Subject Code: 02BT0501

Subject Name: Animal Biotechnology (Core)

M. Sc. Semester – III

Objective: To provide the theoretical as well as practical knowledge of advancement in the area of animal biotechnology with ethics.

Credits Earned: 4 Credits

Course Outcomes: After completion of this course, student will be able to

1. Understand the different methods involved in animal cell culture.
2. Harness the knowledge of biotechnology for industrial and medical purpose.
3. Apply the concepts, tools and techniques of animal cell culture for the development of transgenic animals.
4. Understand the ethical conflicts in biological sciences and health care.

Pre-requisite of course: Basic knowledge of Media, Culturing and Working in Sterile Environment. Practical and Theoretical Knowledge of Molecular Biology and Biochemistry.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Practicals/ TW	
4	0	0	4	50	30	20	0	0	100

Contents:

Unit	Topics	Teaching Hours
I	**Animal Cell Culture** History and scope of animal cell and tissue culture; advantages and disadvantages of tissue culture; laboratory facilities for tissue culture; the substrate on which cells grow; treatment of substrate surfaces; feeder layers on substrate; the gas phase for tissue culture; culture media for cells and tissues; culture procedures, Disaggregation (enzymatic and mechanical) of tissue and primary culture; cultured cells and evolution of cell lines; maintenance of culture-cell lines, Tissue culture (slide, flask and test tube cultures); organ culture; whole embryo culture; tissue engineering (artificial skin and artificial cartilage).	20
II	**Reproductive Biology** Structure of sperms and ovum; cryopreservation of sperms and ova of livestock; artificial insemination; super ovulation, embryo recovery and in vitro fertilization; culture of embryos; cryopreservation of embryos; embryo transfer technology; transgenic manipulation of animal embryos; applications of transgenic animal technology; animal cloning - basic concept, cloning for conservation for conservation endangered species.	15
III	**Animal Transgenics** Methods, vectors and approaches used in gene transfer to the cultured cells and eggs. Transgenic animals (mice, sheep, pigs, rabbits, goats, cows, fish etc.). Methods of transgene analysis. Hybridoma technology and its applications.	15
IV	**Bioethics in Animal Biotechnology** Introduction, ethical conflicts in biological sciences - interference with nature, bioethics in health care - patient confidentiality, informed consent, euthanasia, artificial reproductive technologies, prenatal diagnosis, genetic screening, gene therapy, transplantation. Bioethics in research – cloning and stem cell research, Human and animal experimentation, animal rights/welfare.	10

References:

1. Developmental Biology, Eighth Edition" by Scott F Gilbert.
2. Essential Developmental Biology by Jonathan Slack
3. Developmental Biology, Werner A Muller.
4. Principles of Development - Lewis Wolpert
5. Culture of Animal Cells: a manual of basic technology, 6th Edition by Freshney, R. Ian, Wiley-Blackwell, 2010.
6. Animal Biotechnology 3rd Student Edition by Ranga, M. M., Agrobios, 2010.
7. Animal Cell culture: a practical approach 3rd Edition by Masters, John R. W. Oxford University Press, 2000.
8. Biotechnology of Animal Culture by Yadav, P. R. &Rajiv Tyagi Discovery Publishing House, 2008.
9. Molecular Diagnostics: Current Technology and Applications by Juluri R Rao, Colin Craig Fleming
10. Medical Diagnostics and Procedures by M. Singh Narosa
11. Genetic Analysis of Complex Disease by Jonathan L. Haines, Margaret A. Pericak,
    a. John Willey
12. Techniques in diagnostic Human Biochemical Genetics by Frist A. Homes. Wiley-Blackwell

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Create**
20%	20%	30%	15%	10%	5%

Instructional Method:

a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, etc.

b. The internal evaluation will be done on the basis of continuous evaluation of students in the class-room in the form of attendance, assignments, verbal interactions etc.

c. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.