

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
SHRI PUNDLIK MAHARAJ MAHAVIDYALAYA, NANDURA (Rly.)
DEPARTMENT OF ZOOLOGY
B.Sc-III, SEMESTER-VI
SYLLABUS
SUB: MOLECULAR BIOLOGY AND BIOTECHNOLOGY

There shall be following paper and practical for B.Sc.Part-I Semester One examination. The syllabus is based on 6 theory periods and six practical periods per week (Total 75-80 theory Sessions and 25 practical sessions during the complete semester). There shall be one compulsory paper of 3 hours duration, in theory as stated below and practical examination extending for four hours. Every examinee shall offer the following paper of 100 marks, (Out of which 80 marks will be for written examination and 20 marks for internal assessments) and practical examination of 50 marks. Candidates are required to pass separately in theory and practical examination.

Marks

1) Paper-I: Molecular Biology and Biotechnology...	
Theory (Written)	80
Internal assessments	20
2) Practical:	50
Total :	150 Marks

THEORY

UNIT-I:

Genetic material-definition, Experiments to prove DNA as genetic material: Griffiths transformation experiments with bacteriophage infections, Avery and co-workers experiments, and Hershey and Chase experiment. Chemistry and types DNA (A,B,Z) Mitochondrial DNA; Chemistry, types and function of RNA: mRNA, tRNA and rRNA and Non Genetic RNA.

UNIT-II:

DNA replication: semi conservative method; experiment by Messelson and Stahl. Concept of genes, one gene one enzyme hypothesis, one gene one Polypeptide theory.; A brief account of Concept and action of cistron, split genes, overlapping genes, jumping genes, Genetic diseases: Spinocerebellar ataxia.

UNIT-III:

Genetic code and its features, Protein synthesis transcription and processing of mRNA, translation-different steps, Gene regulation: (promoter and operator), Operon models, and Lac-operon model of E.Coli. Genetic regulation in Eukaryotes-Britten Davidson Model.

UNIT-IV:

Mutation: Definition-mutation theory of DeVries different types of mutations, - molecular basis of mutation: substitution and frameshift mutations, chromosomal aberrations structural (deletion, addition, inversion and translocation), numerical (euploidy and aneuploidy). Natural and induced mutations-significance of mutations. DNA repair process. Polymerase chain reaction (PCR). Southern, Northern and Western blotting techniques, DNA finger printing.

UNIT-V:

Biotechnology:. Genetic Engineering: Recombinant DNA technology and gene cloning-enzymes in recombinant DNA technology, Splicing and cloning of genes, vectors (plasmid and phage vectors), gene Transfer. Somatic cell hybridization, hybridoma technology, and monoclonal antibodies. Practical applications and suspected hazards of biotechnology and genetic engineering in animals.

UNIT-VI:

Immunology: Introduction to immune system: Innate and adaptive immunity, Types and production of immune cells ; Complement system. Humoral Immunity: Antigen and haptens, Antibody: types function, and production. Cell mediated immunity: T-cell receptors, T helper cell and lymphocyte activation Role of cytotoxic T-cell..ELISA Technique RIA.

PRACTICALS

1. Microtechnique scope and importance.
2. Preparation of fixatives - Alcohol, Acetone, Formalin, Bouin's fluid, Cornoy fluid, Formal sublimate.
3. Collection of various tissues/organs from slaughter house for micro-technique
4. Preparation of Alcoholic grades, dehydration and clearing of tissues
5. Use and care of Oven
6. Embedding and block making, trimming of block.
7. Use and Care of different types of Microtome.
8. Honing and stropping Knives
9. Section cutting and spreading,
10. Preparation of various stains -Borax carmine Acetocarmin, Aceto-orcein, Haematoxyline, eosin.
11. Staining of the sections, (Double Staining), mounting.
12. Camera Lucida. Use and Drawings
13. Oculomicrometer scale/ similar micro-measurements use
14. Introduction to models of PCR, Southern blotting through available resources.
15. Vital Staining of mitochondria by using Janus, Green B stain.
16. Extraction of DNA by using salt, detergent and enzymes from natural sources from any animal tissue / plant material
17. Study of Operon models through available resources.
18. Application of DNA finger printing through available resources.

Distribution of marks for practical examination:

Time: 5 Hrs.	Marks
01 Microtechnique.	
a) Trimming and Section cutting of the Paraffin blocks.....	05
b) Spreading of ribbons.....	05
c) Staining of the given slide.....	10
d) Use of camera Lucida/ Ocular micrometer scales.....	05
02. Any one practical based on Sr.14 to 18 of the practical list.....	10
03. Permanent slides submitted by the examinee (5 Slides).....	05
04. Class record duly signed by teacher incharge and certified By H.O.D.....	05
05. Viva – voce.....	05
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	Total Marks...50

References

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4. Kumar, H.D. Molecular biology and biotechnology. Vikas Publishing House, New Delhi.
5. Lewin, B.. Gene VI . Wiley Eastern Ltd., New Delhi.
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