હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી

NAAC A (3.02) State University

પો.બો.નં.-૨૧, યુનિવર્સિટી રોડ, પાટણ (ઉ.ગુ.) ૩૮૪૨૬૫

ફોનઃ(૦૨૭૬૬) ૨૩૭૦૦૦ ફેકસ : (૦૨૭૬૬) ૨૩૧૯૧૭

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રાષ્ટ્રીય શિક્ષણ નીતિ-૨૦૨૦

પરિપત્ર નં.- ૨૦૦/૨૦૨૩

વિષયઃ વિજ્ઞાન વિદ્યાશાખા હેઠળના સ્નાતક કક્ષાના સેમેસ્ટર-૧ અને ૨ના જૂન ૨૦૨૩-૨૪ થી ક્રમશઃ અમલમાં આવતા અભ્યાસક્રમ / પરિક્ષા સ્કીમ અંગે.

આ યુનિવર્સિટીના વિજ્ઞાન વિદ્યાશાખા અંતર્ગત વિષયોના સ્નાતક વિભાગો તથા સંલગ્ન વિજ્ઞાન વિદ્યાશાખાની તમામ કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, એકેડેમિક કાઉન્સિલની તારીખઃ ૧૪/૦૮/૨૦૨૩ની મળેલ સભાના નિર્દિષ્ટ ઠરાવોથી રાષ્ટ્રીય શિક્ષણ નીતિ-૨૦૨૦ અંતર્ગત UGCની Guideline તથા રાજય સરકારશ્રીના શિક્ષણ વિભાગના તારીખઃ ૧૧/૦૭/૨૦૨૩ના ઠરાવ નં.કે.સી.જી./એડમીન/૨૦૨૩-૨૪/૦૬૦૭/ખ-૧ થી પ્રકાશિત કરેલ કોમન કરિકયુલમ એન્ડ ક્રેડિટ ફ્રેમવર્ક હેઠળ ક્રેડિટ માળખું તથા પ્રકાશિત કરેલ સ્ટાન્ડર્ડ ઓપરેટીંગ પ્રોસિજર (S.O.P.) મુજબ વિજ્ઞાન વિદ્યાશાખા હેઠળના નીચેના સ્નાતક કક્ષાના સામેલ પરિશિષ્ટ પ્રમાણેના નવા અભ્યાસક્રમો શૈક્ષણિક વર્ષઃ ૨૦૨૩-૨૪ થી ક્રમશઃ અમલમાં આવે તે રીતે મંજુર કરેલ છે, જેનો અમલ કરવા સારૂ સબંધિતોને આ સાથે મોકલવામાં આવે છે.

ક્રમ નં	અભ્યાસક્રમ	ઠરાવ ક્રમાંક	સેમેસ્ટર
૧	બી.એસ.સી. (ગણિતશાસ્ત્ર)	૧૯	સેમેસ્ટર ૧ અને ૨
૨	બી.એસ.સી. (વનસ્પતિશાસ્ત્ર)	૨૦	સેમેસ્ટર ૧ અને ૨
૩	બી.એસ.સી. (બાયોટેકનોલોજી)	૨૧	સેમેસ્ટર ૧ અને ૨
૪	બી.એસ.સી. (ભૌતિકશાસ્ત્ર)	૨૨	સેમેસ્ટર ૧ અને ૨
૫	બી.એસ.સી. (ઝુલોજી)	૨૩	સેમેસ્ટર ૧ અને ૨
૬	બી.એસ.સી. (રસાયણશાસ્ત્ર)	૩૨	સેમેસ્ટર ૧ અને ૨

સદર બાબતની જાણ આપના સ્તરેથી અધ્યાપકશ્રીઓ તથા વિદ્યાર્થીઓને કરવા વિનંતી છે.

નોંધઃ

(૧) વિદ્યાર્થીઓની જરૂરીયાત માટે પરિપત્રની એક નકલ કોલેજના / ડિપાર્ટમેન્ટના ગ્રંથાલયમાં મૂકવાની રહેશે.

(૨) આ પરિપત્ર યુનિવર્સિટીની વેબસાઇટ www.ngu.ac.in પર પણ ઉપલબ્ધ કરવામાં આવેલ છે. આથી સંબંધિત કોલેજોને ડાઉનલોડ કરી ઉપયોગ કરવા સારૂ જણાવવામાં આવે છે.

(૩) <u>વિજ્ઞાન વિદ્યાશાખા</u> વિદ્યાશાખા હેઠળના સ્નાતક કક્ષાના પ્રોગ્રામ્સના અભ્યાસક્રમોનો પરિપત્ર નં.૧૩૦/૨૦૨૩, તારીખઃ૨૩/૦૬/૨૦૨૩ રદ કરવામાં આવે છે.

