

**PROGRAMME: B.Sc. MICROBIOLOGY
CURRICULUM**

SEMESTER I									
Sl. No	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	STA1101 SFR1101 SHN1101	Tamil - I French - I Hindi - I	3	0	0	3	50	50	1 3 5
2.	SHS1109	General English - I	3	0	0	3	50	50	5
3.	SMB1101	General Microbiology	3	1	0	4	50	50	7
4.	SMB1102	Basic Biochemistry	3	1	0	4	50	50	8
5.	SBT1001	Environmental Science	3	0	0	3	50	50	9
6.	SMB4101	General Microbiology Lab	0	0	3	2	50	50	11
7.	SMB4102	Basic Biochemistry Lab	0	0	3	2	50	50	11
Total Credits for Semester 1 – 21									
Total Marks for Semester 1 – 700									

SEMESTER II									
Sl. No	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	STA 1102 SFR 1102 SHN1102	Tamil – II French – II Hindi – II	3	0	0	3	50	50	12 14 15
2	SHS 110	General English – II	3	0	0	3	50	50	16
3.	SBB1101	Cell Biology	3	1	0	4	50	50	17
4.	SBB1201	Immunology	3	1	0	4	50	50	18
5.	SBB1202	Intermediary Metabolism	3	0	0	3	50	50	19
6.	SBB4201	Cell Biology Lab	0	0	3	2	50	50	20
7.	SBB4202	Immunology Lab	0	0	3	2	50	50	20
Total Credits for Semester 2 – 21									
Total Marks for Semester 2 – 700									

L - LECTURE HOURS, T – TUTORIAL HOURS, P – PRACTICAL HOURS, C – CREDITS

CAE – CONTINUOUS ASSESSMENT EXAMINATION,

ESE – END SEMESTER EXAMINATION

SEMESTER III									
S. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	SBB2101	Introduction to Molecular Biology & Genetics	4	0	0	4	50	50	22
2.	SMB2101	Microbial Ecology	3	0	0	3	50	50	23
3.	SBB2103	Concepts in Biotechnology	3	1	0	4	50	50	24
4.	SMB2103	Bioinstrumentation	3	1	0	4	50	50	25
5.		Elective	3	0	0	3	50	50	
6.	SMB4301	Molecular biology Lab	0	0	3	2	50	50	26
7.	SMB4302	Bioinstrumentation Lab	0	0	3	2	50	50	26
Total Credits for Semester 3 – 21									
Total Marks for Semester 3 – 700									

SEMESTER IV									
Sl. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	SMB2201	Soil & Agricultural Microbiology	3	0	0	3	50	50	27
2.	SMB2202	Food & Dairy Microbiology	3	0	0	3	50	50	28
3.	SMB2203	Air and Water Microbiology	3	0	0	3	50	50	29
4.	SMB2204	Industrial microbiology	4	0	0	4	50	50	30
5.		Elective	3	0	0	3	50	50	
6.	SMB4401	Soil & Agricultural Microbiology Lab	0	0	3	2	50	50	31
7.	SMB4402	Food microbiology Lab	0	0	3	2	50	50	31
Total Credits for Semester 4 – 21									
Total Marks for Semester 4 – 700									

L - LECTURE HOURS, T – TUTORIAL HOURS, P – PRACTICAL HOURS, C – CREDITS

CAE – CONTINUOUS ASSESSMENT EXAMINATION,

ESE – END SEMESTER EXAMINATION

SEMESTER V									
Sl. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	SMB3101	Medical Bacteriology	3	1	0	4	50	50	32
2.	SMB3102	Medical Virology	3	0	0	3	50	50	33
3.	SMB3103	Medical Mycology	3	0	0	3	50	50	34
4.	SMB3104	Phycology and Medical Parasitology	3	1	0	4	50	50	35
5.		Elective	3	0	0	3	50	50	
6.	SMB4501	Bacteriology and Virology Lab	0	0	3	2	50	50	36
7.	SMB4502	Mycology and Parasitology Lab	0	0	3	2	50	50	36
Total Credits for Semester 5 – 21									
Total Marks for Semester 5 – 700									

