HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

NAAC A (3.02) State University

PATAN- 384265

Faculty of Science

B. Sc. Microbiology

Syllabus/ scheme

Semester – 5 to 6

With effect from

June-2025

Date: 03/07/2025 Total page: 24

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY PATAN	
B. Sc. (Microbiology) Syllabus 2025 (according to NEP-2020)	
Document code	**Syllabus MIC- 2025**
Name of faculty	**Science**
Faculty code	**SCI**
Programme name	**B. Sc. MICROBIOLOGY**
Programme code	**SCIUG105**
Effective from	**June-2025**

The proposed new structure for B. Sc. course is based on NEP-2020 which is in force June-2025.

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).

Attendance: The attendance rules will be as per the rules and regulation of Hemchandracharya North Gujarat University, Patan.

Medium of Instruction: The medium of instruction shall be Gujarati but students are free to write answers in Gujarati or English in examination.

Language of question paper: Question paper should be drawn in Gujarati and English translation of the questions must be given in the question paper.

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 component should be used.

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 should be used.

	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 should be used.

	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

1. The primary objective of the program is to impart quality education in the subject of Microbiology as a basic science and its applied branches to the students.
2. To provide quality education in a branch of biological sciences i.e., Microbiology with different specializations.
3. To facilitate Higher education & research in Microbiology.
4. To provide quality education offering skill-based programs and motivate the students for self-employment in applied branches of Microbiology.
5. To inculcate the spirit of microbial resource conservation, utilization and also love for nature.
6. To provides opportunities for professional and personal development through curricular and co- curricular activities.
7. Provide consultancy and organize extension activities.

PROGRAMME OUTCOMES

1. To understand the complex organization of microbial world, physiology, immunology, bioprospecting and importance of microbes in various biogeochemical
2. cycles and for overall development.
3. For instance, if you major in Microbiology, you can also still take courses from across theother complementary.
4. Apply the wide range of subject based skills of various fields that provide a base for future career in disciplines such as Fermentation technology, Food microbiology, Environmental microbiology, Microbial biotechnology, Agriculture, Publishing, Teaching and Research.
5. Understand the applications of biological techniques to various fields of biology.
6. When you graduate with a Bachelor of Science (Microbiology) you can serve as academician in different institutes.
7. The syllabus has been designed in such a way that it will give good experience to the student to work under pressure.

B.Sc. Semester V (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 MIC501	MEDICAL MICROBIOLOGY	4	50	50	100	4	2.30
Major Discipline Specific core course	SC23MJDSC MIC501AIKS	MICROBIOLOGY: VEDIC TO MODERN TIMES	4	50	50	100	4	2.30
Minor Disciplinary Course	SC23MIDC MIC502	CLINICAL AND DIAGNOSTIC MICROBIOLOGY	4	50	50	100	4	2.30
Major Discipline Specific core course Practical Paper	SC23PMJDSC MIC501	MEDICAL MICROBIOLOGY	4	25	25	50 (Part A) + 50 (Part B) = 100	2 (Part A) + 2 (Part B) = 4	More than 3
	SC23PMJDSC MIC501AIKS	MICROBIOLOGY: VEDIC TO MODERN SCIENCE	4	25	25			More than 3
Minor Discipline Specific core course Practical Paper	SC23PMIDC MIC502	CLINICAL AND DIAGNOSTIC MICROBIOLOGY	8	50	50	100	4	More than 3
Skill Enhancement Course	SC23SEC MIC505	MUSHROOM AND SPIRULINA CULTIVATION	2	25	25	50	2	2
Total			**30**	**275**	**275**	**550**	**22**	

B.Sc. Semester VI (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 MIC601	ENVIRONMENTAL MICROBIOLOGY	4	50	50	100	4	2.30
Major Discipline Specific core course	SC23MJDSC MIC601A	WATER AND WASTE WATER MICROBIOLOGY	4	50	50	100	4	2.30
Minor Disciplinary Course	SC23MIDC MIC602	MICROBES AND ENVIRONEMNT	2	25	25	50	2	2.00
Major Discipline Specific core course Practical Paper	SC23PMJDSC MIC601	ENVIRONMENTAL MICROBIOLOGY	4	25	25	50 (Part A) + 50 (Part B) = 100	2 (Part A) + 2 (Part B) = 4	More than 3
	SC23PMJDSC MIC601A	WATER AND WASTE WATER MICROBIOLOGY	4	25	25			More than 3
Minor Discipline Specific core course Practical Paper	SC23PMIC MIC602	MICROBES AND ENVIRONEMNT	4	25	25	50	2	More than 3
Ability Enhancement Course	SC23AEC MIC604	ENGLISH	2	25	25	50	2	2.00
Internship	SC23INT MIC607	INTERNSHIP		50	50	100	4	
Total			**30**	**275**	**275**	**550**	**22**	