કા. કુલસચિવ

બિડાણઃ ઉપરમુજબ

નં-એકે/અ×સ/૩૬૪/૨૦૨૩
તારીખઃ૩૧/ ૦૮/૨૦૨૩

પ્રતિ,

૧. ડીનશ્રી, વિજ્ઞાન વિદ્યાશાખા તરફ.
૨. વિજ્ઞાન વિદ્યાશાખા હેઠળની કોલેજોના આચાર્યશ્રીઓ તરફ
૩. પરીક્ષા નિયામકશ્રી, હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી પાટણ.
૪. ગ્રંથપાલશ્રી, હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી પાટણ.
૫. માન.કુલપતિશ્રી/કુલસચિવશ્રીનું કાર્યાલય હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી પાટણ.
૬. સિસ્ટમ એનાલીસ્ટશ્રી, કોમ્પ્યુટર (રીઝલ્ટ સેન્ટર) હેમ.ઉ.ગુ.યુનિવર્સિટી, પાટણ.(વેબસાઇટ પર મુકવા સારૂ)
૭. પ્રવેશ પ્ર-શાખા, હેમ.ઉ.ગુ.યુનિવર્સિટી, પાટણ
૮. મહેકમ શાખા, હેમ.ઉ.ગુ.યુનિવર્સિટી, પાટણ (૨ નકલ)

I/c Principal
The H.N.S.B.Ltd Science College
Himatnagar-383 001.

Curriculum and Credit Framework For SEM I and II

Asper UGC Guideline

(According to NATIONAL EDUCATION POLICY (NEP) – 2020)

Submittedon21st July 2023

I/c Principal
The H.N.S.B Ltd Science College
Himatnagar-383 001.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

B. Sc. Microbiology

Syllabus/ scheme

Semester – 1 to 2

With effect from

June-2023

Date: 31/08/2023

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY PATAN	
B. Sc. (Microbiology) Syllabus 2023 (According to NEP-2020)	
Document code	**Syllabus MB-2021**
Name of faculty	**Science**
Faculty code	**SCI**
Programme name	**B. Sc. MICROBIOLOGY**
Programme code	**SCIUG105**
Effective from	**June-2023**

The proposed new structure for B. Sc. course is based on NEP-2020 which is in force from June-2023.

Course Pattern

1. This programme is divided into **Eight Semesters** (Four Years). The duration of an academic year consists of two semesters, each of 15 weeks for teaching. The academic session in each semester will provide 90 teaching days. Each semester has 22 credits and the programme is comprised of total 176 credits.
2. The theory courses with 4 credits shall have 60 hrs of direct classroom teaching workload (15 weeks × 4). The theory courses with 3 credits shall have 45 hrs of teaching workload (15 weeks × 3) and the theory courses with 2 credits shall have 30 hrs of teaching workload (15 weeks × 2).
3. Attendance: The attendance rules will be as per the rules and regulation of Hemchandracharya North Gujarat University, Patan.
4. Medium of Instruction: The medium of instruction shall be Gujarati but students are free to write answers in Gujarati or English in examination.
5. Language of question paper: Question paper should be drawn in English Number of students in each batch for practical examination should be 15.

Evaluation

Continuation and Comprehensive Evaluation (CCE)

1. **For CCE of 50** marks following components shall be considered.

Sr. No.	Component	Marks
1	Daily/Weekly/Monthly unit test/ Internal exam	25
2	Assignment/ Quiz test	10
3	Development of soft skill (Seminar/ Group discussion)	05
4	Solving exercise/ Work base training/ Reading analysis	05
5	Attendance	05
	Total	**50**

2. For **CCE of 25** marks following component should be used.

Sr. No.	Component	Marks
1	Daily/Weekly/Monthly unit test/ Internal exam	15
2	Assignment/ Quiz test	05
4	Attendance	05
	Total	**25**

Semester End Evaluation (SEE)

1. For SEE of 50 marks following question paper style shall be considered.

	Total marks	
Q. 1	10	Must be drawn from Unit 1 and will have three long questions out of which any two must be answered (5 marks each)
Q. 2	10	Must be drawn from Unit 2 and will have three long questions out of which any two must be answered (5 marks each)
Q. 3	10	Must be drawn from Unit 3 and will have three long questions out of which any two must be answered (5 marks each)
Q. 4	10	Must be drawn from Unit 4 and will have three long questions out of which any two must be answered (5 marks each)
Q. 5	10	08 short questions must be drawn from all units, out of which any 05 must be answered (2 marks each)
Total	**50**	

2. For SEE of 25 marks following question paper style shall be considered.

	Total marks	
Q. 1	10	Must be drawn from Unit 1 and will have three long questions out of which any two must be answered (5 marks each)
Q. 2	10	Must be drawn from Unit 2 and will have three long questions out of which any two must be answered (5 marks each)
Q. 3	05	08 short questions must be drawn from both units, out of which any 05 must be answered (1 marks each)
Total	**25**	

PROGRAM OBJECTIVE

The primary objective of the programme:

1. to impart quality education in the subject ofMicrobiology as a basic science and its applied branches to the students.
2. to inculcate research aptitude in students
3. to develop analytical skills in students and motivate the students for self-employment in applied branches of Microbiology.
4. to inculcate the spirit of sustainable use of resources, their conservation and love for nature.
5. to conduct field studies and different projects of local and global interests.
6. to provides opportunities for professional and personal development throughcurricular and co- curricular activities.
7. to Provide consultancy and organize extension activities.

