



SACRED HEART COLLEGE (AUTONOMOUS)

Tirupattur – 635 601, Tamil Nadu, S.India

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Ready for
Every Good Work

A Don Bosco Institution of Higher Education, Founded in 1951 * Affiliated to Thiruvalluvar University, Vellore * Autonomous since 1987

Accredited by NAAC (4th Cycle – under RAF) with CGPA of 3.31 / 4 at 'A+' Grade

Sacred Heart College (Autonomous), Tirupattur District

1.2.1 List of New Courses

Department: B. Sc Microbiology

B.Sc. Microbiology

B.Sc Microbiology - Programe Structure

Sem	Part	Subject Code	Subject Title	Hrs	Credit (s)	E - Hrs	CA	SE	Total
I	I	LT 112	Tamil – I	5	3	3	30	70	100
	II	LE 114T	English – I	5	3	3	30	70	100
	III	ABC 101	Allied Biochemistry – I	4	3	3	30	70	100
	III	PABC 101	Allied Practical – I	2	1	6	40	60	100
	III	MB 101	Fundamentals of Microbiology	4	4	3	30	70	100
	III	MB 102	Microbial Diversity and Classification	3	3	3	30	70	100
	III	PMB 101	Main Practical - I	3	3	6	40	60	100
	IV	SK 103	Personal Skills	2	1	-	-	-	-
	IV	VE104A/B	Christian Religion – I/Value Education - I	2	1	3	30	70	100
	IV	CE 102	Communicative English – I	-	1*	-	-	-	-
Total				30	22 + 1*	-	-	-	-
II	I	LT 212	Tamil – II	5	3	3	30	70	100
	II	LE 214AT	English – II	5	3	3	30	70	100
	III	ABC 201	Allied Biochemistry – II	4	3	3	30	70	100

	III	PABC 201	Allied Practical – II	2	1	6	40	60	100
	III	MB 201	Microbial Physiology and Metabolism	4	4	3	30	70	100
	III	MB 202	Bioinstrumentation	3	3	3	30	70	100
	III	PMB 201	Main Practical - II	3	3	6	40	60	100
	IV	SK 203	Social Skills	2	1	-	-	-	-
	IV	VE204A/B	Christian Religion – II/Value Education - II	2	1	3	30	70	100
	IV	CE 202	Communicative English – II	-	1*		-	-	-
	Total			30	22 + 1*	-	-	-	-
III	I	LT 311	Tamil – III	5	3	3	30	70	100
	II	LE 308T	English – III	5	3	3	30	70	100
	III	AM 309C	Allied Biostatistics – I	6	4	3	30	70	100
	III	MB 301	Immunology	4	4	3	30	70	100
	III	MB 302	Mushroom Technology	3	3	3	30	70	100
	III	PMB 301	Main Practical - III	3	3	6	40	60	100
	IV	SK 303	Employment Skills – I	2	1		-	-	-
	IV	VE 305	Environmental Science	2	1	3	30	70	100
		Total			30	22	-	-	-
IV	I	LT 410	Tamil – IV	5	3	3	30	70	100
	II	LE 408T	English – IV	5	3	3	30	70	100
	III	AM 408C	Allied Biostatistics – II	6	4	3	30	70	100
	III	MB 401	Bioinoculant Technology	4	4	3	30	70	100
	III	MB 402	Microbial Genetics	3	3	3	30	70	100
	III	PMB 401	Main Practical - IV	3	3	6	40	60	100
	IV	SK 403	Employment Skills – II	2	1	-	-	-	-
	IV	VE 405	Human Rights	2	1	3	30	70	100
	V		DEEDS	-	2	-	-	-	-

	V		SHELTERS	-	2	-	-	-	-
	V		Summer Lab/Industrial Training	-	2*	-	-	-	-
	Total			30	26 + 2*	-	-	-	-
Sem	Part	Subject Code	Subject Title	Hrs.	Credit (s)	E – Hrs	CA	SE	Total
V	III	MB 501	Molecular Biology and Genetic Engineering	4	4	3	30	70	100
	III	MB 502	Medical Bacteriology	5	5	3	30	70	100
	III	MB 503	Virology	5	5	3	30	70	100
	III	MB 504	Medical Mycology and Parasitology	5	4	3	30	70	100
	III	PMB 501	Main Practical – V	5	4	6	40	60	100
	III		Major Elective – I	4	3	3	30	70	100
		MB 505A	a) Health Care & Hygienic Practices						
		MB 505B	b) Computational Biology						
		MB 505C	c) Pharmaceutical Microbiology						
			(One out of three)						
	III	NMB 501	Non – Major Elective – I	2	1	3	30	70	100
	III		SSP – 1: Nutrition and Dietics	-	1*	-	-	-	-
	Total			30	26 + 1*	-	-	-	-
VI	III	MB 601	Microbial Biotechnology	4	4	3	30	70	100
	III	MB 602	Environmental Microbiology	5	5	3	30	70	100
	III	MB 603	Vermitechnology	4	4	3	30	70	100
	III	MB 604	Food Microbiology	5	5	3	30	70	100
	III	MB 605	Industrial Microbiology	5	5	3	30	70	100
	III	PMB 601	Main Practical – VI	5	4	6	40	60	100
	III	NMB 601	Non – Major Elective – II	2	1	3	30	70	100

III	SSP – 2: Dairy Technology	-	1*	-	-	-	-
Total		30	28 + 1*	-	-	-	-

TOTAL HOURS = 180 Hrs

TOTAL CREDITS = 148 + 2 *(SSP) + 2 *(Lab/Industrial training) + 2* from other department Certificate course.

Sacred Heart College (Autonomous), Tirupattur District

1.2.1 List of New Courses

Department: B. Sc Microbiology

S.No.	Course Code	Course Name
1.	MB 501	Molecular Biology and Genetic Engineering
2.	MB 502	Medical Bacteriology
3.	MB 503	Virology
4.	MB 504	Medical Mycology and Parasitology
5.	PMB 501	Main Practical – V
6.	MB 505 A	Major Elective – I a) Health Care & Hygienic Practices
7.	MB 505 B	Major Elective – I b) Computational Biology
8.	MB 505 C	Major Elective – I c) Pharmaceutical Microbiology
9.	NMB 501	Non – Major Elective – I
10.	MB506X	SSP – 1: Nutrition and Dietics
11.	MB 601	Microbial Biotechnology
12.	MB 602	Environmental Microbiology
13.	MB 603	Vermitechnology
14.	MB 604	Food Microbiology
15.	MB 605	Industrial Microbiology
16.	PMB 601	Main Practical – VI

17.	NMB 601	Non – Major Elective – II
18.	MB606X	SSP – 2: Dairy Technology

Semester – V

4 Hours

4 Credits

MB 501: MOLECULAR BIOLOGY AND GENETIC ENGINEERING

Objectives

- To make the students to understand the Molecular Biology and Genetic Engineering.
- To focus on the basic principles of DNA Replication, Transcription, Translation, Mutation and DNA Repair mechanisms.
- To under the basic concepts and applications of Genetic Engineering.

