

SRI VENKATESWARA UNIVERSITY
B.Sc COURSE IN MICROBIOLOGY
IV SEMESTER
(CBCS) REVISED SYLLABUS – 2021-22
MBT – IV INDUSTRIAL MICROBIOLOGY

UNIT – I

No. of hours: 7

Brief history and developments in industrial microbiology, Sources of industrially important microbes and methods for their isolation, preservation and maintenance of industrial strains, strain improvement. Extremophiles as Industrially important microorganism.

UNIT – II

No.of hours: 10

Concept and discovery of fermentation

Design and Components of a typical Fermenter

Types of fermenters-Laboratory, pilot- scale and production fermenters, constantly stirred tank and air-lift fermenters

Kinetics and methodology of batch, fed-batch (e.g. baker's yeast) and continuous fermentations

Types of fermentation processes- Solid-state and liquid-state (stationary and submerged) fermentations.

Measurement and control of fermentation parameters - pH, temperature, dissolved oxygen, foaming and aeration

UNIT – III

No.of hours: 8

Industrial microorganisms growth kinetics, factors affecting growth and basic nutrition

Fermentation media-Crude and synthetic media; molasses, corn- steep liquor, sulphite waste liquor, whey, yeast extract and protein hydrolysates,

Down-stream processing- Cell disruption, filtration, centrifugation, solvent extraction, precipitation, lyophilization and spray drying

UNIT – IV

No.of hours: 7

Microbial production of industrial products - Citric acid, ethanol, penicillin, glutamic acid, Vitamin B12. Enzymes (amylase, protease, lipase) wine, beer ,

Microbial cells as food.-Single Cell Proteins(SCP),-mushroom cultivation

UNIT – V**No.of hours:7**

Methods of immobilization, advantages and applications of immobilization, large scale applications of immobilized enzymes (glucose isomerase and penicillin acylase). Role of Microbes in Medicine. bioleaching and textile industry.

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IV SEMESTER - W.E.F. 2021-22

MBT – IV INDUSTRIAL MICROBIOLOGY

MODEL QUESTION PAPER

Time: 3 hours

Marks: 75

marks

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer any five of the following questions in Part A.

Part B consists of 5 Units. Answer one full question (A or B) from each unit (i.e., Q.No 9 from Unit – I, Q.No 10 from Unit – II, Q.No 11 from Unit – III, Q.No 12 from Unit – IV, Q.No 13 from Unit – V). Each question carries 10 marks.

PART – A

Answer any *Five* of the following question.

(5X5=25M)

1.	
2.	
3.	
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6.	
7.	
8.	

(P.T.O)

PART - B

Answer All The Questions. Each question carries 10 marks (5X10= 50M)

9.	(A) OR (B)
10.	(A) OR (B)
11.	(A) OR (B)
12.	(A) OR (B)
13.	(A) OR (B)

MBP – IV INDUSTRIAL MICROBIOLOGY

Total hours: 36

Credits: 2

1. Demonstration of Sugar (glucose and Sucrose) fermentation by using Baker's Yeast
2. Quantitative estimation of ethanol by potassium dichromate method
3. Fermentative production Amylase by *Aspergillus sp*,
4. Fermentative production of protease by *Bacillus sp*.
5. Demonstration of wine production by using grape juice
6. Microbial fermentation for the Citric acid production and estimation of citric acid
7. Bioassay of Vitamin B12(Cyanocobalamine)
8. A visit to any educational institute/industry to see an industrial fermenter/bioreactor, and other downstream processing operations

Reference Books

1. Richard H. Baltz. Julian E Davies and Arnold L.Demain Manual of Industrial Microbiology and Biotechnology. 3rd edition, ASM Press (2010).
2. Daniel Forciniti. Industrial Bioseparation: Principles and practice. 1st edition, WileyBlackwell (2008).
3. Reed. G. Prescott and Dunn's Industrial Microbiology. CBS Publishers. (1999).
4. Demain, A. L. Industrial Microbiology and Biotechnology. 2nd Edition. (2001).
5. EL Mansi. E.M.T. Fermentation Microbiology and Biotechnology. 4nd Edition, CRC Taylor & Francis (2020).
6. Waites, M.J., Morgan, N.L., Rockey, J.S. and Higton, G. Industrial Microbiology: An Introduction. Blackwell Science Publishers (2002).
7. Casida LE, Industrial Microbiology, J. Wiley, (Reprint 2008).
8. Pelczar, MJ Chan ECS and Krieg NR, Microbiology McGraw-Hill (2021)
9. Willey, Sherwood, Woolverton. Prescott, Harley, and Klein's Microbiology McGraw-Hill publication, 7th edition 2008
10. Tortora, Funke, 10th edition (2010). Microbiology. Pearson Benjamin Cummings.
11. JACQUELYN G. BLACK. Microbiology Principles and explorations. JOHN WILEY & SONS (2018)
12. Madigan, Martinko, Bender, Buckley, Stahl. Brock Biology of Microorganisms. Pearson 14th edition, 2015
13. Tom Besty, D.C Jim Koegh. Microbiology Demystified McGRAW-HILL, 2005.