PROGRAMME OUTCOMES

1. to understand the fundamentals of microbes as well as complex microbe structure, physiology and evolution of microbes through taxonomic study.
2. For instance, if you take microbiology as major course, you can also still take courses from across the other complementary courses.
3. Apply the wide range of subject based skills of various fields that create a base for future career in disciplines such as Health Sciences, Aquaculture, Agriculture, Environmental Management, Biotechnology, Publishing, Teaching and Research.
4. Understand the applications of biological techniques to various fields of biology.
5. Graduate with microbiology can have best opportunities in the academic as well as industrial sector for developing their career.
6. The syllabus has been designed in such a way that it will give good experience to the student to work under pressure to expertise with great practical and analytical skills.

B. Sc. Semester I (Microbiology)

Course	Course code	Paper title	Teaching hours per week	CCE	SEE	Total marks	Credit points	Exam duration (Hours)
Major Discipline Specific core course	SC23MJDSC MIC101	Fundamentals of Microbiology	4	50	50	100	4	2.5
Minor Discipline Specific core course	SC23MIDSC MIC102	Introduction to Microbiology	2	25	25	50	2	2
Multi Disciplinary Course	SC23MDC MIC103	Basic Microbiology	2	25	25	50	2	2
Major Discipline Specific core course Practical Paper	SC23 PMJDSC MIC101	Fundamentals of Microbiology Practical Part A	4	25	25	50 (Part A) + 50 (Part B) = 100	2 (Part A) + 2 (Part B) = 4	More than 3
		Fundamentals of Microbiology Practical Part B	4	25	25			More than 3
Minor Discipline Specific core course Practical Paper	SC23PMIDSC MIC102	Microbiological techniques (Practical)	4	25	25	50	2	More than 3
Multi Disciplinary Course Practical Paper	SC23PMDC MIC103	Basic Microbiology (Practical)	4	25	25	50	2	More than 3
Ability Enhancement Course	SC23AEC MIC104	English	2	25	25	50	2	2
Value added courses	SC23VAC MIC105	To be selected from Basket	2	25	25	50	2	2
Skill Enhancement Course	SC23SEC MIC106	Microbial Culture Preservation	2	25	25	50	2	2
Total			**30**	**275**	**275**	**550**	**22**	

B. Sc. Semester II (Microbiology)

Course	Course code	Paper title	Teaching hours per week	CCE	SEE	Total marks	Credit points	Exam duration (Hours)
Major Discipline Specific core course	SC23MJDSC MIC201	Cell Biology	4	50	50	100	4	2.5
Minor Discipline Specific core course	SC23MIDSC MIC202	Cell and Biomolecules	2	25	25	50	2	2
Multi Disciplinary Course	SC23MDC MIC203	Biomolecules	2	25	25	50	2	2
Major Discipline Specific core course Practical Paper	SC23 PMJDSC MIC201	Cell Biology Practical Part A	4	25	25	50 (Part A) + 50 (Part B) = 100	2 (Part A) + 2 (Part B) = 4	More than 3
		Cell biology Practical Part B	4	25	25			More than 3
Minor Discipline Specific core course Practical Paper	SC23PMIDSC MIC202	Cell and Biomolecules (Practical)	4	25	25	50	2	More than 3
Multi Disciplinary Course Practical Paper	SC23PMDC MIC203	Biomolecules (Practical)	4	25	25	50	2	More than 3
Ability Enhancement Course	SC23AEC MIC204	English	2	25	25	50	2	2
Value added courses	SC23VAC MIC205	To be selected from Basket	2	25	25	50	2	2
Skill Enhancement Course	SC23SEC MIC206	Microbial Quality Control	2	25	25	50	2	2
Total			**30**	**275**	**275**	**550**	**22**	

Semester I

B. Sc. Semester I (Microbiology)

Course	Course code	Paper title	Teaching hours per week	CCE	SEE	Total marks	Credit points	Exam duration (Hours)
Major Discipline Specific core course	SC23MJDSC MIC101	Fundamentals of Microbiology	4	50	50	100	4	2.5
Minor Discipline Specific core course	SC23MIDSC MIC 102	Introduction to Microbiology	2	25	25	50	2	2
Multi Disciplinary Course	SC23MDC MIC 103	Basic Microbiology	2	25	25	50	2	2
Major Discipline Specific core course Practical Paper	SC23 PMJDSC MIC101	Fundamentals of Microbiology Practical Part A	4	25	25	50 (Part A) + 50 (Part B) = 100	2 (Part A) + 2 (Part B) = 4	More than 3
		Fundamentals of Microbiology Practical Part B	4	25	25			More than 3
Minor Discipline Specific core course Practical Paper	SC23PMIDSC MIC102	Microbiological Techniques (Practical)	4	25	25	50	2	More than 3
Multi Disciplinary Course Practical Paper	SC23PMDC MIC103	Basic Microbiology (Practical)	4	25	25	50	2	More than 3
Ability Enhancement Course	SC23AEC MIC104	English	2	25	25	50	2	2
Value added courses	SC23VAC MIC105	To be select from Basket	2	25	25	50	2	2
Skill Enhancement Course	SC23SEC MIC106	Microbial Culture Preservation	2	25	25	50	2	2
Total			**30**	**275**	**275**	**550**	**22**	