Course Outcomes

Molecular Biology and Genetic Engineering dispense recent study and innovation of significant methods and techniques. This paper embraces information on DNA Replication, Transcription, Translation, Mutation, DNA Repair mechanisms and various applications of Genetic Engineering.

Unit – I

DNA – Structure and Forms; DNA Replication – Types and evidence for Semi-conservative replication; Enzymes involved in DNA Replication – DNA Polymerase, Topoisomerase, DNA Helicase, SSB Proteins, DNA Primase and DNA Ligase; DNA Replication in Prokaryotes; Inhibitors of DNA replication.

Unit – II

RNA - Structure and Types; Prokaryotic Transcription; Genetic code; Translation; Inhibitors of Translation and Transcription.

Unit – III

Mutation and its types; DNA Damage by Physical and Chemical agents; DNA Repair Mechanism – Excision repair, Direct repair, Recombination repair, Mismatch repair and SOS Response; Regulation of Gene expression – Lactose Operon concept.

Unit – IV

Restriction enzymes for cutting DNA; Enzyme for Joining DNA; Cloning Vectors – Plasmids (pBR 322), Phages (M13 & λ) and Cosmids; BACs; YACs; Construction of cDNA and Genomic Library; Applications of Genetic Engineering.

Unit – V

Nucleic acid and Protein hybridization technique – Southern, Northern and Western Blotting; Sequencing of DNA – Maxam & Gilbert method and Sanger's method; Gel Electrophoresis (Agarose Gel Electrophoresis & SDS-PAGE); DNA amplification techniques – PCR; Applications of PCR.

Text Books

- 1) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- 2) Freifelder, D. 2008. Molecular Biology, 2nd Edition, Narose Book Distributors Pvt. Ltd., New Delhi, India.
- 3) Old, R. S and S. B. Primrose. 2006. Principles of Gene Manipulation, 7th Edition, Blackwell Scientific Publications, London.

References

- 1) Gardner, E. J., M. J. Simmons and D. P. Snustad. 2005. Principles of Genetics, 8th Edition, John Wiley and Sons, New York.
- 2) Klug, W. S and M. R. Cummings. 2001. Essentials of Genetics, 4th Edition, Prentice Hall, New Jersey.
- 3) Chatterjee, N and Rana Shinde. 2012. Textbook of Medical Biochemistry, 8th Edition, Jaypee publication, New Delhi, India.
- 4) Weaver, R. F. 2008. Molecular Biology, 5th Edition, McGraw Hill, New York.

Semester – V
5 Hours
5 Credits

MB 502: MEDICAL BACTERIOLOGY

Objectives

- To make the students to understand the Medical Bacteriology.
- To study the pathogenicity, clinical symptoms and treatment for disease causing bacteria.
- To provide the ability to characterize, isolate and identify different Medically important bacteria.

Course Outcomes

To introduce the knowledge of the medically important bacteria, bacterial morphology with the main focuses being the pathogenicity, clinical symptoms, identification and treatment for different bacteria.

Unit - I

Clinical Specimens - Collection, Transport and Storage; Laboratory diagnosis of Bacteria – Staining techniques, Culture medium, Biochemical tests and Serological tests; Antibiotics – Microorganisms involved in Antibiotics production, Classification, Antibiotic Sensitivity Test and Antimicrobial Resistance.

Unit – II

Morphology, Cultural characteristics, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Gram Positive Cocci - *Staphylococcus aureus*, *Streptococcus pyogenes*, *Streptococcus agalactiae*, Viridans *Streptococci* – *Streptococcus pneumoniae* and Gram Negative Cocci – *Neisseria meningitidis* and *Neisseria gonorrhoeae*.

Unit – III

Morphology, Cultural characteristics, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Gram Positive Bacilli - *Bacillus anthracis*, *Bacillus cereus*, *Clostridium* sp., *Listeria monocytogenes*, *Corynebacterium diphtheriae*, *Mycobacterium leprae* and *Mycobacterium tuberculosis*).

Unit – IV

Morphology, Cultural characteristics, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Enterobacteriaceae (*Escherichia coli*, *Klebsiella pneumoniae*, *Proteus* sp., *Salmonella* sp. and *Shigella* sp.), *Pseudomonas aeruginosa*, *Vibrio cholerae*, *Campylobacter jejuni* and *Helicobacter pylori*.

Unit – V

Morphology, Cultural characteristics, Pathogenicity, Laboratory diagnosis, Treatment and Preventive measures for *Haemophilus influenzae*, *Brucella* sp., *Bordetella* sp. Spirochaetes (*Treponema pallidum*, *Borrelia* sp. and *Leptospira* sp.), *Mycoplasma* sp. and *Rickettsia* sp.

Text Books

- 1) Jawetz, E., J. L. Melnic and E. A. Adelberg. 2013. Review of Medical Microbiology, 26th Edition, Lange Medical Publishers, New York.
- 2) Patrick Murray, Ken Rosenthal and Michael Pfaller. 2016. Medical Microbiology, 8th Edition, Elsevier Publications, United States.

References

- 1) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- 2) Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- 3) Chakraborty, P. 2013. A Text book of Microbiology, Published by New Central Book Agency (P) Ltd., Kolkata, India.
- 4) Baron, E. J and S. M. Finegold. 1990. Bailey and Scott's Diagnostic Microbiology, 8th Edition, The C.V. Mosby Company. St. Louis, Missouri.

5 Hours

5 Credits

MB 503: VIROLOGY

Objectives

- To make the students to understand the role of viruses in major diseases.
- To study general aspects of Structure, Classification, Replication, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Viruses.
- To understand the structure and replication of Bacteriophages.

Course Outcomes

Virologist are highly demanded in the Medical research companies, Pharmaceutical companies, Governmental agencies, Laboratory testing companies or Cancer treatment or Research companies depending upon the specialization. This paper will provide the wide knowledge on Structure, Classification, Replication, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Viruses.

