T. Y. (B.Sc)
MICROBIOLOGY

Sr. No	PAPER No.	Name of the Papers	Total Marks
1	MI-301	Virology, Molecular Biology And Genetic Engineering	75
2	MI-302	Microbial Metabolism	75
3	MI-303	Immunology & Clinical Microbiology	75
4	MI-304	Soil And Agricultural Microbiology	75
5	MI-305	Microbial Biotechnology	75
6	MI-306	Practical course in Microbiology	125
	TOTAL		**500**

T. Y. (B.Sc)
MICROBIOLOGY

PAPER: MI – 301[VIROLOGY, MOLECULAR BIOLOGY AND GENETIC ENGINEERING]

UNIT	Detailed Syllabus	Teaching hours	Marks
Unit-1	**Virus structure, classification and host-virus interaction** a.Viroids Prions and Viruses b. Structure of: ►TMV ►T-bacteriophage ►Retrovirus. c. Criteria used for classification of viruses. d. Cultivation, isolation, purification and assay of viruses. (Bacteriophages and animal Viruses) e. Host-virus interaction: Plant-plant virus, Animal-animal virus, Bacteria-bacteriophage (Specific example of γ-bacteriophage and *E.coli*) f. Application of virus interactions: Diphtheria toxin production, Biological control of insects and pests	**15**	**15**
Unit-2	**Basic Genetics** a.Evidences that DNA is the genetic material. b. Types, structure and functions of plasmids. c.Variation and mutation: Mutagenesis, Mutagens, Type of mutants, Isolation of mutants including implications and significance. d.Types, Structure and Functions of insertion sequences and Transposons.	**15**	**15**
Unit-3	**Molecular Biology** a. Molecular Structures of RNAs (mRNA, rRNA, and tRNA) and DNAs (Z, B and A types) b. DNA: ►Meselson and Stahl experiment (Semi-conservative replication of DNA) ►Rolling circle model. c. DNA replication. d. Transcription process: Structural genes initiation, elongation, termination, RNA processing. e. Translation process: Genetic code, codon, anticodon, protein factors, enzymes involvement and translation machinery. f. Regulation: positive and negative control as exemplified in *lac* operon. g. DNA repair mechanisms. ►Excision repair. ►Mismatch repair.	**15**	**15**

	►Photo reactivation.		
Unit-4	**Genetic Engineering** a. Recombination: ►Modes of genetic material transfer (exogenote to endogenote), Transformation, Conjugation, transduction, Transfection. lysogeny and sexduction. ►Molecular mechanism of homologous recombination. Holiday model. b. Tools of genetic engineering: Enzymes and Vector c. Recombinant cloning of gene: production of insulin. d. Steps involved in genetic engineering e. Gene banks and library. f. Applications of genetically engineered microorganisms g. Potential hazards and future prospects of genetic engineering (Social, Ethical and Environmental).	**15**	15
Unit-5	**Basic Tools and related branches** a. Basic organization of computer: Hardware, Software, Bit, Byte, Computer Memory. b. Biostatistics: ►Principles of biostatistics. ►Classification of data, tabulation and graphical representation. ►Measure of central tendency: Mean, Mode, Median. (Merits and demerits) ►Measure of dispersion range: Mean deviation, variance and standard deviation. c. Bioinformatics: ►Introduction to Bioinformatics. ►Application of bioinformatics. ►Some important websites. d. Gel electrophoresis and PCR. e. Blotting techniques: Southern, northern and western.	**15**	**15**

Reference Books for

PAPER: MI – 301

[VIROLOGY, MOLECULAR BIOLOGY AND GENETIC ENGINEERING]

1. Microbiology (5^{th} Edition) - Pelczer M. J.
Pub; McGraw Hill Book Company. N. Y. Chan E.C.S.
Krieg NL.R.
2. Microbiology (International Edition) Concepts and - Pelczer M. J.
Applications.Pub; McGraw Hill Book Company. N. Y. Chan E.C.S.
N. Secondar N.Y. Krieg N.R.
3. General Microbiology (7^{th} Edition). - Hans G. Schlegel
Pub; Cambridge University Press (Low Price Edition.)

