M.Sc., III SEMESTER
HARD CORE PAPER -1; MOLECULAR BIOLOGY

32 Hrs

1. **Unit I & II** **16hrs**
   a. Introduction to nucleic acids
   b. **DNA Replication:** i) Enzyme components of replication unit ii) Mechanism with emphasis on Dna A in initiation, Co-ordinated synthesis End replication in eukaryotes iii) Fidelity.
   c. **Transcription:** i) Transcription apparatus and process (RNA polymerase, cis-regulatory elements, terminators, transcription factors). ii) Post transcriptional modifications of mRNA in eukaryotes (G-cap, Poly tail, Splicing).
   d. **Translation:** i) Genetic code (major features, usage of different codons). ii) Enzymes, factors and the process (Aminoacyl t-RNA synthatase, Peptidyl transferase, IFs, EFs, RFs and Ribosome)

2. **Unit III & IV** **16hrs**
   a. Gene regulation in Prokaryotes: (i) Regulation at transcription initiation: Eg. lac operon (+ve and -ve control) (ii) Regulation beyond transcription initiation: trp attenuator (iii) Regulation in Lambda Phage - Lytic and lysogenic cycle induction.
   b. Gene regulation in Eukaryotes: (a) Transcriptional activators (b) Transcriptional repression: (i) direct repression, indirect repression (ii) Gene silencing by modification of histones and DNA (c) Regulation after transcription initiation: RNA interference
   c. Molecular basis of homologous recombination: Models and protein machinery
   d. Molecular mechanisms of DNA damage repair.

PRACTICALS **4x16=64 Hrs**

1. Extraction of DNA by rapid method.
2. Extraction of DNA by standard method.
3. PCR amplification of DNA and gel electrophoresis.
4. Restriction digestion and gel electrophoresis.
5. Isolation of plasmid DNA from bacteria.
6. Estimation of DNA concentration by Diphenylamine method.
7. Estimation of RNA concentration by Orcinol method

REFERENCES

1) Griffiths A J F, H. J. Muller, D. T. Suzuki, R. C. Lewontin and W. M. Gelbart 2000. An introduction to genetic analysis. W. H. Greeman. New York.
2) Watson, J. D., T. A. Baker S. P. Bell, A Cann, M. Levine and R. Losick, 2004. Molecular Biology of Gene V Edition, Pearson Education RH Ltd. India.
3) Lewin, B 2003 Genes VIII. Oxford University Press. Oxford.