Semester V

B.Sc. Semester V (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 MIC501	MEDICAL MICROBIOLOGY	4	50	50	100	4	2.30
Major Discipline Specific core course	SC23MJDSC MIC501AIKS	MICROBIOLOGY: VEDIC TO MODERN TIMES	4	50	50	100	4	2.30
Minor Disciplinary Course	SC23MIDC MIC502	CLINICAL AND DIAGNOSTIC MICROBIOLOGY	4	50	50	100	4	2.30
Major Discipline Specific core course Practical Paper	SC23PMJDSC MIC501	MEDICAL MICROBIOLOGY	4	25	25	50 (Part A) + 50 (Part B) = 100	2 (Part A) + 2 (Part B) = 4	More than 3
	SC23PMJDSC MIC501AIKS	MICROBIOLOGY: VEDIC TO MODERN SCIENCE	4	25	25			More than 3
Minor Discipline Specific core course Practical Paper	SC23PMIDC MIC502	CLINICAL AND DIAGNOSTIC MICROBIOLOGY	8	50	50	100	4	More than 3
Skill Enhancement Course	SC23SEC MIC505	MUSHROOM AND SPIRULINA CULTIVATION	2	25	25	50	2	2
Total			**30**	**275**	**275**	**550**	**22**	

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

COURSE NAME B. SC. MICROBIOLOGY SEMESTER V

MAJOR DISCPLINE SPECIFIC COURSE CODE: SC23MJDSCMIC501

Total Credits- 04 (04 Period/Week)	**Theory**	**External-50 Marks**
		Internal- 50 Marks

MEDICAL MICROBIOLOGY

Unit 1: Normal microflora of the human body and host pathogen interaction

Normal microflora of the human body: Importance of normal microflora, normal microflora of skin, throat, gastrointestinal tract, urogenital tract Host pathogen interaction: Definitions - Infection, Invasion, Pathogen, Pathogenicity, Virulence, Toxigenicity, Carriers and their types, Opportunistic infections, Nosocomial infections. Transmission of infection, Pathophysiologic effects of LPS

Unit 2: Bacterial and fungal diseases

Bacterial diseases: List of diseases of various organ systems and their causative agents. The following diseases in detail with Symptoms, mode of transmission, prophylaxis and control.

Respiratory Diseases: *Streptococcus pyogenes*, *Haemophilus influenzae*, *Mycobacterium tuberculosis*

Gastrointestinal Diseases: *Escherichia coli*, *Salmonella typhi*, *Vibrio cholerae*, *Helicobacter pylori*

Others: *Staphylococcus aureus*, *Bacillus anthracis*, *Clostridium tetani*, *Treponema pallidum*, *Clostridium difficie*

Fungal diseases: Brief description of each of the following types of mycoses and one representative disease to be studied with respect to transmission, symptoms and prevention

Cutaneous mycoses: Tinea pedis (Athlete's foot)

Systemic mycoses: Histoplasmosis

Opportunistic mycoses: Candidiasis

Unit 3: Viral diseases and Protozoan diseases

Viral diseases: List of diseases of various organ systems and their causative agents. The

following diseases in detail with Symptoms, mode of transmission, prophylaxis and control.

Polio, Herpes, Hepatitis, Rabies, Dengue, AIDS, Influenza with brief description of swine flu, Ebola, Chikungunya, Japanese Encephalitis

Protozoan diseases: List of diseases of various organ systems and their causative agents. The following diseases in detail with Symptoms, mode of transmission, prophylaxis and control

Malaria, Kala-azar

Unit 4: Sample collection, transport and diagnosis and Antimicrobial agents

Collection, transport and culturing of clinical samples, principles of different diagnostic tests (ELISA, Immuno fluorescence, Agglutination based tests, Complement fixation, PCR, DNA probes).