Unit – I

General properties and Structure of viruses; Classification of Virus; Replication of Viruses; Cultivation of Viruses; Diagnosis of Viral infections; Viral diseases – transmission, prevention and treatment; Antiviral agents; Viral Vaccines and its Immunization Schedule.

Unit – II

Structure, Replication, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for DNA Viruses – Poxviridae (Pox Virus); Herpesviridae (Herpes Simplex Virus, Varicella Zoster Virus and Epstein-Barr Virus); Adenoviridae (Adenovirus); Hepadnaviridae (Hepatitis – B Virus); Papillomaviridae (Papilloma Virus); Polymaviridae (BK & JC Virus) and Parvoviridae (B19 Parvo Virus).

Unit – III

Structure, Replication, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for RNA Viruses – Picornaviridae (Poliovirus & Rhinovirus); Rhabdoviridae (Rabies Virus); Calciviridae (Norwalk Virus); Togaviridae (Rubella virus) and Filoviridae (Ebola virus); Arboviruses (Flavivirus & Alphavirus).

Unit – IV

Structure, Replication, Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for RNA Viruses – Orthomyxoviridae (Influenza virus); Paramyxoviridae (Parainfluenza virus, Measles virus & Mumps virus); Coronaviridae (Coronavirus – SARS); Retroviridae (HIV); Reoviridae (Rotavirus); Bunyaviridae (Bunyavirus) and Arenaviridae (Arenavirus).

Unit – V

Bacteriophages - General characteristics, Structure, Replication of Double stranded DNA Bacteriophages - Lytic cycle and Lysogenic cycle; Replication of Single stranded DNA Bacteriophage (M13 phage); Typing of Bacteriophage.

Text Books

- 1) Jawetz, E., J. L. Melnic and E. A. Adelberg. 2013. Review of Medical Microbiology, 26th Edition, Lange Medical Publishers, New York.
- 2) Patrick Murray, Ken Rosenthal and Michael Pfaller. 2016. Medical Microbiology, 8th Edition, Elsevier Publications, United States.

References

- 1) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- 2) Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- 3) Chakraborty, P. 2013. A Text book of Microbiology, Published by New Central Book Agency (P) Ltd., Kolkata, India.
- 4) Baron, E. J and S. M. Finegold. 1990. Bailey and Scott's Diagnostic Microbiology, 8th Edition, The C.V. Mosby Company. St. Louis, Missouri.

Semester – V

5 Hours

5 Credits

MB 504: MEDICAL MYCOLOGY AND PARASITOLOGY

Objectives

- To make the students to understand the role of Fungi, Protozoa and Helminths in Human diseases.
- To study general aspects of Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Fungal and Parasitic diseases.
- To establish basic theoretical knowledge in the fields of Mycology and Parasitology.

Course Outcomes

Students will be familiar with current developments and advances in the field of Mycology and Parasitology. They also will gain more knowledge on Pathogenicity, Clinical Syndrome, Laboratory diagnosis, Treatment and Preventive measures for Fungal and Parasitic diseases.

Unit – I

General Properties of Fungi (Mold and Yeast); Classification of Human Mycoses – Superficial Mycoses, Cutaneous Mycoses, Subcutaneous Mycoses, Endemic Mycoses and Opportunistic Mycoses; Laboratory diagnosis of fungi from clinical specimens; Antifungal agents; Antifungal activity testing methods.

Unit – II

General Characteristics, Pathogenesis, Clinical Manifestations, Laboratory Diagnosis and Treatment for Opportunistic Mycoses (Candidiasis, Cryptococcosis & Aspergillosis), Endemic Mycoses (Blastomycosis, Histoplasmosis & Coccidioidomycosis).

Unit – III

General Characteristics, Pathogenesis, Clinical Manifestations, Laboratory Diagnosis and Treatment for Superficial Mycoses (Black piedra, White piedra, Tinea nigra & Pityriasis versicolor), Cutaneous Mycoses (Dermatophytoses) and Subcutaneous Mycoses (Sporotrichosis); Mycotoxins and Mycotoxicoses.

Unit – IV

Protozoa - Morphology, Life cycle, Clinical Manifestations, Lab diagnosis and Treatment for Intestinal Protozoa (*Entamoeba histolytica*, *Giardia lamblia* & *Balantidium coli*), Urogenital Protozoa (*Trichomonas vaginalis*) and Blood & Tissue Protozoa (*Plasmodium* sp., *Leishmania* sp. & *Trypanosoma* sp.); Antiprotozoan drugs.

Unit – V

Helminths - Morphology, Life cycle, Clinical Manifestations, Lab diagnosis and Treatment for Nematodes (*Ascaris lumbricoides* & *Wuchereria bancrofti*), Trematodes (*Fasciola hepatica* & *Schistosoma* sp.) and Cestodes (*Taenia* sp. and *Echinococcus* sp.); Anthelmintic drugs.

Text Books

- 1) Subhash Chandra Parija. 2013. Textbook of Medical Parasitology, 4th Edition, All India Publishers and Distributors, India.
- 2) Jagdish Chander. 2017. Textbook of Medical Mycology, 4th Edition, Jaypee Brothers Medical Publishers, India.
- 3) Patrick Murray, Ken Rosenthal and Michael Pfaller. 2016. Medical Microbiology, 8th Edition, Elsevier Publications, United States.

References

- 1) Jawetz, E., J. L. Melnic and E. A. Adelberg. 2013. Review of Medical Microbiology, 26th Edition, Lange Medical Publishers, New York.
- 2) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- 3) Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.

PMB 501: MAIN PRACTICAL – V

- 1) Collection and transport of clinical samples.
- 2) Identification of bacteria from clinical samples – *Staphylococcus aureus*, *Escherichia coli*, *Salmonella typhi*, *Shigella* sp., *Proteus vulgaris*, *Klebsiella pneumoniae*, *Vibrio cholerae* and *Pseudomonas aeruginosa*.
- 3) Slide Culture Technique for fungal identification.
- 4) Examination of *Candida albicans* by Germ tube test and Sugar assimilation test.
- 5) Antibiotic sensitivity test.

Semester – V
4 Hours
3 Credits

MB 505 A: ELECTIVE - HEALTH CARE AND HYGIENIC PRACTICES

Objectives

- To strengthen the knowledge of personal health care and hygienic to students.
- To provide a detailed study on vaccine and its schedule throughout the life time for all age group.
- To understand the various type of pollution and its preventive measures.

