

#### Part E

Glick, B.R. and Pasurank. Molecular biotechnology. —Principle and Applications of Recombinant DNA- JJ.(4th edition), ASM Press. 2010.  Anthony D. Ho, Hoffman, R. and Esmall D. Zanjani. Stem Cell Transplantation (4th exclipion), Wiley — lise spublishers, 2006.  Hornyak, G.L., Moore, J.J. Tibbals H.F., Dutta. J. Fundamentals of Nanotechnology (1st edition), CRC press, 2008.							
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8153617/						
References Books	Jogdand. S. N. Medical Biotechnology -, (4th edition), Himalayan publishing house, 2004. Freshney J., Stacey. G. N, Auerbach. J.M, Culture of Human Stem Cells (1st edition), Wiley – Liss publishers, 2007.						
MOOC Courses	NA NA						
Videos	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8153617/						

COs	PO1	PO2	PO3	PO4	P05	P06	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	1	1	-	-	-	-	-	-	-	1	2	1
CO2	2	2	2	2	3	1	2	-	-	-	-	-	2	1	2
CO3	3	1	1	2	2	-	2	-	-	-	-	-	2	1	2
CO4	2	1	1	2	1	3	1	-	-	-	-	-	1	1	1
CO5	1	2	2	1	1	-	1	-	-	-	-	-	1	3	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### Bsc\_Microbiology

Title of the Course	Medical Biotechnology	zal Biotechnology										
Course Code	DSE V (T)											
	Part A											
Year	4th	Semester	Credits	L T P C 2 0 0 2								
Course Type	Embedded theory and lab	vedded theory and lab										
Course Category	Discipline Specific Elective	cipline Specific Elective										
Pre-Requisite/s	Students acquainted with the fu	undamental concepts of nanotechnology and develop an understandin	g to employ its principles in modern biotechnology applications.	Co-Requisite/s								
Course Outcomes & Bloom's Level	CO2- To understand the role of CO3- To learn about biosensor	ced to the biological revolutions in this field.(BL1-Remember) f biotechnology in the world wide market(BL2-Understand) s, vaccine production, monoclonal antibodies, nanotechnology and its to demonstrate the use of biotechnology in solving various medical pr	applications (BL2-Understand) oblems(BL3-Apply)		·							
Coures Elements	Skill Development ✓ Entrepreneurship X Employability ✓ Professsonal Ethics ✓ Gender X Human Values ✓ Environment X		SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education)								

### Part B

Modules	Contents	Pedagogy	Hours
I	Introduction – Origin, significance & worldwide market of Medical Biotechnology. Revolution in clinical diagnosis, Antibody and Nucleic Acid Hybridization techniques, Imaging techniques (Nanodiagnosis).	Lectue methods, demonstrations, experiments, ABL, PBL, Field visits	8
II	Genetic & Metabolic Disorders – Introduction, Classification, Impact of genetic diseases on human health - Chromosome errors - Down syndrome, Klinefelter's and Turner's syndrome, Metabolic disorders – Phenyliketonuria, Homocystinuris, Mucopolysaccharidosis, Gangliciotosis, Gaucher's disease, Diabeles, Hemophilia and sickle cell anemia. Treatment of Genetic diseases - prenatal diagnosis, Genetic Counseling - Ethical, Legal and Social Issues	Lectue methods, demonstrations, experiments, ABL, PBL, Field visits	8
Ш	Revolution in treatment – Recombinant DNA technology for human insulin, Hepatitis B vaccine. Tissue plasminogen activator, clotting factor VIII. Antibody Engineering and Therapeutic Antibodies. Phage therapy.	Lectue methods, demonstrations, experiments, ABL, PBL, Field visits	8
IV	Cancer - Molecular, cellular and genetic basis of cancer, tumor virus and oncogenes, tumor suppressor genes and mechanism of action of p53 proteins. Stem Cells - Sources and types of stem cells, Stem cell transplant and its types, Potential targets for stem cell treatment, Therapeutic applications of stem cells, Regenerative medicine and Stem cell ethics. Skin Grafting	Lectue methods, demonstrations, experiments, ABL, PBL, Field visits	8
v	Gene therapy- basic approaches and types of gene therapy, vectors used in gene therapy, application of gene therapy in medicine. Nanobiotechnology - Introduction, types and structures of nanoparticles, biosynthesis of nanoparticles, application of nanoparticles in treatment.	Lectue methods, demonstrations, experiments, ABL, PBL, Field visits	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	Biochemical test for identification of bacteria	Experiments	BL4-Analyze	3
II	Extraction and separation of Antigen proteins from Bacteria & protozoa	Experiments	3	
III	Estimation of blood glucose.	Experiments	BL4-Analyze	2
IV	Estimation of cholesterol in blood.	Experiments	2	
V	Estimation of iron in blood.	Experiments	BL5-Evaluate	3
VI	Biological synthesis of nanoparticles	Experiments	2	
VII	Widal test	PBL	BL4-Analyze	5

### Part D(Marks Distribution)

Theory											
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	40	60	18	40							
	Practical Practical										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						

#### Part E

Books	Click B.R. and Pasurank. Molecular biotechnology – Principle and Applications of Recombinant DNA. J.J.(4th edition), ASM Press. 2010. Anthony D. Ho, Hoffman. R, and Esmail D. Zanjani, Stem Cell Transplantation (4th edition), Wiley – liss publishers, 2006. Hornyak. G.J., Moore. J.J. Tibbals H.F., Dutta. J. Fundamentals of Nanotechnology (1st edition), CRC press, 2008.
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8153617/
References Books	Jogdand. S. N. Medical Biotechnology -, (4th edition), Himalayan publishing house, 2004. Freshney J., Stacey. G. N, Auerbach. J.M, Culture of Human Stem Cells (1st edition), Wiley – Liss publishers, 2007.
MOOC Courses	NA NA
Videos	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8153617/

COs	PO1	PO2	PO3	PO4	P05	P06	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	1	1	-	-	-	-	-	-	-	1	2	1
CO2	2	2	2	2	3	1	2	-	-	-	-	-	2	1	2
CO3	3	1	1	2	2	-	2	-	-	-	-	-	2	1	2
CO4	2	1	1	2	1	3	1	-	-	-	-	-	1	1	1
CO5	1	2	2	1	1	-	1	-	-	-	-	-	1	3	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### Bsc\_Microbiology

Title of the Course	Medical Microbi	ology										
Course Code	DSE V (T)	JSE V (T)										
	Part A											
Year	Year 4th Semester 7th Credits											
1001	441	Comester	741	4	4	0	0	4				
Course Type	Theory only	heory only										
Course Category	Discipline Core	Jiscipline Core										
Pre-Requisite/s		ovides learning opportunities in the based infectious disease.	sic principles of medical	Co-Requisite/s	It covers mechanisms of infectious disease transmission, principles of aseptic practice, and the rol of the human body's normal microflora.							
Course Outcomes & Bloom's Level	CO2- It covers it CO3- It also pro CO4- To unders CO5- Helps to u	mechanisms of infectious disease tran ovides opportunities to develop inform- stand the importance of pathogenic ba	nsmission, principles of aseptic pra- atics and diagnostic skills, including acteria in human disease with respe- medical field. Explain the methods of	biology and infectious disease. (BL1-Remember) ctice, and the role of the human body normal microflora. (BL1-I the use and interpretation of laboratory tests in the diagnosis of lot to infections of the respiratory tract, gastrointestinal tract, urin of microorganisms control, e.g., chemotherapy & vaccines. Solve	infectious diseases. (Bi ary tract, skin and soft ti	ssue.(BL3-Apply)	scall the relationship of this	s infection to symptoms,				
Coures Elements	Skill Developme Entrepreneursh Employability & Professsonal El Gender X Human Values Environment &	nip X thics X	SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education)								

Part F

Modules	Contents	Pedagogy	Hours
1	Fundamental Concepts: History of microbiology, Discovery of microorganisms, Contributions of Louis Pasteur and Robert Koch in Medical Microbiology. Requirements for microbial growth, growth factors, culture media-synthetic and complex, types of media. Obtaining Pure Cultures, Preserving Bacterial Cultures, Growth Curves and generation time, Control of microbial growth, general concept of effect of environmental factors on growth of microbes.	Tutorials, Collaborative, Demonstrations, videos, case studies , tutorials	8
2	Bacterial Cells - fine structure and function: Size, shape and arrangement of bacterial cells. Cell membrane, cytoplasmic matrix, inclusion bodies (e.g. magnetosomes), nucleoid, Ultrastructure of Gram -ve and Gram -ve bacterial cell wall, Pill, Capsule, Flagelia and motility.	Tutorials, Collaborative, Demonstrations, videos, case studies , tutorials	8
3	Principles of Diseases and Epidemiology: Relationship between Normal microbiota and host, Opportunistic microorganisms, nosocomial infections, Development and spread of infectious disease: invasion, pathogen, parasite, pathogenicity, virulence, carriers and their types.	Tutorials, Collaborative, Demonstrations, videos, case studies , tutorials	7
4	Bacterial Diseases (with reference to eliology, clinical symptoms, virulence factors involved, detection and prevention) Respiratory tract infections: Diphtheria and Tuberculosis, Gastrointestinal tract infections, staphylococcal food poisoning and E. coll gastroentrists, Urinary tract infections; genorrhea and sphilits.	Tutorials, Collaborative, Demonstrations, videos, case studies , tutorials	8
5	Antimicrobial chemotherapy and emerging antimicrobial resistance. Spectrum of antimicrobial activity, action of antimicrobial drugs, inhibitors of cell wall synthesis, anti-mycobacterial artibitotis, inhibitors of proteins synthesis and nucleic acid synthesis, competitive inhibitors of essential metabolities, antifungal, antiviral, anti-protozoan drugs; effectiveness of chemotherapeutic agents, concepts of antimicrobial resistance, novel methods to combat increasing antimicrobial resistance.	Tutorials, Collaborative, Demonstrations, videos, case studies , tutorials	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
5	Antibiotic sensitivity test against microorganism	PBL	BL3-Apply	1 week

#### Part D(Marks Distribution)

Theory											
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	40	40	12	60							
	•	•	Practical	•	•						
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
	0										

Part E

Books	Gerard J. Tortora, Berdell R. Funke, Christine L. Case-Microbiology: An Introduction-9th edition								
Articles	http://microbiology.free.fr/Presentations/antimicrobialchemotheray.pdf								
References Books	References Books Joanne M. Willey, Linda M. Sherwood, Christopher J. Woolverton, Prescott, Harley, and Klein's Microbiology 8th edition								
	https://nptel.ac.in/courses/102105087 https://nptel.ac.in/courses/102103015								
	https://hplela.ci.in/courses/102160897 https://hplela.ciin/courses/102103015 https://hplela.ciin/courses/102								

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	2	1	3	-	-	-	-	-	-	1	3	2
CO2	1	2	1	-	1	3	-	-	-	-	-	-	2	2	1
CO3	3	3	3	3	3	-	3	-	-	-	-	-	3	1	3
CO4	1	2	1	1	1	3	3	-	-	-	-	-	3	2	1
CO5	3	2	2	2	3	3	-	-	-	-	-	-	1	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_Biotechnology

Title of the Course	Medical Microbi	al Microbiology												
Course Code	DSE V (T)													
				Part A										
Year	4th	Semester	7th	Credits	L	Т	P	С						
					4	0	0	4						
Course Type	Theory only	y only												
Course Category	Discipline Core	scipline Core												
Pre-Requisite/s	This course pro microbiology an	vides learning opportunities in the bas d infectious disease.	sic principles of medical	Co-Requisite/s	It covers mechanisms of infectious disease transmission, principles of aseptic practice, and the rol of the human body's normal microflora.									
Course Outcomes & Bloom's Level	CO2- It covers it CO3- It also pro CO4- To unders CO5- Helps to u	mechanisms of infectious disease tran ovides opportunities to develop information stand the importance of pathogenic ba	nsmission, principles of aseptic pra atics and diagnostic skills, including acteria in human disease with respondedical field. Explain the methods of	biology and infectious disease.(BL1-Remember) citice, and the role of the human body's normal microflora. (BL1-I title by the use and interpretation of laboratory tests in the diagnosis of ct to infections of the respiratory tract, gastrointestinal tract, urin, if microorganisms control, e.g., chemotherapy & vaccines. Solve	infectious diseases. (B ary tract, skin and soft ti	ssue (BL3-Apply)	ecall the relationship of this	s infection to symptoms,						
Coures Elements	Skill Development ✓ Entrepreneurship X Employability ✓ Professonal Ethics X Gender X Human Values ✓ Environment ✓													