4.	Biology of microorganisms (Brocks') (9th Edition) 2002 Prentice Hall, Intn Inc. N.Y.	- Madigan, M. T. Martinko & J. Parker.
5.	General Microbiology (5th Edition) Pub; Macmillan Education Ltd., Hampshire.	- Stanier R. J. Ingraham J. L. Wheelio M. L. Painter P. R.
6.	Basic Microbiology With applications (2nd Edition) Pub; Prentice Hall, New Jersey	- Brock K. M.
7.	Microbiology : An Introduction Pub : The Benjamin / gumming Publishing INC. London.12	- Tortora G. J. Funke B. R. Case C. L.
8.	Microbiology : Fundamentals and Applications Pub : Macmillan Publishing Co, New York	- Atlas R. M.
9.	Elementary Microbiology Vol. I & II - Edited by Pub : Akta Prakashan, Nadiad, INDIA	- Modi H-A
10.	Microbes in action Pub : McGra Hill Books Co. pelazer,	- Seeley H. W. Vandemark P. J.
11.	Zinsser Microbiology (15th Edition) Pub : Meredith Corpo Ration, N. Y.	- Joklik W. K. Smith D. T.
12.	Microbiology : Concepts and Applications Pub : John Wiley and Sons, N. Y.	- P. A. Ketchum
13.	Basic Microbiology (5th Edition) Wheeler M. F.	- Volk W. A.
14.	Microbiology (5th International Edition) Pub : Tata McGrow - Hill Publ. Co. Ltd. New Delhi	- Pelezar M. J. Reid R. D. Chan E. C. S.
15.	Microbiology (2nd Edition) Pub : WCB McGraw	- Lim Dginel Hill, Boston
16.	Fundamental principles of bacteriology	- A. J. Salle
17.	Bacteria virus fungi	-H C Dube
18.	Fundamental of Microbiology	- I. Edward Alcamo
19.	Textbook of Microbiology Pub: Elsevier, A division of Reed Elsevier (India) Pvt. Ltd.	Subhash Chandra Parija

Websites for Paper- 301

www.wikipedia.com
www.sgm.ac.uk
www.microbiologyonline.org
www.asm.org
www.mobiology.co
www.springer.co www.altavista.com
www.sfam.org
www.slideshare.net

T. Y. (B.Sc)
MICROBIOLOGY

PAPER: MI-302 [MICROBIOLOGY METABOLISM]

UNIT	Detailed Syllabus	Teaching hours	Marks
Unit-1	**Biosynthesis and Building blocks and monomers** General strategy and need for energy. a. Energy and work b. The law of thermodynamics c. Free energy and reaction Assimilation of Carbon in bacteria and Carbon dioxide Fixation [Calvin Benson cycle] and gluconeogenesis. Assimilation of Nitrogen and Sulfur.	**15**	**15**
Unit-2	**Synthesis of Biopolymers:** Principles of biosynthesis. Biosynthesis of amino acids. Biosynthesis of polysaccharides. The synthesis of purines, pyrimidines. Biosynthesis of peptidoglycan. Biosynthesis of fatty acids. Techniques of separation and characterization. Column chromatography. Mass Spectrophotometer.	**15**	**15**
Unit-3	**Control of Metabolism** Regulation of enzyme activity at physiological level a. Product inhibition. b. Feedback inhibition. c. Covalent modification. d. Allosteric control Regulation of enzyme synthesis a. Regulation of transcription • Negative control [enzyme induction and enzyme repression] • Positive control b. Attenuation. c. DNA binding proteins d. Signal transduction and two component regulatory system.	**15**	**15**
Unit-4	**Chemotherapy and Metabolism in specific microbial system** Principle and Concept of chemotherapy. a. Nature of target site/biochemical system affected by antimicrobial agents. b. Principle of microbial control	**15**	**15**