Antimicrobial agents

Antibacterial agents: Five modes of action with one example each: Inhibitor of nucleic acid synthesis; Inhibitor of cell wall synthesis; Inhibitor of cell membrane function; Inhibitor of protein synthesis; Inhibitor of metabolism

Antifungal agents: Mechanism of action of Amphotericin B, Griseofulvin

Antiviral agents: Mechanism of action of Amantadine, Acyclovir, Azidothymidine

Antibiotic resistance, MDR, XDR, MRSA, NDM-1

Outcomes:

- ✓ Students will know about fundamental aspects medical microbiology
- ✓ Students will learn the causes and prevention of various diseases
- ✓ Students will gain knowledge on antimicrobial agents used to treat various diseases.

References

1. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication
3. Goering R., Dockrell H., Zuckerman M. and Wakelin D. (2007) Mims' Medical Microbiology. 4th edition. Elsevier
4. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education

   Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

COURSE NAME B. SC. MICROBIOLOGY SEMESTER V

MAJOR DISCPLINE SPECIFIC COURSE CODE: SC23MJDSCMIC501A (IKS)

Total credits 04 (04 periods/week)	**Theory**	**External (50 marks)**
		Internal (50 marks)

MICROBIOLOGY: VEDIC TO MODERN TIMES

OBJECTIVE:

To understand the vedic culture related to description of different techniques of microorganisms and landmark discoveries of microbiology

UNIT-1: Vedic Microbiology

- Vedic Microbiology: Introduction to Vedas- Types and great saying of Vedas; Aryans- definition, indigcnous or invaders; Rishi Kanva- the Father of Vedic Microbiology.
- Cosmogony: Vedic concept of origın of Life Vedic period; Vedic classification of Krimis- classification by Charak; shape and colour of germs (Krimis); occurrence of germs (Krimis) in the environment - on animals, body surface of human, water, whey, milk, food grains; knowledge of invisible germs through logie and Devine Eyes.
- Classification of germs (Krimis)- major groups of Krimis- Drishta, Adrishta; Vanous names of the krimis Vedas and in Charaka Samhita; colours of Krimis as in Vedic texts: different terms used for microbes- Amiva, Durnāma, Sunāma. Yädudhān. pisaca, ete.

UNIT II: Pathogenie Germs and Diseases

- Health and healthy life; prevalence of utensil and food grains; kshudrarog in humans- Pandu Roga (jaundice), Galaganda/Gandmala (mumps) and Masurika (smallpox); prophylaxis- changes in eating habit, clothing habit and bathing.
- Destruetion of germs- destruction of germs and their progenies, destruction of germs in active (sakriya) and dormant (susupta) phases, destruction by sun rays, viricidal property in sun rays, eradication of microbes by sun rays.

UNIT-III Vedic Technology

- Occurrence of discases- Yakshma on different parts of body, Kushth, etc.; eradication of Krimis by using medicinai herbs- Apämärga (*Achyranthususpera*), Ajashringi (*Pergulariadaemia*), Vach (*Acoruscalamus*) and Prishniparni (*Urariapicta*):
- eradication of Yakshma by Guggual (*Commiphora wightii*) and by Vach (*Acoruscalamus*); eradication of leprosy by Kushtha (Costusspeciosus) and by Prsniparni (*Urariapicta*)
- Agnihotro (Hawan, Homa)- material used in daily Yajňa, effect of Agnihotra on environment, plants and human health.

UNIT –IV Emergence of Modern Microbiology: Spontaneous vs Biogenesis

- Golden era of microbiology, contributions of scientist and Researchers during golden age of Microbiology, Carl Woese classification, Whittaker five Kingdom classification, Eight Kingdom classification, ribosomal RNA in microbial taxonomy, concept of microbial species, Bergey's Manual of Determinative Bacteriology;
- Microscopy- light, dark field, phase-contrast, fluorescence, and electron microscope: staining techniques- flagella, endospore, capsule, Gram staining, Acid fast staining, Negative staining, VAM staining.

Outcomes:

At the end of course student will be able of Vedic microbiology and scope of microbiology

- To know the different milestone in the history of microbiology, importance
- To understand and know out application of techniques used in the field of Microbiology.