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER I

PROGRAMME CODE: SCIUG105

MAJOR DISCPLINE SPECIFIC COURSE

COURSE CODE: SC23MJDSCMIC101

COURSE TITLE: FUNDAMENTALS OF MICROBIOLOGY

Total Credits- 04 (04 Lectures/Week)		**Theory**	**SEE-50 Marks**
			CCE- 50 Marks

Objective:

to make student familiar with microbiology as important subject, history and development of subject, scope of microbiology in various sectors and basic introduction to microbes

Unit-I: History of Development of Microbiology

- Development of microbiology as a discipline, spontaneous generation vs. biogenesis. contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming
- Role of microorganisms in fermentation, germ theory of disease, principle of immunization.
- Contributions of Martinus W. Beijerinck, Sergei N. Winogradsky, Selman A.Waksman, Paul Ehrlich, Elie Metchnikoff, Edward Jenner

Unit-II: Scope of Microbiology

- Distribution of microbes in nature
- Taxonomic and integrative approaches for subdivision of microbiology, concept of classification, major groups of microorganisms
- Applied area of microbiology: medical, agriculture, soil, water, food, dairy, industries, veterinary, aquatic, space, geochemical and petroleum.

Unit-III: Microscopy and Staining

- Basic Principle of microscopy, working of Light and compound microscope.
- Working principle of bright field microscope, dark field microscope, phase contrast microscope, fluoresence microscope

- Satins and staining: dyes and stains – definition and examples acidic & basic dyes and leuco compounds
- Principles of staining techniques for bacteria
- Types of staining: simple, negative, differential and Gram staining

Unit-IV: Introduction to Microbial World

- Systems of classification: binomial nomenclature, whittaker's five kingdom and carl woese's three kingdom classification systems and their utility.
- Difference between prokaryotic and eukaryotic microorganisms
- General characteristics of acellular microorganisms: general introduction with special reference to the structure of the following: TMV, T4 and λ phage, one step multiplication curve

Outcomes:

Students will;

- ✓ get familiarized with importance of microbiology
- ✓ understand scope of microbiology in various fields
- ✓ come to know about contributions of scientists in field of microbiology
- ✓ able to explain various microscopic and staining techniques for observing microorganisms

References

1. Elementary Microbiology Vol-I, H. A. Modi (2014)
2. Microbiology- Michael J Pleczar – 5th Edition
3. Principle of microbiology by Ronald M. Atlas, 2nd Edition

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PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER - I

PROGRAMME CODE: SCIUG105

PRACTICLS: SC23 PMJDSCMIC101 PART-A & PART B

Total Credits-04	**Part A:2 credits**	**(04 Hours/Week)**	**CCE- 25 Marks**	**SEE-25 Marks**	**Total marks: 100**
	Part B:2 credits	**(04 Hours/Week)**	**CCE- 25 Marks**	**SEE-25 Marks**	

LIST OF PRASCTICALS

1. Good Laboratory Practices and Biosafety.
2. To study the principle, working methodology and applications of important instruments (biological safety cabinets, autoclave, BOD incubator, hot air oven, pH meter, colorimeter)
3. Preparation of standard solutions: (A) percent solutions (B) part dilutions (C) molar solutions (D) normal solutions (E) molal solutions (F) PPM and PPB solutions
4. Study of basic principle and working components of light and compound microscopes
5. Study of *Rhizopus*, *Penicillium*, *Aspergillus* using temporary mounts.
6. Study of *Spirogyra* and *Chlamydomonas*, *Volvox* using temporary Mounts
7. Study of the following protozoans using permanent mounts/photographs: *Amoeba*, *Entamoeba*, *Paramecium* and *Plasmodium*
8. Staining techniques for bacteria – monochrome staining using acidic and basic dyes
9. Study of morphology of different bacteria
10. Hanging drop technique to demonstrate bacterial motility
11. Gram staining of bacteria
12. Study of flagella and pili staining (Loeffler's method)
13. Staining of bacterial spore
14. Isolation of bacteria (streak plate, spread plate and pour plate techniques)
15. Isolation of bacteria by serial dilution (Single and double dilution techniques)
16. Staining of cell wall by Dyar's / Ringer's method
17. Capsule staining in bacteria by Hiss / Maneval's Method
18. Endospore staining by Dorner's / Snyder's method

Reference

1. Patel R.J. and Patel R.K. (2016) Experimental microbiology Volume I, 9thEdition.Aditya,
2. Patel R.J. and Patel R.K. (2017) Experimental microbiology Volume II, 9th Edition. Aditya,
3. Cappuccino J.G. (2016) Microbiology; A Laboratory Manual, 11th Edition. Pearson Edication (Singapore) Pvt. Ltd., (ISBN: 978-9332535190)

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER - I
PROGRAMME CODE: SCIUG105

MINOR DISCPLINE SPECIFIC COURSE
COURSE CODE: SC23MIDSCMIC102
COURSE TITLE: INTRODUCTION TO MICROBIOLOGY

Total Credits- 02 (02 Lectures/Week)		**Theory**	**SEE-25 Marks**
			CCE- 25 Marks

Objective:

to make students learn basic microbiology techniques

Unit-I: History and Scope of Microbiology

- Development of microbiology as a discipline, Spontaneous generation vs. biogenesis. Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming
- Contributions of Martinus W. Beijerinck, Sergei N. Winogradsky, Selman A.Waksman, Paul Ehrlich, Elie Metchnikoff, Edward Jenner
- Distribution of microbes in nature
- Applied area of Microbiology: Medical, Agriculture, Soil, water, food, Dairy, industries, veterinary, aquatic, Space, geochemical and petroleum.