	c. Mechanism of action of antimicrobial drugs (inhibition of cell wall, protein and nucleic acid synthesis, alteration of cell membrane function) d. Detection of drug resistance: Gradient plate technique and replica plate technique. Metabolism in specific microbial system. a. Bioluminescence b. Chemotaxis. Antibiotic sensitivity test a. Disc diffusion test b. Kirby Bauer disc diffusion test c. Broth dilution method d. Agar dilution method		
Unit-5	**Enzyme kinetics and Membrane transport** Enzyme kinetics. a. M-M equation – determination of Km, Vmax and K-catal unit enzyme activity. b. Double reciprocal plot. c. Enzyme activation, enzyme inhibition. Membrane transport. a. Membrane structure: fluid mosaic model and Flick's law. b. Siderophores (Metal transport)	**15**	**15**

Reference Books for

PAPER: MI-302

MICROBIAL METABOLISM

1. Microbiology (5th Edition) - Pelczer M. J.
   Pub; McGraw Hill Book Company. N. Y. Chan E.C.S.
   Krieg NL.R.
2. Microbiology (International Edition) Concepts and - Pelczer M. J.
   Applications. Chan E.C.S.
   Pub; McGraw Hill Book Company. N. Y. Krieg N.R.
   N. Secondar N.Y.
3. General Microbiology (7th Edition). - Hans G. Schlegel
   Pub; Cambridge University Press (Low Price Edition.)
4. Biology of microorganisms (Brocks') (9th Edition) 2002 - Madigan,
   Prentice Hall, Intn Inc. N.Y. M. T. Martinko &
   J. Parker.
5. General Microbiology (5th Edition) - Stanier R. J.Ingraham J. L
   Pub; Macmillan Education Ltd., Hampshire. Wheelio M. L. Painter P. R.
6. Basic Microbiology With applications (2nd Edition) - Brock K. M.
   Pub; Prentice Hall, New Jersey

7. Microbiology : An Introduction - Tortora G. J.
Pub : The Benjamin / gumming Publishing INC. London.12 Funke B. R. Case C. L.
8. Microbiology : Fundamentals and Applications - Atlas R. M.
Pub : Macmillan Publishing Co, New York
9. Outlines of Biochemistry (5th Edition) - Conn E. B. Stumpf P. K.
Pub : John Willey & Sons, N.Y. Bruening G. Doi R. H.
10. Elementary Microbiology Vol. I & II - Edited by - Modi H-A
Pub : Akta Prakashan, Nadiad, INDIA
11. Microbes in actionPub : McGra Hill Books Co. pelazer, - Seeley H. W. Vandemark P. J.
12. Textbook of biochemistry - Ranganatha Rao.
Pub : Prentice-Hall of india Pvt. Ltd. New Delhi.
13. General Biochemistry Pub : Wiley Eastern Ltd. New Delhi. - Weil J. H.
14. Zinsser Microbiology (15th Edition) - Joklik W. K.
Pub : Meredith Corpo Ration, N. Y. Smith D. T.
15. Biochemistry of Bacterial Growth (2nd Edition) - Mandelstam J.
Pub : Blackwell Scientific pub. Oxford, London Mcquilloen K.
16. Review of Physiological chemistry (17th Edition) - Harper H. A.
Pub : Kothari Book Depot, Parel, Bombay - 430 066. Rodwell V. H. Mayes P. A.
17. Elementary Biochemistry (2nd Edition) - Merta E. T.
Pub : Vakils, ferror and Simons Pvt. Ltd. Bombay
18. Microbiology : Concepts and Applications - P. A. Ketchum
Pub : John Wiley and Sons, N. Y.
19. Basic Microbiology (5th Edition)Wheeler M. F. - Volk W. A.
20. Microbiology (5th International Edition) - Pelezar M. J. Reid R. D.
Pub : Tata McGrow - Hill Publ. Co. Ltd. New Delhi Chan E. C. S.
21. Microbiology (2nd Edition) Pub : WCB McGraw - Lim Dginel Hill, Boston
22. Fundamental principles of bacteriology - A. J. Salle
23. Fundamental of Microbiology - I. Edward Alcamo
24. A text book of microbiology -R C Dube D K Maheshwari