Suggested Reading

1. Dubey R. C. 2021,Vedic Microbiology- A Scientific /Approach, Motilal Banarasidas International, Delhi 110007.
2. Dubey R. C. and Muheshwari, D.K. A Textbook of Microbtology. 3rd ed.. S. Chand S Ram Nagar, New Delhi, p.1034.
3. Cappachino. Microbiology- 4 laboratory Manual, Pearson Education India ISBN: 978-9332535190

4. Powar and Daginawala, General Microbiology Voll and Vol2, Himalaya Publishing House, ISBN-13: 978-9350240892

5. Dubey R. C. And Maheshwari D K. Practical Microbiology, 2nd edition. S Chand & Co. P Ltd, New Delhi, p.413. ISBN: 81:219-2559-2

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

COURSE NAME B. SC. MICROBIOLOGY SEMESTER V

MAJOR DISCPLINE SPECIFIC COURSE CODE: SC23PMJDSCMIC501

Total Credits-04	**Part A: 2 credits**	**(04 Period/Week)**	**Internal- 25 Marks**	**External-25 Marks**	**Total marks: 100**
	Part B: 2 credits	**(04 Period/Week)**	**Internal- 25 Marks**	**External-25 Marks**	

PART – A & B

1. Identify pathogenic bacteria (any three of *E. coli*, *Salmonella*, *Pseudomonas*, *Staphylococcus*, *Bacillus*) on the basis of cultural, morphological and biochemical characteristics: IMViC, TSI, nitrate reduction, urease production and catalase tests
2. Study of composition and use of important differential media for identification of pathogenic bacteria: EMB Agar, McConkey agar, Mannitol salt agar, Deoxycholate citrate agar, TCBS
3. Study of bacterial flora of skin by swab method
4. Perform antibacterial sensitivity by Kirby-Bauer method
5. Study symptoms of the diseases with the help of photographs: Polio, anthrax, herpes, chicken pox, HPV warts, AIDS (candidiasis), dermatomycoses (ring worms)
6. Study of various stages of Malaria parasite in RBCs using permanent mounts.
7. Eradication of Krimis by using medicinal herbs
8. Detection of microorganisms from body surface of human, waste water, whey, milk and food grains etc.
9. Effect of Agnohotra on microorganism
10. Effect of antibacterial and antifungal drugs on growth of bacteria and fungi

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

COURSE NAME B. SC. MICROBIOLOGY SEMESTER V

MINOR DISCPLINE SPECIFIC COURSE CODE: SC23MIDSCMIC502

Total credits 04 (04 periods/week)	**Theory**	**External (50 marks)**
		Internal (50 marks)

CLINICAL AND DIAGNOSTIC MICROBIOLOGY
(Minor)

Course Objectives:

This course will help understand the current trends and a concept related to Clinical Microbiology and also gives an insight into various types diseases. This course also focused on diagnosis of various microbial diseases.

UNIT – 1 : Diseases and their transmission

Diseases- sources and types of diseases. Epidemiology of Infectious diseases, Diseases in population- Epidemic, Pandemic, Endemic diseases, Sporadic, outbreaks, Portals of Entry and Exit, Herd Immunity, Control of Disease transmission. Methods of transmission and role of biological vectors- (1) House fly (2) Mosquitoes (3) sand fly in disease transmission.

UNIT – II : Types of Infections

Types of Infections –Description of pathogenesis, etiology and laboratory diagnosis of bacteraemia, blood stream infections, Respiratory tract infections (Pneumonia, Flu) Central Nervous System infections (meningitis, encephalitis) Urinary tract infections and Gastrointestinal tract infections (E. coli and Klebsiella). Sexually transmitted diseases: Treponema, Neisseria.

UNIT – III : Identification of pathogens

Identification of organisms - microscopic examination of specimen for Bacterial pathogens – simple, differential staining, Giemsa, Leishman, Wright stains and motility. Biochemical reaction – Sugar fermentation test, antibiotic Susceptibility testing – MIC, Kirby Bauer, dilution methods. Cultural tests- IMVIC tests. Isolation and identification of viruses.

