

**20BT009****ANIMAL BIOTECHNOLOGY**

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	-	-	-	-	-	-	-	-

**Course Description and Objectives:**

The course offers the students about the goals, practices and accomplishments of contemporary of the fundamentals of animal cell culture, diseases and therapy. The objective of this course is to provide knowledge on virus with its design and stem cells. This course also give deep insights of gene therapy, gene mapping and manipulations in the DNA.

**Course Outcomes:**

The student will be able to:

1. Understand the animal cell culture, maintenance, animal diseases and its diagnosis.
2. Understand the Transgenic animal technology, embryonic culture and their importance in therapeutics.
3. Understand the stem cells along with cellular reprogramming and cloning techniques in animals.
4. Understand and analysis the virus and its design along with the vaccines development by the hybridoma technology.
5. Understand the gene therapy and manipulation in the DNA for the development of therapeutics.

**SKILLS:**

- ✓ Preparation of cell cultures and its preservation.
- ✓ Gene therapy
- ✓ Hybridoma technology for the production of monoclonal antibodies.

**ACTIVITIES:**

- Culturing of cell, passaging of cells and storage of cells.
- Observing and differentiating the Cancer and normal cell.
- Animal Handling and can know the different animals used in the clinical studies
- Plotting the media for the cell lines and stem cells.

**Unit - I**

Animal cell culture history, Laboratory equipment's and setup of the animal cell culture lab. Culturing of cells, types of cell culturing, Cell culture media and media constituents. Subculture -passage number, split ratio, seeding efficiency, criteria for subculture. Cell cycle; primary cell culture; nutritional requirements for animal cell culture; techniques for mass culture of animal cell lines. Maintenance of cell Lines- Cryopreservation and Germplasm storage.

**Unit - II**

An over view and important concepts of tissue culture and tissue engineering technology, its applications in various fields. Embryo culture and embryo rescue. *In vitro* fertilization, transgenesis—Methods of transferring genes into animal oocytes, eggs, embryos and specific tissues by physical, chemical and biological methods—Biopharming— Transgenic animal technology, application to production and therapeutics

**Unit - III**

Stem cells and its types; Stem cell research- *In vitro* derivation of gametes, Maintenance of stem cells in culture and applications, Somatic cell nuclear transfer, Gene expression of pluripotent cells; Cellular reprogramming; Induced pluripotency; Cloning techniques in animals and therapeutic cloning.

**Unit - IV**

Viral disease in animals—Animal viral vectors—Vector design—SV40, adeno virus, retrovirus, vaccinia virus, herpes virus, adeno associated virus and baculo virus; Immune response; Lymphocytes, immune system; Baculo virus expression vectors—Vaccines and their applications in animal infections —High technology vaccines – Hybridoma technology and production of monoclonal antibodies.

**Unit - V**

Gene therapy; Prospects and problems, Single gene, Gene mapping, Hematopoietic cells for cellular gene therapy of animal disease —Knockout mice and mice model for human genetic disorder —Baculo virus in biocontrol; Enzymes technology; Somatic manipulation of DNA; Nucleic acid hybridization and probes in diagnosis— Preparation of probes, evaluation and applications.

**TEXT BOOKS:**

1. Freshney R.I. Cultures of Animal cells: A manual of Basic Techniques and specialized applications, 6thEdition, John Wiley and Sons, 2010.
2. Glick, B.R. and Pasternack, J.J. and Pattern ,C. Molecular Biotechnology, 4thEdition ASM Press, 2003

**REFERENCES BOOKS:**

1. Lewin, B. Genes VIII, Pearson Prentice Hall, 2004
2. Portner, R, Animal Cell Biotechnology, Methods and Protocol, 2ndEdition, Humana Press, 2007.