Course Outcomes

Introducing the basics about the Health care and Hygienic practices to study various types of Vaccines to control the life time infectious disease.

Unit – I

Hygiene – Personal hygiene and Grooming routines; Importance of Personal hygiene; Factors for Good health; Importance of Hand washing; Health status in India; Future challenges in Public health.

Unit – II

Vaccines – History, Types of Vaccines, Conventional and Modern vaccines, Route of administrations, Mechanisms of inducing immunity; Diseases prevented by Vaccination; Microbial synthesis of Vaccines; Vaccine risks and safety.

Unit – III

Child health management – General child health and Types of infection in Child; Vaccination schedule in Children – New born, Child below 5 years and Child below 10 years; Vaccination schedule for Adults - Hepatitis B vaccines, MMR vaccines, Tetanus vaccines and Varicella vaccines; Vaccines for Travelers; Universal Immunization Programme.

Unit – IV

Common diseases caused by Microorganisms – Air borne and Water borne diseases; Water pollution; Water quality and analysis of Drinking water quality; Sanitary surveys; World Health Organization (WHO) and Centre for Disease Control and Prevention (CDC).

Unit – V

Industrial Pollution and Toxic pollutants from industries; Hygienic practices in Industries; Hygienic practices in Hospitals; Nosocomial Infections and its preventive measures; Vaccines for Healthcare workers; Biomedical wastes and its management.

Text Books

- 1) Vijaya Ramesh, K. 2008. Environmental Microbiology, MJP Publishers, Chennai, India.
- 2) Prasada Rao, J. V. R. 1999. Manual for Control of Hospital Associated Infections National AIDS Control Organization. Ministry of Health and Family Welfare, Government of India. New Delhi.

References

- 1) Judith A. Owen, Jenni Punt, Sharon A. Stanford and Patricia P. Jones. 2009. Kuby's Immunology, 4th Edition, W. H. Freeman and Company, New York.
- 2) Reed, G. 2004. Prescott and Dunn's Industrial Microbiology, 4th Edition, CBS Publishers and Distributors, New Delhi, India.
- 3) Chaudhri, A. K. 1998. Tripathy, G. C. and D. Sharma - Common sense rules for wellbeing, Naval Printing Press, New Delhi.
- 4) Dunne, J. 1997. Webb, M., R. Scott and P. Beale - First Aid Manual, 7th Edition, Dorling Kindersley Ltd., London.

Semester – V
4 Hours
3 Credits

MB 505B: ELECTIVE - COMPUTATIONAL BIOLOGY

Objectives

- To detail the importance of Computer in the field of Life sciences.
- To obtain good understanding about the interpretation of Biological database.
- To uptake knowledge in latest tools and technology.

Course Outcomes

The paper Computational Biology adds information about the search engines and various software tools involved in Bioinformatics and Chemoinformatics.

Unit – I

Introduction to Computers – History of Computers; Generation of Computers; Operating Systems – Windows, Unix – Hardware, Software and Disc operating systems; Office applications–MS-Office, MS-Word, MS-Excel and MS PowerPoint.

Unit – II

Bioinformatics – Definition, History and Development, Role of Bioinformatics in Biology; Introduction to Internet - Local area and wide area network, Types of files – HTML, TXT and PDF; Search Engines - Types and applications.

Unit – III

Biological sequence database – Primary databases (NCBI, EMBL and DDBJ), Secondary databases – Nucleic acid secondary databases and Protein secondary databases; Phylogenetic analysis and Sequence submission tools; Sequence Annotation.

Unit – IV

Applied Genomics – Prokaryotic and Eukaryotic Genomes, DNA Microarray, Microarray Database, Tools for analysis of Human Genome and Human Genome Project; Functional Proteomics – Protein – protein interaction and Yeast two hybrid system.

Unit – V

Chemoinformatics - Definition, History and Development, Applications of Chemoinformatics; Drugs – Physical and Chemical properties, Mode of action and Drug designing; Docking studies; Future perspectives in Chemoinformatics.

Text Books

- 1) Jin Xiong. 2006. Essential Bioinformatics, 1st Edition, Cambridge University Press, New York, United States.
- 2) Hooman Rashidi and Lukas K. Buehler. 2005. Bioinformatics Basics: Applications in Biological Science and Medicine, CRC Press, Taylor & Francis Group, United Kingdom.

References

- 1) Stephen A. Krawetz, David D. Womble. Stephen A. Krawetz and David D. Womble. 2003. Introduction to Bioinformatics: A theoretical and Practical approach, Humana Press, USA.
- 2) Bryan Bergeron. 2002. Bioinformatics Computing, Prentice Hall.
- 3) Claverie, J. M and C. Notredame. 2003. Bioinformatics for Dummies, Wiley Publishing, Inc., United Kingdom.

Semester – V
4 Hours
3 Credits

MB 505C: ELECTIVE - PHARMACEUTICAL MICROBIOLOGY

Objectives

- To explain the concept, principles on control and management of manufacturing and quality control testing of Biopharmaceutical products.
- To understand a view on regulatory issues involving the trends in biopharmaceutical industry and changing regulatory needs related to products.

Course Outcomes

The paper Pharmaceutical Microbiology provides an overview of the concepts of manufacture Biopharmaceutical products in today's regulatory environment.

Unit – I

Pharmaceutically useful and problematic microorganisms; Identification and characterization of pharmaceutically important microbes; Pharmaceutical products and its Sterilization; Testing of pharmaceutical products; Applications of microorganisms in Pharmaceutical science.

Unit - II

History of Chemotherapy; Drugs - Definition, Sources, Classification, Routes of drug administration, Dosage forms, Drug receptors, Mechanism of action of drugs, Combined effect of drugs, Factors modifying drug action and Selective toxicity.

Unit – III

Chemical Disinfectants, Antiseptics and Preservatives – Acids and Esters, Alcohols, Aldehydes, Biguanides, Halogens, Heavy metals, Hydrogen peroxide & peroxygen compounds, Phenols, Surface active agents and Dyes; Antimicrobial combination and systems; Disinfection policy.

Unit – IV

Antibiotics – Cell wall inhibitors, Cell membrane inhibitors, Protein synthesis inhibitors, Nucleic acid inhibitors and Antimetabolites; Antimicrobial drug resistance; Antibiotic sensitivity tests.

