



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of applied and health sciences

DEPARTMENT OF PURE AND APPLIED SCIENCES
UNIVERSITY EXAMINATION FOR:

DIPLOMA IN SCIENCE LABORATORY TECHNOLOGY (DSLT 16S)
AAB 2209 BIOMEDICAL TECHNIQUES-CELL BIOLOGY AND HISTOLOGY
SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES:SEPTEMBER 2018

TIME:2HOURS

DATE: Sep 2017

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions.

Answer Question ONE (compulsory) and any other TWO Questions.

Do not write on the question paper.

QUESTION ONE

- | | |
|--|---------|
| a) (i) State the role of mitochondria | 1 mark |
| (ii)State THREE functions of Epithelial tissue | 3 marks |
| b) (i) Define the term diffusion | 2 marks |
| (ii)List TWO examples of passive transport | 2 marks |
| c) (i)List THREE types of RNA (ribonucleic acid) | 3 marks |
| (ii)State the advantage of Euparal mounting media | 1 mark |
| d) (i)State THREE important necessities for proper tissue sectioning | 3 marks |
| (ii)State the use of Eosin Methylene blue Agar | 1 mark |
| e) (i)Name enzymes which hydrolyze the following; | |
| (i)Proteins | 1 mark |
| (ii)Ribonucleic acid | 1 mark |
| f)(i)Define Differential media | 3 marks |
| (ii)State the function of Areolar connective tissue | 1 mark |
| g) (i)Name THREE types of human muscles | 3 marks |
| (ii)Name water-based mounting medium | 1 mark |

h) Define the term homologous chromosome

2 marks

QUESTION TWO

(a) Discuss the process of cytokinesis

7 marks

(b) Draw a well labeled diagram of a Eukaryotic cell

8 marks

QUESTION THREE

(a) Describe meiosis cell division

8 marks

(b) Describe the formulation of formal saline

7 marks

QUESTION FOUR

(a) Explain the regulation of blood sugar by homeostasis

8 marks

(b) Explain double helix structure of (Deoxyribonucleic acid) DNA.

7 marks

QUESTION FIVE

(a) Describe the cell cycle

7 marks

(b) Discuss the consequences of crossing over of chromosome

8 marks

MARKING SCHEME FOR AAB 2209 BIOMEDICAL TECHNIQUES-PAPER-B

1).a) (i)	-Synthesis of ATP and converts glucose to ATP.	1 mark
(ii)	-) It protects us from the outside world – skin. - Absorbs – stomach and intestinal lining (gut) - Filters – the kidney - Secretes – forms glands	3 marks

b) (i)	- is the net movement of a substance (liquid or gas) from an area of higher concentration to one of lower concentration.	2 marks
(ii)	-Diffusion of oxygen and carbon dioxide, osmosis of water, and facilitated diffusion.	2 marks
c) (i)	- They are tRNA (transfer RNA), mRNA (messenger RNA) and rRNA (ribosomal RNA).	3 marks
(ii)	Directly transfer specimens from alcohol to Euparal without the need of toxic solvents.	1 mark
d)	(1) a very sharp knife, (2) a very sharp knife, and (3) a very sharp knife. (ii) They inhibit Gram-positive organisms. Such a medium is selective for Gram-negative species. (1 mark)	3 marks
(e) (i)	- By proteases	1 mark
(ii)	- by nucleases.	1 mark
f	-Types are those that distinguish microorganisms from one another based on growth characteristics evident when grown on specific medium types.	2marks
(ii)	-Cushion around organs ,loose arrangement of cells and fibers	2 marks
g) (i)	-Smooth, Skeletal, Cardiac muscle,	3 marks
(ii)	-Glycerol jelly	1 mark
h	Chromosome of the same size and shape which carry the same type of genes	2 marks
2.) (a)	-First, a cleavage furrow appears cleavage furrow = shallow groove near the location of the old metaphase plate -A contractile ring of actin microfilaments in association with myosin, a protein -Actin and myosin are also involved in muscle contraction and other movement functions -The contraction of a the dividing cell's ring of microfilaments is like the pulling of drawstrings -The cell is pinched in two -Cytokinesis in plant cells is different because plant cells have cell walls. There is no cleavage furrow -During telophase, vesicles from the Golgi apparatus move along microtubules to the middle of the cell (where the cell plate was) and	7 marks