Unit-II Microscopy, Staining and Microbial World

- Basic Principle of microscopy, working of Light and compound microscope. Working principle of Phase Contrast Microscope, Fluoresence Microscope
- Satins and staining: Principles of staining techniques for bacteria, Types of staining: simple, negative, differential and gram staining
- Systems of classification Binomial Nomenclature, Whittaker's five kingdom and Carl Woese's three kingdom classification systems and their utility.
- Difference between prokaryotic and eukaryotic microorganisms

Outcomes:

Student will;

- ✓ understand principle and working of various microscopes
- ✓ have hands on experience for operating microscopes
- ✓ learn staining techniques for observation of bacterial cells

Reference

1. Elementary Microbiology Vol-I, H. A. Modi (2014)
2. Microbiology- Michael J Pleczar – 5th Edition

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER I

PROGRAMME CODE: SCIUG105

MINOR DISCPLINE SPECIFIC COURSE PRACTICAL

COURSE CODE:SC23PMIDSCMIC102

COURSE TITLE: INTRODUCTION TO MICROBIOLOGY

Total Credits- 02 (04 Hours/Week)	**SEE-25 Marks**
	CCE- 25 Marks

LIST OF PRACTICALS

- Good laboratory practices and biosafety.
- To study the principle, working methodology and applications of important instruments (biological safety cabinets, autoclave, BOD incubator, hot air oven, pH meter)
- Study the basic principle and working components of light and compound microscope
- Staining techniques for bacteria – monochrome staining using acidic and basic dyes
- Hanging drop technique to demonstrate bacterial motility
- Gram staining of bacteria
- Staining of cell wall by Dyar's / Ringer's method
- Capsule staining in bacteria by Hiss / Maneval's Method
- Endospore staining by Dorner's / Snyder's method

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER I

PROGRAMME CODE: SCIUG105

MULTIDISCIPLINARY SPECIFIC COURSE

COURSE CODE: SC23MDCMIC103

COURSE TITLE: BASIC MICROBIOLOGY

Total Credits- 02	**(02 Lectures/Week)**	**Theory**	**SEE-25 Marks**
			CCE- 25 Marks

Objective:

to make students learn about basic concept of microbiology

Unit-I: Scope of Microbiology

- Distribution of microbes in nature
- Taxonomic and integrative Approaches for subdivision of microbiology, Concept of classification, major groups of microorganisms
- Applied area of Microbiology: Medical, Agriculture, Soil, water, food, Dairy, industries, veterinary, aquatic, Space, geochemical and petroleum.

Unit-II: Bacterial cell and Microscopy

- Basic structure of bacterial cell, Morphology of bacteria
- Basic Principle of microscopy, working of Light and compound microscope.
- Satins and staining: Dyes and stains – Definition and examples acidic & basic dyes and luco compounds
- Principles of staining techniques for bacteria
- Types of staining: simple, negative, differential and gram staining

Reference

1. Elementary Microbiology Vol-I, H. A. Modi (2014)
2. Microbiology- Michael J Pleczar – 5th Edition

Outcomes:

Student will;

- ✓ well verse with scope of microbiology
- ✓ have hands on experience for operating microscope
- ✓ learn staining technique for observation of bacterial cells

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER I

PROGRAMME CODE: SCIUG105

MULTIDISCIPLINARY SPECIFIC COURSE PRACTICAL

COURSE CODE:SC23PMDCMIC103

COURSE TITLE: BASIC MICROBIOLOGY

Total Credits- 02 (04 Hours/Week)	**SEE-25 Marks**
	CCE- 25 Marks

LIST OF PRACTICALS

- Good Laboratory Practices and Biosafety.
- To study the principle, working methodology and applications of important instruments (biological safety cabinets, autoclave, BOD incubator, hot air oven, pH meter)
- Study the basic principle and working components of Light microscope
- Study the morphology of different bacteria
- Study of bacterial staining
- Gram staining of Bacteria

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER I

PROGRAMME CODE: SCIUG105

SKILL ENHANCEMENT COURSE

COURSE CODE: SC23SECMIC106

COURSE TITLE: MICROBIAL CULTURE PRESERVATION

Total Credits- 02 (02 Lectures/Week)	**Theory**	**SEE- 25 Marks** **CCE- 25 Marks**

UNIT-I Preparation of media

- Different types and composition of isolation media
- Media and reagent preparation: Calculation of normality, molarities and % solution
- Methods of sample collections and its transport
- Sterilization of media and methods of sterilization