UNIT – IV: Sample collection and serology

Clinical lab technology- Methods of collection of urine, blood, sputum, stool etc. The techniques of preservation of samples. Separation of blood plasma and serum. Blood smear preparations, E.S.R, P.C.V, Blood indices - Platelet count: BT, CT. Examination of urine: Sample collection, microscopic examination- crystals, casts, sediments, pregnancy tests. Examination of Stool - Indication, Collection, Microscopic examination and its significance.

Serology – Antigen - antibody reactions – Agglutinations (blood grouping, WIDAL) Hemagglutination, Precipitation (VDRL), Complementation fixation test, Immunodiffusion, Immunoelectrophoretic (rocket, counter current). ELISA, RIA. Quantitative study of Antigen - Antibody precipitin reactions, Western blot analysis for HIV

Learning outcomes

- Deep understanding of the disease cyclesand their out breaks
- Gaining theoretical knowledge of most common disease-causing organisms
- Enumerating the methods and vehicles of disease transmission
- Understanding the basics of Clinical laboratory protocols
- Systematic knowledge on the pathogenesis and laboratory diagnosisof diseases
- Developing insights into clinical practices and serological techniques

REFERENCE BOOKS

1. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication
3. Virology, Sawant, K.C., 2005, First edition, Dominant Publishers and distributors, Delhi.
4. Subash O. Panija Textbook of Medical Parasitology, 1996. First edition. All India Publishers and Distributors Regd. 920 Poonamallee High Road, Chennai.
5. Rajesh Karyakarte and Ajith Damle (2005) Medical Parasitology, books and Allied (P)Ltd. Kolkata.
6. Jaya Ram Paniker, Textbook of Medical Parasitology, Published by 'Jaypee Brothers', 4th Edition.

7. Coloratlas, Textbook of Diagnostic Microbiology (5th Edition), edited by Eimer.W. Koneman, published by Lippinett.
8. Mosby, Diagnostic Microbiology by Bailey and Swotts, 10th Edition, published.
9. David Greenwood, Richard C.B.Slack, John.F.Peutherer, Medical Microbiology, 16th Edition.
10. SharmaJ.B., Medical Microbiology – A Clinical perspective, paras publishing.
11. Patrick R.Murray, Ken.S.Rosenthal, George.S.Kobayashi, Michael A. Ptaller, Medical Microbiology, 3rd Edition.
12. Jawetz, Melnick and Adelberg's, Medical Microbiology (2004) 23rd Edition, Mc Graw Hill.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

COURSE NAME B. SC. MICROBIOLOGY SEMESTER V

MINOR DISCPLINE SPECIFIC COURSE CODE: SC23PMIDSCMIC502

Total credits 04 (08 periods/week)	**PRACTICAL**	**External (50 marks)**
		Internal (50marks)

CLINICAL AND DIAGNOSTIC MICROBIOLOGY (Minor) (PRACTICAL)

1. Identify pathogenic bacteria (any three of *E. coli*, *Salmonella*, *Pseudomonas*, *Staphylococcus*, *Bacillus*) on the basis of cultural, morphological and biochemical characteristics: IMViC, TSI, nitrate reduction, urease production and catalase tests
2. Study of bacterial flora of skin by swab method
3. Perform antibacterial sensitivity by Kirby-Bauer method
4. Study symptoms of the diseases with the help of photographs: Polio, anthrax, herpes, chicken pox, HPV warts, AIDS (candidiasis), dermatomycoses (ring worms)
5. Study of various stages of Malaria parasite in RBCs using permanent mounts.
6. Gram staining of bacteria
7. Preparation of thin blood film for malaria and observation under microscope
8. Latex agglutination test
9. Determination of resistance/sensitivity of bacteria using disc diffusion method
10. Determination of minimal inhibitory concentration (MIC) of an antibiotic by serial double dilution method
11. Demonstrations of PCR and ELISA: Principle, working and applications
12. Laboratory diagnosis of common helminthes infections (permanent slide observations of Helminths' Round worm, Hook worm and Pin worm)
13. Medical Parasitology – *E. histolytica, G. lamblia, Trypanosomas*, *Leishmania* and *Plasmodium* (Permanent Slide Observation)
14. Collection of throat swabs – culturing the specimen. And laboratory examination for *streptococcus pyogenes*

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

COURSE NAME B. SC. MICROBIOLOGY SEMESTER V

SKILL ENHANCEMENT COURSE CODE: SC23SECMIC505

Total credits 02 (02 periods/week)	**Theory**	**External (25 marks)**
		Internal (25 marks)

MUSHROOM AND SPIRULINA CULTIVATION

Course Objectives: The course imparts entrepreneurial skills with objectives (i) to learn about the types of edible mushrooms and their uses to human kind (ii) to gain knowledge on cultivation methods for mushroom and the diseases that commonly affect them (iii) to appreciate the importance of *Spirulina* to human kind, understanding their cultivation methods and processing techniques.