SEMESTER VI									
Sl. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1.	SBT1002	Research Methodology	3	0	0	3	50	50	37
2.	SMB3201	Clinical Microbiology	3	0	0	3	50	50	38
3.	S30PROJ	Project	0	0	30	15	50	50	
Total Credits for Semester 6 – 21									
Total Marks for Semester 6 – 300									

L - LECTURE HOURS, T – TUTORIAL HOURS, P – PRACTICAL HOURS, C – CREDITS

CAE – CONTINUOUS ASSESSMENT EXAMINATION,

ESE – END SEMESTER EXAMINATION,

Semester	Theory courses (including elective courses)			Practical Courses (including Project)		
	Total No.	Total Credits	Total Marks	Total No.	Total Credits	Total Marks
1	5	17	500	2	4	200
2	5	17	500	2	4	200
3	5	17	500	2	4	200
4	5	17	500	2	4	200
5	5	17	500	2	4	200
6	2	6	500	1	15	100
Overall Total	27	91	3000	11	35	1100

Overall total credits for B.Sc.(Microbiology) Programme	126
Overall total marks for B.Sc.(Microbiology) Programme	4100

LIST OF ELECTIVES

ELECTIVE COURSES									
Sl. No.	Course Code	Course Title	L	T	P	C	Marks		Page No.
							CAE	ESE	
1	SMB1601	Advances in Microbiology	3	0	0	3	50	50	39
2	SMB1602	Biofertilizers and Biopesticides	3	0	0	3	50	50	40
3	SMB1603	Food Fermentation Techniques	3	0	0	3	50	50	41
4	SMB1604	Management of Human Microbial Diseases	3	0	0	3	50	50	42
5	SBB1601	Advanced instrumentation Techniques	3	0	0	3	50	50	43
6	SBB1605	Computer Application in Biology	3	0	0	3	50	50	44
7	SMB1605	Entrepreneurial Microbiology	3	0	0	3	50	50	45
8	SMB1606	Microbial diversity	3	0	0	3	50	50	46
9	SBB1609	Introduction to Bioinformatics	3	0	0	3	50	50	47
10	SMB1507	Medical Laboratory techniques	3	0	0	3	50	50	48
11	SMB1608	Human Physiology	3	0	0	3	50	50	49
12	SMB1609	Marine microbiology	3	0	0	3	50	50	50
13	SBB3103	Plant biotechnology	3	0	0	3	50	50	51
14	SBB1611	Biostatistics	3	0	0	3	50	50	52
15	SBB1615	Bioethics, Biosafety and IPR	3	0	0	3	50	50	53
16	SBB1616	Nanobiotechnology	3	0	0	3	50	50	54

L - LECTURE HOURS, T – TUTORIAL HOURS, P – PRACTICAL HOURS, C – CREDITS

CAE – CONTINUOUS ASSESSMENT EXAMINATION,

ESE – END SEMESTER EXAMINATION

SMB2201	SOIL & AGRICULTURAL MICROBIOLOGY	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- The purpose of this course is to introduce students to scientific foundation of microorganisms and their relationship to agriculture and environment. The course will appraise the students about application/control of microbes for agriculture and how to design approaches to mitigate environmental pollutants

UNIT 1 SOIL MICROBES ASSOCIATION**12 Hrs.**

Distribution of microorganisms in nature – Microbial communities in soil- factors influencing the microbial density in soil- zymogenous and autochthonous flora in Soil- Microbial associations – symbiotic proto cooperation, ammensalism, Commensalism, syntropism, parasitism and predation with suitable examples.