Part B

Modules	Contents	Pedagogy	Hours
1	Fundamental Concepts: History of microbiology, Discovery of microorganisms, Contributions of Louis Pasteur and Robert Koch in Medical Microbiology, Requirements for microbial growth, growth factors, culture medie-synthetic and complex, types of media. Obtaining Pure Cultures, Preserving Bacterial Cultures, Growth Curves and generation time, Control of microbial growth, general concept of effect of environmental factors on growth of microbial	Tutorials, Collaborative, Demonstrations, videos, case studies , futorials	8
2	Bacterial Cells - fine structure and function: Size, shape and arrangement of bacterial cells. Cell membrane, cytoplasmic matrix, inclusion bodies (e.g. magnetosomes), nucleoid, Ultrastructure of Gram -ve and Gram -ve bacterial cell wall, Pili, Capsule, Flagela and motility.	Tutorials, Collaborative, Demonstrations, videos, case studies , futorials	8
3	Principles of Diseases and Epidemiology: Relationship between Normal microbiota and host, Opportunistic microorganisms, nosocomial infections, Development and spread of infectious disease: invasion, pathogen, parasite, pathogenicity, virulence, carriers and their types.	Tutorials, Collaborative, Demonstrations, videos, case studies , futorials	7
	Bacterial Diseases (with reference to etiology, clinical symptoms, virulence factors involved, detection and prevention) Respiratory tract infections: Diphtheria and Tuberculosis, Gastrointestinal tract infections, staphylococcal food poisoning and E. coli gastroenifist, Urinary tract infections: genometre and spirits or provided to the provided of the provided	Tutorials, Collaborative, Demonstrations, videos, case studies , futorials	8
5	Antimicrobial chemotherapy and emerging antimicrobial resistance: Spectrum of antimicrobial activity, action of antimicrobial drugs, inhibitors of cell wall synthesis, anti-mycobacterial antibiotics, inhibitors of protein synthesis and nucleic acid synthesis, competitive inhibitors of essential metabolites, antifunga, antiviria, anti-protozoan drugs, effectiveness of chemotherapeutic agents, concepts of antimicrobial resistance, novel methods to combat increasing antimicrobial resistance.	Tutorials, Collaborative, Demonstrations, videos, case studies , futorials	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
5	Antibiotic sensitivity test against microorganism	PBL	BL3-Apply	1 week

# Part D(Marks Distribution)

	Theory												
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
100	40	40	12	60									
	•	•	Practical	•	•								
Total Marks	Minimum Passing Marks External Evaluation		Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
	0												

Part E

Books	Gerard J. Tortora, Berdell R. Funke, Christine L. Case-Microbiology: An Introduction-9th edition
Articles	http://microbiology.free.fr/Presentations/antimicrobialchemotheray.pdf
References Books	Joanne M. Willey, Linda M. Sherwood, Christopher J. Woolverton, Prescott, Harley, and Klein's Microbiology 8th edition
	https://nptel.ac.in/courses/102105087 https://nptel.ac.in/courses/102103015
	https://hptal.ac.in/courses/10/2105087 https://hptal.ac.in/courses/10/2105087

(	COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	1	2	2	1	3	-	-	-	-	-	-	1	3	2
CO2		1	2	1	-	1	3	-	-	-	-	-	-	2	2	1
CO3		3	3	3	3	3	-	3	-	-	-	-	-	3	1	3
CO4		1	2	1	1	1	3	3	-	-	-	-	-	3	2	1
CO5		3	2	2	2	3	3	-	-	-	-	-	-	1	2	2
CO6		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### Bsc\_Microbiology

Title of the Course	Industrial Biotec	chnology										
Course Code	DSE VI (T)											
				Part A								
Year	4th	Semester	7th	Credits	L	Т	P	С				
	.=:			4	4	0	0	4				
Course Type	Theory only	<i>n</i> y only										
Course Category	Discipline Core	iscipline Core										
Pre-Requisite/s		ovides learning opportunities in the bas and infectious disease.	ic principles of medical	Co-Requisite/s	It covers mechanisms of infectious disease transmission, principles of aseptic practice, and the role of the human body's normal microflora.							
Course Outcomes & Bloom's Level	CO2- It covers CO3- It also pro CO4- To unders CO5- Helps to	mechanisms of infectious disease tran ovides opportunities to develop informa stand the importance of pathogenic ba	smission, principles of aseptic pra- atics and diagnostic skills, including cteria in human disease with respe- redical field. Explain the methods of	biology and infectious disease. (BL1-Remember) ctice, and the role of the human body's normal microflora. (BL1-I tipe, and the role of the human body's normal microflora. (BL1-I tipe) the use and interpretation of laboratory tests in the diagnosis of ct to infections of the respiratory tract, gastrointestinal tract, urin, of microorganisms control, e.g., chemotherapy & vaccines. Solve	infectious diseases. (Bi ary tract, skin and soft tis	ssue.(BL3-Apply)	rcall the relationship of this	s infection to symptoms,				
Coures Elements	Skill Development ✓ Enterprenurship × Employability ✓ Employability ✓											

Part B

Modules	Contents	Pedagogy	Hours
1	Fundamental Concepts: History of microbiology, Discovery of microorganisms, Contributions of Louis Pasteur and Robert Koch in Medical Microbiology, Requirements for microbial growth, growth factors, culture media-synthetic and complex, types of media. Obtaining Pure Cultures, Preserving Bacterial Cultures, Growth Curves and generation time, Control of microbial growth, general concept of effect of environmental factors on growth of microbial	Tutorials, Collaborative, Demonstrations, videos, case studies , tutorials	8
2	Bacterial Cells - fine structure and function: Size, shape and arrangement of bacterial cells. Cell membrane, cytoplasmic matrix, inclusion bodies (e.g. magnetosomes), nucleoid, Ultrastructure of Gram -ve and Gram -ve bacterial cell wall, Pill, Capsule, Flagela and motility.	Tutorials, Collaborative, Demonstrations, videos, case studies , tutorials	8
3	Principles of Diseases and Epidemiology: Relationship between Normal microbiota and host, Opportunistic microorganisms, nosocomial infections, Development and spread of infectious disease: invasion, pathogen, parasite, pathogenicity, virulence, carriers and their types.	Tutorials, Collaborative, Demonstrations, videos, case studies , tutorials	7
4	Bacterial Diseases (with reference to etiology, clinical symptoms, virulence factors involved, detection and prevention) Respiratory tract infections: Diptheria and Tuberculosis, Gastrointestinal tract infections, staphylococcal food poisoning and E. coll gastroenfells. Ulrinary tract infections: genometre and spight of the properties of the properti	Tutorials, Collaborative, Demonstrations, videos, case studies , tutorials	8
5	Antimicrobial chemotherapy and emerging antimicrobial resistance. Spectrum of antimicrobial activity, action of antimicrobial drugs, inhibitors of cell wall synthesis, anti-mycobacterial antibiotics, inhibitors of protein synthesis and nucleic acid synthesis, competitive inhibitors of essential metabolites, antifunga, antiviria, anti-protozoan drugs, effectiveness of chemotherapeutic agents, concepts of antimicrobial resistance, novel methods to combat increasing antimicrobial resistance.	Tutorials, Collaborative, Demonstrations, videos, case studies , tutorials	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
5	Antibiotic sensitivity test against microorganism	PBL	BL3-Apply	1 week

### Part D(Marks Distribution)

	Theory												
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
100	40	40	12	60									
	•	•	Practical	•	•								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
	0												

Part E

Books	Gerard J. Tortora, Berdell R. Funke, Christine L. Case-Microbiology: An Introduction-9th edition					
Articles	http://microbiology.free.fr/Presentations/antimicrobialchemotheray.pdf					
References Books Joanne M. Willey, Linda M. Sherwood, Christopher J. Woolverton, Prescott, Harley, and Klein's Microbiology 8th edition						
	https://nptel.ac.in/courses/102105087 https://nptel.ac.in/courses/102103015					
	https://hplela.ci.in/courses/102160897 https://hplela.ciin/courses/102103015 https://hplela.ciin/courses/102					

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	2	1	3	-	-	-	-	-	-	1	3	2
CO2	1	2	1	-	1	3	-	-	-	-	-	-	2	2	1
CO3	3	3	3	3	3	-	3	-	-	-	-	-	3	1	3
CO4	1	2	1	1	1	3	3	-	-	-	-	-	3	2	1
CO5	3	2	2	2	3	3	-	-	-	-	-	-	1	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### Bsc\_Microbiology

Title of the Course	Industrial Microbiology	ustrial Microbiology									
Course Code	DSE VI (T)	iεVi(T)									
Part A											
Year	4th Semester	7th	Credits	L	Т	P	С				
			3	3	0	1	4				
Course Type	Embedded theory and lab	xedded theory and lab									
Course Category	Discipline Core	cipline Core									
Pre-Requisite/s	Explain the various fermentation strategies industrial microorganisms	and the growth kinetics of	Co-Requisite/s	the environmental and nutritional factors affecting the production of various metabolites, the best conditions and optimization protocol needed for various microbial products							
Course Outcomes & Bloom's Level	CO1- To identify the different types of ferme CO2- Explain the various fermentation strat CO3- Discuss the methods for the productic CO4- Describe the environmental and nutrit CO5- Select the best conditions and optimiz	egies and the growth kinetics on of certain products (metabli ional factors affecting the pro-									
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professsonal Ethics ✓ Gender X Human Values ✓ Environment ✓	SDG (Goals)	SDG4(Quality education) SDG8(Decent work and economic growth)								

		Part B	
Modules	Contents	Pedagogy	Hours
1	Bioreactor / Fermenter – types & operation of Bioreactors, physioc-chemical standards used in bioreactors, limitations of bioreactors, stages of Imemination processes, Media design for fermentation processes, Solid substrate fermentation, Fermenters (Stirred tank, bubble columns, airlift. Bioreactors, Static, Submerged and agitated fermentation), advantages & disadvantages of solid substrate & liquid fermentation.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	8
2	Technology of Microbial cell maintenance – steps to maintain microbial culture in an aseptic & sterile environment (how to inocultate, preserve & maintain). Strain preservation, maintenance and strain improvement by mutation of gene transfer processes.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, industrial visits	8
3	Downstream processing – extraction, separation, concentration, recovery & purification, operations (Insulin, Vitamins, Metabolites), Industria production of Ethyl acohol, Acetic Acid (Vinegar), Citic acid, lactic acid, carnylase, protease penicillin, tetracycline and vitamin B12, with reference to easily available raw materials, Production of herbal drugs.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, industrial visits	8
4	Enzyme technology – nature of enzymes, application of enzymes, limitations of microbial cells used as catalysts in fermentation, multi-enzyme reactors, genetic engineering & protein engineering of enzymes, cloning strategy for enzymes, technology of enzyme production, use of immobilized cells and enzymes (Ca-alginate beads, polyacryfamide), industrial applications of immobilized enzymes.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	8
5	Biotechnology in specific medical & industrial applications - Retting of jute, microbial process for immunization (Production of monocional antibodies). Deterioration of paper, textiles, painted surfaces and their prevention, Biofilms, microbial biopolymers, bio-surfaciants, Microbial culture selection with high yield potential.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, industrial visits	8

	Pa	art C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Study different parts of fermenter	Experiments	BL2-Understand	2
1	To check the antimicrobial properties of Asoca sarca	PBL	BL4-Analyze	2 months
4	Solid state fermentation – Mushroom production	Experiments	BL3-Apply	2
5	Production of Wine from Grapes	Experiments	BL3-Apply	2
6	Cell separation of yeast and LAB by Centrifugal and Filtration	Experiments	BL3-Apply	2

### Part D(Marks Distribution)

	Theory										
Total Marks	Minimum Passing Marks	External Evaluation Min. External Evaluation		Internal Evaluation	Min. Internal Evaluation						
100	40	40	12	60							
	Practical Practical										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	50	40	20	60							

	Part E			
Books	L. E. Casida Industrial Microbiology (1st Edition)			
Articles strainimprovement-130430125756-phpapp02.pdf				
References Books	References Books Nduka Okafor Modern Industrial Microbiology and Biotechnology-1st Edition			
MOOC Courses	https://nptel.ac.in/courses/102106053 https://nptel.ac.in/courses/102106022			
Vidoos	https://nptel.ac.in/courses/102106053			

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	1	1	3	1	-	-	-	-	-	1	2	1
CO2	1	1	1	3	3	2	-	-	-	-	=	=	2	3	-
CO3	3	2	3	-	3	-	1	-	-	-	=	=	3	1	3
CO4	3	2	3	2	2	3	2	-	-	-	=	=	1	2	3
CO5	3	3	3	2	3	2	2	-	-	-	=	=	2	3	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_Biotechnology

