



NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

SCHOOL OF NATURAL AND APPLIED SCIENCES
DEPARTMENT OF BIOLOGY, CHEMISTRY AND PHYSICS

QUALIFICATION: BACHELOR OF SCIENCE HONOURS	
QUALIFICATION CODE: 08BOSH	LEVEL: 8
COURSE CODE: PAB811S	COURSE NAME: PLANT AND ANIMAL BIOTECHNOLOGY
SESSION: JULY 2023	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 110

SUPPLEMENTARY / SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
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INSTRUCTIONS
<ol style="list-style-type: none">1. Answer ALL the questions2. Write clearly and neatly3. Number the answers clearly4. All written work MUST be done in blue or black ink5. No books, notes and other additional aids are allowed6. Draw diagrams wherever necessary

PERMISSIBLE MATERIALS

None

THIS QUESTION PAPER CONSISTS OF 6 PAGES
(Including this front page)

QUESTION 1: MULTIPLE CHOICE QUESTIONS

[15]

- There are 15 multiple choice questions in this section. Each question carries 1 mark.
 - Answer **ALL** questions by selecting the **LETTER** with the correct answer.
- 1.1 Fruit juice or coconut milk is added to plant tissue culture media because;
- (a) It is a source of micronutrients
 - (b) It is a source of macronutrients
 - (c) It is a source of growth regulators
 - (d) It helps in maintaining pH of the media
- 1.2 Cybrids are produced by;
- (a) Fusion of two different nuclei from two different species
 - (b) Fusion of two same nuclei from same species
 - (c) Nucleus of one species but cytoplasm from both the parent species
 - (d) None of the above
- 1.3 Plant cells cannot be preserved by cryopreservation because
- (a) The chloroplasts in plant cells are denatured by super high temperature
 - (b) Water stored in vacuole of plant cells form ice crystal in freeze and thaw
 - (c) Plant cells differentiate rapidly under cryopreservation
 - (d) The biological reaction of plant cells cannot be stopped by cryopreservation
- 1.4 Why is CO₂ often used in an incubator to culture mammalian cells?
- (a) To control oxygen consumption
 - (b) To control or prevent viral/bacterial contamination
 - (c) To control cell growth
 - (d) To control the pH
- 1.5 The medical product that is produced by the pacific sponge is known as;
- (a) Ziconotide
 - (b) Calcitonin
 - (c) Hydroxyapatite
 - (d) Manoalide
- 1.6 Maximum number of existing transgenic animals is of _____.
- (a) Fish
 - (b) Cow
 - (c) Pig
 - (d) Mice
- 1.7 How can you solve building up of toxic metabolites in the medium? (A) remove medium and add fresh medium (B) use antibiotics (C) use RPMI-1640 medium with fetal bovine serum
- (a) A and B
 - (b) B and C
 - (c) A and C
 - (d) None of the above

- 1.8 Artificial Insemination; (A) increase the frequency of desirable characteristics (B) produces two superior animals (C) mixing of the genetic material from two parents (D) exact duplicate of an adult with known characteristics
(a) A & B
(b) B, C & D
(c) A, C & D
(d) A & C
- 1.9 Cells that do not attach normally to a substrate but remain in suspension with a spherical shape;
(a) Epithelial like
(b) Lymphoblast like
(c) Fibroblast like
(d) Trophoblast like
- 1.10 An example for mammalian tissue culture media.
(a) Luria Bertani media
(b) Yeast Peptone Dextrose media
(c) Bristol's media
(d) Dulbecco's Modified Eagle media
- 1.11 Which of the following chemical enhances vir gene expression;
(a) Cyanidin
(b) Glutenin
(c) Acetosyringone
(d) Dextran
- 1.12 Why are fish in fish farm susceptible to diseases and stress?
(a) Little genetic diversity and disease resistance
(b) Fish are more susceptible to stress and disease caused by bacterial and viral pathogens
(c) Large supply of fish can be wiped out quickly if disease is not controlled
(d) All the above is correct
- 1.13 Why are detection kits or vaccines developed?
(a) To detect problem in water supplies that are contaminated because of inadequate sewage treatment facilities
(b) To detect a number of pathogens that pose serious threats to fish raised by aquaculture
(c) To detect contaminated seafood and minimize infections
(d) All of them
- 1.14 A hybridoma cell;
(a) Produces different types of antibodies against different types of antigens
(b) Produces only specific antibodies only against a specific antigen
(c) Produces different types of antibodies but only one type of antigen
(d) None of the above