UNIT 2 DECOMPOSITION**12 Hrs.**

Microbial decomposition; cellulose, Hemi cellulose, lignin, pectin and chitin. –Factors influencing degradation- acetate utilization -bioconversion of organic wastes- sugarcane wastes- coir pith composition- composting, principles and Applications- conversion process

UNIT 3 DISEASES**12 Hrs.**

Role of enzymes and toxins in pathogenesis. Fungal diseases of plants: Rusts of wheat, linseeds; late blight of potato; red rot of sugarcane. Bacterial diseases of plants: Citrus canker, blight of rice. Viral diseases of plants: Leaf curl of Papaya, vein clearing of lady's finger

UNIT 4 APPLICATIONS**12 Hrs.**

Microorganisms in the decomposition of organic matter- carbon cycle – nitrogen Cycle- nitrogen fixing microorganisms- root nodule bacteria – non-symbiotic Nitrogen fixers – biofertilizers in agriculture- Rhizobium and phosphate solubilisers- Mycorrhizal association – phosphorous cycle

UNIT 5 BIOFERTILIZERS**12 Hrs.**

Bio fertilizers: Types, production and application - Mycorrhizae : Types and their application in agriculture and forestry. – Vermicomposting - Reclamation of waste agricultural land by microorganisms

Max Hours.60**TEXT / REFERENCE BOOKS**

1. Soil Microbiology by Prof. N.S. Subba Rao, Fourth edition, Oxford and IBH Publishing CO. PVT., LTD., New Delhi
2. Introduction to soil microbiology. Alexander M. (1977) John Wiley & Sons, Inc., New York.
3. Modern Soil Microbiology, Dirk J, Elias V, Trevors JT, Wellington, EMH (1997) Marcel Dekker INC, New York.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A :** 10 questions of 2 marks each - No choice**20 Marks****PART B :** 2 questions from each UNIT of internal choice; each carrying 16 marks**80 Marks**

SMB2202	FOOD & DAIRY MICROBIOLOGY	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- This course aims on studying interaction of microorganisms and food in relation to food-borne diseases, food spoilage and bioprocessing of food and dairy products.
- To make students learn about technologies to render foods and dairy products safe and analytical techniques for monitoring of food biological safety.

UNIT 1 FACTORS**12 Hrs.**

Intrinsic and extrinsic factors that affect growth and survival of microbes in foods, natural flora and source of contamination of foods in general.

UNIT 2 SPOILAGE**12 Hrs.**

Principles, Spoilage of vegetables, fruits, meat, eggs, milk and butter, bread, canned Foods

UNIT 3 PRESERVATION**12 Hrs.**

Principles, physical methods of food preservation: temperature (low, high, canning, drying), irradiation, hydrostatic pressure, high voltage pulse, microwave processing and aseptic packaging, chemical methods of food preservation: salt, sugar, organic acids, SO₂, nitrite and nitrates, ethylene oxide, antibiotics and bacteriocins

UNIT 4 FERMENTATION**12 Hrs.**

Dairy starter cultures, fermented dairy products: yogurt, acidophilus milk, kumiss, kefir, dahi and cheese, other fermented foods: dosa, sauerkraut, soy sauce and tampeh, Probiotics: Health benefits, types of microorganisms used, probiotic foods available in market.

UNIT 5 MICROBIAL DISEASES**12 Hrs.**

Food intoxications: *Staphylococcus aureus*, *Clostridium botulinum* and mycotoxins; Food infections: *Bacillus cereus*, *Vibrio parahaemolyticus*, *Escherichia coli*, Salmonellosis, Shigellosis, *Yersinia enterocolitica*, *Listeria monocytogenes* and *Campylobacter jejuni*.