Websites for Paper-302

www.wikipedia.com
www.neomed.edu
www.accessexllence.org
www.microbiologybook.org
www.mic.sgmjournals.org
www.medicine.dal.co
www.medicine.virginia.edu

T. Y. (B.Sc)
MICROBIOLOGY

PAPER: MI-303 [IMMUNOLOGY & CLINICAL MICROBIOLOGY]

UNIT	Detailed Syllabus	Teaching hours	Marks
Unit-1	**Host-parasite interactions and some epidemiological consideration** ❖ Normal flora of human body and Gnotobiosis. ❖ Infection and pathogenesis. ❖ Natural resistance and non specific defense mechanisms. ❖ Concept of epidemiology. ❖ Modern immunization program followed in India including advantage and limitations.	**15**	**15**
Unit-2	**Antigen and Antibody** ❖ General Features of Antigen-Antibody reactions. ❖ In-vitro antigen-antibody reactions and their applications. ❖ Theories of antibody production. ❖ Structure and classes of immunoglobulin	**15**	**15**
Unit-3	**The Immune Response** ❖ Hypersensitivity a. Concept b. Types of reactions ❖ Autoimmune Diseases ❖ Immunodeficiency Disorders ❖ Monoclonal Antibody Preparations (also hybridoma cells)	**15**	**15**
Unit-4	**Study of some Representative Human Diseases (Causative agent, Transmission, symptoms, diagnosis, prevention and control)** ❖ Respiratory tract diseases: Tuberculosis, Common cold. ❖ Alimentary tract diseases: Typhoid, Hepatitis. ❖ Sexually transmitted diseases: Syphilis, AIDS ❖ Cuts, wounds and skin diseases: Staphylococcus infection and Tetanus. ❖ Neurological diseases: Meningitis. ❖ Nosocomial infections: Common types, Diagnosis and control.	**15**	**15**
Unit-5	**Hematology, Blood banking and Modern Techniques** ❖ Haematology: Components of blood and their functions, Hematopoiesis, Homeostasis and anticoagulants. ❖ Immunoassays – ABO and Rh blood group system, blood grouping, cross matching, coomb's test. ❖ Blood banking Criteria for the selection of donor and recipient. Collection and Preservation of blood including blood components.		

	Medicolegal aspects of blood banking. ❖ Clinical biochemistry: Kidney function tests and their significance. Liver function tests and their significance. ❖ DNA finger printing.		

Reference Books for

PAPER: MI-303

IMMUNOLOGY & CLINICAL MICROBIOLOGY

1. Microbiology (5th Edition) - Pelczer M. J.
   Pub; McGraw Hill Book Company. N. Y. Chan E.C.S.Krieg NL.R.
2. Microbiology (International Edition) Concepts and - Pelczer M. J.
   Applications.Pub; McGraw Hill Book Company. Chan E.C.S.
   N. Y. N. Secondar N.Y. Krieg N.R.
3. General Microbiology (7th Edition). Pub; - Hans G. Schlegel
   Cambridge University Press (Low Price Edition.)
4. Biology of microorganisms (Brocks') (9th Edition) - Madigan,
   2002 M. T. Martinko &
   Prentice Hall, Intn Inc. N.Y. J. Parker.
5. General Microbiology (5th Edition) - Stanier R. J. Ingraham J. L.
   Pub; Macmillan Education Ltd., Hampshire. Wheelio M. L. Painter P. R.
6. Basic Microbiology With applications (2nd - Brock K. M.
   Edition)Pub; Prentice Hall, New Jersey
7. Microbiology : An Introduction - Tortora G. J.
   Pub : The Benjamin / gumming Publishing INC. Funke B. R.
   London.12 Case C. L.
8. Microbiology : Fundamentals and Applications - Atlas R. M.
   Pub : Macmillan Publishing Co, New York
9. Elementary Microbiology Vol. I & II - Edited by - Modi H-A
   Pub : Akta Prakashan, Nadiad, INDIA
10. Microbes in action - Seeley H. W.
    Pub : McGra Hill Books Co. pelazer, Vandemark P. J.
11. Zinsser Microbiology (15th Edition) - Joklik W. K.
    Pub : Meredith Corpo Ration, N. Y. Smith D. T.
12. Microbiology : Concepts and Applications - P. A. Ketchum
    Pub : John Wiley and Sons, N. Y.
13. Basic Microbiology (5th Edition)Wheeler M. F. - Volk W. A.
14. Microbiology (5th International Edition) - Pelezar M. J.
    Pub : Tata McGrow - Hill Publ. Co. Ltd. New Reid R. D.
    Delhi Chan E. C. S.
15. Microbiology (2nd Edition) - Lim Dginel

