



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES**

**DEPARTMENT OF NATURAL AND APPLIED SCIENCES**

<b>QUALIFICATION: BACHELOR OF SCIENCE HONOURS</b>	
<b>QUALIFICATION CODE: 08BOSH</b>	<b>LEVEL: 8</b>
<b>COURSE CODE: PAB811S</b>	<b>COURSE NAME: PLANT AND ANIMAL BIOTECHNOLOGY</b>
<b>SESSION: JUNE 2022</b>	<b>PAPER: THEORY</b>
<b>DURATION: 3 HOURS</b>	<b>MARKS: 100</b>

<b>EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER(S)</b>	DR JEYA KENNEDY
<b>MODERATOR:</b>	DR JUAN VORSTER

<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Write clearly and neatly</li><li>2. Number the answers clearly</li><li>3. All written work <b>MUST</b> be done in blue or black ink</li><li>4. No books, notes and other additional aids are allowed</li><li>5. Mark all answers clearly with their respective question numbers</li><li>6. Draw diagrams wherever necessary</li></ol>

**PERMISSIBLE MATERIALS**

None

**THIS QUESTION PAPER CONSISTS OF 4 PAGES**  
(Including this front page)

**QUESTION 1:**

**Multiple choices**

[6]

- 1.1 Hormone pair required for a callus to differentiate are;  
(a) auxin & cytokinins  
(b) auxin & gibberellin  
(c) cytokinins & abscisic acid  
(d) all of them
- 1.2 Part of plant used for culturing is called;  
(a) scion  
(b) explant  
(c) stock  
(d) callus
- 1.3 DMSO (Dimethyl sulfoxide) is used as;  
(a) gelling agent  
(b) alkalating agents  
(c) chelating agent  
(d) cryoprotectant
- 1.4 Steps in a reproductive process used to produce a sheep with certain traits are listed below.  
Step 1 — The nucleus was removed from an unfertilized egg taken from sheep A. Step 2 — The nucleus of a body cell taken from sheep B was then inserted into this unfertilized egg from sheep A.  
Step 3 — The resulting cell was then implanted into the uterus of sheep C.  
Step 4 — Sheep C gave birth to sheep D.  
Which sheep would be most genetically similar to sheep D?  
(a) sheep A, only  
(b) sheep B, only  
(c) both sheep A and B  
(d) both sheep A and C
- 1.5 Hybridoma cells have an application to produce; (1)  
(a) Antigens  
(b) Antibodies  
(c) Cancer cells  
(d) Cell lines
- 1.6 Name the pigment that gives shrimp their pink colour.  
(a) prialt  
(b) eribulin  
(c) yondelis  
(d) astaxanthin

**QUESTION 2:**

**Fill in the blanks**

[5]

- 2.1 Credit of successfully establishment the tissue on artificial culture medium goes to German botanist \_\_\_\_\_. (1)
- 2.2 \_\_\_\_\_ method of gene transfer requires skilled personnel. (1)
- 2.3 Differentiation of roots, shoots and leaves from callus is called \_\_\_\_\_. (1)
- 2.4 Activated charcoal is used in nutrition media to \_\_\_\_\_. (1)
- 2.5 \_\_\_\_\_ are those cell lines which have a limited life span, and they grow through a limited number of cell generations. (1)

**QUESTION 3:**

**One sentence**

[5]

- 3.1 Which is the most widely used vector for producing Bt crops. (1)
- 3.2 Name the scientist who developed pest resistant plant by using RNA interference technique. (1)
- 3.3 Name the compound used as cryoprotectants. (1)
- 3.4 What might happen if you have low levels of cytokinin (kinetin) and high levels of auxin (IAA) when culturing tobacco callus on nutrient agar? (1)
- 3.5 What type of LAFs are present in plant tissue culture laboratory? (1)

**QUESTION 4:**

**Longer questions**

[56]

- 4.1 Why is apical meristems with low concentration of viruses? (3)
- 4.2 Describe three artificial types of media used in animal cell culture. (6)
- 4.3 Explain the different stages involved in micropropagation. (5)
- 4.4 As a research scientist you have been tasked to generate genetic transformation of plants by 'Wounded explant' by using *Agrobacterium*-mediated. Briefly state **SIX (6)** steps you would consider when designing this project. (6)
- 4.5 Explain the mechanism of RNA interference. (7)

- 4.6 Why are zebrafish commonly being used to test new human drugs? (5)
- 4.7 What is the difference and similarities between cold trypsinization and warm trypsinization? (5)
- 4.8 David is given the T-flask of cell culture which grow as monolayer adhering to the flask surface that is fully confluency, now his lecture told him, the flask can be split or divided to seed 2-4 new flasks depending on the vigour of the cell growth. He came to you for help what advice do you give him to follow the procedure. (10)
- 4.9 You are given a task in the lab to make a medium for callus culture, what type of media you are going to use and briefly mention the composition you are going to add in the media. How will you induce callus from it and the advantages of callus culturing? (9)

**QUESTION 5:**

**Essay questions**

**[28]**

- 5.1 As a NUST science student a small-scale farmer came to you for advice about triploid grass carp and transgenic fish in aquaculture. He wants to know what triploid species are and how to create triploid species? What will be the uses and issues regarding triploid grass carp? What is the difference between transgenic fish and triploids? Can you advice the farmer from the theory point of view of what have you learned? (13)
- 5.1 As a research scholar you have been tasked to write the procedure of isolation of protoplasts culture from the plant leaf cells. Briefly state the necessary steps in order for you to consider when writing this project and mention its application. (15)

**THE END**