References/Readings	1. Modern Experimental Biochemistry (2003). Boyer, R. Principles and Techniques of Biochemistry and MolecularBiology (2005). Wilson, K. & Walker, J. 2. An Introduction to Practical Biochemistry.(2005). Plummer,D.T. Laboratory Manual of Biochemistry.(1998). Jayaraman, J. 3. Physical Chemistry: Principles and Applications in the Biological Sciences. Tinoco, Sauer, Wang, and Puglisi. (2013) Prentice Hall, Inc. 4. Physical Chemistry for the Life Sciences (2nd Edition). Atkins, de Paula. (2015) 5. Bioanalytics: Analytical Methods and Concepts in Biochemistry and Molecular, Friedrich Lottspeich, Joachim W. Engels, (2018). Wiley-VCH publisher. 6. Laboratory Protocols in Applied Life Sciences, (2014), Prakash S. Bisen, Taylor and Francis Publisher	
Learning Outcomes	Students should be able to: • elaborate concepts of biochemistry with easy-to-run experiments. • familiarize with basic laboratory instruments and understand principles underlying measurements using those instruments for experiments in biochemistry.	

Programme: M. Sc. Biotechnology

Course Code: GBC-193 **Title of the Course:** Lab III - Molecular Biology & Genetic Engineering

Number of Credits: 3

Effective from AY: 2019-2020

Prerequisites for the course:	No prerequisites required.	
Objective:	The objectives of this course are to provide students with the experimental knowledge of molecular biology and genetic engineering.	

Content:	1. UV mutagenesis to isolate amino acid auxotroph. 2. Transduction 3. Phage titre with λ phage/M13. 4. Genetic Transfer-Conjugation, gene mapping. 5. Plasmid DNA isolation and DNA quantification. 6. Restriction Enzyme digestion of plasmid DNA. 7. Genomic DNA and RNA isolation 8. Polymerase Chain reaction. 9.Cloning of insert in to a plasmid vector 10. Transformation of *E.coli* with standard plasmids, Calculation of transformation efficiency. 11. Confirmation of the insert by Colony PCR and Restriction mapping 12. Expression of recombinant protein, concept of soluble proteins and inclusion body formation in *E.coli*, SDS-PAGE analysis 13. Purification of His-Tagged protein on Ni-NTA columns 14. Southern hybridization.	72 hours
Pedagogy:	lectures/ tutorials/assignments/self-study	
References/Readings	1. Biotechnology. (1998). Singh, B.D. 2. Genetic engineering: principles & practice (1996). Mitra, S. 3. Principles of gene manipulations (1996) Old,R.W. & Primrose,S.B. 4. The basic principles of gene cloning (1996). Brown, T.A. 5. An introduction to Genetic engineering.(1994). Nicholl,D.S.T. 6. Recombinant DNA. (1992). Watson et al. 7. Genetic engineering fundamentals: An introduction to principles & applications. (1989).	

	Kammermeyer,K. & Virginica,C. 8. From Genes to Clones: Introduction to Gene Technology. (1987). Winnacker, E.L. 9. Genetic engineering Vol I-VI Setlow and Halander. 10. Genetic engineering Vol I-IV (1981). Williamson, R.(Editor). 11. Laboratory Manual for GENETIC ENGINEERING 1st Edition (2009) S. JOHN VENNISON PHI Learning 12. Molecular Cloning: A Laboratory Manual (Fourth Edition): Three-volume set 4th Edition (2012) by Michael R. Green , Joseph Sambrook	
Learning Outcomes	Students should be able to gain hands-on experience on gene cloning, protein expression and purification. This experience would enable them to begin a career in industry.	