UNIT-II Pure culture and maintenance

- Pure culture techniques: Serial dilution, Double dilution, plating methods: Streaking, spreading and pouring
- Preservation of culture: sub culturing, Oil overlay, storage at low temperature,: Lyophilization and use of liquid nitrogen
- National and international culture collections and their functions

Reference

1. Elementary Microbiology Vol-I, H. A. Modi (2014)
2. Microbiology- Michael J Pleczar – 5th Edition
3. Principle of microbiology by Ronald M. Atlas, 2nd Edition

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER I

PROGRAM CODE: SCIUG105

MAJOR DISCPLINE SPECIFIC COURSE PRACTICAL

FUNDAMENTALS OF MICROBIOLOGY PRACTICAL

PRACTICAL SKELETON

Time: more than 3 Hours **Total Marks: 50**

Q 1	Perform the given experiment, write principle, methodology and show your results to the examiner	**10**
Q 2	Perform the given experiment, write principle, methodology and interpret the results	**10**
Q 3	Perform the given experiment and explain your results	**10**
Q 4	Spotting	**10**
Q 6	Viva voce	**05**
Q 7	Journal submission	**05**

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER I

PROGRAMME CODE: SCIUG105

MINOR DISCPLINE SPECIFIC COURSE PRACTICAL

INTRODUCTION TO MICROBIOLOGY PRACTICAL

PRACTICAL SKELETON

Time: 3 Hours **Total Marks: 25**

Q 1	Perform the given experiment, write principle, methodology and show your results to the examiner	**05**
Q 2	Perform the given experiment, write principle, methodology and interpret the results	**05**
Q 3	Spotting	**05**
Q 4	Viva-voce	**05**
Q 5	Journal	**05**

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER I

PROGRAMME CODE: SCIUG105

MULTIDISCIPLINARY COURSE PRACTICAL

BASIC MICROBIOLOGY PRACTICAL

PRACTICAL SKELETON

Time: 3 Hours **Total Marks: 25**

Q 1	Perform the given experiment, write principle, methodology and show your results to the examiner	**05**
Q 2	Perform the given experiment, write principle, methodology and interpret the results	**05**
Q 3	Spotting	**05**
Q 4	Viva-voce	**05**
Q 5	Journal	**05**

Semester II

B. Sc. Semester II (Microbiology)

Course	Course code	Paper title	Teaching hours per week	CCE	SEE	Total marks	Credit points	Exam duration (Hours)
Major Discipline Specific core course	SC23MJDSC MIC201	Cell Biology	4	50	50	100	4	2.5
Minor Discipline Specific core course	SC23MIDSC MIC202	Cell and Biomolecules	2	25	25	50	2	2
Multi Disciplinary Course	SC23MDC MIC203	Biomolecules	2	25	25	50	2	2
Major Discipline Specific core course Practical Paper	SC23 PMJDSC MIC201	Cell Biology Practical Part A	4	25	25	50 (Part A) + 50 (Part B) = 100	2 (Part A) + 2 (Part B) = 4	More than 3
		Cell Biology Practical Part B	4	25	25			More than 3
Minor Discipline Specific core course Practical Paper	SC23PMIDSC MIC202	Cell and Biomolecules (Practical)	4	25	25	50	2	More than 3
Multi Disciplinary Course Practical Paper	SC23PMDC MIC203	Biomolecules (Practical)	4	25	25	50	2	More than 3
Ability Enhancement Course	SC23AEC MIC204	English	2	25	25	50	2	2
Value added courses	SC23VAC MIC205	To be select from Basket	2	25	25	50	2	2
Skill Enhancement Course	SC23SEC MIC206	Microbial Quality Control	2	25	25	50	2	2
Total			**30**	**275**	**275**	**550**	**22**	

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER II

PROGRAMME CODE: SCIUG105

MAJOR DISCPLINE SPECIFIC COURSE

COURSE CODE: SC23MJDSCMIC201

COURSE TITLE: CELL BIOLOGY

Total Credits- 04 (04 Lectures/Week)		**Theory**	**SEE-50 Marks**
			CCE- 50 Marks

Objective:

to make student familiar with concept of cell and its components and their functions

Unit-1 Structure of Cell

- Difference between plant cell and animal cell
- Plasma membrane: structure and function
- Cell Wall: structure of eukaryotic cell wall and prokaryotic cell wall, function of cell wall
- Cytoskeleton: structure and organization of actin filaments, association of actin filaments with plasma membrane, cell surface protrusions, intermediate filaments, microtubules

Unit-II Cell organelles

- Structure and function of mitochondria, golgi complex, chloroplasts and peroxisomes
- Cellular function of ribosomes, vacuoles, lysosomes, nucleus and nuclear membrane
- Types and functions of endoplasmic reticulum
- Cell-Cell interactions - adhesion junctions, tight junctions, gap junctions, and plasmodesmata (only structural aspects)

Unit-III Cell cycle and regulation

- Cell division: process of mitosis and meiosis
- Eukaryotic cell cycle and its regulations with check points
- Cell signaling concept, signaling through G-protein coupled receptors
- Programmed cell death

Unit-IV Biology of cancer

- Introduction to cancer biology
- Cancer and cell cycle
- Development of cancer: cause, types and cure

Reference

1. Microbiology- Michael J Pleczar – 5th Edition
2. Hardin J, Bertoni G and Kleinsmith LJ. (2010). Becker's World of the Cell. 8th edition. Pearson.