Unit – V

Antiviral drugs; Antifungal drugs; Antiprotozoan drugs; Anthelmintic drugs; Natural products as Antimicrobial agents – Medicinal plants, Mushrooms, Kitchen spices, Algae, Actinobacteria and Lactic acid bacteria.

Text Books

- 1) Patrick Murray, Ken Rosenthal and Michael Pfaller. 2016. Medical Microbiology, 8th Edition, Elsevier Publications, United States.
- 2) Luis Jimenez. 2004. Microbial Contamination Control in the Pharmaceutical Industry, Marcel Dekker Inc., New York.

References

- 1) Stephen P Denyer, Norman A Hodges and Sean P Gorman. 2011. Hugo and Russell's Pharmaceutical Microbiology, 8th Edition, Blackwell Publishing Company, New York, United States.
- 2) Thomas N. Tozer, Malcolm Rowland. Introduction to Pharmacokinetics and Pharmacodynamics: The Quantitative Basis of Drug Therapy. 2006. Lippincott Williams & Wilkins publishers.
- 3) Nita K. Pandit. 2007. Introduction to the Pharmaceutical Sciences. Lippincott Williams & Wilkins publishers.
- 4) Hugo and Russell, 2011. Pharmaceutical Microbiology. 8th Edition. Wiley Blackwell Publications.

NMB 501: Non – Major Elective I – APPLIED MICROBIOLOGY

Objectives

- To make students to understand the fundamentals of microbiology and its applications.
- To encode the importance of the role of microorganisms in food industries and agricultural sciences both in beneficial and harmful ways.
- To study about the water borne disease and microbial standards of water quality.

Course Outcomes

Microbiology has played a central role in all aspects of Biological sciences. This course Applied Microbiology will familiarize the students from various Arts and Science Departments with fundamental knowledge on microbiology and its applications.

Unit – I

Microbiology – History, Various branches and Scope; Cell - Prokaryotes and Eukaryotes; Bacteria – Characteristics (Gram positive and Gram negative); Culture medium; Economic importance of Bacteria.

Unit - II

Fungi and Algae – Characteristics and Economic importance. Water pollution; Bacteriological analysis of water; Water borne diseases; Purification of water.

Unit – III

Food Preservation; Lactic acid bacteria; Fermented dairy products – Cheese, Yogurt and Fermented milk; Spoilage and defects of fermented dairy products; Testing of Milk.

Unit - IV

Microbial fermentation and its types; Fermentation products - Baker's yeast, Bread and Alcoholic beverages (Beer & Wine); Cultivation and Health benefits of *Spirulina* and Mushroom.

Unit – V

Bioinoculants – Definition, Types, Importance and Advantages; Nitrogen fixing microorganisms; Phosphate solubilizing microorganisms; Biopesticides; Organic farming - Composting and Vermicomposting.

Text Books

- 1) Gerard J. Tortora, Berdell R. Funke and Christine L. Case. 2015. Microbiology – An Introduction, 12th Edition, Peareson Publishers, San Francisco.
- 2) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- 3) Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.

References

- 1) Dubey, R.C. and D. K. Maheswari. 2010. A Text book of Microbiology. 3rd Edition, S. Chand and Company, New Delhi.
- 2) Chakraborty. 2003. A Text book of Microbiology. 2nd Edition, Published by New Central Book Agency (P) Ltd., Kolkata.
- 3) Pelczar Jr. M. J., Chan, E. C. S and Kreig, N. R. 2006. Microbiology. 5th Edition Mc Graw Hill Inc. New York.
- 4) Powar, C. B and H. F. Daginawala. 2008. General Microbiology. Volume – II, Himalaya Publishing House, Mumbai.

Semester – V

0 Hours

1 Credit

SSP – 1: NUTRITION AND DIETICS

Objectives

- To know about importance of food, nutrition and nutrients.
- To understand the nutrients associated health risks.
- To learn about the various diets used for various disease conditions.

Course Outcomes

Nutrition is the study of nutrients in food, how the body uses nutrients, and the relationship between diet, health and disease. In this Self study paper Nutrition and Dietics, students will gain knowledge about the Importance of nutrients and various diets used for various disease conditions.

Unit – I

Introduction and definition of food and nutrition; Basic food groups; Physiological role and Nutritional significance of Carbohydrates, Lipids and Proteins.

Unit - II

Unit of Energy measurement; Measurement of food stuffs by Bomb calorimeter; RQ of foods – BMR and its measurements; SDA of foods.

Unit - III

Single cell protein (SCP); Essential aminoacids; Biological value of Proteins (Animal & Plant proteins); Protein - Energy Malnutrition: Kwashiorkar and Marasmus.

Unit - IV

Food Allergy - Causes, Symptoms, Diagnosis and Treatment; Therapeutic Diets for Peptic ulcer, High Blood Pressure, Renal and Vesicle calculi, GOUT and Diabetes Mellitus; Balanced Diet for Pregnant & lactating women, Infants, Children, Adults and Old age.

Unit –V

Diet for Intestinal disorders – Diarrhoea; Diets in liver disorders in human being – Jaundice and Viral hepatitis; Diet for Kidney and Urinary tract – Nephritis and Renal failure; Treatment of Anemias (Iron, Folic acid and Vitamin B12 deficiency).

Text Books

- 1) Srilakshmi, B. 2012. Nutrition Science, New Age, New Delhi, India.
- 2) Swaminathan, S. 1986. Hand book of Food and Nutrition, Bangalore Printing and Publishers, India.

References

- 1) Chatterjee, N and Rana Shinde. 2012. Textbook of Medical Biochemistry, 8th Edition, Jaypee publication, New Delhi, India.
- 2) Murray, R. K., D. K. Granner, P. A. Mayes and D. W. Rodwell. 2006. Harper's Biochemistry, 25th Edition, Prentice Hall, New Jersey.
- 3) Nelson, D. L and M. M. Cox. 2008. Lehninger Principles of Biochemistry, 5th Edition, W. H. Freeman and Company, New York.
- 4) Sathyanarayanan, U. 2002. Essentials of Biochemistry, Books and Allied (p) Ltd, India.
- 5) Voet, D and G. Voet. 2006. Biochemistry, John Wiley and Sons, New York.

Semester – V

2 Hours

1 Credits

Semester – V

5 Hours

5 Credits

Semester – VI
5 Hours
5 Credits

MB 601: MICROBIAL BIOTECHNOLOGY

Objectives

- To learn the basic tools in Microbial Biotechnology.
- To understand the various concepts of Recombinant DNA Technology and Microbial products.
- To emphasize on IPR issues and need for knowledge in patents in Biotechnology.

