

# ADIKAVI NANNAYA UNIVERSITY

## RAJAMAHENDRAVARAM

### CBCS / Semester System

(W.e.f. 2015-16 Admitted Batch)

### III Semester Syllabus

## MICROBIOLOGY

### MBT- 301 MICROBIAL GENETICS AND MOLECULAR BIOLOGY

**TOTAL HOURS:48**

**CREDITS: 4**

#### **UNIT-I**

**No. of hours: 10**

DNA and RNA as genetic material.

Structure and organization of prokaryotic DNA.

Extrachromosomal genetic elements – Plasmids and transposons in bacteria.

Replication of DNA – Semi conservative mechanism, Enzymes involved in replication.

#### **UNIT-II**

**No. of hours: 10**

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

Mutagens - Physical and Chemical mutagens.

Outlines of DNA damage and repair mechanisms.

Genetic recombination in bacteria – Conjugation, Transformation and Transduction.

#### **UNIT-III**

**No. of hours: 10**

Types of RNA and their functions.

Genetic code.

Structure of ribosomes.

#### **UNIT-IV**

**No. of hours: 8**

Types of genes – structural, constitutive, regulatory

Protein synthesis – Transcription and translation.

Regulation of gene expression in bacteria – *lac* operon.

## **UNIT-V**

**No. of hours: 10**

Basic principles of genetic engineering.

Restriction endonucleases, DNA polymerases and ligases.

Vectors like Pbr 322, M13.

Outlines of gene cloning methods.

Polymerase chain reaction. Genomic and cDNA libraries.

General account on application of genetic engineering in industry, agriculture and medicine.

## **MBP- 301 MICROBIAL GENETICS AND MOLECULAR BIOLOGY**

**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**

Crueger, W. and Crueger, A. (2000). **Biotechnology: A Text Book of Industrial Microbiology**, PrenticeHall of India Pvt. Ltd., New Delhi.

Freifelder, D. (1990). **Microbial Genetics**. Narosa Publishing House, New Delhi.

Freifelder, D. (1997). **Essentials of Molecular Biology**. Narosa Publishing House, New Delhi.

Glazer, A.N. and Nikaido, H. (1995). **Microbial Biotechnology – Fundamentals of Applied Microbiology**, W.H. Freeman and company, New York.

Glick, B.P. and Pasternack, J. (1998). **Molecular Biotechnology**, ASM Press, Washington D.C., USA.

Kannan, N. (2003). **Hand Book of Laboratory Culture Medias, Reagents, Stains and Buffers**. Panima Publishing Co., New Delhi.

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.

- Nicholl, D.S.T. (2004). **An Introduction to Genetic Engineering**. 2 nd Edition. Cambridge University Press, London.
- Old, R.W. and Primrose, S.B. (1994) **Principles of Gene Manipulation**, Blackwell Science Publication, New York.
- Ram Reddy, S., Venkateswarlu, 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.
- Turner, P.C., McLennan, A.G., Bates, A.D. and White, M.R.H. (1998). **Instant Notes in Molecular Biology**, Viva Books Pvt., Ltd., New Delhi.
- Twynan, R.M. (2003). **Advanced Molecular Biology**. Viva books Pvt. Ltd. New Delhi.
- Verma, P.S. and Agarwal, V.K. (2004). **Cell Biology, Genetics, Molecular Biology, Evolution and Ecology**. S. Chand & Co. Ltd., New Delhi.  
Washington, D.C., USA.