BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – B.Sc.(BT)-Hons-2022
Course Name – Animal Cell Culture
Course Code - BBTC304
(Semester III)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) You need to culture neural stem cells and maintain them in an undifferentiated state. Which specific reagent would be most critical for this purpose?

a) Retinoic acid
b) Epidermal growth factor (EGF)
c) Dimethyl sulfoxide (DMSO)
d) Ethanol

(ii) Identify the balanced salt solution used for animal cell culture among the following?

a) NaCl-KCL Solution
b) Iscove's salt solution
c) Phosphate Buffer saline
d) Robert's salt solution

(iii) In the history of animal cell culture, what was the first animal cell line to be established in 1951?

a) HeLa cells
b) CHO cells
c) NIH/3T3 cells
d) BHK-21 cells

(iv) In drug testing, what is the main advantage of using 3D cell culture models over traditional 2D monolayer cultures?

a) 3D cultures are less expensive
b) 3D cultures are easier to scale up
c) 3D cultures better mimic the in vivo environment
d) 3D cultures require fewer cell types

(v) A pharmaceutical company wants to scale up the production of a diagnostic antigen for a new test. What factors should they consider to ensure commercial-scale production success?

a) Sterility and contamination control
b) Theoretical knowledge of antigens
c) Laboratory equipment calibration
d) Number of research papers published

(vi) The harmful effect of new drugs need to be tested on normal animal cells in culture by which of the following assay.

a) Cell adherence assay
b) Cell Cytotoxicity assay
c) Cell proliferation assay
d) Apoptosis assay

(vii) Suppose a researcher is using gene editing to develop disease-resistant chickens. What specific technique might they employ for this purpose?

a) Artificial insemination
b) In vitro fertilization
c) CRISPR-Cas9 gene editing
d) Cloning

(viii) Describe the purpose of adding antibiotics to animal cell culture media?

a) To enhance cell growth
b) To maintain pH
c) To prevent bacterial contamination
d) To improve oxygenation

(ix) Which parameter is commonly assessed to determine the therapeutic index of a drug in cell culture?

a) Cell viability
b) Cell membrane permeability
c) Cell migration
d) Cell metabolism

(x) Analyze the role of surface modification in nanoparticles for gene delivery.

a) Surface modification enhances gene delivery by improving nanoparticle stability, cellular uptake, and targeted delivery.
b) Surface modification decreases gene delivery efficiency.
c) Surface modification is irrelevant in gene delivery applications.
d) Surface modification only affects the color of the nanoparticles.

(xi) Identify the primary method used for producing cloned animals?

a) Somatic Cell Nuclear Transfer (SCNT)
b) In vitro fertilization (IVF)
c) Artificial insemination
d) Gene editing

(xii) In recombinant vaccine production, how is the antigen gene typically inserted into the host organism?

a) By chemical treatment
b) By physical force
c) Using a viral vector
d) It occurs naturally

(xiii) Identify the component that is typically used as a buffering agent in cell culture media to maintain a stable pH?

a) Glucose
b) Fetal bovine serum
c) Sodium bicarbonate
d) Penicillin-Streptomycin

(xiv) What is the primary purpose of using a CO2 incubator in cell culture?

a) Maintain optimum temperature
b) Maintain humidity
c) Provide CO2 for pH regulation
d) Sterilize the culture

(xv) You are conducting a cell culture experiment that requires a BSS with a pH of 7.4. If the current pH is 7.2, how would you adjust it using a bicarbonate buffer system?

a) Increase carbon dioxide concentration
b) Decrease carbon dioxide concentration
c) Add more fetal bovine serum
d) Remove the culture medium

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Describe the basic differences between 2D and 3D animal cell culture techniques. (3)
3. Compare and contrast static and dynamic animal cell culture techniques in terms of growth kinetics and nutrient distribution. (3)
4. Explain in details the physiological process of cell attachment during in-vitro cell culture. (3)
5. Discuss the purpose of primary cell culture. (3)
6. Assess some public concerns related to the use of animal biotechnology in food production. (3)

OR

Assess briefly the process of cytopathic effect on animal cells in culture. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Elaborate on the metabolism of cells in culture conditions and the role of specific nutrients in supporting cellular functions. (5)

8. Describe the process of developing cell lines and describe the significance of this technique in biomedical research and drug development. (5)
9. Provide an example of how cell culture technology has improved the production efficiency of a specific viral vaccine (5)
10. Define the concept of animal biotechnology and discuss its applications in modern agriculture. (5)
11. Evaluate the role of nanoparticles in the development of biosensors, emphasizing their impact on enhancing sensitivity, selectivity, and response time for detecting biomolecules and pathogens. (5)
12. Compare and contrast the detailed process of apoptosis and necrosis in animal cells. (5)

OR

Write about the different ethical considerations surrounding the use of animal tissues in culture models? (5)

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