



SRI KRISHNADEVARAYA UNIVERSITY:: ANANTAPURAMU

UG CBCS SYLLABUS

VI Semester

(2017-2018)

B.Sc. MICROBIOLOGY

VI SEMESTER- SYLLABUS

(AS PER CBCS AND SEMESTER SYSTEM)

III YEARS

w.e.f. 2017-2018



AP STATE COUNCIL OF HIGHER EDUCATION
CBCS - PATTERN FOR MICROBIOLOGY

Year	Semester	Paper	Title	Marks	Credits	
I	I	101	Introduction to microbiology and microbial diversity	100	4	
			Practical-101	50	2	
	II	201	Microbial biochemistry and metabolism	100	4	
			Practical-201	50	2	
II	III	301	Microbial genetics and molecular biology	100	4	
			Practical-301	50	2	
	IV	401	Immunology and medical microbiology	100	4	
			Practical-401	50	2	
III	V	501	Environmental & agricultural microbiology	100	3	
			Practical-501	50	2	
		502	Food and industrial microbiology	100	3	
			Practical-501	50	2	
	One paper from A, B and C					
	601 A*	Microbial biotechnology		100	3	
		Practical- 601 A		50	2	
	601 B*	Advances in microbiology		100	3	
		Practical-601 B		50	2	
	601 C*	Instrumentation and biotechniques		100	3	
		Practical-601 C		50	2	
	One Cluster from A, B and C					
	VI	701 A	CLUSTER ELECTIVE-A			
			I.	Microbial diagnosis in health clinics	100	3
			II.	Microbial quality control in food and pharmaceutical industry	100	3
			III.	Management of Human microbial diseases	100	3
Practical – 701 AI			50	2		
Practical-701 AII			50	2		
Project work -701 AIII			50	2		
701 B			I.	Microbes in sustainable agriculture	100	3
			II.	Biofertilisers and biopesticides	100	3
			III.	Mushroom cultivation	100	3
	Practical – 701 BI		50	2		
	Practical-701 BII		50	2		
	Project work -701 BIII		50	2		
701 C	i.	Biosafety and intellectual property rights	100	3		

			ii. Biostatistics	100	3
			iii. Bioinformatics	100	3
			Practical – 701 CI	50	2
			Practical-701 CII	50	2
			Project work -701 CIII	50	2

SRI KRISHNADEVARAYA UNIVERSITY:: ANANTAPURAMU
B.Sc MICROBIOLOGY (CBCS) SYLLABUS
THIRD YEAR – SEMESTER- VI
Paper – VII (Elective-A)
MBT- 601A MICROBIAL BIOTECHNOLOGY

TOTAL HOURS: 36

CREDITS: 3

UNIT- I

No. of Hours: 8

Microbial biotechnology: Scope and its applications in human therapeutics, agriculture (Biofertilizers, PGPR, Mycorrhizae), environmental, and food technology.
Genetically engineered microbes for industrial application: Bacteria and yeast

UNIT- II

No. of Hours: 7

Recombinant microbial production processes in pharmaceutical industries - Streptokinase, recombinant vaccines (Hepatitis B vaccine).
Microbial polysaccharides, polyesters and bioplastics.
Microbial production of bio-pesticides
Microbial biosensors

UNIT- III

No. of Hours: 10

Microbial based transformation of steroids and sterols.
Bio-catalytic processes and their industrial applications: Production of high fructose syrup and production of cocoa butter substitute.
Immobilization methods and their application: Whole cell immobilization

UNIT- IV

No. of Hours: 7

Bio-ethanol and bio-diesel production: commercial production from lignocellulosic waste and algal biomass.
Biogas production: Methane and hydrogen production using microbial culture. Microorganisms in bioremediation: Degradation of xenobiotics.
Mineral recovery, removal of heavy metals from aqueous effluents.

UNIT- V

No. of Hours: 4

Outlines of Intellectual Property Rights: Patents, Copyrights, Trademarks

MBP- 601A MICROBIAL BIOTECHNOLOGY**TOTAL HOURS: 36****CREDITS: 2**

1. Yeast cell immobilization in calcium alginate gels
2. Enzyme immobilization by sodium alginate method
3. Pigment production from fungi (*Trichoderma* / *Aspergillus* / *Penicillium*)
4. Isolation of xylanase or lipase producing bacteria
5. Study of algal Single Cell Proteins

SRI KRISHNADEVARAYA UNIVERSITY:: ANANTAPURAMU**THIRD YEAR – SEMESTER -VI**

Paper :VIII (Cluster Elective – A1)

MBT- 701AI MICROBIAL DIAGNOSIS IN HEALTH CLINICS**TOTAL HOURS: 36****CREDITS: 3****UNIT- I****No. of hours: 8**

Bacterial, Viral, Fungal and Protozoan Diseases of various human body systems, Disease associated clinical samples for diagnosis.

UNIT- II**No. of hours: 8**

Collection of clinical samples (oral cavity, throat, skin, blood, CSF, urine and faeces) and precautions required.

Method of transport of clinical samples to laboratory and storage.

UNIT- III**No. of hours: 8**

Examination of sample by staining - Gram stain, Ziehl-Neelson staining for tuberculosis, Giemsa-stained thin blood film for malaria

Preparation and use of culture media - Blood agar, Chocolate agar, Lowenstein-Jensen medium, MacConkey agar, Distinct colony properties of various bacterial pathogens.