HACCP, Indices of food sanitary quality and sanitizers

Max Hours.60**TEXT / REFERENCE BOOKS**

1. Adams MR and Moss MO. (1995). Food Microbiology. 4th edition, New Age International (P) Limited Publishers, New Delhi, India.
2. Banwart JM. (1987). Basic Food Microbiology. 1st edition. CBS Publishers and Distributors, Delhi, India.
3. Davidson PM and Brannen AL. (1993). Antimicrobials in Foods. Marcel Dekker, New York.
4. Dillion VM and Board RG. (1996). Natural Antimicrobial Systems and Food Preservation. CAB International, Wallingford, Oxon.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each UNIT of internal choice; each carrying 16 marks****80 Marks**

SMB2203	AIR AND WATER MICROBIOLOGY	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- This course prepares students to apply microbiological techniques to monitor water and air quality, domestic and industrial water and wastewater treatment systems and site remediation project

UNIT 1 AEROMICROBIOLOGY**12 Hrs.**

Aeromicrobiology - Bioaerosols, Air borne microorganisms (bacteria, Viruses, fungi) and their impact on human health and environment, significance in food and pharma industries and operation theatres, allergens Air flora Droplet, droplet nuclei, and aerosols Air pollution: Chemical pollutants, their sources in air and effects on human health.

UNIT 2 AIR SAMPLE ANALYSIS**12 Hrs.**

Air sample collection and analysis Bioaerosol sampling, air samplers, methods of analysis Identification characteristics Methods of Air sampling and types of air samplers - A. Impact on solids, B. Impingement in liquid, C. Sedimentation D. Centrifugation, E. Precipitation F. Thermal Precipitation, CFU, culture media for bacteria and fungi.

UNIT 3 CONTROL**12 Hrs.**

Control measures Fate of bioaerosols, inactivation mechanisms – UV light, HEPA filters, desiccation, Incineration Air sanitation: Physical and chemical methods Air borne infections

UNIT 4 WATER MICROBIOLOGY**12 Hrs.**

Water Microbiology, Water borne pathogens, water borne diseases

UNIT 5 WATER ANALYSIS**12 Hrs.**

Microbiological analysis of water Sample Collection, Treatment and safety of drinking (potable) water, methods to detect potability of water samples: (a) standard qualitative procedure: presumptive test/MPN test, confirmed and completed tests for faecal coliforms (b) Membrane filter technique and (c) Presence/absence tests Precipitation, chemical disinfection, filtration, high temperature, UV light

Max Hours.60**TEXT / REFERENCE BOOKS**

1. da Silva N, Taniwaki MH, Junqueira VC, Silveira N, Nascimento MS, Gomes RAR (2012) Microbiological Examination Methods of Food and Water A Laboratory Manual, CRC Press
2. Atlas RM and Bartha R. (2000). Microbial Ecology: Fundamentals & Applications. 4th edition. Benjamin/Cummings Science Publishing, USA
3. Maier RM, Pepper IL and Gerba CP. (2009). Environmental Microbiology. 2nd edition, Academic Press
4. Hurst CJ, Crawford RL, Garland JL, Lipson DA (2007) Manual of Environmental Microbiology, 3rd edition, ASM press

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each UNIT of internal choice; each carrying 16 marks****80 Marks**

SMB2204	INDUSTRIAL MICROBIOLOGY	L	T	P	Credits	Total Marks
		3	1	0	4	100

COURSE OBJECTIVES

- The objective of this course to enable students to correlate metabolic aspects of industrially relevant microorganisms with the corresponding biotechnological products, and learn the basics of simple strategies for strain improvements encompassing both classical and metabolic engineering methods, design medium and downstream processing.

UNIT 1 HISTORY**12 Hrs.**

Brief history and developments in industrial microbiology Types of fermentation processes - Solid-state and liquid-state (stationary and submerged) fermentations; batch, fed-batch (Eg. Baker's yeast) and continuous fermentations

UNIT 2 BIO-REACTOR**12 Hrs.**

Components of a typical bio-reactor, Types of bioreactors-Laboratory, pilot- scale and production fermenters, constantly stirred tank and air-lift fermenters, Measurement and control of fermentation parameters - pH, temperature, dissolved oxygen, foaming and aeration