Pub : WCB McGraw Hill, Boston
16. Fundamental principles of bacteriology - A. J. Salle
17. Microbiology and pathology for nurses. - Frobisher Goodole
18. Textbook of Microbiology - R. Ananthanarayan C.K.Jayaean Panikar
19. Fundamental of Microbiology - I. Edward Alcamo
20. Medical Microbiology (2nd Edition) - P. R. Murroy
    G. S. Kobayashi
    M. A. Pfalled
    K. S. Rosenthal
21. A text book of microbiology -R C Dube
    D K Maheshwari

Websites for Paper-303

www.microguide.com
www.delta.edu
www.pearsonhinghered.com
www.vmsl.edu
www.pinterest.com
www.benedict.edu
www.webicinia.com
www.mednotes.net

T. Y. (B.Sc)
MICROBIOLOGY

PAPER: MI-304 [SOIL AND AGRICULTURAL MICROBIOLOGY]

UNIT	Detailed Syllabus	Teaching hours	Marks
Unit-1	**Microbial Populations associated with soil and plants** ❖ Types of Soil and Pedogenesis. ❖ Phylosphere regions. ❖ Types of microorganisms and their enumeration in soil. ❖ Mycorrhizae: Ectomycorrhizae, Endomycorrhizae, Ectendomycorrhizae and Vesicular Arbuscular (V-A) mycorrhizae	**15**	**15**
Unit-2	**Microbial activities in the soil** ❖ Cyclic changes of elements – I : Carbon, Hydrogen and Oxygen. ❖ Cyclic changes of elements – II: Phosphorus, Sulfur and Iron. ❖ Nitrogen cycle: Nitrogen fixation (symbiotic & asymbiotic), ammonification, nitrification, dentrification. ❖ Biodeterioration. ❖ Soil erosion: Climatic changes (environmental factors), urbanization and industrialization.	**15**	**15**
Unit-3	**Plant Pathology and Disease** ❖ Plant pathology: a. Common symptoms of plant diseases. b. Transmission of plant diseases. c. Prevention and control of plant diseases. ❖ Plant diseases: (Etiology, symptoms, diseases cycle, transmission and control) a. Downy Mildew of Bajra. b. Tikka disease of ground nut. c. Red rot of sugarcane. d. Citrus canker	**15**	**15**
Unit-4	**Novel Microbial Applications** ❖ Bioremediation. ❖ Bioleaching of ores. ❖ Biogas: Methane producing micro-organisms, feed stocks for production, features and uses of biogas. ❖ Bio-fertilizers, PGPR, phosphate Solubilization. ❖ Bioindicators and Biosensors of environment.	**15**	**15**
Unit-5	**Biotechnology and Environment** ❖ Biotechnology a. Gene transfer methods.	**15**	**15**

	[For animals and plants, vector mediated gene transfer including Agrobacterium mediated gene transfer, direct gens transfer, liposomes, electroporation, particle gun] b. Transgenic animal: Mouse c. Transgenic plants: Environment a. Current levels of biodiversity. b. Overview of metagenomics. c. Conservation(In situ and ex situ)		

Reference Books for

PAPER: MI-304

[SOIL AND AGRICULTURAL MICROBIOLOGY]