Title of the Course	Industrial Microbiology	strial Microbiology									
Course Code	DSE VI (T)										
Part A											
Year	4th Semester	7th	Credits	L	Т	P	С				
154	Scinesia:	7.01	5154.15	3	0	1	4				
Course Type	Embedded theory and lab	dded theory and lab									
Course Category	Discipline Core	pline Core									
Pre-Requisite/s	Explain the various fermentation strategies industrial microorganisms	and the growth kinetics of	Co-Requisite/s	the environmental and nutritional factors affecting the production of various metabolites, the best conditions and optimization protocol needed for various microbial products							
Course Outcomes & Bloom's Level	CO3- Discuss the methods for the producti	tegies and the growth kinetics on of certain products (metab itional factors affecting the pro	s of industrial microorganisms (BL2-Understand) solilles) using different microorganisms (BL2-Understand) oduction of various metabolites(BL3-Apply) irlous microbial products(BL4-Analyze)								
Coures Elements	Skill Development  Entrepreneurship  Employability  Professsonal Ethics  Gender  Human Values  Entrepreneurship  Entrepreneurship  SDG (Goals)  SDG4(Quality education) SDG8(Decent work and economic growth) SDG8(Decent work and economic growth)										

		Part B	
Modules	Contents	Pedagogy	Hours
1	Bioreactor / Fermenter – types & operation of Bioreactors, physico-chemical standards used in bioreactors, limitations of bioreactors, stages of fermentation processes, Media design for fermentation processes, Solid substrate fermentation, Fermenters (Stirred tank, bubble columns, airlift. Bioreactors, Static, Submerged and agitated fermentation), advantages & disadvantages of solid substrate & liquid fermentation.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	8
2	Technology of Microbial cell maintenance – steps to maintain microbial culture in an aseptic & sterile environment (how to inocultate, preserve & maintain). Strain preservation, maintenance and strain improvement by mutation of gene transfer processes.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, industrial visits	8
3	Downstream processing – extraction, separation, concentration, recovery & purification, operations (Insulin, Vitamins, Metabolites), Industria production of Etryl alcohol, Acetic Acid (Vinegar), Citric acid, Lotic acid, carrylase, protease penicillin, tetracycline and vitamin B12, with reference to easily available raw materials, Production of herbal drugs.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, industrial visits	8
4	Enzyme technology – nature of enzymes, application of enzymes, limitations of microbial cells used as catalysts in fermentation, multi-enzyme reactors, genetic engineering & protein engineering of enzymes, cloning strategy for enzymes, technology of enzyme production, use of immobilized cells and enzymes (Ca-alginate beads, polyacrylamide), industrial applications of immobilized enzymes.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	8
5	Biotechnology in specific medical & industrial applications - Retting of jute, microbial process for immunization (Production of monocional antibodies). Deterioration of paper, textiles, painted surfaces and their prevention, Biofilms, microbial biopolymers, bio-surfaciants, Microbial culture selection with high yield potential.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, industrial visits	8

	Pa	art C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Study different parts of fermenter	Experiments	BL2-Understand	2
1	To check the antimicrobial properties of Asoca sarca	PBL	BL4-Analyze	2 months
4	Solid state fermentation – Mushroom production	Experiments	BL3-Apply	2
5	Production of Wine from Grapes	Experiments	BL3-Apply	2
6	Cell separation of yeast and LAB by Centrifugal and Filtration	Experiments	BL3-Apply	2

#### Part D(Marks Distribution) Theory Min. External Evaluation Internal Evaluation Total Marks External Evaluation Min. Internal Evaluation Minimum Passing Marks Practical Total Marks Minimum Passing Marks External Evaluation Min. External Evaluation Internal Evaluation Min. Internal Evaluation 50 40

	Part E
Books	L. E. Casida Industrial Microbiology (1st Edition)
Articles	strainimprovement-130430125756-phpapp02.pdf
References Books	Nduka Okafor Modern Industrial Microbiology and Biotechnology-1st Edition
MOOC Courses	https://nptel.ac.in/courses/102106053 https://nptel.ac.in/courses/102106022
Videos	https://ipidel.ac.in/courses/10/2106053 https://ipidel.ac.in/courses/10/2106052 https://ipidel.ac.in/courses/10/2106052

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	1	1	3	1	-	-	-	-	-	1	2	1
CO2	1	1	1	3	3	2	-	-	-	-	-	-	2	3	-
CO3	3	2	3	-	3	-	1	-	-	-	-	-	3	1	3
CO4	3	2	3	2	2	3	2	-	-	-	-	-	1	2	3
CO5	3	3	3	2	3	2	2	=	-	-	=	=	2	3	2
CO6	-	-	-				-	-	-	-	-	-	-	-	-



BSc\_Biotechnology

Title of the Course	Industrial Biotech	dustrial Biotechnology								
Course Code	DSE VI (T)	SE VI (T)								
Part A										
Year	4th	Semester	7th	Credits		L	Т	P	С	
Teal .	401	Selliestei	741	Credits		4	0	0	4	
Course Type	Theory only							•		
Course Category	Discipline Core	ipline Core								
Pre-Requisite/s	This course prov microbiology and	vides learning opportunities in the bas d infectious disease.	ic principles of medical	Co-Requisite/s		It covers mechanisms of infectious disease transmission, principles of aseptic practice, and the role of the human body's normal microflora.				
Course Outcomes & Bloom's Level	CO2- Demonstra CO3- Demonstra CO4- Apply mole	ding of the basic principles and clinica ate an understanding of basic molecu ate an understanding of electrophores ecular diagnostic techniques to the id- id the basics in quality control and qui	lar diagnostic techniques (BL2-Une sis in the separation of DNA fragme entification and diagnosis of diseas	ents() ses(BL3-Apply)	1-Remember)					
Coures Elements				SDG3(Good health and well-being) SDG4(Quality education)						
				Part B						
Modules			Contents			Pedagogy		H	Hours	

Part B									
	Modules	Contents	Pedagogy	Hours					

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
5	Antibiotic sensitivity test against microorganism	PBL	BL3-Apply	1 week

	Part D(Marks Distribution)											
	Theory											
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation							
100	40	40	12	60								
	Practical Practical											
Total Marks Minimum Passing Marks		External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation							
	0											

	Part E									
Books	Gerard J. Tortora, Berdell R. Funke, Christine L. Case-Microbiology: An Introduction-9th edition									
Articles http://microbiology.free.fr/Presentations/antimicrobiolchemotheray.pdf										
References Books	Joanne M. Willey, Linda M. Sherwood, Christopher J. Woolverton, Prescott, Harley, and Klein's Microbiology 8th edition									
MOOC Courses	https://nptel.ac.in/courses/102105087 https://nptel.ac.in/courses/102103015									
Videos	https://nptel.ac.in/courses/102105087 https://nptel.ac.in/courses/102103015									

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	2	1	3	-	-	-	-	-	-	1	3	2
CO2	1	2	1	-	1	3	-	-	-	-	-	-	2	2	1
CO3	3	3	3	3	3	-	3	-	-	-	-	-	3	1	3
CO4	1	2	1	1	1	3	3	-	-	-	-	-	3	2	1
CO5	3	2	2	2	3	3	-	-	-	=	-	=	1	2	2
COS		_	_	_	_	_	_	_	_	_	_	_	_	_	_



### Bsc\_Microbiology

Title of the Course	Food and Dairy	Microbiology										
Course Code	DSE VII (T)											
	PartA											
Year	4th	Semester	8th	Credits	L	Т	P	С				
					3	0	1	4				
Course Type	Embedded theo	ory and lab										
Course Category	Discipline Core	cipline Core										
Pre-Requisite/s	Explain the inter influencing their	ractions between microorganisms and t growth and survival.	he food environment, and factors	Co-Requisite/s	Describe the characteristics of foodborne, waterborne, and spoilage microorganisms, and methods for their isolation, detection, and identification.							
Course Outcomes & Bloom's Level	CO2- Demonstr CO3- Demonstr CO4- Apply mol	nding of the basic principles and clinical rate an understanding of basic molecula rate an understanding of electrophoresis lecular diagnostic techniques to the iden nd the basics in quality control and qual	ar diagnostic techniques(BL2-Unde is in the separation of DNA fragmen ntification and diagnosis of disease:	ts()								
Coures Elements	ent√ ip√ thics√	SDG4(Quality education)										

Modules Contents Pedagogy Hours

	Pai	rt C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Staining of microorganisms	Experiments	BL3-Apply	2
2	Composition, preparation and sterilization of media	Experiments	BL3-Apply	2
3	Demonstration of techniques for pure culture of microorganisms	Experiments	BL4-Analyze	2
4	Streak plate method	Experiments	BL3-Apply	2
5	Pour plate method.	Experiments	BL3-Apply	2
6	Serial dilution agar plate method	Experiments	BL4-Analyze	2
7	Microbiology testing of milk	PBL	BL4-Analyze	2
8	Serial dilution agar plate method	Experiments	BL4-Analyze	2
9	To visit the various food industries in order to learn the basic methodologies	Industrial Visit	BL2-Understand	5
10	To visualize the effect of antibiotics on the expression and growth of fungi and Bacterial cell.	PBL	BL3-Apply	4
11	To determine the production of primary and secondary metabolites by Endophytic Microorganism.	PBL	BL3-Apply	4

### Part D(Marks Distribution)

	Theory												
Total Marks Minimum Passing Marks		External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
100 50		40	12	60									
	Practical												
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation								
100	50	40	20	60									

#### Part E

Books	Virendra Kumar Pande Textbook of Food Microbiology 1st Edition
Articles	https://academic.oup.com/ljmb
	John C. Ayres Microbiology of Foods 2nd Edition Frazier, W.C. Food Microbiology 4th edition Frazier, M.C. Food Microbiology 3th edition Petaz, H.J. and Rober, D. Microbiology 5th edition
	https://onlinecourses.nplela.cin/nc224_ag0/2/preview https://onlinecourses.nplela.cin/nc223_ag0/2/preview https://onlinecourses.nplela.cin/nc223_ag0/2/preview https://onlinecourses.nplela.cin/nc223_ag0/2/preview https://onlinecourses.nplela.cin/nc224_ag0/7/preview
Videos	https://nptel.ac.in/courses/102105058

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	2	2	1	-	-	-	-	-	2	3	1	2
CO2	2	2	1	3	1	3	2	-	-	-	-	2	1	2	1
CO3	1	1	2	2	2	1	2	3	-	-	-	1	3	3	2
CO4	3	2	3	3	1	1	3	2	-	-	-	1	2	3	1
CO5	2	3	3	2	3	2	1	2	-	-	-	3	1	2	3
CO6	-	-	-	=	i.	=	=	i.	-	-	-	i	-	-	-



### BSc\_Biotechnology

Title of the Course	Food and Dairy	Microbiology									
Course Code	DSE VII (T)										
				Part A							
Year	4th	Semester	8th	Credits	L	Т	P	С			
	401	Genesia	out	S. Callo	3	0	1	4			
Course Type	Embedded thed	ory and lab									
Course Category	Discipline Core	scipline Core									
Pre-Requisite/s	Explain the inte influencing their	eractions between microorganisms and t r growth and survival.	he food environment, and factors	Co-Requisite/s	Describe the characteristics of foodborne, waterborne, and spollage microorganisms, and methods for their isolation, detection, and identification.						
Course Outcomes & Bloom's Level	CO2- Demonstr CO3- Demonstr CO4- Apply mo	nding of the basic principles and clinical rate an understanding of basic molecula rate an understanding of electrophoresis lecular diagnostic techniques to the iden nd the basics in quality control and qual	ar diagnostic techniques(BL2-Unde is in the separation of DNA fragment intification and diagnosis of disease	s()							
Coures Elements	Skill Developme Entrepreneursh Employability ✓ Professsonal El Gender X Human Values Environment ✓	nip ✓ thics ✓	SDG (Goals)	SDG4(Quality education)							

 Part B

 Modules
 Contents
 Pedagogy
 Hours

	Pa	rt C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Staining of microorganisms	Experiments	BL3-Apply	2
2	Composition, preparation and sterilization of media	Experiments	BL3-Apply	2
3	Demonstration of techniques for pure culture of microorganisms	Experiments	BL4-Analyze	2
4	Streak plate method	Experiments	BL3-Apply	2
5	Pour plate method.	Experiments	BL3-Apply	2
6	Serial dilution agar plate method	Experiments	BL4-Analyze	2
7	Microbiology testing of milk	PBL	BL4-Analyze	2
8	Serial dilution agar plate method	Experiments	BL4-Analyze	2
9	To visit the various food industries in order to learn the basic methodologies	Industrial Visit	BL2-Understand	5
10	To visualize the effect of antibiotics on the expression and growth of fungi and Bacterial cell.	PBL	BL3-Apply	4
		1		1.