UNIT- IV**No. of hours: 6**

Serological Methods - Agglutination, ELISA, immunofluorescence, Nucleic acid based methods - PCR, Nucleic acid probes.

Kit methods for rapid detection- Typhoid, Dengue and HIV

UNIT- V**No. of hours: 6**

Importance, Determination of resistance/sensitivity of bacteria using disc diffusion method, Determination of minimal inhibitory concentration (MIC) of an antibiotic by serial double dilution method

MBP- 701AI MICROBIAL DIAGNOSIS IN HEALTH CLINICS

TOTAL HOURS: 36

CREDITS: 2

1. Collection transport and processing of clinical specimens (Blood, Urine, Stool and Sputum). Receipts, Labeling, recording and dispatching clinical specimens.
2. Isolation of bacteria in pure culture and Antibiotic sensitivity.
3. Identification of common bacteria by studying their morphology, cultural character, Biochemical reactions, slide agglutination and other tests.
4. Maintenance and preservation of stock culture.

SUGGESTED READING

1. Ananthanarayan R and Paniker CKJ (2009) Textbook of Microbiology, 8th edition, Universities Press Private Ltd.
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. Randhawa, VS, Mehta G and Sharma KB (2009) Practicals and Viva in Medical Microbiology 2nd edition, Elsevier India Pvt Ltd.
4. Tille P (2013) Bailey's and Scott's Diagnostic Microbiology, 13th edition, Mosby.
5. Collee JG, Fraser, AG, Marmion, BP, Simmons A (2007) Mackie and McCartney Practical Medical Microbiology, 14th edition, Elsevier.

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B.Sc MICROBIOLOGY (CBCS) SYLLABUS

THIRD YEAR – SEMESTER- VI

Paper :VIII (Cluster Elective – A2)

MBT- 701AII MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES

TOTAL HOURS: 36**CREDITS: 3****UNIT – I****No. of Hours: 8**

Good laboratory practices - Good microbiological practices.

Biosafety cabinets – Working of biosafety cabinets, using protective clothing, specification for BSL-1, BSL-2, BSL-3.

Discarding biohazardous waste – Methodology of Disinfection, Autoclaving & Incineration

UNIT – II**No. of Hours: 8**

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

UNIT – III**No. of Hours: 8**

Molecular methods - Nucleic acid probes, PCR based detection, biosensors.

UNIT – IV**No. of Hours: 8**

Enrichment culture technique, 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 centres (COB, 10 min Resazurin assay).

UNIT – V**No. of Hours: 4**

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.

MBP701AII: MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES**TOTAL HOURS: 36****CREDITS: 2**

1. Sterility tests for Instruments – Autoclave & Hot Air Oven

2. Disinfection of selected instruments & Equipments
3. Sterility of Air and its relationship to Laboratory & Hospital sepsis.
4. Sterility testing of Microbiological media
5. Sterility testing of Pharmaceutical products –Antibiotics, Vaccines & fluids
6. Standard qualitative analysis of water.
7. Analysis of food samples for Mycotoxins

SRI KRISHNADEVARAYA UNIVERSITY:: ANANTAPURAMU
THIRD YEAR – SEMESTER –VI

Paper :VIII (Cluster Elective – A3)

MBT-701AIII MANAGEMENT OF HUMAN MICROBIAL DISEASES

TOTAL HOURS: 36

CREDITS: 3

Unit I

No of Hours: 8

Definition and concept of health, disease, Infection and Pathogen.

Types of human microbial diseases and their transmission, causative agents and symptoms of human microbial diseases: Respiratory microbial diseases, gastrointestinal microbial diseases, nervous system diseases, skin diseases, eye diseases, urinary tract diseases, sexually transmitted diseases, mosquito borne disease

Unit II

No of Hours: 6

Microbial mediated cancers
 Nosocomial infections.
 Recent outbreaks of human microbial diseases (SARS/ Swine flu/Ebola) – causes, spread and control.

Unit III

No of Hours: 8

Various serological and molecular methods for diagnosis of microbial diseases. Detection by diagnostic kits based on ELISA, Immunofluorescence, Agglutination tests, PCR, DNA probes (illustrate each with one example).

Unit IV

No of Hours: 8

Treatment using antibiotics: Mechanism of action of antibiotics belonging to different classes: beta lactam antibiotics (penicillin, cephalosporins), quinolones, polypeptides and aminoglycosides. Judicious use of antibiotics, importance of completing antibiotic regimen, Concept of DOTS, emergence of antibiotic resistance, current issues of MDR/XDR microbial strains. Treatment using antiviral agents: Mechanism of action of Amantadine, Acyclovir, Azidothymidine. Concept of HAART

Unit V

No of Hours: 6

General preventive measures, Importance of personal hygiene, environmental sanitation and methods to prevent the spread of infectious agents transmitted by direct contact, food, water and insect vectors. Vaccines: Importance, types, vaccines available against microbial diseases, vaccination schedule (compulsory and preventive) in the Indian context.

MB project-701AIII MANAGEMENT OF HUMAN MICROBIAL DISEASES**TOTAL HOURS: 36****CREDITS: 2****PROJECT:****Submission of project work and viva.**

Suggested Readings

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