1. Microbiology (5th Edition) Pub; McGraw Hill Book Company. N. Y. - Pelczer M. J. Chan E.C.S. Krieg NL.R.
2. Microbiology (International Edition) Concepts and Applications.Pub; McGraw Hill Book Company. N. Y. N. Secondar N.Y. - Pelczer M. J. Chan E.C.S. Krieg N.R.
3. Microorganisms in Action : Concepts and Applications in Microbial Ecology. Pub; Black well scientific publications, London. - Lynch J. M. Hobbie J. B.
4. General Microbiology (7th Edition). Pub; Cambridge University Press (Low Price Edition.) - Hans G. Schlegel
5. Biology of microorganisms (Brocks') (9th Edition) 2002 Prentice Hall, Intn Inc. N.Y. - Madigan,M. T. Martinko &J. Parker.
6. Environmental Biology and Toxicology (2nd Edition) Pub; Rastogi Publications, Meerut. - P. D. Sharma.
7. Microbiology (2nd Edition)Pub; Rastogi Publications, Meerut. - P. D. Sharma.
8. General Microbiology (5th Edition) Pub; Macmillan Education Ltd., Hampshire. - Stanier R. J. Ingraham J. L. Wheelio M. L. Painter P. R.
9. Microbial Ecology - Fundamental and Applications Pub; Addison - Wesley Publications Co. - Atlas R. M. Bartha R. London.
10. Basic Microbiology With applications (2nd Edition) Pub; Prentice Hall, New Jersey - Brock K. M.
11. Microbiology : An Introduction Pub : The Benjamin / gumming Publishing INC. London.12 - Tortora G. J. Funke B. R. Case C. L.
12. Microbiology : Fundamentals and Applications - Atlas R. M.

Pub : Macmillan Publishing Co, New York
13. Introduction Mycology (3rd Edition) - Alexopoulos C. J.
Pub : Willey Eastern Ltd. New Delhi
14. Elementary Microbiology Vol. I & II - Edited by - Modi H-A
Pub : Akta Prakashan, Nadiad, INDIA
15. Microbes in action - Seeley H. W.
Pub : McGra Hill Books Co. pelazer, Vandemark P. J.
16. Zinsser Microbiology (15th Edition) - Joklik W. K.
Pub : Meredith Corpo Ration, N. Y. Smith D. T.
17. The Blue Greens Pub : Edward Arnold, London. - Fay Peter
18. Microbiology : Concepts and Applications - P. A. Ketchum
Pub : John Wiley and Sons, N. Y.
19. Basic Microbiology (5th Edition)Wheeler M. F. - Volk W. A.
20. Microbiology (5th International Edition) - Pelezar M. J. Reid R. D.
Pub : Tata McGrow - Hill Publ. Co. Ltd. New Delhi Chan E. C. S.
21. Microbiology (2nd Edition) - Lim Dginel
Pub : WCB McGraw Hill, Boston
22. A textbook of environmental chemistry and pollution control (3rd Edition) - S. S. Dara
Pub : S. Chand and Company Ltd., New Delhi - 110 055.
23. Environmental pollution - Timy Katyal
Pub : Anmol Publications Pvt. Ltd., New Delhi - 110 002. M. Satak
Edited by Raj Kumar
24. Concepts of ecology, Pub : Saras Publication, Kanyakumari - N. Arunugam
25. Fundamental principles of bacteriology - A. J. Salle
26. Tertiary level biology, Environmental Microbiology - W. D. Grant
Pub : Blackie London P. E. Long.
27. Fundamental of Microbiology - I. Edward Alcamo

Websites for Paper-304

www.studyblue.com
www.indiabix.com
www.biologycorner.com
http://journals.asm.org
http://www.who.int/en/
http://webmd.com
www.wikians.com

T. Y. (B.Sc)
MICROBIOLOGY

PAPER: MI-305 [MICROBIAL BIOTECHNOLOGY]