UNIT 3 UPSTREAM PROCESSING**12 Hrs.**

Sources of industrially important microbes and methods for their isolation, preservation and maintenance of industrial strains, strain improvement, Crude and synthetic media; molasses, corn steep liquor, sulphite waste liquor, whey, yeast extract and protein hydrolysates

UNIT 4 DOWNSTREAM PROCESSING**12 Hrs.**

Cell disruption, filtration, centrifugation, solvent extraction, precipitation, lyophilization and spray drying. Citric acid, ethanol, penicillin, glutamic acid, Vitamin B12 Enzymes (amylase, protease, lipase)
Wine, beer

UNIT 5 IMMOBILIZATION**12 Hrs.**

Methods of immobilization, advantages and applications of immobilization, large scale applications of immobilized enzymes (glucose isomerase and penicillin acylase)

Max Hours.60**TEXT / REFERENCE BOOKS**

1. Patel A.H. (1996). Industrial Microbiology. 1st edition, Macmillan India Limited
2. Okafor N. (2007). Modern Industrial Microbiology and Biotechnology. 1st edition. Bios Scientific Publishers Limited. USA
3. Waites M.J., Morgan N.L., Rockey J.S. and Highton G. (2001). Industrial Microbiology: An Introduction. 1st edition. Wiley – Blackwell
4. Glaze A.N. and Nikaido H. (1995). Microbial Biotechnology: Fundamentals of Applied Microbiology. 1st edition. W.H. Freeman and Company
5. Casida LE. (1991). Industrial Microbiology. 1st edition. Wiley Eastern Limited.
6. Crueger W and Crueger A. (2000). Biotechnology: A textbook of Industrial Microbiology. 2nd edition. Panima Publishing Co. New Delhi.
7. Stanbury PF, Whitaker A and Hall SJ. (2006). Principles of Fermentation Technology. 2nd edition, Elsevier Science Ltd..

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A** : 10 questions of 2 marks each - No choice**20 Marks****PART B** : 2 questions from each UNIT of internal choice; each carrying 16 marks**80 Marks**

SMB1607	MEDICAL LABORATORY TECHNIQUES	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- The main purpose of the program is to provide the students with the good knowledge of the basic techniques used in the laboratory.

UNIT 1 DISEASES**12 Hrs.**

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

UNIT 2 COLLECTION OF SAMPLES**12 Hrs.**

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 3 EXAMINATION OF SAMPLES**12 Hrs.**

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 4 SEROLOGICAL ANALYSIS**12 Hrs.**

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

UNIT 5 ANALYSIS METHODS**12 Hrs.**

Typhoid, Dengue and HIV, Swine flu Testing for Antibiotic Sensitivity in Bacteria 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

Max Hours.60**TEXT / REFERENCE BOOKS.**

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 Collee JG, Fraser, AG, Marmion, BP,

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A** : 10 questions of 2 marks each - No choice**20 Marks****PART B** : 2 questions from each UNIT of internal choice; each carrying 16 marks**80 Marks**

SMB1603	FOOD FERMENTATION TECHNIQUES	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To impart knowledge about the innovations in food processing technologies and their applications. To understand changes in the composition of food and comparison with conventional cooking methods. To know the need according to different foods and to food quality parameters and their maintenance during storage.

UNIT 1 HISTORY**12 Hrs.**

History and scope of fermented foods; definition and importance of fermented foods; Organisms used for production of fermented food products; Environmental parameters for fermentation process; Classification of fermentation processes for fermented foods.

