

Course: MICROBIOLOGY PG

Semester	3
Paper Number	MMCB4313
Paper Title	GENOMICS AND PROTEOMICS
No of credits	3
Non composite/composite	Composite
No. of periods assigned	3
Course description/objective	<ul style="list-style-type: none"><li>• To know the genetic mapping, marker analysis</li><li>• To know gene therapy techniques</li><li>• To characterize proteomics techniques</li></ul>
Reference List	<ol style="list-style-type: none"><li>1. Genome 2 T.A Brown</li><li>2. Gene therapy 2010 by Mauro Giacca.</li><li>3. Principles of Gene Manipulation and genomics: An Introduction to genetic engineering 2007, by Primrose and Twyman.</li></ol>
Evaluation	<p>Theory: 70 (60 End sem + 10 CIA) Practical: 30 (10 End sem + 20 CIA) Question Paper format: END SEM 60 MARKS</p> <p><b><u>MODULE 1: 30 MARKS</u></b></p> <ul style="list-style-type: none"><li>• SHORT QUESTION: FROM 7 QTNS <b>ANSWER 5 (EACH 2 MARKS)</b> = 5X2=10</li><li>• LONG QUESTION: FROM 6 QTNS <b>ANSWER 4 (EACH 5 MARKS)</b>= 4X5=20</li></ul> <p><b><u>MODULE 2: 30 MARKS</u></b></p> <ul style="list-style-type: none"><li>• SHORT QUESTION: FROM 7 QTNS <b>ANSWER 5 (EACH 2 MARKS)</b> = 5X2=10</li><li>• LONG QUESTION: FROM 6 QTNS <b>ANSWER 4 (EACH 5 MARKS)</b>= 4X5=20</li></ul> <p>Viva: End sem 10 marks</p>

## **GENOMICS & PROTEOMICS**

### **THEORY 70**

#### **MODULE 1-Genomics ,gene therapy(35 MARKS)**

**Genomics**-significance of genome mapping ,distinguish between linkage mapping and physical mapping, different types of marker,techniques for linkage analysis,genetic map in bacteria,limitations of genetic map,strength and weakness of different types of physical mapping,Radiation hybridization and somatic cell hybridization, FISH techniques, karyotyping, restriction mapping,EST and STS mapping,DNA fingerprinting techniques [SSC]

Genetic mechanisms of antimicrobial resistance-(mode of actions of antibiotics and its resistance)[SSC]

**Gene therapy**-Types of gene therapy, somatic virus germline gene therapy, mechanism of gene therapy, Immunotherapy, Detection of mutations in neoplastic diseases MCC, SSCP, DGGE, PTTC. Cell mediated and Gene therapy as a novel form of drug delivery, vectors, cell types. Gene therapy using viral and non-viral vectors; adenovirus, adeno-associated virus, baculovirus, retrovirus, lentivirus, direct gene delivery, electroporation, lipoplexes, polyplexes, lipopolyplexes, dendrimers, other recent methods. Hybrid methods, pseudotyping. [AB]

#### **MODULE 2 Proteomics(35 MARKS)**

Proteomics-basic overview, protein chemistry to proteomics, cellular proteomics, assays to study protein-protein interactions: pull-downs, immunoprecipitation, yeast two hybrid, fluorescence resonance energy transfer, Protein separation techniques in brief -2D gel electrophoresis, Mass spectrometry, identification of post translational modifications, biomarkers, MASCOT (introduction), biological applications of proteomics. Metabolomics in modern biology. [RM]

### **PRACTICAL: 30**

**Genomics/gene therapy**-amplification of human gene with specific primers by PCR technique and agarose gel analysis, single nucleotide polymorphism using restriction enzyme, genetic fidelity of tissue culture plants with RAPD markers [AB,SSC,JG]

**Proteomics**-Immunoprecipitation and gel electrophoresis. Basics of MASCOT(online free version), protein identification using computational tools [RM,JG]

**References:**

Genome 2 T.A Brown

Gene therapy 2010 by MauroGiacca.

Principles of Gene Manipulation and genomics: An Introduction to genetic engineering 2007, by Primrose and Twyman.