UNIT	Detailed Syllabus	Teaching hours	Marks
Unit-1	**Introduction** ❖ Historical development of Industrial Microbiology and microbial biotechnology. ❖ Impact of Molecular biology on biotechnology. ❖ Modern biotechnology: its areas and applications. ❖ Enzyme immobilization techniques and its applications	**15**	**15**
Unit-2	**Basic of Industrial fermentation** ❖ Fermenter design and equipments. ❖ Types of bioreactors: stirred tank, reactor, Fluidized-bed reactor, Air-lift fermenter. Production strains a. Screening techniques. b. Strain improvement strategies: Selection of natural variants, included mutations [physical and chemical mutagen], Gene manipulation. c. Preparation of inocula. d. Preservation of micro-organisms ❖ Production media ❖ Industrial sterilization a. Sterilization of equipments b. Sterilization of production media c. Sterilization of air d. Sterility testing	**15**	**15**
Unit-3	**Microbial Fermentation processes** ❖ Types of fermentation process a. surface and submerged fermentation [batch, fed-batch and continuous fermentation] b. Solid state fermentation. ❖ Scale-up and scale-down process. ❖ Monitoring and control of process parameters: Temperature, pH, dissolved oxygen, pressure and foam. ❖ Recovery of end product(s).	**15**	**15**
Unit-4	**Study of production processes** ❖ Beverages : wine, beer, vinegar(acitic acid) ❖ Solvent : Ethanol ❖ Antibiotics : Penicillin	**15**	**15**

	❖ Vitamins: riboflavin ❖ Enzymes: Amylase		
Unit-5	**Microbial processes** ❖ Steroid transformations ❖ Biomass production : SCP (Single Cell Protein) and Edible Mushroom ❖ Biocatalyst biosynthesis: Application-academic, medical and industrial. ❖ Recombinant DNA products : Insulin ❖ Microbiological assay of vitamin [Vitamin B12] and antibiotic [penicillin].	**15**	**15**

Reference Books for

PAPER: MI-305

MICROBIAL BIOTECHNOLOGY

1. Microbiology (5th Edition) - Pelczer M. J.Chan E.C.S.
   Pub; McGraw Hill Book Company. N. Y. Krieg NL.R.
2. Microbiology (International Edition) Concepts and - Pelczer M. J.
   Applications.Pub; McGraw Hill Book Company. N. Y. Chan E.C.S.
   N. Secondar N.Y. Krieg N.R.
3. General Microbiology (7th Edition). - Hans G. Schlegel
   Pub; Cambridge University Press (Low Price Edition.)
4. Biology of microorganisms (Brocks') (9th Edition) 2002 - Madigan,M. T. Martinko
   Prentice Hall, Intn Inc. N.Y. &J. Parker.
5. General Microbiology (5th Edition) - Stanier R. J
   Pub; Macmillan Education Ltd., Hampshire. Ingraham J. L.
   Wheelio M. L.
   Painter P. R.
6. Basic Microbiology With applications (2nd Edition) - Brock K. M.
   Pub; Prentice Hall, New Jersey
7. Microbiology : An Introduction - Tortora G. J. Funke B. R.
   Pub : The Benjamin / gumming Publishing INC. London.12 Case C. L.
8. Microbiology : Fundamentals and Applications - Atlas R. M.
   Pub : Macmillan Publishing Co, New York
9. Elementary Microbiology Vol. I & II - Edited by - Modi H-A
   Pub : Akta Prakashan, Nadiad, INDIA
10. Microbes in action - Seeley H. W.
    Pub : McGra Hill Books Co. pelazer, Vandemark P. J.
11. Zinsser Microbiology (15th Edition) - Joklik W. K.
    Pub : Meredith Corpo Ration, N. Y. Smith D. T.
12. Microbiology : Concepts and Applications - P. A. Ketchum
    Pub : John Wiley and Sons, N. Y.