Unit - I Mushrooms – Cultivation and economics

- Edible and non-edible mushroom –historical account, most commonly cultivated mushrooms in the world, distribution and production in various countries.
- Cultivation of button, oyster and paddy straw mushroom –raising a pure culture – spawn preparation and mass cultivation – harvest pests and diseases in mushroom
- Economics of mushroom cultivation – precautions in mushroom cultivation – precaution to be taken while selecting the area, spawn preparation, spawn run, during cropping harvesting etc. Mushroom recipes (western and Indian recipes, pickles, powders, jams etc.

Unit – II *Spirulina* and its cultivation

- Introduction to SCP production –historical use and rediscovery of *Spirulina* importance– morphology, taxonomy and habitat of *Spirulina*– biochemical composition including proximate composition – amino acids – unsaturated fatty acids – minerals and vitamins. Human health benefits of *Spirulina*.
- Natural production –laboratory cultivation – small scale commercial production – commercial and mass cultivation (tank construction, culture medium, strain selection, scaling up of the process) – importance of light and pH in *Spirulina* cultivation – harvesting, drying and packing.

Reference books

1. Changs T. and Hayanes W.A. (Ed.) (1978) Biology and Cultivation of Edible Mushrooms. Academic Press. N.Y.
2. Habib M.A.B., Parvin M., Huntington T.C. and Hasan M.R. (2008) A review on culture, production and use of Spirulina as food for humans and feeds for domestic animals and fish. FAO Fishers and Aquaculture Circular No. 1034, FAO, Rome, Italy.
3. Biswas S., Datta M. and Ngachan S.V. (2012) Mushrooms: A Manual for Cultivation, PHI.
4. Selvendran D. (2015) Large Scale Algal Biomass (Spirulina) Production in India. In: D. Das (Ed.) Algal Biorefinery: An Integrated Approach, Springer.
5. Zadrazil F. and Grabbe K. (1983) Edible Mushroom, Biotechnology Vol. 3, Weinheim: Verlag Chemie, Berlin.

Course Outcome: Upon successful completion of the course the candidate will

• gain understanding on the edible mushrooms, its distribution and production in various countries.

• gain insight on the cultivation of various mushrooms.

• gain knowledge on economics of mushroom cultivation and preparation of various mushroom recipes.

• understand the importance of Spirulina and their cultivation methods

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

COURSE NAME B. SC. MICROBIOLOGY SEMESTER V

PRACTICAL MAJOR DISCPLINE SPECIFIC COURSE CODE:

SC23PMJDSCMIC501 & SC23PMJDSCMIC501A (IKS)

PRACTICAL SKELETON

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

PART A

Q 1		Experiment to perform	**06**
Q 2		Practical	**06**
Q 3		Do as directed. 1. A 2. B 3. C	**06**
Q 4	**a**	Viva-voce	**03**
	b	Journal	**04**

PART B

Q 1		Perform	**05**
Q 2		Write	**04**
Q3		Do as directed: 1. A 2. B 3. C	**06**
Q 4		Spoting (part A and B)	**04**
Q 5	**a**	Viva-voce	**03**
	b	Journal	**03**

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
COURSE NAME B. SC. MICROBIOLOGY SEMESTER V

PRACTICAL MINORDISCIPLINARY SPECIFIC COURSE
CODE: SC23MIDCMIC502

PRACTICAL SKELETON

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

Q 1		Practical	**08**
Q 2		Practical	**04**
Q 3		Do as directed. A B C D E F G H	**16**
Q 4		Submission / report	**06**
Q5		spoting	**06**
Q6		Viva-voce	**05**
Q7		Journal	**05**