### Part D(Marks Distribution)

	Theory										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	50	40	12	60							
			Practical								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	50	40	20	60							

#### Part E

Books	Virendra Kumar Pande Textbook of Food Microbiology 1st Edition
Articles	https://academic.oup.com/ljmb
References Books	John C. Ayres Microbiology of Foods 2nd Edition Frazier, W.C. Food Microbiology 4th edition Frazier, M.C. Food Microbiology 3th edition Petaz, H.J. and Rober, D. Microbiology 5th edition
	https://onlinecourses.nplela.cin/nc224_ag0/2/preview https://onlinecourses.nplela.cin/nc223_ag0/2/preview https://onlinecourses.nplela.cin/nc223_ag0/2/preview https://onlinecourses.nplela.cin/nc223_ag0/2/preview https://onlinecourses.nplela.cin/nc224_ag0/7/preview
Videos	https://nptel.ac.in/courses/102105058

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	2	2	1	-	-	-	-	-	2	3	1	2
CO2	2	2	1	3	1	3	2	-	-	-	-	2	1	2	1
CO3	1	1	2	2	2	1	2	3	-	-	-	1	3	3	2
CO4	3	2	3	3	1	1	3	2	-	-	-	1	2	3	1
CO5	2	3	3	2	3	2	1	2	-	-	-	3	1	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



							-	Sc_Biotec											
								DOC_DIOLEC	iniology										
		ne Course		armaceutical Biotechnolo	gy														
	Cours	e Code	DS	E VII (T)															
					1			Part	A			-					_		_
	Y	ear	411	ו		Sem	nester		8th					Cred	dits	L 2	T 0	P 0	C 2
	Cours	е Туре	Er	nbedded theory and lab															
	Course	Category	Di	sciplinary Major															
	Pre-Re	quisite/s	St	udent must know Genetic	engineering a	pplications in relation	n to production of pha	armaceuticals	and the use of micr	oorganisms i	n fermentation	technology		Co-Requ	uisite/s				
	Course ( & Bloor	Outcomes n's Level	CC	01- understanding of the 02- Demonstrate an unde 03- Demonstrate an unde 04- Apply molecular diag 05- Understand the basic	rstanding of ba	asic molecular diagno	ostic techniques(BL2 separation of DNA fra	!-Understand	1)	nostics.(BL1	-Remember)								
	Coures	Elements	Er Er Pr Ge Hu	ill Development   Itrepreneurship   Itrepreneurship   Inployability   Inployab						SDG (G	ioals)		SDG4(Qualit	health and well-bei y education) nt work and econom					
								Part	В										
	Мо	dules				Co	ontents	-					Pedagogy			н	ours		
Modu	les				Title			Part	С	Experin	tive-ABCA/PB	BL/ ork/		E	Bloom's Level			Hours	
1		Isolation of enzymes t	from natural	isolates					PBL	li .	nternships			BL3-Apply			I week		
11				s using isolated enzymes					PBL					BL6-Create					
III		Isolation of genomic E		s using isolated enzymes					Experiments					BL3-Apply			3		
IV				ing kit and its visualization	ueina agaroe	a del electrophorecie			Experiments					BL4-Analyze			7		
v				necessary arrangements			•		Field work					BL6-Create			30 days		
VI		To demonstarte the w			or produceror	or arrino doldo			Industrial Visit					BL2-Understand					
VII				f medicinal plant extracts					Experiments BL3-Apply										
VIII		Antibacterial activity.	it inculous o	Thousand plant extraols					Experiments					BL4-Analyze					
IX		Antifungal activity.							Experiments					BL4-Analyze					
X		Total antioxidant activ	ity						PBL					BL4-Analyze					
XI		Phytochemical screen		ry metabolites					PBL					BL4-Analyze					
XII		Phytochemical screen							PBL					BL5-Evaluate					
XIII				acts by chromatography.					PBL					BL4-Analyze			10		
XIV		Estimation of ascorbio							PBL					BL5-Evaluate					
							Par	t D(Marks	Distribution)										
Total M	larks	Min	imum Passi	ng Marks		External Evaluat	tion		Min. External E	valuation		In	ternal Evalu	ation	м	in. Internal Ev	aluation		
100		40		-	60			18				40							
		1						Practi	cal			-			1				
Total M	larks	Mini	imum Passi	ng Marks		External Evaluat	tion		Min. External E	valuation		In	ternal Evalu	ation	м	in. Internal Ev	aluation		
								Part	_										
	Во	oks	J.\	W. Goding: Monoclonal A	ntibodies			rdil	_										
		cles		ps://www.ncbi.nlm.nih.go		PMC3525971/													
	Referenc	es Books	B.F RA	R. Glick and J.J. Pasterna Goldshy et. al., : Kuby Ir M. Walker and E.B. Gingo	k: Molecular B nmunology ld: Molecular B	iotechnology: Princip	oles and Applications	of Recombin	antDNA: ASM Press	Washington	D.C.								
	моос	Courses		ps://nptel.ac.in/courses/1		a, Diotooliile	3, -,,												
		eos		ps://nptel.ac.in/courses/1															
							Соп	urse Articul	ation Matrix										
COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	P09	PO10		PO11	PO12	PSO	n PS	102	PSC	03	
CO1	1	2	2	2	1	1	-	-	-	-		-	-	1	1		2		
CO2	2	2	1	1	2	-	1	-	-	-		-	-	2	2		3		
CO3	2	1	2	3	2	1	2	-	-	-		-	-	2	3		1		
CO4	3	1	3	3	1	1	1	-	-	-		-	-	3	3		1		
CO5	1	1	3	1	3	2	-	-	-	-		-	-	2	3		2		
CO6	-	-	-	-	-	-	-	-	-	-		-	-	-	-		-		



### Bsc\_Microbiology

Title of the Course	Pharmaceutical Biotechnolog	gy						
Course Code	DSE VII (T)							
		Pai	rtA					
Year	4th	Semester	8th	Credits	L	Т	Р	С
1641	441	Semester	out	Oreuta	2	0	0	2
Course Type	Embedded theory and lab							
Course Category	Disciplinary Major							
Pre-Requisite/s	Student must know Genetic	engineering applications in relation to production of pharmaceutical	ls and the use of microorganisms in fermentation technology	Co-Requisite/s				
Course Outcomes & Bloom's Level	CO2- Demonstrate an under CO3- Demonstrate an under CO4- Apply molecular diagn	pasic principles and clinical significance of laboratory testing in the testanding of basic molecular diagnostic techniques(BL2-Understanstanding of electrophoresis in the separation of DNA fragments() tostic techniques to the identification and diagnosis of diseases(BLs in quality control and quality assurance(BL2-Understand)	nd)		•			
Coures Elements	Skill Development \( \square\) Entrepreneurship \( \times\) Employability \( \square\) Professsonal Ethics \( \square\) Gender \( \times\) Human Values \( \square\) Environment \( \square\)		SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure)				

Part B Pedagogy Hours

	Pa	art C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	Isolation of enzymes from natural isolates	PBL	BL3-Apply	1 week
II	production of immobilized enzymes using isolated enzymes	PBL	BL6-Create	7
III	Isolation of genomic DNA	Experiments	BL3-Apply	6
IV	To perform restriction digestion using kit and its visualization using agarose gel electrophoresis	Experiments	BL4-Analyze	7
V	Preparation of culture media and necessary arrangements for production of amino acids	Field work	BL6-Create	30 days

Modules

# Part D(Marks Distribution)

	Theory										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	40	60	18	40							
			Practical								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						

Part E

Books	J.W. Goding: Monoclonal Antibodies
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3525971/
References Books	B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of RecombinantDNA: ASM Press Washington D.C. RA Goldshy et al.: Xuby Immunology M.W. Walter and B.E. Gingdid: Molecular Biology and Biotechnology by Royal
MOOC Courses	https://nptel.ac.in/courses/102105342
Videos	https://hptel.ac.in/courses/102105342

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	2	1	1	-	-	-	-	-	-	1	1	2
CO2	2	2	1	1	2	-	1	-	-	-	-	-	2	2	3
CO3	2	1	2	3	2	1	2	-	-	-	-	-	2	3	1
CO4	3	1	3	3	1	1	1	-	-	-	-	-	3	3	1
CO5	1	1	3	1	3	2	-	-	-	-	-	-	2	3	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



### BSc\_ComputerScience

Title of the Course	Ethical Hacking Fundamental							
Course Code	DSE0602[T]							
		Part A						
Year	3rd	Semester	6th		Credit	s	L T F	P C
Course Type	Embedded theory and lab							
Course Category	Discipline Specific Elective							
Pre-Requisite/s	: An attendee of this course mu system. Must be familiar with L	ist have knowledge of Computer system and its components and should inux Operating system, communication network and must have knowled	understand the types of ge of Python or any other	data and data storage in computer scripting language.	Co-Requis	site/s		
Course Outcomes & Bloom's Level	CO2- Demonstrate an understa CO3- Demonstrate an understa CO4- Apply molecular diagnost	ic principles and clinical significance of laboratory testing in the field of nanding of basic molecular diagnostic techniques (EL2-Understand) anding of electrophoresis in the separation of DNA fragments () its techniques to the identification and diagnosis of diseases (BL3-Apply quality control and quality assurance (BL2-Understand)		1-Remember)				
Coures Elements	Skill Development X Entrepreneurship X Employability X Professsonal Ethics X Gender X Human Values ✓ Environment X			SDG (Goals)	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being SDG4(Quality education) SDG8(Decent work and economic SDG11(Sustainable cities and eco	c growth)		
		Part B						
Modules		Contents		Pedag	ogy	Hours		

	Pai	t C		
Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1-2	Assignment	Experiments	BL2-Understand	8
3-4	Activity	Experiments	BL3-Apply	10
1-5	Project	Case Study	BL4-Analyze	15

Part D(Marks Distribution)

	Theory										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	40	60	18	40	22						
			Practical								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
100	50	60	30	40	20						

Part E

Books	Matt Walker CEH Certified Ethical Hacker All-in-One Exam Guide, Second Edition 2nd Edition				
Articles	Patrick Engebretson The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy (Syngress Basics Series) 1st Edition Syngress Basics Series				
References Books Hein Smith (Author), Hillary Morrison (Author) Ethical Hacking: A Comprehensive Beginners Guide to Learn and Master Ethical Hacking					
MOOC Courses					
Videos					

COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	-	-	-	-	-	-	-	-	3	2	1
CO2	1	1	1	2	1	-	-	-	-	-	-		2	3	1
CO3	2	1	1	2	2	-	-	-	-	-	-	=	3	2	1
CO4	1	1	1	2	3	-	-	-	-	-	-	-	1	3	1
CO5	2	2	2	-	-	-	-	-	-	-	-	-	3	2	1
CO6	-	2	1	-	-	-	-	-	-	-	-	-	1	2	1



### BSc\_ComputerScience

200unpatituted.no										
Title of the Course	Title of the Course Mobile Application Development									
Course Code	DSE0603[T]	D603[T]								
Part A										
Year	3rd	Semester	6th	Credi	ite.	L	Т	P	С	
rear	Siu	Semester	out	Credi	its	3	0	1	4	
Course Type	Embedded theory	y and lab								
Course Category Discipline Specific Elective										
Pre-Requisites - Having the little overview about the object-oriented programming.  Co-Requisites - Prerequisites - Having the little overview about the object-oriented programming.										
CO1- understanding of the basic principles and clinical significance of laboratory testing in the field of molecular diagnostics. (BL1-Remember) CO2- Demonstrate an understanding of basic molecular diagnostic techniques (BL2-Understand) CO3- Demonstrate an understanding of electrophoresis in the separation of DNA fragments() CO4- Apply molecular diagnostic techniques to the identification and amongsois of diseases(BL3-Apply) CO5- Understand the basics in quality control and quality assurance(BL2-Understand)										
Coures Elements	Skill Developmen Entrepreneurship Employability ✓ Professsonal Eth Gender X Human Values ✓ Environment X	x ics x	SDG (Goals)	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-beit SDG4(Quality education) SDG8(Decent work and econom SDG10(Reduced inequalities) SDG11(Sustainable cities and ec	nic growth)					
			Pa	rt B						
Modules Contents Pedagogy Hours										
Part C										
Case Study: Mobile Application Using SQLite and Shared Preferences										

		ibution)