Course Outcomes

The paper Microbial Biotechnology helps the student to study theoretical concepts of Biotechnology and their applications in Genetic engineering and Microbiology. It also creates an awareness on the Intellectual property rights and patenting of Biotechnological processes.

Unit – I

Biotechnology – Definition, Various branches and Scope; Impact of Microbial Biotechnology; Metabolites from Microorganisms – Primary and Secondary metabolites; Microbial production of industrial enzymes; Enzyme immobilization; Industrial application of Enzymes.

Unit – II

Recombinant DNA technology – Principles and applications; Cutting and joining enzymes in rDNA technology; Recombinant Vaccines; Microbial synthesis of Pharmaceutical products – Insulin, Interferon, Hormones and Monoclonal antibodies.

Unit – III

Production of Microbial biotechnology products – Xanthan, Dextran, Biosurfactants, Steroids transformation and Polyhydroxyalkanoates (PHA & PHB); Biofuels – Bioethanol, Biodiesel and Biogas.

Unit – IV

SCP (Algae & Yeast) – List of organisms, Cultivation Techniques, Advantages and Disadvantages; SCP from wastes; Genetically modified foods; Gene therapy; Stem cell therapy.

Unit – V

Animals used for laboratory experiments; Care and Maintenance for laboratory animals; Ethics in animal experimentation; Ethical issues in Human Gene Therapy; Protection of Biotechnological inventions – Patent protection, Trade secrets and Plant Breeder's Rights; Biowarfare and Bioterrorism.

Text Books

- 1) Dubey, R. C. 2014. A Text Book of Biotechnology, 5th Edition, S. Chand Publishing, India.
- 2) Satyanarayana, U. 2005. Biotechnology, 1st Edition, Books and Allied (P) Ltd., Kolkata, India.

References

- 1) Old, R. S and S. B. Primrose. 2006. Principles of Gene Manipulation, 7th Edition, Blackwell Scientific Publications, London.
- 2) Jogdand, S. N. 2005. Gene Biotechnology, Himalaya Publishing House, Mumbai, India.
- 3) Singh, B. D. 2012. Biotechnology, 5th Edition, Kalyani Publishers, Chennai, Tamil Nadu, India.
- 4) Kumarasan, V. 2001. Biotechnology, Published by Saras Publication, Nagercoil, Tamil Nadu, India.

Semester – VI
5 Hours
5 Credits

MB 602: ENVIRONMENTAL MICROBIOLOGY

Objectives

- To creating the awareness about environmental problems among people.
- To provides a comprehensive overview of Biogeochemical processes relevant to environmental scientists and engineers mediated by microorganisms.
- To study about the water borne pathogens, water borne disease, microbial standards of water quality, biogenic pollution, air borne microbes and waste water management.

Course Outcomes

The paper Environmental Microbiology will create awareness about Microbes and environment, distribution, diversity and ecological importance, characteristics of microorganisms in different environment and its Biogeochemical cycle. This paper will also provides a detailed knowledge on Waste water treatment technologies.

Unit – I

Relationship between Microorganisms and Atmosphere; Sampling of Air; Air borne disease caused by Bacteria, Fungi and Viruses; Air pollution and Green house effect; Air Sanitation.

Unit – II

Soil characteristics (Physical & Chemical); Soil Microbiology – Major group of Soil microorganisms; Qualitative microflora of soil (Bacteria, Actinobacteria, Fungi, Viruses, Algae & Protozoa); Soil types and their microflora; Quantification of Soil microflora; Role of microorganisms in soil fertility.

Unit – III

Ecosystems - Fresh water ecosystem, Marine ecosystem, Estuarine ecosystem and Mangrove ecosystem; Water zonations; Eutrophication; Water pollution; Bacteriological analysis of water; Water borne diseases; Purification of water; Recycling of water.

Unit – IV

Organic matter decomposition; Biogeochemical cycles – Carbon cycle, Nitrogen cycle, Phosphorous cycle, Sulphur cycle and Iron cycle; Microbe – Microbe Interactions; Plant – Microbe Interactions.

Unit – V

Solid waste management - Incineration, Composting & Sanitary landfill; Sewage treatment – Small scale sewage treatment (Cesspools, Septic tank & Imhoff's tank) and Large scale sewage treatments (Primary treatment - Physical, Secondary treatment - Biological & Tertiary treatment - Chemical); Xenobiotics; Bioremediation, Bioleaching and Biodeterioration.

Text Books

- 1) Vijaya Ramesh, K. 2008. Environmental Microbiology, MJP Publishers, Chennai, India.
- 2) Subba Rao N.S. 1999. Soil Microbiology, 4th Edition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.

References

- 1) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- 2) Patel, A. H. 2016. Industrial Microbiology, 2nd Edition, Laxmi Publications, New Delhi, India.
- 3) Madigan, M. T., J. M. Martinko and J. Parker. 2009. Brock's Biology of Microorganisms, 12th Edition, Pearson/Benjamin Cummings, New York.
- 4) Maier, R. M., I. L. Pepper and C. P. Gerba. 2009. Environmental Microbiology, 2nd Edition, Academic Press, United States.

Semester – VI

4 Hours

4 Credits

MB 603: VERMITECHNOLOGY

Objectives

- To study about the properties of soil and microbial composting.
- To understand the biology of Earthworms and its role in Vermicomposting.
- To learn the ability of Earthworms in Organic farming and Solid waste reclamation.

Course Outcomes

The course Vermitechnology has been designed to provide the knowledge to the students about Organic farming through Composting and Vermicomposting. This paper also provides the details of Earthworms and its role in Solid waste reclamation.

Unit – I

Vermitechnology – History, Scope and Future; Soil – Structure and Types; Influence of soil microorganisms in Vermitechnology; Development and future of Vermitechnology in India and other countries; Earthworms – Diversity, Geographical distribution, Morphology, Life cycle and Behaviour patterns.

Unit – II

Ecological categories of Earthworms – Epigeics, Anecics and Endogeics; Burrowing activity of Earthworms; Physical, chemical and biological changes caused by Earthworms in soil Drilospheres and Vermicasts; Effect of Earthworm is Soil structure – Carbon, Nitrogen and Phosphorous Transformation.

