



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)
(MAIN CAMPUS)
UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR**

MAIN EXAMINATIONS

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN MEDICAL BIOTECHNOLOGY**

COURSE CODE: BMB 326

**COURSE TITLE: TISSUE ENGINEERING &
EMBRYOTECHNOLOGY**

DATE: 9TH DECEMBER 2020

TIME: 2.00 -4.00PM

INSTRUCTIONS TO CANDIDATES

This paper is divided into three sections, A B and C respectively: Multiple Choice Questions (MCQs), Short Answer Questions (SAQs) and Long Answer Questions (LAQs).

Answer **ALL** Questions

TIME: 2 Hours

SECTION A 20 MARKS

MMUST observes ZERO tolerance to examination cheating

1. Name the type of culture which is prepared by inoculating directly from the tissue of an organism to culture media?
 - a) Primary cell culture
 - b) Secondary cell culture
 - c) Cell lines
 - d) Transformed cell culture
2. Cloning a mammal by somatic nuclear transfer involves all of the following except
 - a) Artificial doubling of the haploid chromosome number of an egg cell
 - b) Removal of a somatic cell from an adult
 - c) Harvesting egg cells from a female
 - d) Removal of the nucleus from an egg cell
3. Which of the following is NOT the major function of serum
 - a) Promotion of tuber and bulb formation
 - b) Stimulate cell growth
 - c) Enhance cell attachment
 - d) Provide transport proteins
4. Scaffolds usually serve at three of the following stated purposes except
 - a) Provides nutrients and growth factors
 - b) Deliver and retain cells and biochemical factors
 - c) Enable diffusion of vital cell nutrients and expressed products
 - d) Exert certain mechanical and biological influences to modify the behaviour of the cell phase
5. Autologous stem-cells are:
 - a) Are cells obtained from the body of a donor of the same species which they are implanted
 - b) Are cells obtained from the same individual to which they will be re-implanted
 - c) Are cells obtained from the body of a donor of a different species implanted in an individual of another species
 - d) Are cells obtained from and implanted in genetically identical organisms
6. The following stated characteristics are key in determining scaffolds in tissue engineering exercise excepts
 - a) Should be biocompatible
 - b) Should be biodegradable
 - c) Should have proper architecture
 - d) Should be able to provide necessary nutrients for cells
7. Name the phenomenon where a single cell is able to reproduce the whole organism?
 - a) Transfection
 - b) Gene knocking
 - c) Transgenesis
 - d) Animal cloning
8. Which cloning technique is used to clone the whole organism?
 - a) DNA cloning
 - b) Reproductive cloning
 - c) Gene cloning
 - d) Therapeutic cloning
9. What is the role of stem cells with regard to the function of adult tissues and organs?

- a) Stem cells are undifferentiated cells that divide asymmetrically, giving rise to one daughter that remains a stem cell and one daughter that will differentiate to replace damaged and worn out cells in the adult tissue or organ.
 - b) Stem cells are embryonic cells that persist in the adult, and can give rise to all of the cell types in the body.
 - c) Stem cells are determined cells that reside in fully differentiated tissues and can, when needed, differentiate to supply new cells for growth of the tissue.
 - d) Stem cells are differentiated cells that have yet to express the genes and proteins characteristic of their differentiated state, and do so when needed for repair of tissues and organs.
10. The success of using SCNT to create a cloned offspring was shown by the following experiment:
- a) Nucleus was taken from a cell of the udder of a white sheep.
 - b) It was fused with an enucleated oocyte from a sheep with a black face and legs.
 - c) The oocyte with its new nuclear genetic material divided to form an early embryo.
 - d) The embryo was implanted in a surrogate mother sheep that had a black face and legs.
11. Which of the following cells would be considered differentiated?
- a) Blastomere
 - b) Spemann organizer
 - c) Stem cell
 - d) Muscle cell
12. An embryonic stem cell can be described as:
- a) Totipotent
 - b) Pluripotent
 - c) Multipotent
 - d) Unipotent
13. Name defining features of stem cells
- a) Unspecialised cells which can specialize
 - b) Mitosis
 - c) Proliferation
 - d) Meiosis
14. What is the role of stem cells with regard to the function of adult tissues and organs?
- a) Stem cells are differentiated cells that have yet to express the genes and proteins characteristic of their differentiated state, and do so when needed for repair of tissues and organs.
 - b) Stem cells are embryonic cells that persist in the adult, and can give rise to all of the cell types in the body.
 - c) Stem cells are determined cells that reside in fully differentiated tissues and can, when needed, differentiate to supply new cells for growth of the tissue.
 - d) Stem cells are undifferentiated cells that divide asymmetrically, giving rise to one daughter that remains a stem cell and one daughter that will differentiate to replace damaged and worn out cells in the adult tissue or organ.
15. What is the main difference between a cloned (SCNT) individual and an individual who is a product of normal sexual reproduction?
- a) The SCNT individual has genetic material primarily from one person instead of two.

- b) The SCNT individual has genetic material primarily from two people instead of one
 - c) The SCNT individual has no genetic material.
 - d) There is no significant difference
16. The production of a large number of genetically similar animals through tissue engineering and cell cultures is called
- a) Hybridoma technology
 - b) Recombinant DNA technology
 - c) Gene therapy
 - d) Micro-propagation
17. with reference to medical biotechnology, micro-injection is a method of
- a) Injecting a solution of DNA into the nucleus of a cell
 - b) Injecting nutrients into a cell culture media
 - c) Injecting microbes into a cell culture media
 - d) Injecting medicine to human beings
18. Cell surface proteins that promote cell-cell contact cause cells to do which of the following?
- a) Find other cells
 - b) Anchor to plastic surfaces
 - c) Allow cells to know where they are located
 - d) Stop growing due to contact inhibition
19. In the culture medium of human embryonic stem cells, the following constituents are needed:
- a) Human serum
 - b) A chemically defined medium
 - c) Conditioned medium from mouse embryonic stem cells
 - d) Porcine serum extracts
20. Adult stem cells are:
- a) Specialized and undifferentiable cells
 - b) Specialized and differentiable cells
 - c) Unspecialized and undifferentiable cells
 - d) Unspecialized and differentiable cells

SECTION B 40 MARKS

1. Highlight FOUR advantages and disadvantages of using serum media for organ propagation. (8 Mks)
2. Explain FOUR applications of cell and tissue/organ culture (8 Mks)
3. Outline FOUR advances of stem cell research and promises of its applications in biomedical practice. (8 Mks)
4. Briefly outlines FOUR strategies in Tissue Engineering (8 Mks)
5. Explain FOUR characteristics of a good scaffold material construction human kidney (8 Mks)

SECTION C 60 MARKS

1. Discuss recent advances in tissue Engineering (20 Mks)
2. Explain various applications of tissue Engineering in medicine and biomedical research (20 Mks)
3. Explain the tissue engineering processes (20 Mks)