B. Sc. III – SEMESTER V
BTT- 501: MOLECULAR BIOLOGY (CORE 1)

Unit I:

Genome Structure: Watson and Crick model of DNA; Genome organization with specific reference to prokaryotic and eukaryotic genomes; Genome size. Concepts of Genetic Material, Gene, Chromosome and Genome. Experiments to prove DNA as genetic material (Griffith experiment, Hershey- Chase experiment)

Unit II

DNA Replication:Enzymology of replication (DNA polymerase I, pol II and III, helicases, topoisomerases, single strand binding proteins, DNA melting proteins, primase. Proof of semiconservative replication, Replication origins, initiation, elongation, and termination. Rolling circle replication of DNA

Unit III

Transcription : Enzymatic synthesis of RNA: Basic features of transcription, structure of prokaryotic RNA polymerase (core enzyme and holo enzyme, sigma factor), concept of promoter (Pribnow box, -10 and -35 sequences), Four steps of transcription (promoter binding and activation, RNA chain initiation, chain elongation, termination and release). Reverse transcription.

Unit IV

Gene Expression and regulation

Regulation of gene expression; Clustered genes and the operon concepts - Negative and positive control of the Lac Operon, trp operon, Control of gene expression. Poly and Mono cistronic m-RNA,

Unit V:

Genetic Code and Protein Synthesis

Genetic code: Features of genetic code, Structure of m RNA, brief structure of tRNA, the adaptor hypothesis, attachment of amino acids to tRNA. Codon-anticodon interaction - the wobble hypothesis. Initiation, elongation, termination of protein.

PRACTICALS BTP: 502-MOLECULAR BIOLOGY

1. Effect of UV radiations on the growth of microorganisms.
2. Determination of absorption maxima of DNA and RNA and their quantification
3. Quantitative estimation of RNA
4. Quantitative estimation of DNA
5. Isolation of plasmid DNA from bacteria
6. Isolation of genomic DNA from *E.coli*
7. Isolation of DNA from sheep liver
8. Isolation of DNA from plant leaves (Rice or Tobacco or any other plant)
9. Separation of DNA by Agarose gel Electrophoresis
10. Purity analysis of the Nucleic acids

B. Sc. III – SEMESTER V
BTT- 503: rDNA TECHNOLOGY (Core - 2)

Unit I:
Restriction and Modification. Classification of restriction endonucleases. Enzymes used in molecular cloning; Polymerases, ligases, phosphatases, kinases and nucleases; Advanced Molecular biology techniques, Electrophoresis and Blotting techniques.

Unit II
Cutting and joining DNA (cohesive end ligation, methods of blunt end ligation). Transfection and transformation. Selection of transformed cells. Screening methods (Genetic marker and blue white screening)

Unit III:
Cloning vehicles - Plasmid, Bacteriophage, Construction of genomic and cDNA libraries. Advantages of cDNA libraries.

Unit IV.
Methods of gene sequencing – Maxam - Gilberts and Sanger's dideoxy chain termination methods; Polymerase chain reaction technique (Components in PCR and PCR conditions)
Methods of gene transfer in fungi, yeast and higher plants using microinjection, microprojectile bombardment (gene gun method, Electroporation and Agrobacterium mediated transformation

Unit V:
Applications of recombinant DNA technology in Agriculture (Transgenic Plants) Medicine (production of Insulin, Growth harmone, Tissue plasmogen activator and HBsAg vaccine)

PRACTICALS BTP 504: rDNA TECHNOLOGY

1. Problem in Genetic engineering.
2. Transformation in Bacteria using plasmid.
3. Restriction digestion of DNA and its electrophoretic separation.
4. Ligation of DNA molecules and their testing using electrophoresis.
5. Activity of DNAase and RNAse on DNA and RNA.
6. Isolation of Plasmid DNA.
7. Demonstration of PCR

Note: the candidate has to take 2 core papers compulsory.

S.V. University Degree examinations 2017

B.Sc (Biotechnology) ~~III year~~ V semester

BTT-501 : Molecular Biology

Time: 3h Marks: 75

SECTION-A

~~Any~~ Answer Any five of the following 5x3 = 15 marks

1). Concept of Gene
2) Giant chromosome
3) Origin of Replication
4) Promoter
5) Reverse transcription
6) cistronic mRNA
7) t-RNA
8) Wobble Hypothesis

SECTION-B

Answer all the Questions 5x12 = 60 Marks

9)a) Explain in detail about watson and crick model of DNA

(or)

b) List and discuss in brief about the experiments which proved DNA as the Genetic Material.

10) a) write in detail about the DNA replication process.

(or)

b) Explain in detail about the enzymes and proteins involved in DNA replication.

[P.T.O]

11) a) Define Transcription. Explain the process of transcription in detail.

(or)

b) write a short notes on RNA polymerases.

12) a) what is Gene Regulation; Explain Lac operon?

(or)

b) write an ~~short notes~~ essay on control of Gene expression.

13) a) Explain in detail about Genetic code and its importance.

(or)

b) write in detail about Protein synthesis.

S.V. University Degree Examinations

B.Sc Biotechnology V- Semester

BTT:503 rDNA Technology [Elective]

Time: 3hrs Marks: 75

SECTION-A

Answer any five of the following Questions 5×3=15 marks.

1) Norther blotting.
2) DNA Ligases
3) Cohesive end Ligation.
4) Bacteriophages
5) PCR
6) Transgenic plants
7) Gene Gun
8) Vaccines

SECTION-B

Answer all the Questions 5×12=60 Marks

9)a) Define Restriction endonucleases. Explain different types with suitable examples.

(or)

b) Explain the Separation of DNA using Agarose gel Electrophoresis.

10) a) Explain Transfection and Transformation.

(or)

b) write in detail about the Screening methods for transformed cells.

PTO

11) a) what are plasmids? Mention various types and explain their role in as cloning vehicle.

(or)

b) Construct the cDNA Library and explain the process of importance of cDNA Library.

12) a) Explain in detail about PCR.

(or)

b) Explain various Gene transfer techniques.

13) a) what are Transgenic plants? Explain the importance with a suitable example.

(or)

b) Explain the process of Insulin production with the help of rDNA technology.