	Part Likars Distribution) Theory								
Total Marks Minimum Passing Marks External Evaluation Min. External Evaluation internal Evaluation Min. Internal Evaluation Min. Internal Evaluation									
100	40	60	18	40	22				
	Practical								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
100	50	60	30	40	20				

### Part E

Books	Android Wireless Application Development				
Articles					
References Books Chartie Collins, Michael D.Galpin, Matthias Kappler Android in Practice DreamTech Press 2016					
MOOC Courses					
Videos					

	COs	P01	PO2	PO3	PO4	PO5	PO6	P07	P08	P09	PO10	PO11	PO12	PSO1	PSO2	PS03
С	:01	3	-	-	-	-	-	-	-	-	-		-	1	1	2
С	:02	1	-	-	-	2	-	-	-	-	-		-	3	2	2
С	:03	2	-	-	-	1	-	2	-	-	-		-	3	2	2
С	:04	-	-	-	2	2	2	-	2	-	-	1	1	2	2	2
С	:05	-	-	1	-	-	2	-	1	-	-	-	-	2	2	2
С	:06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	_



### MSc\_FoodTechnology

Title of the Course	Food Safety and Management [T]										
Course Code	FT-303 [T]										
	Part A										
Year	2nd	Semester	3rd	Credits	L	Т	Р	С			
	4 0										
Course Type	Course Type Theory only										
Course Category	Course Category Discipline Core										
Pre-Requisite/s	Pre-Requisite/s  Student must hold a B.Sc degree in Food Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or equivalent. The minimum percentage in the qualifying examination should be 50%  Students should have prior knowledge of food hazards, risk, foo safety and Critical control points.										
& Bloom's Level											
Coures Elements	Skill Development X Entrepreneurship X Employability X Professonal Efficis ✓ Gender X Human Values ✓ Environment ✓  SDG (Goals)  SDG3(Good health and well-being) SDG4(quality education) SDG12(responsible consuption and production)										
·		·	Part B	·	·		·	•			
Modules		Contents		Pedagogy			Hours				
•											

# Following Distribution) Theory Total Marks Minimum Passing Marks External Evaluation Min. External Evaluation Internal Evaluation Min. Internal Evaluation 100 40 60 18 40

Practical

Total Marks Minimum Passing Marks External Evaluation Min. External Evaluation Internal Evaluation Min. Internal Evaluation

	Part E									
Books										
Articles	Articles https://www.sciencedirect.com/science/article/abs/pii/S2214799316300777									
References Books	New Product and Process Development by Clarke and Wright Angi-angiogenic Functional and Medicinal Foods by Losso IN Handbook of Nutraceuticals and Functional Foods by Robert EC Rheology and Texture in Food Quality by J.M. DeMan Food Product Development by Earls R, Earls R and Anderson									
MOOC Courses	https://onlinecourses.swayam2.ac.in/cec20_ag06/preview									
Videos	https://www.youtube.com/watch?v=DSkre3Lkklg									

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	-	1	-	-	-	-	1	3	1	1
CO2	3	3	2	2	2	1	1	-	-	-	-	-	3	1	1
CO3	2	2	3	2	2	2	-	-	-	-	-	-	3	1	1
CO4	2	1	3	3	3	1	2	-	-	-	-	3	3	3	3
CO5	2	1	2	3	3	2	2	-	-	-	-	3	3	3	3
COS	_	_		_	_	_	_	_	_	_	_	_	_	_	_



### MSc\_FoodTechnology

little of the Course	Research Methodology	asearch methodology [1]								
Course Code	FT-305 [T]									
Part A										
Year	2nd	Semester	3rd	Credits	L	Т	Р	С		
					4	0	0	4		
Course Type	Soft skill	kill								
Course Category	Specialization Elective Courses									
Pre-Requisite/s	The student must hold a B.Sc degree in Food Technology, B.Sc. Biology, B.Sc. Bio-Chemistry or equivalent. The minimum percentage in the qualifying examination should be 50%  Co-Requisite/s  Student should have basic knowledge of mean, median mode,sampling methods and probability									
Course Outcomes & Bloom's Level	CO2- Demonstrate an u CO3- Demonstrate an u CO4- Apply molecular of	the basic principles and clinical significance of labounderstanding of basic molecular diagnostic technic understanding of electrophoresis in the separation of diagnostic techniques to the identification and diagnostic techniques to the identification and diagnastic sin quality control and quality assurance (BL2-	ques(BL2-Understand) of DNA fragments() nosis of diseases(BL3-Apply)	s.(BL1-Remember)						
Coures Elements	Skill Development ✓ Entrepreneurship X Employability X Professonal Ethics ✓ Gender X Human Values ✓ Environment X									

	Pall D		
Modules	Contents	Pedagogy	Hours

	Part D(Marks Distribution)													
	Theory													
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation									
100	40	60	18	40										
	•	•	Practical	•	•									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation									
	۰													

	Part E
Books	Kothari, C. R. (2004, January 1). Research Methodology. New Age International.
Articles	
References Books	Pannersalvam, R. (2014, April 4), RESEARCH METHODOLOGY, PHI Learning PAI. Ltd. Wilkinson, T. S., & Bhandarkar, P. L. (2023, January 1), Methodology and Techniques of Social Research. Young, P. V. (1996), January 13, Scientific Social Surveys and Research. Englewood Cliffs, N.J.: Prentice-Hall.
MOOC Courses	https://hptel.ac.in/courses/110105091
Videos	https://youtu.be/oXn/ROOtfBI

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	2	2	-	-	-	-	-	1	3	1	1
CO2	2	2	3	2	1	1	-	-	-	1	-	-	3	1	1
CO3	2	2	2	1	2	2	-	-	-	-	-	-	3	1	1
CO4	1	1	2	2	1	2	-	-	-	-	-	1	3	3	3
CO5	1	3	3	2	3	2	1	-	-	=	1	-	3	3	3
CO6	-	-	_	-	-	_	-	-	-	-	_	-	_	-	-



## Svllahus-2023-2024

								Sy	mabus-202	3-2024								
								В	Sc_FoodTech	nology								
	Title of the	Course		NCC-2														
	Course	Code		NCC-2														
			1						D4.4									
									Part A								L	. T P C
	Yea	r		1st			Sem	ester		2nd					Credi	its	2	
	Course	Type		Theory or	nlv													.   0   2   7
	Pre-Requ	isite/s		Should be	e acquainted with t	he basics knowled	ige of General Awa	reness about Lea		Co-Requi	isite/s							
	Course Ou & Bloom's	tcomes s Level		CO3- Der CO4- App CO5- Und	derstanding of the t monstrate an unde monstrate an unde ply molecular diagr derstand the basics	pasic principles an retanding of basic retanding of electr nostic techniques t in quality control	d clinical significan molecular diagnos ophoresis in the se o the identification and quality assura	ce of laboratory te tic techniques(BL: paration of DNA fr and diagnosis of c nce(BL2-Underst	sting in the field of 2-Understand) agments() liseases(BL3-App and)	of molecular diagnos	stics.(BL1-	-Remember)						
	Coures Ele	ements		Entreprent Employab Professso Gender X Human Va	neurship X bility  onal Ethics X  (alues						SDG	G (Goals)		SDG4(Quality educa SDG6(Clean water a SDG13(Climate acti	ation) and sanitatio on)			
									Part B									
	Modu	iles					Cont	ents					Per	dagogy			Hou	rs
								Pa	rt D(Marks Dis	tribution)								
									Theory									
Total M			inimum Pas	ssing Mar	rks		External Evaluation			Min. External Eval	uation		Inter	nal Evaluation			Min. Internal Evalu	uation
0		0				0			0				0		0			
									Practical									
Total M	arks	Mi	inimum Pas	ssing Mar	rks	1	External Evaluation	n		Min. External Eval	uation		Inter	nal Evaluation			Min. Internal Evalu	uation
								Į.	Part E									
	Book	s		R Gupta ;	; NCC National Ca	det Corps A, B & C	Certificate Exami	nation Book; Ram	esh Publishing Ho	ouse, 2018.								
	Articl	es		https://indi	liancc.mygov.in/													
	References	Books		Singh, Ne	eraj; A Hand Book	of NCC; Kanti Pra	kashan Publisher (	Cadet training han	d book specialise	d subjects (2017)								
	MOOC Co	ourses																
	Video	os		https://ww	w.youtube.com/wa	atch?v=eBA5t4iep	AA.											
								Co	urse Articulation	on Matrix								
Course Type Theory only Course Category Generic Elective Should be acquainted with the basics knowledge of General Awareness about Leadership Quality, Personality Development, Defense system etc Course Outcomes & Bloom's Level Course Outcomes & Bloom's Level Course Stements Course Articulation Matrix Course Articulation Matrix		PS01		PSO2	PSO3													
	-	-	-		-	-	-	-	-	-	-		-	-	-		-	-
CO2	-	-	-		=	-	-	-	-	-	-		=	-	-		-	-
	-	-	-		-	-	-	-	-	-	-		=	-	-		-	-
	-	-	-		-	-	-	-	-	-	-		=	-	-		-	-
	-	-	-		-	-	-	-	-	-	-		-	-	-		-	-
CO6	-	-	-		-	-	-	-	-	-	-		-	-	-		-	-



	Oynabus-2025-2024																
									BSc_FoodTech	inology							
	Title of the Course    NCC-1																
	Course C	ode	N	ICC-I													
									Dt A								
									Part A								I T P C
	Year		1	st			Sem	nester		1st					Credits		
	Course T	vne	т	heory only	,					1							2 0 2 7
						e basics knowled	ge of General Awa	areness about Lea	adership Quality, F	Personality Develop	pment, Defer	nse system e	tc		Co-Requisite/s		
	Course Out & Bloom's	comes Level		01- under 02- Demo 03- Demo 04- Apply 05- Under	rstanding of the ba onstrate an undersonstrate an undersonstrate an undersonstrate diagnorstand the basics	asic principles and standing of basic standing of electro ostic techniques to in quality control	d clinical significar molecular diagnos ophoresis in the se o the identification and quality assura	nce of laboratory to stic techniques(BL eparation of DNA and diagnosis of ance(BL2-Unders	esting in the field ( 2-Understand) fragments() diseases(BL3-Ap tand)	of molecular diagn	ostics.(BL1-	Remember)					
	Coures Ele	ments	E F C	ntrepreneu mployabilit Professsona Sender X Human Valu	urship X ity ✓ all Ethics X ues ✓						SDG	G (Goals)		SDG4(Quality educ SDG6(Clean water SDG13(Climate ac	cation) and sanitation) tion)		
	Part B																
								Pa		tribution)							
Total Ma	netro.	Mi	nimum Pass	ina Marka			External Evaluation			Min. External Eva	aluation		Inte	mal Evaluation		Min. Internal E	velvetien
0	0		IIIIuiii Pass	iliy marks	•	0	External Evaluation	on	0	MIII. EXIVIIIAI EV	aiuation		0	nai Evaluation	0	MIII. IIILETTIAI E	valuation
0						ľ			Practical				1				
Total Ma	arks	Mir	nimum Pass	ing Marks	5		External Evaluation	on		Min. External Eva	aluation		Inter	mal Evaluation		Min. Internal E	valuation
									Part E								
	Books	3	F	R Gupta ; N	NCC National Cad	et Corps A, B & C	Certificate Exami	ination Book; Ran	nesh Publishing H	ouse, 2018.							
	Article	s	h	ttps://indiar	ncc.mygov.in/												
	References	Books	s	ingh, Neera	raj; A Hand Book o	of NCC; Kanti Pra	kashan Publisher	Cadet training ha	nd book specialise	ed subjects (2017)							
	MOOC Cor	ırses															
	Video	1	h	ttps://www.	.youtube.com/wate	ch?v=eBA5t4iepA	VA.										
COs	PO1	PO2	PO3		PO4	PO5	PO6	PO7	PO8	PO9	PO10		PO11	PO12	PSO1	PSO2	PSO3
CO1	-		-			-	-	-		-			-		-	-	-
CO2	_		-	-			_		_		-			_	_		_
CO3	_		1_	_		_	_	_	_		1_						
CO4	_	_	-				_	_	_	_	-			_	_		
CO5	-	-	-	-			-	-	-	-	-			-	-	-	-
CO6	-	-	1-	-		-	-	-	-	-	-		-	-	-	-	-
	1	-1	1				I.	1	-1	-1			1	1	1		