	<p>coalesce, producing the cell plate Cell-wall construction materials are carried in the vesicles and are continually deposited until a complete cell wall forms between the two daughter cells</p> <p>-</p>	
(b)		
3.) (a)	<p>- Meiosis cell division</p> <p>Prophase II Centrioles form and move toward the poles The nuclear membrane dissolves</p> <p>Metaphase II Microtubules grow from the centrioles and attach to the centromeres The sister chromatids line up along the cell equator</p> <p>Anaphase II The centromeres break and sister chromatids separate Cytokinesis begins</p> <p>Telophase II The chromosomes may decondense (depends on species) Cytokinesis reaches completion, creating four haploid daughter cells</p>	8 marks
(b)	<p>Formal saline</p> <p>Formulation</p> <ul style="list-style-type: none"> • 40% formaldehyde: 100 ml • Sodium chloride: 9 g • Distilled water: 900 ml • Fixation time: 12 – 24 hours <p>-This mixture of formaldehyde in isotonic saline was widely used for routine histopathology prior to the introduction of phosphate buffered formalin. It often produces formalin pigment.</p> <p>-</p>	7 marks
4. (a)	<p>Model:</p> <p>a) Low glucose concentration is detected by the pancreas b) Alpha cells in the pancreatic islets secrete glucagon c) Glucagon flows through the blood to the liver. d) Liver responds by adding glucose to blood stream. h) High blood glucose levels stimulate the beta pancreatic cells a) Beta pancreatic cells secrete insulin f) Insulin flows through the blood to the liver g) Insulin stimulates the liver to remove blood glucose and store this as glycogen (insoluble)</p> <p>Note from the second diagram that the glucose levels remain within a set of narrow limits</p>	8 marks

	The response and change in blood glucose levels becomes the new stimuli for receptors	
(b)	<p>DNA are made of two chains made of polymer units of nucleotides. The backbones of DNA are made of sugar and phosphate groups which are joined by ester bonds.</p> <p>The two strands of DNA are anti-parallel, they run in opposite directions.</p> <p>Each sugar molecule is attached to one of the four nucleobases. The nucleobases encode genetic information, that is read using the genetic code.</p> <p>Inside the cell, the DNA are arranged in long structures called chromosomes.</p> <p>The chromosomes are duplicated in the process of DNA replication, during cell division.</p> <p>Each cell has its own one complete set of chromosomes.</p>	7 marks
5.) (a)	<p>The cell cycle is controlled by a cyclically operating set of reaction sequences that both trigger and coordinate key events in the cell cycle</p> <p>-The cell-cycle control system is driven by a built-in clock that can be adjusted by external stimuli (chemical messages)</p> <p>-Checkpoint - a critical control point in the cell cycle where stop and go-ahead signals can regulate the cell cycle</p> <p>Animal cells have built-in stop signals that halt the cell cycles and checkpoints until overridden by go-ahead signals.</p> <p>Three Major checkpoints are found in the G1, G2, and M phases of the cell cycle</p> <p>-The G1 checkpoint - the Restriction Point</p> <p>The G1 checkpoint ensures that the cell is large enough to divide, and that enough nutrients are available to support the resulting daughter cells.</p> <p>If a cell receives a go-ahead signal at the G1 checkpoint, it will usually continue with the cell cycle</p> <p>If the cell does not receive the go-ahead signal, it will exit the cell cycle and switch to a non-dividing state called G0</p> <p>Actually, most cells in the human body are in the G0 phase</p> <p>-The G2 checkpoint ensures that DNA replication in S phase has been completed successfully.</p> <p>-The metaphase checkpoint ensures that all of the chromosomes are attached to the mitotic spindle by a kinetochore.</p>	8 marks
(b)		

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