UNIT 2 FERMENTED FOODS**12 Hrs.**

Fermented beverages- production of different types of wine and beer; Fermented food of vegetables and fruits- Processing, microbiology, starter cultures, biochemistry, food safety of sauerkraut, pickles, Kimchi; Cereal and legume based fermented products bread, Soya Sauce, Koji, Tempeh, Miso, Natto, Tofu, Angkak; Indian products like Idly, Dosa, Bada

UNIT 3 FERMENTED DAIRY FOODS**12 Hrs.**

Microbiology of Fermented Dairy Products (Product Characteristics, Processing, Starter culture, Growth, Genetics) Buttermilk; Yogurt (probiotics, prebiotics, synbiotics); Acidophilus Milk; Bifidus Milk, Bulgarian milk; acidophilus milk; Kefir; Kummis; Cheeses; Properties and beneficial effects of probiotic and prebiotic.

UNIT 4 FERMENTED MEAT AND DRINKS**12 Hrs.**

Fermented meat and fish products; Microbial fermentation of tea, coffee and cacao. health aspects of fermented foods.

UNIT 5 FOOD PROCESSING**12 Hrs.**

Benefits and drawback of food processing, parameters for food processing. Processing of milk, vegetables, meat, oil processing, grind milling. Food additives-safety and their effects. Processing method- size reduction, mixing, separation and concentration of food components, High hydrostatic pressure, phytochemical processes. Effects of food processing on food nutrition.

Max Hours.60**TEXT / REFERENCE BOOKS**

1. James. M. Jay, Martin J. Loessner and David A. Golden, Food Microbiology, Springer Publication, 7th Edition, 2005.
2. Frazier, Food Microbiology, McGraw Hill Publication, 4th Edition, 2001
3. Shetty K., G. Paliyath et al. – Food Biotechnology – 2nd Edition- Taylor and Francis, 2006.
4. Kosikowski, F.V. 1997. Cheese and fermented milk foods. Frank Kosikowski and Vikram Mistry, Brooktondale, N. Y.
5. Fox, P.F. 1993. Cheese : chemistry, physics, and microbiology, London ; New York: Chapman & Hall,.
6. Wood, J. B. 1985. Microbiology of fermented foods. Volumes I and II. . Elsevier Applied Science Publishers. London, England
7. Joshi, V.K. and Pandey, A. Ed. 1999. Biotechnology. Food Fermentation, (2 Vol. set). Education Publ. New Delhi
8. Jay, J.M. (2008) Modern Food Microbiology (Sixth Edition). Aspen Publishers, Inc. Gaithersburg, Maryland

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A :** 10 questions of 2 marks each - No choice**20 Marks****PART B :** 2 questions from each UNIT of internal choice; each carrying 16 marks**80 Marks**

SMB3101	MEDICAL BACTERIOLOGY	L	T	P	Credits	Total Marks
		3	1	0	4	100

COURSE OBJECTIVES

- This course aims at understanding important medically important bacteria its mode of infection, pathogenesis prophylaxis and treatment.

UNIT 1 INFECTION**12 Hrs.**

Infection-Sources of infection, method of transmission of infection, Factors predisposing to microbial pathogenicity, Types of infectious diseases. Normal Microbial flora of human body. Gram-positive pathogens *Staphylococcus*, *Streptococcus*, *Corynebacterium*, *Clostridium*.

UNIT 2 GRAM NEGATIVE PATHOGENS**12 Hrs.**

Gram negative pathogens- *Neisseria*, *E.coli*, *Klebsiella*, *Proteus*, *Salmonella*, *Shigella*, *Vibrio*, *Yersinia*.

UNIT 3 ACID FAST BACTERIS**12 Hrs.**

Acid fast bacteria-*Mycobacterium tuberculosis* and *M.lepreae*.

UNIT 4 SPIROCHETES**12 Hrs.**

Spirochetes-*Leptospira*, *Treponema*.

UNIT 5 OTHER MEDICALLY IMPORTANT ORGANISMS**12 Hrs.**

Mycoplasma. *Chlamydia*. *Helicobacter* and *Campylobacter*. Other important anaerobic pathogens.

