ADIKAVI SRI MAHARSHI VALMIKI UNIVERSITY, RAICHUR

SYLLABUS

B.Sc. Three Year Degree Program for the Subject

Bio-Technology

With Effect from 2024-25

DISCIPLINE SPECIFIC CORE COURSE (DSC) FOR SEM I-IV, SKILL ENHANCEMENT COURSE (SEC) FOR SEM IV/V/VI and ELECTIVE COURSES FOR SEM V AND VI

AS PER N E P (Revised): 2024

B.Sc. Semester–IV

Discipline Specific Course (DSC)

Course Title: - Molecular biology

Course Code:C4BIT1T1

Type of Course	Theory /Practical	Credits	Instruction Hour / Week	Total No. of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative AssessmentMarks	TotalMarks
DSC-7	**Theory**	**04**	**04**	**60hrs.**	**3hrs.**	**20**	**80**	**100**

Course Outcomes (COs):

At the end of the course students will be able to:

CO1: Understanding of origination of molecular basis of life, DNA and RNA.
CO2: Understanding of basic cellular processes - transcription, translation, DNA replication and repair mechanism.
CO3: Understanding of structure, functional relationship of proteins and nucleic acids
CO4: Understanding of recombination in prokaryotes and genetic code.
CO5: Understanding of gene expression and regulation in prokaryotes and eukaryotes.
CO6: Understanding of Genome organization in prokaryotes and eukaryotes.

Unit	Title: Molecular biology (Credits: Theory-4, Practicals-2)	60 hrs/ sem
Unit 1	1.1: Molecular basis of life- Introduction, Experimental proof of DNA and RNA as genetic material. 1.2: Nucleic acids- Structure, types and function of DNA and RNA. Ribozymes. Watson and Crick model of DNA and other forms of DNA (A and Z).	15 hrs
Unit 2	2.1: DNA replication- Prokaryotic and Eukaryotic – Enzymes and proteins involved in replication. Theta model and Rolling circle model. 2.2: DNA damage and repair - Causes and mechanisms - Photo reactivation, Excision repair, Mismatch repair and SOS repair.	15 hrs
Unit 3	3.1: Recombination in prokaryotes - Transformation, Conjugation and Transduction 3.2: Structure of prokaryotic and Eukaryotic gene- Genetic code and its characteristics , Wobble hypothesis. 3.3: Transcription in prokaryotes and eukaryotes – Mechanism, promoters and RNA polymerase, transcription factors, post transcription modification of eukaryotic mRNA.	15 hrs
Unit 4	4.1: Translation in prokaryotes and eukaryotes - Initiation, elongation and termination of protein synthesis, translational factors. Post translational modification of protein. Inhibitors of translation 4.2: Gene Expression and Regulation - Gene Expression and Regulation in Prokaryotes – Operon concept (Lac operon model). 4.3: Insertional elements and transposons- Introduction, types of Transposable Elements - Maize and Drosophila.	15hrs

Formative Assessment for Theory	
Assessment Occasion/type	**Marks**
Internal Assessment Test1	05
Internal Assessment Test2	05
Assignment	10
Total	**20 Marks**
Formative Assessment as per guidelines.	

B.Sc. Semester–IV

Discipline Specific Course (DSC)

Course Title: - Molecular biology

Course Code:C4BIT1P1

Type of Course	Theory /Practical	Credits	Instruction Hour / Week	Total No. of Lectures/Hours /Semester	Duration of Exam	Formative Assessment Marks	Summative AssessmentMarks	TotalMarks
DSC-8	**Practical**	**02**	**04**	**56hrs.**	**3hrs.**	**10**	**40**	**50**

Course Outcomes (COs):

At the end of the course students will be able to:

CO1: Understanding of basic of DNA and RNA structure and its model
CO2: Understanding of DNA and RNA estimations
CO3: Understanding of protein extraction and estimation by standard analytical methods
CO4: Understanding of Protein separation by PAGE method
CO5: Understanding of Recombination in prokaryotes
CO6: Understanding of mutations

List of the Experiments, each will have 04Hrs / Week

1. Preparation of DNA model.
2. Estimation of RNA by Orcinol method.
3. Estimation of DNA by DPA method
4. Determination of Tm value and purity of DNA.
5. Extraction and estimation of protein from animal source (Milk /egg / goat liver) by salt precipitation and organic solvent method.
6. Extraction and estimation of protein from plant source (Green gram/pea) by salt precipitation and organic solvent method
7. Protein separation by polyacrylamide gel electrophoresis.
8. Demonstration of conjugation, transformation and transduction by charts.
9. Isolation of UV induced mutants of *E.coli*
10. Demonstration of petite characteristics in yeast upon UV exposure
11. Demonstration of Drosophila mutants
12. Isolation of DNA from bacterial cells
13. Transformation study by kits.

Books recommended:

1. Lodish, H., Ber, A., Zipursky, L.S., matsudaira, P., bahimore, D and Darnell J. 2001, Molecular Biology W.H. Freeman De Robertis.
2. E.D.P. and De Robertis E.M.S. 1998: Cell and Molecular Biology, Lea and Jeliger. Philadelphians K.M Varghese Company
3. Freifelder, D. And Malacinski, G.M. 1993: Essentials of molecular biology, jones and Barklett Publishers, Inc
4. George, M. And Malacinski 1998: Essentials of molecular biology, jones and Barklett Publishers, Inc
5. Glick, B, R and Pasternak j. J 2000: Molecular Biotechnology, principle and applications of recombinant DNA. American society for Microbiology. Washington DC
6. Griffiths, A. J. F. Miller, J.H. Suzuki, D.T. Lewontic, R.C. Gilbert W.M 2000. An introduction to genetic analysis. 7th edn W. H. Freeman. New York
7. Gene cloning and manipulation, Cambridge University Press. Howe. C.1995. USA
8. Karp, G 1996: Cell and Molecular Biology Concept and Experiments. John Wilcy and Sons Inc. New
9. Roger L.P. Adams, John Knowlwe and david P. Lender 2000: Biochemistry of Nucleic acid. Chapman and Hall publications
10. Sandya Mitra 1988: Elements of molecular Biology. Mcmillan Publications,
11. Smith 1998: Molecular Biology. Faber and Faber publication
12. Watson J.D. Hopkins, N.H. Roberts J.W. Steitz. J.A and weiner A.M 1987: Molecular Biology of Gene 4th Edn Benzamin Publ. Co. New York,