



B.Sc. PLANT BIOLOGY & PLANT BIOTECHNOLOGY

Paper 11a GENETICS AND MOLECULAR BIOLOGY

B.Sc. va (Candidates admitted from the academic Year 2008-2009)

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Core Theory

UNIT I

Mendel's law of inheritance, modifications (codominance, incomplete dominance, lethal genes), quantitative inheritance, cytoplasmic inheritance (eg. *Mirabilis*, yeast, maize). Multiple alleles (ABO blood group in humans).

Terminology: Gene, allele, dominant, recessive, homozygous, heterozygous, test-cross, back cross, monohybrid, dihybrid, genotype, phenotype.

UNIT II

Organisation of DNA double helix - A, B and Z forms of DNA.

Terminology: Histones, Histone octamer, Non- Histones, Nucleosome, Euchromatin, Heterochromatin Constitutive, Facultative, Interstitial and Telomeric constitutive Heterochromatins and SAT DNA.

UNIT III

DNA replication, DNA repair and DNA rearrangement.

Terminology : AT - rich domain, GC - rich domain, Ori - site, Helicase, SSB, pre - primasome, Primasome, Primase, DNA pol I, DNA pol II, DNA pol III, RNA primer, Okazaki fragment, Leading and Lagging strands, Telomerase and Methylation of DNA.

UNIT IV

DNA finger printing, RFLP, RAPD, AFLP, PCR, Western, Southern and Northern blotting.

UNIT V

Protein Synthesis - Transcription, Post - transcriptional modification of hn RNA and translation.

Terminology: Upstream and downstream of a gene, CAAT box, TATA box, Enhancer, Pribnow box, Exon, Intron, sense strand, antisense strand, transcription factors, DNA pol II, Rho factor, hn RNA, polyadenylation, spliceosome, aminoacyl synthetase, peptidyl transferase, leader sequence, initiation factors, elongation factors,

termination factors, start and stop codons, anticodons and signal peptide.

UNIT VI

Gene Regulation with reference to lac Operon. Gene Therapy. Inheritance of disease. Genetic diagnosis-pre-natal, embryonal and adult. Genetic screening of Sickle cell anemia (SCA). Risks involved in gene therapy. Stem cells, Germ line therapy.

Terminology: Operon, inducible operon, Operator site, Promoter, Polycistronic m RNA, Regulator, regulator constitutive, Regulator super repressor, repressor, super repressor, inducer, ADA Deficiency, PKU, dominant disorders, recessive disorders, X-linked diseases, hemizygous, amniocentesis, Chorionic villus sampling (CVS), counseling.

Suggested Reading

- BOURGAIZE, D. 2001. Biotechnology: Demistifying the concepts. Pearson Publications.
- WATSON, J.D. *et al.* 2003. Molecular Biology of the Gene. Fourth Edition. The Benjamin Cummings Pub. Co.
- LEWIN, B. 2003. Genes VIII. Oxford University Press.
- LEWIN, B. 2001. Genes VII. Oxford University Press.
- FRIEFELDER, D. 2005. Molecular Biology. Second Edition. Narosa Pub. House.
- LEWIN, B. 1994. Genes V. Oxford University Press.
- SOBTI R.C. and GOBE. 1991. Eukaryotic chromosomes. Narosa Publishing House.
- SMITH-KEARY, P. 1991. Molecular Genetics. Macmillan Pub. Co. Ltd. London.
- STEWARD M.W. 1984. Antibodies: Their structure and function. Chapman and Hall Ltd.
- STRICKBERGER, M.W. 1990. Genetics. Third Edition. Macmillan Publishing Company.