Unit – III

Composing – Difference between Microbial Composting and Vermicomposting; Factors affecting Composting process; Analysis of Physico-chemical characteristics and microbial quality of Compost materials; Microbial Composting - Aerobic and Anaerobic Composting.

Unit – IV

Vermicompost - Earthworm species used in vermicompost production; Materials used for Vermicomposting; Vermicomposting methods – Small scale and Large scale; Packaging, marketing and Cost benefit analysis of Vermicompost; Pests, parasites and pathogens affecting Earthworms; Applications of Vermicomposting in Agriculture and Horticulture practices; Advantages of Vermicompost over Chemical inputs.

Unit - V

Vermiculture; Vermiculture unit – Materials required and maintenance; Vermiwash and its applications; Feeding habits and food for Composting worms; Importance of microorganisms as food for Earthworms; Problems in Vermiculture units and remedial suggestions; Earthworms in recycling of various solid wastes; Benefits of Earthworms other than Vermicomposting.

Text Books

- 1) Vijaya Ramesh, K. 2008. Environmental Microbiology, MJP Publishers, Chennai, India.
- 2) Subba Rao N.S. 1999. Soil Microbiology, 4th Edition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.

References

- 1) Satyanarayana, U. 2005. Biotechnology, 1st Edition, Books and Allied (P) Ltd., Kolkata, India.
- 2) Edwards, C. A and Bohlen, P. J. 1996. Biology and Ecology of Earthworms, Chapman and Hall, London.
- 3) Ismail, S. A. 1997. Vermicology: The Biology Earth worm, Orient Longman, United Kingdom.
- 4) Kale Radha, D. 1998. Earthworm: Cinderella of organic farming. Prism Books Pvt. Ltd., Bangalore, India.
- 5) Satchell, J. E. 1983. Earthworm Ecology: From Darwin to Agriculture. Chapman and Hall, London Stephenson J., 1923. The fauna of British India - Oligo.

Semester – VI

5 Hours

5 Credits

MB 604: FOOD MICROBIOLOGY

Objectives

- To encode the importance of the role of microorganisms in food industries both in beneficial and harmful ways.

- To obtain a good understanding of food microbiology and become qualified as microbiologist in food industries.
- To know the role of microbes in the spoilage of food products.

Course Outcomes

The Food Microbiology paper adds information about the role of microorganisms in many food, beverage and various industries both in production and spoilage processes.

Unit – I

History and Development of Food Microbiology; Importance of microorganisms in Food microbiology – Mold, Yeast and Bacteria; Intrinsic and Extrinsic parameters of foods that affect microbial growth; Contamination of foods; Principles of Food preservation – High & Low temperature, High pressure, Drying and Radiation; Food preservatives – Natural & Chemical.

Unit – II

Contamination, preservation and spoilage of Cereals and its products, Sugars and its products, Vegetables, Fruits, Milk products, Egg, Meat products, Seafoods and Poultry products.

Unit – III

Fermentation and its types; Traditional Indian fermented foods; Production of Baker's Yeast; Bread production from yeast and its spoilage; Fermented vegetables – Olives, Pickles & Sauerkraut; Fermented Meat & Fish; Mold fermentations – Tempeh, Soy sauce & Rice wine and Mycoprotein.

Unit – IV

Lactic acid bacteria; Diseases caused by Lactic acid bacteria; Concept of Probiotics & Prebiotics; Lactic starter cultures; Fermented dairy products – Cheese, Yogurt and Fermented milk; Spoilage and defects of fermented dairy products; Testing of Milk and its products.

Unit – V

Food borne illness caused by Bacteria, Fungi, Viruses, Rickettsias and Parasites; Microbiology of food products; Hazard analysis and critical control points (HACCP); Enforcement and control agencies; Microbiological criteria for food.

Text Books

- 1) William C. Frazier and Dennis C. Westhoff. 2013. Food Microbiology, 5th Edition, McGraw Hill, New York.
- 2) James M. Jay, Martin J. Loessner and David A. Golden. 2005. Modern Food Microbiology, 7th Edition, Springer Publications, United States.
- 3) Martin R. Adams and Maurice O. Moss. 2008. Food Microbiology, 3rd Edition, RSC Publishing, United Kingdom.

References

- 1) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- 2) Patel, A. H. 2016. Industrial Microbiology, 2nd Edition, Laxmi Publications, New Delhi, India.
- 3) Casida, L. E. 2007. Industrial Microbiology, New Age International Publishers, New Delhi, India.
- 4) Reed, G. 2004. Prescott and Dunn's Industrial Microbiology, 4th Edition, CBS Publishers and Distributors, New Delhi, India.

Semester – VI

5 Hours

5 Credits

MB 605: INDUSTRIAL MICROBIOLOGY

Objectives

- To encompass the use of Industrially important microorganisms in the manufacture of food or industrial products.
- To understand the Fermentation process and design of various Fermentors.
- To study the use of microorganisms for the production of Antibiotics, Vaccines, Organic acids, Organic solvents, Amino acids, Vitamins and Industrial enzymes.

Course Outcomes

From the Industrial Microbiology paper, students acquire the knowledge in the large scale production of Industrial product and providing the trends to cater the needs of industry.

Unit – I

History of Industrial Microbiology; Industrially important microorganisms; Primary and Secondary metabolites from microorganisms; Design of Fermentor; Factors affecting Fermentor design; Types of Fermentor; Industrial Sterilization of Fermentor, Media and Air.

Unit – II

Production Strains – Screening techniques, Strain development, Preservation of Microorganisms and Preparation of Inoculum; Fermentation medium; Downstream Processing; Foam formation and Antifoam agents.

Unit – III

Microbial production of Antibiotics (Penicillin & Streptomycin), Vaccines (Hepatitis – B Vaccine & Rabies Vaccine) and Organic acids (Citric acid, Lactic acid & Acetic acid).

Unit – IV

Microbial production of Amino acids (Glutamic acid & Lysine), Vitamins (Vitamin – B2, B12, & Vitamin – C) and Enzymes (Amylases, Proteases & Pectinases).

Unit – V

Yeasts and its industrial uses; Production of Brewer's Yeast; Production of Food & Fodder Yeast; Microbial production of Solvents (Ethanol, Acetone – butanol & 2,3 - butanediol) and Alcoholic beverages (Beer & Wine).

Text Books

- 1) Patel, A. H. 2016. Industrial Microbiology, 2nd Edition, Laxmi Publications, New Delhi, India.

