

Course: MICROBIOLOGY PG

Semester	3
Paper Number	MMCB 4311
Paper Title	MEDICAL MICROBIOLOGY & MICROBIAL BIOTECHNOLOGY
No of credits	6
Non composite/composite	Composite
No. of periods assigned	6
Course description/objective	<ul style="list-style-type: none"> • To characterize host parasite interaction • To know Definition, history and classification of of Probiotics • To techniques of microbial biotechnology
Reference List	<ol style="list-style-type: none"> 1. Molecular Biology: Robert Weaver 2. Principles of Gene Manipulation and Genomics-Primrose and Twyman 3. Molecular Cloning-Sambrook etal 4. Molecular Biology of the Gene-Watson 5. Plant tissue culture: Theory and practice a revised edition by S.S.Bhojwani, M.K.Razdan (1996)Elsevier 6. Plant tissue culture techniques and experiments by Roberta H.Smith (2000) 7. Introduction to plant tissue culture by M.K.Razdan(2003) 8. Plant Biotechnology by Slater 9. Comprehensive Microbiology-Mitra, Dutta and Roy, Medical Microbiology-Paniker
Evaluation	<p>Theory: 70 (60 End sem + 10 CIA) Practical: 30 (10 End sem + 20 CIA)</p> <p>Question Paper format: theory end semester</p> <p>Module 1: 30 marks SHORT QUESTION: FROM 7 QTNS ANSWER 5 (EACH 2 MARKS) = 5X2=10 LONG QUESTION: FROM 6 QTNS ANSWER 4 (EACH 5 MARKS)= 4X5=20</p> <p>Module 2: 30 marks SHORT QUESTION: FROM 7 QTNS ANSWER 5 (EACH 2 MARKS) = 5X2=10 LONG QUESTION: FROM 6 QTNS ANSWER 4 (EACH 5 MARKS)= 4X5=20</p> <p>Viva: End sem 10 marks</p>

MMCB4311

MEDICAL MICROBIOLOGY & MICROBIAL BIOTECHNOLOGY

THEORY 70

MODULE 1: Medical Microbiology 35 MARKS

Biology of obligate Parasites: Rickettsia, Chlamydia, Trypanosomes, Spirochetes etc. and diseases caused by them. **Common Mycotic infections in humans:** Superficial, subcutaneous, cutaneous and systemic mycoses. General description of mycotic pathogens, diagnosis and prevention. Hospital Infections and its implications [AKM]

Normal microbia becoming opportunistic pathogens, **Host- Parasite interactions**, The invasion and Establishment of Microbes in hosts – Exposure to microbes: Contamination & Infection, Portal of Entry, Role of adhesion, invasion and spreading factors in infection. Host defence mechanisms against diseases and Strategies of pathogens to overcome these mechanisms. **The nature of Infectious Disease** – Manifestations of disease, etiology, Virulence factors – Extracellular enzymes, Toxins, Antiphagocytic factors. **The stages of Infectious diseases** – Incubation, Prodromal period, illness, decline and convalescence. **Movement of pathogens out of hosts** – Portal of Exit, Modes of transmission: contact, vehicle, vector. **Viral diseases:** Host-Cell Reactions, Cell Destruction (Cytocidal Infection, Necrosis), Virus Replication without Cell Destruction (Noncytotoxic Infection), Latent Infection. Mechanism of viral pathogenesis. Pathogenesis, symptoms, lab diagnosis, prophylaxis and treatment of Adenoviruses, Polioviruses, Herpesviruses, Pox viruses, Hepatitis viruses, antiviral immunity vaccines **Hospital Infection** - Hospital infections and biomedical waste management. Quality control in microbiology. Collection of specimens for bacteriological investigations--Causative agents and investigations in case of a) Sexually transmitted diseases (b) Dental infections (c) Blood transfusion and associated infections [MM]

Mechanisms of Bacterial Pathogenesis: *Helicobacter pylori*, *Mycobacterium*, *Shigella*, *Salmonella*, *E. coli*, *Vibrio*, *Bacillus*, *Corynebacterium*, *Staphylococcus*, *Streptococcus*, *Pneumococcus*, *Clostridium*, etc. [JG]

MODULE 2: Techniques in Microbial biotechnology 35 MARKS

Genetic Engineering in Eukaryotes: Types of vectors designed for cloning in yeast. RNA interference and gene editing Studying of gene function through protein interactions- Applications of RNA interference in genetic engineering. Concept of gene knock out technique; Mutagenesis and gene editing: Site directed mutagenesis, CRISPR/ CAS system and its applications. [MMG]

Genetic engineering of plants: Different transformation strategies; their advantages and disadvantages, comparison of methods, selectable markers and reporter genes. Biological vectors: Bacteria and Viruses; *Agrobacterium tumefaciens* and *A. rhizogenes*; Genetic elements present on the Ti plasmid, genetic engineering of Ti plasmid, Ri plasmid, disarmed plasmids-binary cloning vector, Cointegrate cloning vector, marker free transgenic plants; Agroinfiltration. Specific promoters for plant; Light regulated *cis* elements. EIA for transgenic plants, protection of plant varieties and Farmers' Rights (PPVFR) Act.[AB]

PRACTICALS 30

Study of Yeast in Buccal Microflora, Isolation and estimation of Bio film producing organism from tooth etching, Identification of Yeast in food spoilage through chrome agar detection, Detection of fungal frequency in ambient air. [AKM]

antibiotic production of an unknown bacteria [MM]

Isolation and identification of Probiotics bacteria - Isolation of bacterial probiotics from curd and development of probiotics in vitro. Antimicrobial resistance profiles of probiotics.(MM)

Media Preparation (White's and M S) Sterilization of explants and inoculation, Meristem culture, Suspension culture, Agrobacterium-mediated transformation. [AB]

Reference:

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