									BSc_PCI	И								
	Title of the	e Course		NCC														
	Course	Code		NCC0101		acquainted with the basics knowledge of General Awareness about Leadership Quality, Personality Development, Defense system etc  CC-Requisite/s  Straining of the basic principles and clinical significance of laboratory testing in the field of molecular diagnostics (BL1-Remember) constrain as understanding of basic molecular diagnostic techniques (BL2-Understand)  microbia basic principles and characterized to the desired control of URA fingenesis (BL3-Remember)  strain and the basics in quality control and quality seturnors (BL2-Understand)  SDG (Goals)  SDG												
Title of the Course Code    Course Code   NCCIO11   Part A																		
	V-			NCC   NCC0101												L T P C		
	10	ar		ist			261	nester		ist				Credits	:	2 0 2 4		
	Course	Туре		Theory or	nly													
	Course C	Category		Generic E	Elective	g of the basic principles and clinical significance of laboratory testing in the field of molecular diagnostics (BL1-Remember) an understanding of basic molecular diagnostic techniques (BL2-Understand) and understanding of basic molecular diagnostic techniques (BL2-Understand) and diagnostics (BL3-Apphy) has been been been been been been been bee												
	Pre-Req	uisite/s				Semester												
	Course O & Bloom	utcomes 's Level		CO3- Der CO4- App CO5- Und	derstanding of the monstrate an unde monstrate an unde oly molecular diago derstand the basic	basic principles a erstanding of basic erstanding of elect nostic techniques s in quality contro	nd clinical significal molecular diagno rophoresis in the s to the identification I and quality assur	nce of laboratory to estic techniques(BL eparation of DNA n and diagnosis of ance(BL2-Unders	testing in the field of L2-Understand) fragments() diseases(BL3-Ap stand)	of molecular diagnost	ics.(BL1-Rememb	er)						
	Skill Development  Entrepreneurship × Employability / Professional Ethics × Gender × Human Values √ Environment ✓ Entryreneurship × Employability / Professional Ethics × Gender × Human Values √ Environment ✓ Entryreneurship × Environment ✓ Entryreneurship × Environment ✓ Environment ✓ Entryreneurship × Environment ✓ Enviro																	
Title of the Course   NCC																		
	Mod	lules					Co	ntents				Pe	edagogy		Hou	rs		
								Pa		tribution)								
	Gender X   Human Values / Environment ✓   Part B																	
			Minimum Pa	assing Mar	ks		External Evaluat	ion		Min. External Evalu	ation		rnal Evaluation		Min. Internal Eval	uation		
0		0				0						0		0				
Total N	Marke		Minimum P	assina Mar	ke		Evternal Evaluat	ion		Min Evternal Evalu	ation	Inte	rnal Evaluation		Min Internal Eval	uation		
Total II	nu no	•		accing mai			External Evaluat	.0		mini External Evalu	ution		mai Evaldation		min monu Eva	uuuon		
									Part E									
	Boo	oks		R Gupta ;	NCC National Ca	det Corps A, B &	C Certificate Exan	nination Book; Ran	nesh Publishing H	ouse, 2018.								
				Singh, Ne	eraj; A Hand Book	of NCC; Kanti Pr	akashan Publishe	Cadet training ha	nd book specialise	d subjects (2017)								
	Vide	eos		https://ww	w.youtube.com/wa	atch?v=eBA5t4iep	)AA											
COn	DO1	DO2	DC2		DO4	DOE	DOS				DO10	PO44	DO12	DCO1	DE OS	DEO2		
	PU1	PO2	PO3		PU4	PU5	PU6	PU/	PO8	PO9	PU10	P011	PU12	P5U1	PSU2	P5U3		
					_						_	+1		_		-		
	_	_	-		_	_	_	_	_	_	_		_	_	_	_		
	-	-	-		-	-	-	-	-	-	-	-	1-	-	1-	-		
	-	-	-		-	-	-	-	-	-	-	-	-	-	1-	-		
	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-		



	Synabus-2023-2024																
								В	Sc_ComputerS	Science							
	Title of the	Course	N	ICC (optional)													
	Course	Code	N	ICC0201[T]													
									Part A								
	Yea	r	1	st			Sem	ester		2nd					Credits	1	L T P C
	Course	Туре	т	Theory only		1											- 1- 1- 1-
	Course Ca			Seneric Electiv	e												
	Pre-Requ	isite/s	s	Should be acqu	ainted with th	ne basics knowled	ige of General Awa	reness about Lead	dership Quality, P	ersonality Develop	ment, Defer	nse system et	c		Co-Requisite/s		
	Course Ou & Bloom's	stcomes s Level	C	CO1- understar CO2- Demonst CO3- Demonst CO4- Apply mo CO5- Understa CO6- ()	nding of the barate an unders rate an unders rate an unders lecular diagno nd the basics	asic principles an standing of basic standing of electr ostic techniques t in quality control	d clinical significan molecular diagnos ophoresis in the se to the identification and quality assura	ce of laboratory te tic techniques(BL2 paration of DNA fr and diagnosis of d nce(BL2-Underst	sting in the field of 2-Understand) agments() iseases(BL3-App and)	of molecular diagno	stics.(BL1-	Remember)					
	Coures El	ements	E E P G	Skill Developme Entrepreneursh Employability Professsonal E Gender X Human Values Environment	ip X thics X						SDG	G(Goals)		SDG3(Good health a SDG4(Quality educe SDG6(Clean water a SDG13(Climate actic SDG15(Life on land)	ition) and sanitation) on)		
	Part B  Modules Contents Pedagogy Hours																
	Modules Contents Pedagogy Hours																
	Part D(Marks Distribution)																
									Theory								
Total M		0 Mi	inimum Pass	sing Marks		0	External Evaluation		0	Min. External Eval	uation		0 Interes	nal Evaluation	0	Min. Internal Eval	uation
0		0				0			Practical				0		0		
Total M	arks	Mi	inimum Pass	sing Marks			External Evaluation	on		Min. External Eval	uation		Intern	nal Evaluation		Min. Internal Eval	uation
									Part E								
	Bool	ks	F	R Gupta ; NCC	National Cad	let Corps A, B & 0	Certificate Exami	nation Book; Rame	esh Publishing Ho	ouse, 2018.							-
	Artic	es	hl	ttps://indiancc.	mygov.in/												
	Reference		s	ingh, Neeraj; A	Hand Book o	of NCC; Kanti Pra	akashan Publisher	Cadet training han	d book specialise	d subjects (2017)							
	MOOC C																
	Vide	os	hi	ttps://www.you	tube.com/wat	tch?v=eBA5t4iep.	AA										
								Co	urse Articulatio	on Matrix							
COs	PO1	PO2	PO3	PO4		PO5	P06	P07	PO8	PO9	PO10		PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-		-	-	-	-	-	-		-	-	-	-	-
CO2	-	-	-	-		-	-	-	-	-	-		-	-	-	-	-
CO3	-	-	-	-		-	-	-	-	-	-		-	-	-	-	-
CO4	-	-	-	-		-	-	.=	-	-	1-			-	-	-	-
C05	-	-	-						-	-	-		-	-	-	-	-
CO6	-	-	-	-		-	-	-	-	-	-		-	-	-	-	1-



									BSc_PCI	Л							
	Title of the	Course		NCC (option	nal)												
	Course	Code		NCC0201[T	ŋ												
				I					Part A								
	Yea	ar		1st			Sem	ester		2nd					Credits	L	T P C
	Course	Туре		Theory only	y	1											.  -  -  -
	Course C			Generic Ele													
	Pre-Req	uisite/s		Should be a	acquainted with t	he basics know	ledge of General Awa	areness about Lea	dership Quality, F	ersonality Developm	ent, Defen	nse system et	c		Co-Requisite/s		
	Course O	utcomes 's Level		CO1- under CO2- Demo CO3- Demo CO4- Apply CO5- Under CO6- ()	rstanding of the boostrate an unde onstrate an unde y molecular diagresstand the basics	pasic principles rstanding of ba rstanding of ele lostic technique in quality conf	and clinical significar sic molecular diagnos actrophoresis in the se as to the identification trol and quality assura	nce of laboratory te stic techniques(BL eparation of DNA fi and diagnosis of c ence(BL2-Underst	esting in the field of 2-Understand) ragments() diseases(BL3-Ap and)	f molecular diagnost	ics.(BL1-F	Remember)					
	Coures E	lements		Skill Develo Entreprene Employabili Professson Gender X Human Vali Environmen	urship X lity ✓ nal Ethics X						SDG	i (Goals)		SDG3(Good health a SDG4(Quality educa SDG6(Clean water a SDG13(Climate actic SDG15(Life on land)	tion) nd sanitation) on)		
·									Part B								
	Modules Contents Pedagogy Hours																
								Do	rt D(Marks Dis	tuib: stiem)							
								га	Theory	undulon)							
Total M	arks	М	Minimum Passing Marks				External Evaluation	on		Min. External Evalu	ation		Intern	nal Evaluation		Min. Internal Evalu	uation
0		0				0			0				0		0		
	•								Practical				•				
Total M	arks	М	linimum Pa	ssing Marks	s		External Evaluation	on		Min. External Evalu	ation		Inter	nal Evaluation		Min. Internal Evalu	uation
									Part E								
	Boo	ks		R Gupta; N	NCC National Ca	det Corps A, B	& C Certificate Exam	ination Book; Ram	esh Publishing H	ouse, 2018.							
	Artic	les		https://india	ncc.mygov.in/												
	Reference	s Books		Singh, Neer	raj; A Hand Book	of NCC; Kanti	Prakashan Publisher	Cadet training han	d book specialise	d subjects (2017)							
	MOOC C	ourses															
	Vide	os		https://www	.youtube.com/wa	tch?v=eBA5t4i	epAA										
								Co	urse Articulation	on Matrix							
COs	PO1	PO2	PO3	F	PO4	PO5	P06	P07	PO8	PO9	PO10		PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-		-	=	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-
CO4	-	-	-		-	-	-	-	-	-	-		-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-		-	-	ı,	-	-
CO6	-	-	-	T-		-	-	-	-	-	-			-		-	-



#### BSc FoodTechnology

					Doc_r ood recimology								
Title of th	e Course	Introduction to 0	Good Laboratory practices	П									
Course	Code	SEC VI [T]											
					Part A								
Ye	ar	3rd	Semester	6th	Credits	L	Т	F		С			
10	u.	0.0	Comester	out.	5154.15	2	0	C	)	2			
Course	е Туре	Theory only											
Course C	Category	Skill Enhancem	ment Courses										
Pre-Req	uisite/s	Knowledge of fe	food laboratory euipments	and testing protocols	Co-Requisite/s	To study g	guidelines on good laboratory pra-	ctices and SOPs	and calibration procedure of	different instruments.			
	CO1- understanding of the basic principles and clinical significance of laboratory testing in the field of molecular diagnostics. (BL1-Remember) CO2- Demonstrate an understanding of basic molecular diagnostic techniques (BL2-Inderstand) CO3- Demonstrate an understanding of basic molecular diagnostic techniques (BL2-Inderstand) CO3- Demonstrate an understanding of basic molecular diagnostic techniques to the identification and i												
Coures E	Elements	Skill Developme Entrepreneursh Employability X Professsonal E Gender X Human Values Environment X	hip X X Ethics X	SDG (Goals) SD SD SD	G1(No poverty) G2(Zero harger) G2(Zero harger) G3(Caro harger) G3(Code health and well-being) G8(Clean water and sanitation) G12(Responsible consuption and production)								
					Part B								
Mod	dules			Contents			Pedagogy			Hours			
	Part D(Marks Distribution) Theory												
Total Marks	Minimum Pa	assing Marks		External Evaluation	Min. External Evaluation		Internal Evaluation	on	Min. Intern	nal Evaluation			
100	40		60		18		40						

Part E			

Internal Evaluation

Min. Internal Evaluation

Books	World health organization (WHO); Handbook Good Laboratory Practices
Articles	
	Indian council of medical research, New Delhi; Guidelines for good laboratory practices B.W.Wenclawiak, M.Koch E. Hadjicostas; Quality Assurance in Analytical Chemistry.
MOOC Courses	https://nptel.ac.in/courses/126105020
Videos	https://youtu.be/h5NpTku5BGc?si=U-GL_p3nLe4_7pZM

Min. External Evaluation

External Evaluation

Total Marks

Minimum Passing Marks

							Cou	rse Articulation	Matrix						
COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	1	1	-	1	1	1	-	1	1	1
CO2	2	2	1	1	1	1	1	1	-	1	-	-	2	1	1
CO3	2	2	1	2	1	2	-	-	1	1	-	-	2	1	2
CO4	2	3	2	2	1	2	1	1	-	1	1	-	3	2	2
CO5	3	3	2	2	1	2	-	1	1	1	1	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-			-