- 2) Casida, L. E. 2007. Industrial Microbiology, New Age International Publishers, New Delhi, India.
- 3) Waites, M. J. 2007. Industrial Microbiology, Blackwell Publishing Company, United Kingdom.

References

- 1) Reed, G. 2004. Prescott and Dunn's Industrial Microbiology, 4th Edition, CBS Publishers and Distributors, New Delhi, India.
- 2) Stanbury, P. T and A. Whitaker. 2005. Principles of Fermentation Technology, Pergamon Press, New York.
- 3) William C. Frazier and Dennis C. Westhoff. 2013. Food Microbiology, 5th Edition, McGraw Hill, New York.
- 4) Martin R. Adams and Maurice O. Moss. 2008. Food Microbiology, 3rd Edition, RSC Publishing, United Kingdom.

PMB 601: MAIN PRACTICAL – VI

- 1) Assessment of Milk quality by MBRT.
- 2) Enumeration of microorganisms in Milk and Water by SPC Method.
- 3) Isolation and enumeration of microorganisms from Air.
- 4) Isolation and enumeration of microorganisms from Fruits and Vegetables.
- 5) Isolation and enumeration of Antibiotic producing fungi from soil.
- 6) Bacteriological examination of water by MPN test.
- 7) Isolation of Yeast from Grapes.

NMB 601: Non – Major Elective 2 – MICROBIAL DISEASES AND HEALTH CARE

Objectives

- To make the students to understand the various diseases caused by microorganisms.
- To study the clinical conditions and preventive measures for microbial diseases.
- To provide the knowledge about Antibiotics, Drugs, Vaccines and Vaccination.

Course Outcomes

To introduce the knowledge of the medically important microorganisms which are responsible for causing diseases. The course Microbial disease and health care will provide the knowledge to the students about microbial diseases and its preventive measures, vaccines and vaccination.

Unit – I

Microbial Infection – Types, Source, Mode of Transmission and Factors predisposing to Microbial Pathogenicity; Epidemiology of Diseases; Reservoirs of Microbial diseases.

Unit – II

Clinical conditions and prevention of Bacterial diseases – Typhoid, Cholera, Botulism, Anthrax, Tuberculosis and Leprosy; Antibiotics.

Unit – III

Clinical conditions and prevention of Viral diseases – AIDS, Rabies, Polio, Hepatitis, Small Pox and Dengue; Antiviral drugs; Vaccines and Vaccination schedule.

Unit – IV

Clinical conditions and prevention of Fungal diseases – Candidiasis, Cryptococcosis, Aspergillosis and Dermatophytes; Mycotoxins; Antifungal drugs.

Unit – V

Protozoa diseases – Amoebiasis, Malaria and Leishmaniasis; Antiprotozoan drugs; Helminth diseases - Ascariasis, Filariasis, and Taenia infection; Antihelminthic drugs.

Text Books

- 1) Patrick Murray, Ken Rosenthal and Michael Pfaller. 2016. Medical Microbiology, 8th Edition, Elsevier Publications, United States.
- 2) Subhash Chandra Parija. 2013. Textbook of Medical Parasitology, 4th Edition, All India Publishers and Distributors, India.
- 3) Jagdish Chander. 2017. Textbook of Medical Mycology, 4th Edition, Jaypee Brothers Medical Publishers, India.

References

- 1) Jawetz, E., J. L. Melnic and E. A. Adelberg. 2013. Review of Medical Microbiology, 26th Edition, Lange Medical Publishers, New York.
- 2) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.
- 3) Reba Kanungo. 2017. Ananthanarayan and Paniker's Text book of Microbiology, 7th Edition, Orient Longman Limited, Chennai, India.
- 4) Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton. 2017. Prescott's Microbiology, 10th Edition, McGraw Hill Publication, United States.

Semester – VI

0 Hours

1 Credits

SSP – 2: DAIRY TECHNOLOGY

Objectives

- To encode the importance of the role of microorganisms in Dairy industries
- To obtain a good understanding of Dairy microbiology and become an Entrepreneur.
- To obtain knowledge in food quality and spoilage of Dairy products.

Course Outcomes

The Self study paper Dairy Technology is about the study of milk and milk-derived food products. It focuses on the biological, chemical, physical, and microbiological aspects of milk itself, and on the technological aspects of the transformation of milk into its various consumer products including fermented products, concentrated and dried products, butter and ice cream. This course also provides information about the role of microorganisms in Dairy products development.

Unit – I

Milk and Milk processing – Milk composition, Milk components, Milk processing, Products from milk and Changes to milk components during processing; Microflora of Raw milk.

Unit – II

Microbiology of Butter – Definition, Initial microflora, Processing and its effect on microflora, Spoilage and Pathogens; Microbiology of Cream – Definition, Initial microflora, Processing and its effect on microflora, Spoilage and Pathogens.

Unit – III

Microbiology of Concentrated and Dried milk products - Definition, Initial microflora, Processing and its effect on microflora, Spoilage and Pathogens.

Unit – IV

Microbiology of Cheese - Definition, Initial microflora, Types, Processing and its effect on microflora, Processed cheese, Value added cheese, Spoilage of cheese and Pathogens in cheese.

Unit – V

Probiotics and Probiotic products; Microbiology of Ice cream and related products - Definition, Initial microflora, Processing and its effect on microflora, Distribution, Spoilage, Pathogens (Growth and survival) and Toxins; HACCP system in manufacture of Ice cream.

Text Books

- 1) Rhea Fernandes. 2009. Microbiology Handbook on Dairy Products, 1st Edition, Leatherhead Publishing, United Kingdom.
- 2) Elmer H. Marth and James L. Steele. 2001. Applied Dairy Microbiology, 2nd Edition, Marcel Dekker, Inc., United Kingdom.
- 3) Richard K. Robinson. 2002. Dairy Microbiology Handbook, 3rd Edition, John Wiley and Sons, Inc., United Kingdom.

References

- 1) William C. Frazier and Dennis C. Westhoff. 2013. Food Microbiology, 5th Edition, McGraw Hill, New York.
- 2) James M. Jay, Martin J. Loessner and David A. Golden. 2005. Modern Food Microbiology, 7th Edition, Springer Publications, United States.
- 3) Martin R. Adams and Maurice O. Moss. 2008. Food Microbiology, 3rd Edition, RSC Publishing, United Kingdom.
- 4) Patel, A. H. 2016. Industrial Microbiology, 2nd Edition, Laxmi Publications, New Delhi, India.