Outputs:

Students will;

- ✓ understand basic structure of cell
- ✓ know about different cell organelles and their functions
- ✓ understand process of cell cycle and will have hands on experience to know about mitosis and meiosis stages
- ✓ have basic knowledge of cancer and its relation with cell cycle also understand basic knowledge of development of cancer and its cure

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER II

PROGRAMME CODE: SCIUG105

PRACTICLS: SC23 PMJDSCMIC201 PART-A & PART B
CELL BIOLOGY

Total Credits-04	**Part A:2 credits**	**(04 Hours/Week)**	**CCE- 25 Marks**	**SEE-25 Marks**	**Total marks: 100**
	Part B:2 credits	**(04 Hours/Week)**	**CCE- 25 Marks**	**SEE-25 Marks**	

List of Practicals

1. Study a representative plant and animal cell by microscopy.
2. Study of the structure of cell organelles through electron micrographs
3. Cytochemical staining of DNA – Feulgen
4. Demonstration of the presence of mitochondria in striated muscle cells/ cheek epithelial cell using vital stain Janus Green B
5. Study of polyploidy in Onion root tip by colchicine treatment.
6. Identification and study of cancer cells by photomicrographs.
7. Study of different stages of mitosis.
8. Study of different stages of meiosis.
9. Isolation of mitochondria
10. Cell wall staining in plant cells
11. Buccal smear – Identification of barr body
12. Isolation of chorloplast
13. Estimation of chlorophyll
14. Study of chromosome aberrations
15. LS and TS of plant tissue

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER II

PROGRAMME CODE: SCIUG105

MINOR DISCPLINE SPECIFIC COURSE

COURSE CODE: SC23MIDSCMIC202

COURSE TITLE: CELL AND BIOMOLECULES

Total Credits- 02 (02 Lectures/Week)		**Theory**	**SEE-25 Marks**
			CCE-25 Marks

Objective:

to understand basic concept of cell and their biomolecules

UNIT-I Cell organelles

- Structure and function of mitochondria, golgi complex,
- Structure and function of chloroplasts and peroxisomes
- Cellular function of ribosomes, vacuoles, lysosomes, nucleus and nuclear membrane
- Types and functions of endoplasmic reticulum

UNIT-II Biochemicals of cell

- Function of carbohydrates, classification of carbohydrates
- Classification of amino acids, functions of proteins, structure of proteins
- Classification of functions of lipids, importance of cholesterol
- Structure of nucleotides – purines and pyrimidines
- Functions of vitamins and minerals

Reference

1. Biochemistry by U. Sathyanarayana and chakrapani 4th Edition (2013)
2. Hardin J, Bertoni G and Kleinsmith LJ. (2010). Becker's World of the Cell. 8th edition. Pearson.

Outcomes:

Student will;

- ✓ understand basic cell organelles and their structure
- ✓ well verse with biomolecules and their importance for life

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER II

PROGRAMME CODE: SCIUG105

MINOR DISCPLINE SPECIFIC COURSE PRACTICAL

COURSE CODE:SC23PMIDSCMIC202

COURSE TITLE: CELL AND BIOMOLECULES

Total Credits- 02 (04 Hours/Week)	**SEE-25 Marks**
	CCE- 25 Marks

LIST OF PRACTICALS

- Study a representative plant and animal cell by microscopy.
- Study of the structure of cell organelles through electron micrographs
- Qualitative tests for carbohydrates, reducing sugars, non reducing sugars
- Qualitative tests for lipids and proteins
- Study of protein secondary and tertiary structures with the help of models
- Demonstration of DNA models with help of monograph or digital image
- Estimation of protein by Folin-lawry method
- Protein Estimation of non reducing sugar by Cole's method
- Estimation of reducing sugar by DNSA method

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PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER II

PROGRAMME CODE: SCIUG105

MULTIDISCIPLINARY SPECIFIC COURSE

COURSE CODE: SC23MDCMIC203

COURSE TITLE: BIOMOLECULES

Total Credits- 02	**(02 Lectures/Week)**	**Theory**	**SEE-25 Marks**
			CCE- 25 Marks

Objective

to make student learn about basic importance of biomolecules

UNIT-I Carbohydrate and Protein

- General functions and classification of carbohydrates
- Stereo isomerism of monosaccharides, D and L forms, epimers, mutarotation and anomers of glucose, Storage polysaccharides - starch and glycogen (structure and function)
- Function of proteins and basic classification of amino acids based on function, structure and properties.
- Structure of proteins: primary, secondary, tertiary and quaternary structures of proteins.