BSc\_PCM

Title of the Course	SEC-2										
Course Code	SEC0201										
			Part A								
Year	1st	Semester	2nd		Credits	L	Т	P	С		
Teal	100	Sellester	Zild		orealis	24	0	0	24		
Course Type	Theory only	only									
Course Category	Humanities, Social	Sciences and Management									
Pre-Requisite/s					Co-Requisite/s						
Course Outcomes & Bloom's Level	CO1- understandin	understanding of the basic principles and clinical significance of laboratory testing in the field of molecular diagnostics. (BL1-Remember)									
Coures Elements	Skill Development Entrepreneurship X Employability X Professsonal Ethic Gender X Human Values ✓ Environment X	(	SDG (Goals)	SDG4(Quality edu SDG5(Gender equ SDG11(Sustainabl SDG15(Life on lan	uality) le cities and economies)						
	Part B										
Modules		Conte	ents		Pedagogy			Hour	s		
					•						

	Part D(Marks Distribution)										
	Theory										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation						
None	0	0	None	None							
	Practical										
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation							
None	0	0	None	1. Bigan Chandra and others: India's Struggle For Independence, Penguine Publishers. 2. Bigan Chandra: History Of Modern India. Orient Blackswan publishers. 3. Sunil Khilmani: The Idea of India, Penguine publishers. 4. Shekhar Bandopadhyay: Forn Plastic to Partition and After, A History of Modern India, Orient Blackswan publishers. 5. Rakesh Batabyat: The Penguine Book of Modern India Speeches; 1878 to Present, Penguine Publishers. 6. A R Desait-Social Background of Indian Nationalism, Popular Plankashan. 7. B R Namica. Mahalma Gandhi. A BiographyLondro 8. B. R. Namida. Gandhi and His Chitiss. Oxford 9. Grija Shanter: Socialist Trends in Indian National Movement, Meerut 10. Umila Phadrist: Towards he milegraption of Indian States, 1919-1947, Numbel 11. Bimal Prasad. Gandhi.Nehru and JPA Study in Leadership, New Delhi 12. Bipan Chandra and others:India Since Independence, Penguine 13. Ramchandra Cultan Markers of Modern India, Penguine. 14. Austin Grantellic. The Indian Constitution, Oxford 19. Grantellic. The Indian Constitution Confidence 19. Grantellic. The Indian Constitution Confidence 19. Grantellic. The Indian	None						

	Part E							
Books	None							
Articles								
References Books	None							
MOOC Courses	None							
Videos								

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	=	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	=	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	=	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	=	-
CO6	_	-	-	-	-	_	-	-	-	-	-	-	-	-	_



### BSc\_ComputerScience

Title of the Course	SEC-2									
Course Code	SEC0201									
			Part A							
Year	1st	Semester	2nd		Credits	L	Т	P	С	
100.	150	Comester	2110		orcano	24	0	0	24	
Course Type	Theory only	only								
Course Category	Humanities, Social	Jal Sciences and Management								
Pre-Requisite/s					Co-Requisite/s					
Course Outcomes & Bloom's Level	CO1- understandin	- understanding of the basic principles and clinical significance of laboratory testing in the field of molecular diagnostics.(BL1-Remember)								
Coures Elements	Skill Development Entrepreneurship X Employability X Professsonal Ethic Gender X Human Values ✓ Environment X	trepreneurship X ployability X /ressonal Ethics ✓ store X  SDG (Goals) nder X  man Values ✓			cation) uality) le citles and economies) d)					
Part B										
Modules		Conte	ents		Pedagogy			Hour	's	

# Part D(Marks Distribution)

				Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
None	0	0	None	None	None				
	Practical								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
None	0	0	None	1. Bipan Chandra and others: India's Struggie For Independence, Penguine Publishers. 2. Bipan Chandra: History Of Modern India, Orient Blackswan publishers. 3. Sunit Khilmani: The Idea of India, Penguine publishers. 4. Shekhar Bandopadhyay; Forn Plastic to Partition and After, A History of Modern India. Orient Blackswan publishers. 5. Rakesh Batabyat: The Penguine Book of Modern Indian Speeches, 1878 to Present, Penguine Publishers. 6. A R Desai-Social Background of Indian Nationalism. Popular Placksist. 7. B Y Nareds. Mishalma Gandhi. A Biographyl, London 6. B.R. Nareds. Gandhi and His Citilise. Oxford 9. Grija Shankar: Socialist Trends in Indian National Movement, Meerut 10. Urmlia Placksis: Owner's the Integration of Indian Statist. 1914-1947, Naturab 11. Stamp Hissaic Gandhi. Nethou and JPA Study in Leadership, New Delhi 12. Bipan Chandra and others: India Since Independence, Penguine 13. Ramchandra Gutta-Makeso Holden India, Penguine 14. Austin Granville: The Indian Constitution, Oxford	None				

#### Part E

Books	None
Articles	
References Books	None
MOOC Courses	None
Videos	

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	=	-	-	-	-	-	1	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



BSc\_Biotechnology

Title of the Course	India in 21st Cent	ury								
Course Code	VAC II (T)									
			Par	t A						
Year	1st	Semester	2nd	Cred	dite	L	T	P	С	
154.	100	Comodo	2110	0100		2	0	0	2	
Course Type	Theory only									
Course Category	Indian Knowledge	ilan Knowledge System (IKC)								
Pre-Requisite/s	concepts is essei includes understa integration. 2. "HI Indian Freedom the Revolt of 185 struggle provides of Political Mover those led by figur cooperation, civil of Indian freedom phases of nation-the planned prog globalization. Knu understanding of global concerns and sustainability	of Sociological Concepts*. A foundations that log graps the composition of Indian so conding social institutions, cultural environment storical Background*: Familiarity with the forement, is coicid for comprehending U forement, and the context of understanding of plotting the site of the context of the co	siety discussed in Unit I. This ents, and threats to national inistory of India, particularly the init II. Knowledge of events such as saraious phases of the freedomen showness of the freedomen showness of the freedomen showness of the freedomen showness of the freedomen initially with concepts like normal at a sharp and the showness of the freedomen of the freedomen in the freedomen of the	Со-Requ	uisite/s	institutions, cultural Familiantly with soci interactionism can p. Context of Indias': independence, and evolution of Indian the transition to indiant the transition to indiant the transition to indiant the transition to indiant indiant the transition to indiant the transition to indiant the transition to indiant the transition of Indiant the Green Revolution to contemporary i global trends in are enhances understatissues like climate issues like climate is	environments, and thriviological theories such ological theories such provide a deeper comp frowledge of Indian hi post-independence ed society. Understandin ependence enhances i "Oiltical Movements in India, is essential. Awarene usus stakeholders in the Familiarity with Post-India political changes in pure, and social movem ution, reservation system didian society, 5. "Glob as such as technology, unding of India's position anding of ledia's position median position."	velopments, offers conte glue socio-economic im nsight into contemporary molia": - Knowledge of ke ncluding those led by Gi os struggle for independen bependence Developme st-independence India, est-independence India, and economic liberal al Perspective and Aware economics, environmen in the global context I	on is fundamental theory, and symbolic samics. 2. "Historical isla period, the struggle for xt for understanding the acust of colonial rule and acust of colonial rule and andhi, Nehru, and other ontext of colonial India ce enriches starting the Nehruvian ess of key policies, such including the Nehruvian ess of key policies, such such acust of the Nehruvian ess of key policies, such such acust of the Nehruvian ess of key policies, such such acust of the Nehruvian ess of key policies, such such acust of the Nehruvian ess of key policies, such such acust of the Nehruvian ess of key policies, such th	
Course Outcomes & Bloom's Level	CO2- Demonstra CO3- Demonstra	ing of the basic principles and clinical sign te an understanding of basic molecular dia te an understanding of electrophoresis in t cular diagnostic techniques to the identific	egnostic techniques(BL2-Understan he separation of DNA fragments()	id)	1-Remember)					
Coures Elements	Skill Developmer Entrepreneurship Employability ✓ Professsonal Eth Gender X Human Values ✓ Environment X	×	SDG (Goals)	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG10(Relucoud nequalities) SDG12(Responsible consuption and production) SDG3(Zenter action)						
			Par	t B	T.					
Modules	1		Contents			Pedagogy		Н	lours	

Part Di	Marks	Distributio	n'

Title

Modules

Indicative-ABCA/PBL/ Experiments/Field work/

Bloom's Level

Hours

	Theory								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
100	40	60	18	40					
	Practical Practical								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				

#### Part E

Books	Bipan Chandra and others: India's Struggle For Independence, Penguine Publishers. Bipan Chandra: India's Struggle For Independence, Penguine Publishers. Bipan Chandra: India, Orient Blackswan publishers. Sunil Khilnani: The Idea of India, Penguine publishers.
Articles	https://www.youtube.com/watch?v=i8N6YRTJsDk
References Books	Shekhar Bandopadhyay: From Plastic to Partition and After. A History of Modern India, Orient Blackswan publishers. Shekhar Bandopadhyay: From Plastic to Partition and After, A History of Modern India, Orient Blackswan publishers. A R Desai-Social Background of Indian Nationalism, Popular Prakashan .  B R Nandar Maharma Candril, A Biography, London
MOOC Courses	1.https://www.youtube.com/watch?v=i8N6YRTJsDk
Videos	1.https://www.youtube.com/watch?v=i8NBYRTJsDk 2.https://youtu.bei/nWisTrx3qdS 3.https://www.youtube.com/watch?v=QghqJSUAK48ilst= 4.https://youtu.bei/pBEU8_JZPU 5.https://youtu.bei/pPsiKQwaZ4dg

COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	1	-	-	1	-	-	-	-	1
CO2	-	-	-	-	-	1	1	-	1	-	-	1	-	-	1
CO3	-	-	-	-	-	1	3	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	2	-	-	-	1	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



BSc\_FoodTechnology

				200							
Title of th	e Course	India in 21st Centuary [T]									
Course	e Code	VAC-II [T]									
					Part A						
							L	Т	Р		С
Ye	ar	1st	Semester	2nd	Cred	its	2	00	00		2
Cours	Course Type Theory only						'				
Course	Category	Ability Enhancement Course	es								
Pre-Rec	1. "Understanding of Sociological Concepts": A foundational knowledge of sociological concepts is essential to grasp the composition of Indian society discussed in Unit I. This includes wenderstanding social institutions, cultural environments, and threats to familiarity with sociological threat includes understanding social institutions, cultural environments, and threat to national integration. 2. "Historical Background": Familiarity with the history of India, particularly the Indian Freedom Movement," A basic understanding of period and open control of 1857, the emergence of nationalism, and the various phases of the freedom social properties of Political Movements' has used understanding of political movements in India, particularly those led by figures like Gandhi, is necessary for Unit III. Familiarity with concepts like non-cooperation, cult disobedience, and the Cult Indian movement asid is in analyzing the dynamics of Indian freedom and partition. 4. "Knowledge of Post-Independence Era": Understanding the phases of nation-building since independence is with lar of the Various stakeholders in the strug phases of ination-building since independence is with lar of unit V. This includes wareness of the planned progress ora, populat policies, and the paradigm shift towards liberalization and globalization. Knowledge of responses from different societial groups and regions ventrices the special concerns such as environmental issues, globalization, and movements for democracy and sustainability. A broad understanding of plantial society, 5. "Global remove of the paradigm shift towards liberalization and globalization, and movements for democracy and sustainability. A broad understanding of plantial society. S. "Global remove of the paradigm shift boards in the structure of the paradi						, and threats to n ies such as funct less such as funct lenden development standing the so hances insight in ments in India* in India, including Awareness of the rs in the struggle Post-Independe tiges in post-Inde I movements, is tion system, and 5. "Global Persp hnhology, econom s position in the e stonal trade, and	national integration integration incalism, conflict the nor of societal dynamicular godinal ments, offers context cicl-economic impact cicl-economic impact of the conference	s fundamental sory, and symbolic nics. 2. "Historical period, the struggle for understanding it sto of colonial rule a cical issues. 3. igures, ideologies, ideologies, ideologies, enriches " Understanding it duding the Nehruvia of key policies, su tion, provides insiglies": - Knowledge o and geopolitics derstanding global derstanding global		
Course C & Bloom		CO2- Demonstrate an unde CO3- Demonstrate an unde	pasic principles and clinical sig rstanding of basic molecular di rstanding of electrophoresis in nostic techniques to the identifi	iagnostic techniques(BL2-U the separation of DNA fragr	nents()	-Remember)					
Skill Development X Entrepreneurship X Employability X Coures Elements Professonal Ethics X Gender V Human Values V Environment V					SDG4(Quality education) SDG5(Gender equality) SDG10(Reduced inequalities)	SDG3(Cood health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG10(Reduced inequalities) SDG10(Responsible consupption and production)					
					Part B						
Mo	dules			Contents	_		Pedagogy			Hou	irs
				Part [	(Marks Distribution)						
Total Marks	Minimum Pa	assing Marks	External Ev	aluation	Min. External Evaluation		Internal Evaluation	n		Min. Internal Eval	uation
00	40		60	18			40				
	1		1	10			1				

