

## **Open Elective : Principles of Medical Biotechnology-I**

**MM. Th 80 + 20, Time: 3h**

### **Course Outcomes:**

- CO1. Students will be able to explain the basic concept of ELISA, RIA and Western blot.
- CO2. Students get familiarity with Hemoglobin – Structure, biosynthesis and catabolism.
- CO3. Students will be able to appreciate the collection and transport of specimens for diagnosis.
- CO4. Students having familiarization with tools of epidemiology.

### **Unit -I**

Innate and acquired immunity. Nature and Biology of antigens and super antigens. Antibody structure and function. Antigen - antibody interactions, ELISA, RIA, Western blot, Immunoprecipitation, Inflammation- Acute and chronic inflammation, Hypersensitivity. Blood group – ABO and Rh. Haemoglobin – Structure, biosynthesis and catabolism.

### **Unit -II**

Different types of anaemia and their causes (Deficiency of iron, B12 and folic acid, hemolytic, aplastic and genetic disorders). Homeostasis – factors, mechanism, anticoagulants, procoagulants. Host microbe interactions, entry of pathogens, growth and multiplication of the pathogens, Endotoxins, Collection and transport of specimens for diagnosis

### **Unit –III**

Methods of antimicrobial activity determination, types of epidemiology, tools of epidemiology, Recognition of an infectious disease in a population, types of epidemics, control of epidemics. General properties of viruses, viral multiplication, viral hemagglutination, Cultivation of viruses, Classification and nomenclature of viruses, host response to virus infection

**NOTE:** There will be seven questions in all. Question No. 1 will be compulsory and short answer type covering the entire syllabus. The remaining six questions will be set with two questions from each unit. The candidate will be required to attempt Question 1 and four more selecting at-least one from each unit.

### **Recommended Books**

1. John E. Hall, Medical Physiology by Guyton, Saunders, 12<sup>th</sup> edition

2. Mims' Medical Microbiology By (author) [Richard Goering](#), By (author) [Hazel Dockrell](#), By (author) [Mark Zuckerman](#), By (author) [Ivan M. Roitt](#), By (author) [Peter L. Chiodini Saunders \(W.B.\) Co Ltd](#).
3. Benjamin E. (1996), Immunology – A short course 3rd Edition, John Wiley, New York
4. Kuby J. (1997), Immunology, 3rd Edition, W.H. Freeman & Co., New York
5. Roitt, I.M. (1997), Essential Immunology, 9th Edition, Oxford Black Well Science, London
6. Tizard I.R. (1995), Immunology – An introduction, 4th Edition, Philadelphia Saunders College press.

## **Open Elective : Principle of Medical Biotechnology II**

**MM. Th 80 + 20, Time: 3h**

### **Course Outcomes:**

- CO1. Student will learn what exactly genetic engineering is and how enzymes are used in this field.
- CO2. Students will be able to explain about different technique and its implication in creating genetically engineered organisms.
- CO3. Students will be able to explain the basic requirement and method of animal cell culture.
- CO4. Student will be able to understand basic concept of stem cells and its uses in therapeutic applications.

### **Unit – I**

Cloning vectors- Plasmid, cosmid, phagemid, phasmid, bacteriophages YAC, BAC, HAC; Shuttle vectors; Recombinant – production, identification and selection; Restriction endonucleases, Ligases; Hybridization; Linkers and adaptors; DNA Transformation and transfection methods; Cell expression system; Human genome project

### **Unit – II**

PCR and its variant; Blotting- Southern, northern & western; Genomic and cDNA library;; DNA Footprinting ; Gene therapy, Gene knockout, Tissue engineering.

Animal Cell Culture: Introduction and Application of animal cell culture. Equipments, materials, culture vessels for animal cell culture, Primary and established cell line cultures

### **Unit – III**

Basic biology of stem cells; Types & sources of stem cells, Blood cell formation from Bone marrow stem cells, Isolation & characterizations of stem cells, Cancer stem cells, Induced

pluripotent stem cells, Stem cell banking, Therapeutic application of stem cells.

**NOTE:** There will be seven questions in all. Question No. 1 will be compulsory and short answer type covering the entire syllabus. The remaining six questions will be set with two questions from each unit. The candidate will be required to attempt Question 1 and four more selecting at-least one from each unit.

### **Recommended Books**

1. R. Lanza, J. Gearhart et al (Ed), Essential of Stem Cell Biology, Elsevier Academic press.
2. R. Lanza, I. Weissman, J. Thomson, and R. Pedersen, Handbook of Stem Cells, TwoVolume, Volume 1-2: Volume 1-Embryonic Stem Cells; Volume 2-Adult & Fetal Stem Cells, 2012, Academic Press.
3. Culture of Animal Cells- A manual of basic techniques by R.I. Freshney
4. Animal Cells Culture and Media, D.C.Darling and S.J.Morgan, 1994. BIOS Scientific Publishers Limited.
5. Gene cloning and DNA analysis – An Introduction (2006) 5th edition, T.A Brown, Blackwell publisher.
6. Essential genes (2006), Benzamin Lewin, Pearson education international.
7. Genome-3 (2007) T.A Brown. Garland science, Taylor & Francis, NewYork.
8. Principles of gene manipulation and Genomics (2006) 7th edition, S.B Primose and R.M Twyman, Blackwell publishing.
9. Principles of Genetic Engineering (2009), Mousumi Debnath, pointer publisher, Jaipur.
10. Molecular Biotechnology-Principles and Applications of Recombinant DNA (2003) 3rd edition, Bernard R Glick and Jack J pasternak. ASM press, Washington.
11. Human Molecular Genetics (2004) 3rd edition, Tom Strachan & Andrew P Read, Garland science.