UNIT-II Lipids and Nucleic acid

- General functions of lipids, classification of lipids
- Fatty acids: occurrence, even and odd carbon FA, saturated and unsaturated FA, nomenclature of FA
- Properties of triacylglycerols, phospholipids: glycerophospholipids and sphingophospholipids, functions of phospholipids, general introduction of glycolipids, steroids: structure and occurrence of cholesterol
- Nucleotides: structure of nucleotides – purine and pyrimidines, structure of DNA, structure and types of RNA – mRNA, tRNA and rRNA.

Reference:

1. Biochemistry by U. Sathyanarayana and chakrapani 4th Edition (2013)
2. Fundamentals of Biochemistry by Jain & Jain, S. Chand Publications (2009)

Outcomes:

- ✓ Student will understand about biomolecules and its importance for life

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PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER II

PROGRAMME CODE: SCIUG105

MULTIDISCIPLINARY SPECIFIC COURSE PRACTICAL

COURSE CODE:SC23PMDCMIC203

COURSE TITLE: BIOMOLECULES

Total Credits- 02 (04 Hours/Week)	**SEE-25 Marks**
	CCE- 25 Marks

LIST OF PRACTICALS

- Qualitative tests for carbohydrates, reducing sugars, non reducing sugars
- Qualitative tests for lipids and proteins
- Study of protein secondary and tertiary structures with the help of models
- Demonstration of DNA models with help of monograph or digital image
- Demonstration of types of RNA with help of monograph or digital image
- Estimation of protein by Folin-lawry method
- Protein Estimation of non reducing sugar by Cole's method
- Estimation of reducing sugar by DNSA method

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PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER II

PROGRAMME CODE: SCIUG105

SKILL ENHANCEMENT COURSE

COURSE CODE: SC23SECMIC206

COURSE TITLE: MICROBIAL QUALITY CONTROL

Total Credits- 02 (02 Lectures/Week)	**Theory**	**SEE- 25 Marks** **CCE- 25 Marks**

Objective

to develop microbiology laboratory oriented skills

Unit 1 Microbiological Laboratory and Safe Practices

- Good laboratory practices - good microbiological practices
- Biosafety cabinets – working of biosafety cabinets, using protective clothing, specification for BSL1, BSL-2, BSL-3.
- Discarding biohazardous waste – methodology of disinfection, autoclaving & incineration

Unit 2 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, gel diffusion,
- Sterility testing for pharmaceutical products molecular methods - nucleic acid probes, PCR based detection, biosensors.
- Detection of specific microorganisms - on XLD agar, salmonella shigella Agar, manitol salt agar, EMB agar, McConkey agar, saboraud agar
- Ascertaining microbial quality of milk by MBRT, rapid detection methods of microbiological quality of milk at milk collection centers

Outcomes:

Students will;

- ✓ know about GLP, Biosafety and biohazardous wastes
- ✓ learn skill related to microbes determination in food and pharmaceutical samples

Reference

1. Harrigan WF (1998) Laboratory Methods in Food Microbiology, 3rd ed. Academic Press
2. Garg N, Garg KL and Mukerji KG (2010) Laboratory Manual of Food Microbiology I K International Publishing House Pvt. Ltd.
3. Jay JM, Loessner MJ, Golden DA (2005) Modern Food Microbiology, 7th edition. Springer
4. Baird RM, Hodges NA and Denyer SP (2005) Handbook of Microbiological Quality control in Pharmaceutical and Medical Devices, Taylor and Francis Inc.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER II
PROGRAMME CODE: SCIUG104
MAJOR DISCPLINE SPECIFIC COURSE PRACTICAL

CELL BIOLOGY PRACTICAL

PRACTICAL SKELETON

Time: More than 3 Hours **Total Marks: 50**

Q 1	Perform the given experiment, write principle, methodology and show your results to the examiner	**10**
Q 2	Perform the given experiment, write principle, methodology and interpret the results	**10**
Q 3	Perform the given experiment and explain your results	**10**
Q 4	Spotting	**10**
Q 6	Viva voce	**05**
Q 7	Journal submission	**05**

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER II
PROGRAMME CODE: SCIUG105
MINOR DISCPLINE SPECIFIC COURSEPRACTICAL

CELL AND BIOMOLECULES PRACTICAL

PRACTICAL SKELETON

Time: 3 Hours **Total Marks: 25**

Q 1	Perform the given experiment, write principle, methodology and show your results to the examiner	**05**
Q 2	Perform the given experiment, write principle, methodology and interpret the results	**05**
Q 3	Spotting	**05**
Q 4	Viva-voce	**05**
Q 5	Journal	**05**

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

PROGRAMME NAME B. SC. MICROBIOLOGY SEMESTER II
PROGRAMME CODE: SCIUG105
MULTI DISCIPLINARY SPECIFIC COURSE PRACTICAL

BIOMOLECULES PRACTICAL

PRACTICAL SKELETON

Time: 3 Hours **Total Marks: 25**

Q 1	Perform the given experiment, write principle, methodology and show your results to the examiner	**05**
Q 2	Perform the given experiment, write principle, methodology and interpret the results	**05**
Q 3	Spotting	**05**
Q 4	Viva-voce	**05**
Q 5	Journal	**05**