	Theory								
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
100	40	60	18	40					
			Practical						
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
00	00	00		00					

	Part E
Books	1. Bose, N.K. 1967, Culture and Society in India. Bombay: Asia Publishing House 2. Dube, S.C. 1990, Indian village (New Delhi: National Book Trust.) 3. Percival Spear: History of Indian Society, Penguin , 1966. 4. Uberoi, Patrica: Family , kinship and Marriage , New Delhi: oxford University Press , 1995, PP 50 to 73 , 416 to 451 5. Gandhi , M.K.: Removal of Uniouchability , Navjeevan Publishing House , Ahmadabad , 1954
Articles	
References Books	1. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak
MOOC Courses	
Videos	1.https://www.youtube.com/watch?v=i8N6YRTJsDk 2. https://youtu.be/nW%T7x3qd5E 3.https://www.youtube.com/watch?v=pQghqJSUAK4&list= 4.https://youtu.be/sPECWaZ4dg

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	=	1	1	1
CO2	-	-	-	-	-	1	-	-	2	1	-	=	1	1	1
CO3	-	-	-	-	-	2	2	-	-	-	=	-	2	1	1
CO4	-	-	-	-	-	1	-	-	-	-	=	-	2	1	2
C05	-	-	-	-	-	-	-	-	-	-	=	-	2	1	2



### BSc\_FoodTechnology

Title of the Course	Environmental Issu	ental Issues and Sustainable Development [T]							
Course Code	VAC-IV [T]	п							
	PartA								
Year	Year         2nd         Semester         4th         Credits         L         T         P         C							С	
Total	2.10	Comedica	741	ordana -	3	0	0	3	
Course Type	Theory only								
Course Category	Foundation core								
Pre-Requisite/s	Basic Knowledge of	of Environmental Issues and Sustainable	e development	Co-Requisite/s	Knowledge about SI	OGs and Strategies for	implementation of SDGs	5.	
Course Outcomes & Bloom's Level	CO2- Demonstrate CO3- Demonstrate CO4- Apply moleci	ng of the basic principles and clinical sign an understanding of basic molecular di a an understanding of electrophoresis in ular diagnostic techniques to the identific the basics in quality control and quality a	agnostic techniques(BL2-Understand) the separation of DNA fragments() cation and diagnosis of diseases(BL3-						
Coures Elements	Skill Development X Enterprenarship X Enterprenarship X Professional Ethics X Gender X Human Values ✓ Environment ✓  SDG (Goals)  SDG (Goals)  SDG (Goals)  SDG (Quality education) SDG 3(Climate action) SDG 12(Responsible consuption and production) SDG 13(Climate action)								

	Talto		
Modules	Contents	Pedagogy	Hours
	•	•	

	Part D(Marks Distribution)							
	Theory							
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation			
100	40	60	18	40				
			Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation			
	0							

	Part E
Books	Dinar, A., & Rapoport, A. (2013, March 5). Analyzing Global Environmental Issues. Routledge.
Articles	1. Sala, Serenella, Biagio Culfo, and Peter Nijkamp. 'A systemic framework for sustainability assessment." Ecological Economics 119 (2015) 314-325. 2 Gasparatos, Alexandros, and Anna Scolobig, 'Choosing the most appropriate sustainability assessment ("Ecological Economics 8), no. (2012) 17-1. 3. Stafford, Smith, Mark, David Griggs, Nowna Gaffeny, Farooq Unlis, and Peter Nijka Karlae, Bjorn Stafford, Smith, Smith, David Griggs, Change Gaffeny, Farooq Unlis, and Bearbard, Smith Raine, Bjorn Stafford, Smith, Sm
References Books	French, D., & Kotzé, L. J. (2018, June 29). Sustainable Development Goals. Edward Elgar Publishing.
MOOC Courses	https://mptel.ac.in/courses/109105190
Videos	https://youtu.be/OSki0OcNJxU

	Course Articulation Matrix														
COs	PO1	PO2	PO3	PO4	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	-	-	1	-	-	-	-	-	-	=	-
CO2	1	2	2	-	-	-	2	-	-	-	-	-	=	-	-
CO3	2	1	3	-	-	-	2	-	-	-	-	-	=	-	-
CO4	2	2	3	-	-	-	3	-	-	-	-	-	=	-	-
CO5	2	3	2	-	-	-	3	-	-	-	-	-	=	-	-
COS															



BSc\_PCM

Title of the Course	India in 21st centuary									
Course Code	VAC0101[T]	101								
	Part A									
Year	Year 1st Semester 1st Credits									
Course Type Theory only										
Course Category Skill Enhancement Courses										
Pre-Requisite/s	This includes understanding is particularly the Indian Freedon various phases of the freedom understanding of political move disobedience, and the Quit Ind phases of nation-building since liberalization and globalization "Global Awareness": Unit V de	cal Concepts*. A foundational knowledge of sociological concepts is essenciacial institutions, cultural environments, and threats to national integration. In Movement, is crucial for comprehending Unit II. Knowledge of events sus strugie provides context for understanding the birth of the indian nation-ment sin India, particularly those led by figures like Gandhi, is necessary its movement also in analyzing the dynamics of Indian freedom and partitive independence is vital for Unit IV. This includes awareness of the planned Knowledge of responses from different societal groups and regions entitives into global concerns such as environmental issues, globalization, and and their impact on nations is necessary to engage with this contrient effect.	2. "Historical Background": Familiantly with the history of India, has the Revolt of 1857, the emergence of nationalism, and the state. 3. "Awareness of Political Movements": A basic for Until III. Familiarly with concepts like non-cooperation, civil or. 4. "Knowledge of Post-Independence Era": Understanding the progress era, populist policies, and the paradigm shift towards hese the understanding of India's post-Independence journey. 5. movements for democracy and sustainability. A troop of the progress of the processor of the progress of the progr	Co-Requisite/s						
Course Outcomes & Bloom's Level	CO2- Demonstrate an understa CO3- Demonstrate an understa	sic principles and clinical significance of laboratory testing in the field of mo anding of basic molecular diagnostic techniques(BL2-Understand) anding of electrophoresis in the separation of DNA fragments() stic techniques to the identification and diagnosis of diseases(BL3-Apply)	elecular diagnostics.(BL1-Remember)		•					
Skill Development \( \) Enterpreneurship \( \) Enterpreneurship \( \) Enterpreneurship \( \) Enterpreneurship \( \) Employability \( \) Professional Ethics \( \) Gender \( \) Human Values \( \) Environment \( \) Environment \( \)  SDG (Goals)  SDG (Goals)  SDG(Qoals) SDG(Qoald) SDG(Qoa										
		Part B								

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)									
	Theory								
Total Marks	Total Marks Minimum Passing Marks External Evaluation Min. External Evaluation Internal Evaluation Min. Internal Evaluation								
100	40	40 12		60	28				
Practical									
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation				
00	00	00		00					

	Part E
Books	1. Bose, N.K. 1967, Culture and Society in India. Bombay: Asia Publishing House 2. Dube, S.C. 1990, Indian village (New Delhi: National Book Trust.) 3. Percival Spear: History of Indian Society, Penguin , 1966. 4. Uberoi, Patrica: Family , kinship and Marriage , New Delhi: oxford University Press , 1995, PP 50 to 73 , 416 to 451 5. Gandhi , M K: Removal of Uniouchability , Navjeevan Publishing House , Ahmadabad , 1954
Articles	
References Books	1. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
MOOC Courses	
Vidooe	1 https://www.youtuba.com/watch2y-j9NSVPT JeDk 2, https://wwitu-ba/MMET7/3/od2E 2 https://www.youtuba.com/watch2y-pOdba ISLIAK/48/let- 4 https://www.ba/mageELIBA 17DLL5 https://www.ba/mageEl

Course Articulation Matrix															
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	=	-	=	1	1	1
CO2	-	-	-	-	-	1	-	-	2	-	-	-	1	1	1
CO3	-	-	-	-	=	2	2	-	-	-	-	=	2	1	1
CO4	-	-	-	-	=	1	-	-	-	-	-	=	2	1	2
CO5	-	-	-	-	=	-	-	-	-	-	-	=	-	-	-
COS															



BSc\_ComputerScience

Title of the Course

PO2

PO3

PO4

PO5

PO1

COs

CO1

CO3 CO4 CO5 CO6

India in 21st centuary

Cours	e Code	VAC0101[1]											
				Part A									
Ye	əar	1st		1st				Credits	L T P C 2 0 0 2				
Cours	е Туре	Theory only											
Course	Category	Add-On Courses											
Pre-Requisite/s		"Understanding of Sociological Concepts": A foundational knowledge of sociological concepts is essential to grasp the composition of Indian society discussed in Unit I. This includes understanding social institutions, cultural environments, and threats to national integration. 2. "Historical Background": Familiarity with the history of India, particularly the findian Freedom Movement, is crucial for comprehending Unit II. Knowledge of events such as the Revolt of 18th the emergence of instantantian, and the appropriate of the comprehending Unit II. Knowledge of events such as the Revolt of 18th the emergence of instantantian, and the understanding of political movements in India particularly those led by figures like Gandhi, is necessary for Unit III. Emmiliarity with concepts like non-cooperation, civil disobedience, and the Quilt Indian movement alds in analyzing the dynamics of Indian freedom and partition. 4. "Knowledge of Indian Hosens and Political Indian H							Co-Requisite/s				
	Outcomes n's Level	CO1- understanding of the basic principles and clinical significance of laboratory testing in the field of molecular diagnostics (BL1-Remember) CO2- Demonstrate an understanding of basic molecular diagnostic techniques (BL2-Understand) CO3- Demonstrate an understanding of electrophoresis in the separation of DNA fragments() CO4- Apply molecular diagnostic techniques to the identification and diagnosts of diseases(slL3-Apply)											
Coures Elements		Skill Development   Entrepreneurship X Employability X Professsonal Ethics   Gender   Human Values   Environment X			\$DG4(C \$DG5(Goals) \$DG10 \$DG12			SDG4(Quality edu SDG5(Gender equ SDG10(Reduced	2(Good health and well-being) ((Quality education) ((Gender equality) ((Reduced inequalities) ((Reduced inequalities) ((Reduced inequalities) ((Reduced inequalities) ((Reduced inequalities) ((Reduced inequalities) ((Red				
				Part B									
Mo	dules		Contents		Pedagogy			Hours					
				Part C									
Mod	lules		Title		Indicative-ABCA/PBL/ Experiments/Field work/ Internships			Bloom's Level	Hours				
1 Quiz & Flip Class room					PBL				2				
			Р	art D(Marks Distribut	ion)								
Theory  Total Marks Minimum Passing Marks External Evaluation Min. External Evaluation I							Internal Fresh	al Evaluation Min. Internal Evaluation					
Total Marks	40	issing marks	External Evaluation 60	28	External Evaluation Interna			Jation	12				
100	40		00	Practical		12							
Total Marks	Minimum Pa	assing Marks	External Evaluation	External Evaluation Internal Evalu			aluation Min. Internal Evaluation		ition				
00	00	00					00						
		t		Part E									
	oks	1. Bose, N.K. 1967, Culture and Society in India. Bombay: Asia Publishing House 2. Dube, S.C. 1990, Indian village, (New Delhi: National Book Trust.) 3. Percival Spear: History of Indian Society, Penguin , 1966. 4. Uberoi, Patrica: Family , kinship and Marriage , New Delhi: oxford University Press, 1995, PP 50 to 73, 416 to 4515. Gandhi , M.K. Removal of Uniouchability , Navjeevan Publishing House , Ahmadabad , 1954											
Arti													
	es Books	1. A Nagraj, 1998, Jeevan Vidy	a ek Parichay, Divya Path Sansthan, Amarkantak.										
	Courses												
Vid	eos	1.https://www.youtube.com/wai	tch?v=i8N6YRTJsDk 2. https://youtu.be/MWsT7x3c	qd3E 3.https://www.youtu	be.com/watch?v=pQ	ghqJSUAK4&list=	4.https://youtu.be/9BEU8A_	JZPU 5.https://yout	u.be/pPsKQwaZ4dg				

Course Articulation Matrix PO8 PO9

PO7

2

PO10

PO11

PO12

PSO1

PS02

PSO3