Max Hours.60**TEXT / REFERENCE BOOKS**

1. Medical Microbiology-David Green wood
2. Text book of Microbiology, Ananthanarayan & Jayaram Panicker
3. Jawetz-Medical Microbiology-Geo F.Brooks, Janet S Butel.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A** : 10 questions of 2 marks each - No choice**20 Marks****PART B** : 2 questions from each UNIT of internal choice; each carrying 16 marks**80 Marks**

SMB3102	MEDICAL VIROLOGY	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- This course aims at understanding important medically important virus its mode of infection, pathogenesis prophylaxis and treatment.

UNIT 1 GENERAL CONCEPTS**12 Hrs.**

General Concepts: Virus history, Diversity, shapes, sizes and components of genomes. Isolation and purification of viruses and components.

UNIT 2 INFECTION**12 Hrs.**

Consequences of virus infection to animals and human. Viral infection: affect on host macromolecules. Viral infection: establishment of the antiviral state. Viruses counter attack mechanisms.

UNIT 3 CLASSIFICATION**12 Hrs.**

Classification of viruses and nomenclatures.

Positive strand RNA viruses- Picornaviruses. Flaviviruses- West Nile virus and Dengue virus. Coronaviruses- SARS pathogenesis

Negative strand RNA viruses Paramyxoviruses. Orthomyxoviruses: Influenza pathogenesis and Bird flu. Rhabdoviruses: Rabies pathogenesis.

UNIT 4 RNA VIRUS**12 Hrs.**

dsRNA viruses- Reoviruses. Retroviruses: structure, classification, life cycle; reverse transcription. Retroviruses: HIV, viral pathogenesis and AIDS.

UNIT 5 DNA VIRUS**12 Hrs.**

Small DNA viruses: parvo- and polyomaviruses. Large DNA viruses: Herpes-ado-, and poxviruses. Miscellaneous viruses.

Max Hours.60**TEXT / REFERENCE BOOKS**

1. Principles of Virology 2nd edition by S.J.Flint, L.W.Enquist,R.M.Krug,V.R. Racaniello, and A.M.Skalka.
2. Fields Virology 5th Edition by Bernard Fields, David Knipeand Peter Howley.
3. Medical Virology 4th edition by David O.White and FrankJ. Fenner.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A** : 10 questions of 2 marks each - No choice**20 Marks****PART B** : 2 questions from each UNIT of internal choice; each carrying 16 marks**80 Marks**

SMB3103	MEDICAL MYCOLOGY	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- This course aims at understanding important medically important fungi its mode of infection, pathogenesis prophylaxis and treatment.

UNIT 1 CLASSIFICATION**12 Hrs.**

General characteristics & classification of fungi - Morphology & reproduction of fungi - Pathogenesis of fungal infections - Isolation & identification of fungi

UNIT 2 YEAST**12 Hrs.**

Yeasts and yeast like fungi of medical importance including Candida. - Cryptococcus, Malassezia, Trichosporon, Geotrichum, Saccharomyces etc. Mycelial fungi of medical importance including Aspergillus, Zygomycetes, Pseudoallescheria, Fusarium, Piedra, other dematiaceous hyphomycetes and other hyalohyphomycetes etc.

UNIT 3 DIMORPHIC FUNGI**12 Hrs.**

Dimorphic fungi including Histoplasma, Blastomyces, Coccidioides, Paracoccidioides, Sporothrix, Penicillium marneffei etc. - Dermatophytes

UNIT 4 FUNGI DISEASES**12 Hrs.**

Fungi causing mycetoma, keratomycosis & otomycosis. - Pneumocystis jirovecii infection - Rhinosporidium seeberi & Loboa loboi - Actinomycetes & Nocardia.