- 1.15 Name the scientist who extracted Insulin from dog's pancreas.
(a) Banting and Best
(b) Hirs, Moore and Stein
(c) Fredrick Sanger
(d) Kohler and Milstein

QUESTION 2: FILL IN THE BLANKS

[10]

The number of marks is given in brackets () at the end of each question

- 2.1 Temperature of plant culture room is maintained between _____. (1)
- 2.2 Sub culturing of cells can be started at which phase of cell growth at the end of _____ phase. (1)
- 2.3 Gene-cloning techniques to mass-produce _____, the pigment that gives shrimp their pink colour. (1)
- 2.4 A handheld antibody test kit developed for to detect _____ in oysters. (1)
- 2.5 In stem cell method, microinjections are done in the _____ stage. (1)
- 2.6 Synthetic seed is produced by encapsulating somatic embryo with _____ and _____. (2)
- 2.7 Animal and human cancers are strikingly similar, information gleaned from one species might be used to treat the other. For example, the _____ gene found in 65% of human breast tumours is similar to the gene in dogs. Randomized trials in both dogs and humans have shown that _____ of a tumour site combined with radiation can be more effective in local tumour control than radiation therapy alone. (2)

QUESTION 3: ONE-SENTENCE ANSWERS

[10]

Each answer carries one mark

- 3.1 The soil bacterium *Agrobacterium tumefaciens* infects plants at a wound site. What is the signal that activates the vir locus as a result of the wound?
- 3.2 Which part of the tobacco plant is infected by *Meloidogyne incognita*?
- 3.3 What is the diameter of microinjections glass needle is used to insert transgenic DNA into the male pronucleus?
- 3.4 How many hours the Zebrafish eggs complete embryogenesis?
- 3.5 Name the most widely used chemical for protoplast fusion, as fusogens.

- 3.6 Which factor helps transgenic salmon grow faster?
- 3.7 What are triploid species?
- 3.8 What is the other name for super pig?
- 3.9 What is the function of opines in *A. tumefaciens* related to T-DNA?
- 3.10 What does the HAT medium abbreviation stand for?

QUESTION 4: SHORT QUESTIONS

[27]

The number of marks is given in brackets () at the end of each question

- 4.1 Distinguish between the pair of dedifferentiation and differentiation. (2)
- 4.2 What is an explant? What are the types of explants used in Plant Tissue Culture? (2)
- 4.3 Give reason why rats are superior to mice for drug toxicity. (3)
- 4.4 Give reason for the low concentration of viruses in apical meristems. (3)
- 4.5 Describe two innovations methods of fish farming. (2)
- 4.6 What are biofilms? Give examples of biofilms in aquatic environments as well as humans. Explain how scientists are looking to marine organisms as a natural way to minimize biofilming. (5)
- 4.7 What conditions do plant cells need to multiply in vitro? (5)
- 4.8 Write some advantages of callus culturing? (5)

QUESTION 5: LONGER QUESTIONS

[18]

The number of marks is given in brackets () at the end of each question

- 6.1 A student working in cell culture was not able to perform his experiments because of poor cell growth. Can you help him by suggesting the possible reasons for the problem? (6)
- 6.2 Discuss the merits and demerits of particle bombardment method of genetic transformation. (6)
- 6.3 Explain the health of aquatic organism and the safety of the seafood supply. (6)

QUESTION 6: ESSAY QUESTIONS

[30]

- 6.1 As a research scholar you have been given a task to write the procedure of isolating 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)
- 6.2 Explain the process involved in the production of transgenes that are cloned and then introduced directly in the fertilized eggs by microinjection and discuss its various advantages and disadvantages. (15)

THE END