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Wheeler M. F.
14. Microbiology (5th International Edition) - Pelezar M. J. Reid R. D.
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15. Microbiology (2nd Edition) - Lim Dginel
Pub : WCB McGraw Hill, Boston
16. Fundamental principles of bacteriology - A. J. Salle
17. Fundamental of Microbiology - I. Edward Alcamo
18. Food Microbiology - Frazier
19. Dairy Microbiology - Prajapati
Pub : Akta Prakashan
20. A text book of microbiology -R C Dube D K Maheswari

Websites for Paper-305

http://www.vaccineinformation.org
http://www.nlm.nih.gov
www.bioservice.com/microbiology
www.mobio.com
http://microbewiki.kenyon.edu
www.microbiologyonline.org.uk
www.nlm.com

T. Y. (B.Sc)
MICROBIOLOGY

PAPER: MI-306 PRACTICALS COURSE IN MICROBIOLOGY

University Annual Examination **Marks: 125**

- Practical examination shall be of Three days (Six hours per day, Total 18 hours)
- Journal certified by the Head of the Department has to be presented by the candidate at the time of practical examination.
- Students shall not be allowed without certified journals in the University practical examination.

Total number of exercises to be performed by each candidate will be as under:

(1) Isolation of pigment mutants of *S. Marcescence.*
(2) Isolation of Lac mutants.
(3) Gradient plate technique for the isolation of resistant mutants.
(4) Replica plate technique to prove spontaneous nature of mutation.
(5) Isolation of bacteriophage from soil/sewage.
(6) Estimation of protein by Biuret method.
(7) Sugar estimation by Cole's method.
(8) Chromatography: paper and thin-layer.
(9) Electrophorosis: Paper and Gel(demonstration).
(10) R.P.R. test.
(11) Widal test (Slide).
(12) Blood grouping: ABO and Rh.
(13) Total count of WBC and RBC.
(14) Differential count of Leucocytes.
(15) E.S.R. determination.
(16) Hemoglobin determination.
(17) Physical, Chemical and microscopic examination of urine.
(18) Blood chemistry: Estimation of sugar, urea, cholesterol, and bilirubin.
(19) Medical problems [Minimum three per year]
   a. *Enterobacter aerogenes/ klebsiella*
   b. *Escherichia coli*
   c. *Proteus vulgaris or Proteus mirabilis*
   d. *Salmonella group*
   e. *Dysentery group*
   f. *Pseudomonas aeruginosa*
   g. *Staphylococcus aureus*

(20) Antibiotic sensitivity test: Ditch and MultiDisc method
(21) Determination of M.I.C.
(22) Isolation, cultivation and characterization of
   a. Nitrogen fixing bacteria: symbiotic-Asymbiotic.
   b. Endosppre forming bacteria *Bacillus and clostridium* Spp.
   c. Actinomycetes
   d. Cyanobacteria from soil.
(23) Isolation, cultivation and identification of fungi from soil.
(24) Study of diseased plant specimen.
(25) Isolation, cultivation and characterization of plant pathogen [*Xanthomonas citri]*
(26) Screening of organisms from soil: Amylase producer
(27) Screening of organisms from soil: antibiotic producer.
(28) To determine strength of organic sewage: Determination of BOD and COD.
(29) Determination of oxygen transfer rate.
(30) Sterility testing.
(31) Study of permanent slides.
(32) Computer based experiments:
   a. Biostatical analysis : mean mode and median
   b. Bioreactor design
   c. RNA structure
   d. BLAST And FASTA

Reference Books for Practical's

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1.	Mackie and McCartney's Practical Medical Microbiology (14th Edition)	- Collee J. E. Fraser A. G. Marnion B. P.
2.	Laboratory experiments in Microbiology (5th Edition)	- Johnson T. R. Cape. C. L.
3.	Laboratory Manual in Biochemistry (1981)	- Jayaranan J.
4.	An introduction to practical biochemistry (3rd Editio) Pub : McGraw Hill Book Co., U. K. 1987.	- Plummer D. T.
5.	Experimental Microbiology Vol. I & II. Pub : Prion publications, Ahmedabad.	- Rakesh J. Patel Kiran R. Patel
6.	Microbiology A. Practical approach	- Bhavesh Patel Nandini Phanse