UNIT 5 COMMON LAB CONTAMINANTS**12 Hrs.**

Common laboratory fungal contaminants- Mycetism & mycotoxicosis - Antifungal agents & in vitro antifungal susceptibility tests. - Hypersensitivity to fungi

Max Hours.60**TEXT / REFERENCE BOOKS**

1. Patel A.H. (1996). Industrial Microbiology. 1st edition, Macmillan India Limited
2. Okafor N. (2007). Modern Industrial Microbiology and Biotechnology. 1st edition. Bios Scientific Publishers Limited. USA
3. Waites M.J., Morgan N.L., Rockey J.S. and Highton G. (2001). Industrial Microbiology: An Introduction. 1st edition. Wiley – Blackwell
4. Glaze A.N. and Nikaido H. (1995). Microbial Biotechnology: Fundamentals of Applied Microbiology. 1st edition. W.H. Freeman and Company
5. Casida LE. (1991). Industrial Microbiology. 1st edition. Wiley Eastern Limited.
6. Crueger W and Crueger A. (2000). Biotechnology: A textbook of Industrial Microbiology. 2nd edition. Panima Publishing Co. New Delhi.
7. Stanbury PF, Whitaker A and Hall SJ. (2006). Principles of Fermentation Technology. 2nd edition, Elsevier Science Ltd..

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A : 10 questions of 2 marks each - No choice****20 Marks****PART B : 2 questions from each UNIT of internal choice; each carrying 16 marks****80 Marks**

SMB3104	PHYCOLOGY AND MEDICAL PARASITOLOGY	L	T	P	Credits	Total Marks
		3	1	0	4	100

COURSE OBJECTIVES

- This course aims at understanding important medically important parasite its mode of infection, pathogenesis prophylaxis and treatment. To understand the Algal diversity.

UNIT 1 CLASSIFICATION**12 Hrs.**

Algae in diversified habitats (terrestrial, fresh water, marine) thallus organization, cell ultrastructure, reproduction (vegetative, asexual, sexual) criteria for classification of algae: pigments, reserve food, flagella, modern classification.

UNIT 2 CLASSIFICATIONS & APPLICATIONS**12 Hrs.**

Salient features of protochlorophyta, chlorophyta, charophyta, xanthophyta, Bacillariophyta, phaeophyta and Rhodophyta with special reference to Microcystis, Hydrodictyon, Chara, Draparnaldiopsis, Sargassum, Dictyota, Batrachospermum. Algal blooms, algal biofertilizers; algae as food, feed and use in industry.

UNIT 3 PARASITOLOGY**12 Hrs.**

Parasitology – General Concepts – Introduction to Parasitology, Classification – Host parasite relationship. Laboratory techniques in parasitology-Blood –Thick and thin smear, Faeces –Examination for ova and cyst.

UNIT 4 PROTOZOOLOGY**12 Hrs.**

Protozoology: Pathogenic mechanisms, Disease transmissions, their life cycles and Lab Diagnosis of the following- *Entamoebahistolytica*, *Plasmodium vivax*, *Plasmodium falciparum*, *Leishmaniadonovani*, *Giardia lamblia*, *Trichomonasvaginalis*, *Balantidium coli*, *Toxoplasma gondii* and *Cryptosporidium parvum*.

UNIT 5 HELMINTHOLOGY**12 Hrs.**

Helminthology: Classification, Cestodes – *Taeniasolium*, *T. saginata*, *T. echinococcus*, trematodes – *Schistosoma haematobium*, *Fasciola hepatica*, Nematodes – *Ascaris*, *Anchyllostoma*, *Trichuris*, *Enterobius* and *Wuchereria*- their life cycle, Transmission, pathogenicity and Lab Diagnosis.

Max Hours.60**TEXT / REFERENCE BOOKS**

1. Text Book of Medical Parasitology by P. Chakraborty
2. Text Book of Parasitology By JayaramPanicker
3. Text Book of Medical Parasitology by Parija S.C.
4. Parasitology by K.D. Chatterjee

END SEMESTER EXAMINATION QUESTION PAPER PATTERN**Max. Marks : 100****Exam Duration : 3 Hrs.****PART A :** 10 questions of 2 marks each - No choice**20 Marks****PART B :** 2 questions from each UNIT of internal choice; each carrying 16 marks**80 Marks**