14. Wulf Crueger. Cruegers Biotechnology: A Textbook of Industrial Microbiology 2017
15. Dr. R.C. Dubey, Dr. D.K. Maheswari 2012 . Practical Microbiology
16. S. Ram reddy and G. Ram reddy 2012. Practical Microbiology,

SRI VENKATESWARA UNIVERSITY
B.Sc COURSE IN MICROBIOLOGY
IV SEMESTER
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MBT – V: MOLECULAR BIOLOGY AND MICROBIAL GENETICS

TOTAL HOURS: 48

CREDITS: 4

UNIT- I

No. of hours: 8

DNA and RNA as genetic material. Replication of DNA: Bidirectional and unidirectional replication, semi-conservative, semidiscontinuous replication. Mechanism of DNA replication: Enzymes and proteins involved in DNA replication – DNA polymerases, DNA ligase, primase, telomerase – for replication of linear ends, mechanism of DNA replication and inhibitors of DNA replication.

UNIT- II

No. of hours: 12

Transcription - Definition, promoter - concept and strength of promoter. Transcriptional Machinery and Mechanism of transcription. Translation - Genetic code, Translational machinery and translation mechanism, inhibitors of transcription and Translation, Regulation of gene expression in bacteria - operon concepts - Negative and positive control of the Lac Operon, trp operon.

UNIT- III

No. of hours: 12

Concept of gene : Muton, Recon and Cistron. One gene one enzyme and one gene one polypeptide hypotheses

Mutagens - Physical and Chemical mutagens

Mutations - spontaneous and induced, base pair changes, frame shifts, deletions, inversions, tandem duplications, insertions.

Outlines of DNA damage and repair mechanisms

UNIT- IV

No. of hours: 10

Mechanisms of Genetic Exchange:

Transformation - Discovery, molecular mechanism of natural competence

Conjugation - Discovery, molecular mechanism, Hfr and F' strains

Transduction – Discovery, Generalized transduction, specialized transduction

UNIT- V

No. of hours: 6

Extra chromosomal genetic elements: Properties, types and function of plasmids, . Prokaryotic transposable elements – Insertion Sequences, composite and non-composite transposons, Replicative and Non replicative transposition, Uses of transposons and transposition.

Reference Books:

1. Benjamin Lewin, GeneXII, OxfordUniversityPress, (12 edition)2018).
2. BruceAlberts,AlexanderJohnson,JulianLewis,MartinRaff,KeithRoberts,PeterWalter, Molecular biology of the Cell, 6th Edition. Garland publishing Inc, (2014).
3. Darnell,LodishandBaltimore, MolecularCellBiology, ScientificAmericanPublishingInc. (2016)
- 4.Watson.J.D,Baker.T.A,Bell.S.P,Gann.A.Levine.M.Losick.R, Molecular Biology of Gene, 5th Edition.TheBenjamin/CummingsPub.Co.Inc. (2007).
5. DavidFrifielder,Stanely R.Maloy, Molecularbiology and Microbial genetics. 2ndEdition,JonesandBarlettPublishers. (1994).
6. BrownT.A., GeneCloningand DNA analysis. 4nd Edition, ASMpress. (2011).
7. Sandy Primrose. Principles of Gene Manipulation and Genomics. 7th Ed., Blackwell Publishers. (2013).
8. Glick BR and Pasternak JJ, Molecular Biotechnology, 3nd Ed.ASM press. (2010).
9. Uldis N.Streips,RonalE.Yasbin.Modern Microbial Genetics.2nd EditionWiley-Liss,Inc. (2002).
10. Russel P J, Essential genetics, Blackwell Science Inc, 2 sub edition, (1987).
11. Gardner E J, Simmons M J and Snupstad DP, Principles of genetics, 8th edition John Wiley & Sons, (2006).
12. Larry Snyder , Wendy Champness Molecular Genetics of Bacteria, ASM Press; (2007)

MBP – V: MOLECULAR BIOLOGY AND MICROBIAL GENETICS

TOTAL HOURS: 48

CREDITS: 2

1. Study of different types of DNA and RNA using micrographs and model / schematic representations.
2. Study of semi-conservative replication of DNA through micrographs / schematic representations
3. Isolation of genomic DNA from *E. coli*
4. Estimation of DNA using UV spectrophotometer.
5. Resolution and visualization of DNA by Agarose Gel Electrophoresis.
6. Resolution and visualization of proteins by Polyacrylamide Gel Electrophoresis (SDS - PAGE).
7. Problems related to DNA and RNA characteristics, Transcription and Translation.
8. Induction of mutations in bacteria by UV light.
9. Instrumentation in molecular biology - Ultra centrifuge, Transilluminator, PCR

SUGGESTED READING:

- Freifelder, D. (1990). Microbial Genetics. Narosa Publishing House, New Delhi.
- Freifelder, D. (1997). Essentials of Molecular Biology. Narosa Publishing House, New Delhi.
- Glick, B.P. and Pasternack, J. (1998). Molecular Biotechnology, ASM Press, Washington D.C., USA.
- Lewin, B. (2000). Genes VIII. Oxford University Press, England.
- Maloy, S.R., Cronan, J.E. and Freifelder, D. (1994). Microbial Genetics, Jones and Bartlett Publishers, London.
- Ram Reddy, S., Venkateshwarlu, K. and Krishna Reddy, V. (2007) A text Book of Molecular Biotechnology. Himalaya Publishers, Hyderabad.
- Sinnot E.W., L.C. Dunn and T. Dobzhansky. (1958). Principles of Genetics. 5 th Edition. McGraw Hill, New York.
- Smith, J.E. (1996). Biotechnology, Cambridge University Press.
- Snyder, L. and Champness, W. (1997). Molecular Genetics of Bacteria. ASM press,
- Strickberger, M.W. (1967). Genetics. Oxford & IBH, New Delhi.
- Verma, P.S. and Agarwal, V.K. (2004). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Co. Ltd., New Delhi.

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