ANIMAL CELL CULTURE

Semester	Subject Code	Category	Lecture		Theory		P	C
V	21CBT5B	Core theory -VI	6 hrs per week	90	6 hrs per week	90	0	4

COURSE OBJECTIVE:

- To understand the cell culture technique, Cell viability and cytotoxicity assays, significance of its cultivation and its application in the production of valuable products.

COURSE OUTCOMES: Up on successful completion of course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL (K1-K4)
CO1.	Understand the animal cell culture and its types.	K2
CO2.	Understand different types of culture media and stem cells	K2
CO3.	Analyze how cells stored by cryopreservation techniques	K4
CO4.	Apply knowledge for the embryo transfer methods	K3
CO5.	Summarize various applications of animal cell culture and its human genetic engineering risks.	K2

Knowledge level: K1- Remember; K2- Understand; K3- Apply; K4- analyze

Mapping with Programme Outcomes

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	M	M	M	M
CO2	M	S	M	M	M	M
CO3	M	M	S	M	M	M
CO4	M	M	M	S	M	M
CO5	M	M	S	S	S	S

S-strong; M- medium; L-low

UNIT-I BASICS OF ANIMAL CELL CULTURE **18 Hours**

Animal cell culture history and principles. Advantages and disadvantages of animal cell culture. Applications of animal cell culture. Cell culture: Primary cell culture techniques – mechanical disaggregation, enzymatic disaggregation, Balanced salt solution, natural media and synthetic media, chemically defined and serum free media – Advantages and disadvantages.

UNIT-II STEM CELLS **20 Hours**

Stem Cells sources, Unique properties of stem cells, Classification, Embryonic stem cells, adult stem cells, umbilical cord stem cells – similarities and differences between adult and embryonic stem cells – Advantages and disadvantages, Applications of stem cells

UNIT-III CYTOTOXICITY AND CELL VIABILITY ASSAYS AND CELL STORAGE TECHNIQUES **18 Hours**

Cytotoxicity and Cell viability assays –MTT Assay, Dye uptake assay, Dye exclusion assay, Enzyme released assays.

Cryopreservation- Introduction, Signification of Cryopreservation, Mechanism of Cryopreservation-Freezing method, Thawing process, Storage of animal cells. Applications of Cryopreservation of animal stock cells.

UNIT-IV EMBRYO TRANSFER AND TRANSGENIC ANIMALS **18 Hours**

Embryo transfer:Artificial insemination, Super ovulation, in-vitro fertilization, Pregnancy diagnosis, Sexing of embryos, Embryo splitting. Cryopreservation of embryo.

Transgenic animals: Transgenic fish, transgenic mice, transgenic sheep, transgenic insects.

UNIT-V APPLICATIONS OF ANIMAL CELL CULTURE **16 Hours**

Production of recombinant hemoglobin, blood substitutes, artificial blood, vaccines, testing of drugs, testing toxicity of environmental pollutants in cell culture. Genetic counseling drug screening and development.

Distribution of Marks: Theory 80% and Problems 20%

TEACHING METHODOLOGY

- Class room teaching
- Assignments
- Discussions
- Home work
- PPT presentations
- Seminars
- Models/Charts

TEXT BOOKS:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Martin Clynes	Animal cell culture techniques	Springer Berlin Heidelberg	1998
2.	John M. Davis	Animal cell culture	John Wiley and Sons	2011
3.	John Masters	Animal cell culture	OUP Oxford	2000
4.	Jennie P. Mather and David Barnes	Animal Cell Culture Methods	Academic Press	1998
5.	Ian Freshney .R	Culture of animal cells	John Wiley & Sons	2015

REFERENCE BOOKS:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	John M. Walker, Jeffrey W. Pollard and John M.Walker	Animal cell culture	Humana Press	1990
2.	Singh.B, Gautam S.K and Chauhan.M.S	Textbook of animal biotechnology	Paperback	2015
3	Sheelendra Bhatt	Animal cell culture concept and application	Alpha science international Ltd	2011
4.	Singh.B, Gautam S.K and Chauhan M.S	Animal Biotechnology	TERI, New Delhi	2015
5.	Srivastava, R. K. Singh	Animal Biotechnology	Oxford and IBH Publisher	2018

WEB SOURCES

1. https://www.lasc.uzh.ch/en/services/TS-(embryo-transfer-etc.).html
2. https://www.worldcat.org/title/principles-of-animal-cell-culture.
3. https://www.kobo.com/us/en/ebook/culture-of-animal-cells
4. https://www.ebooks.com/enus/book/698880/culture-of-animal-cells/r-ian
5. https://en.wikipedia.org/wiki/Cell_culture
6. https://www.biotechnologynotes.com/animals/animal-cell-culture-history

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