



TECHNICAL UNIVERSITY OF MOMBASA
FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF MEDICAL SCIENCES

UNIVERSITY EXAMINATION FOR:

BMLS

AML 4410 : MEDICAL BIOTECHNOLOGY

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2019

TIME: 2 HOURS

DATE: Pick Date Aug 2019

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **TWO** Section(s). Attempt ALL questions.

Paper 2

Section A

Q1. Which of the following proteins are required for proper folding of polypeptides after they are synthesized?

- a) Chaperons
- b) Histones
- c) Heat shock proteins
- d) Antibodies
- e) Transcription factors

Q2. Which of the following is thought to have originated by “backward slippage” of daughter strands on its template strand during replication?

- a) Solitary genes
- b) Heat-shock proteins
- c) Prokaryotic genome
- d) Viral genome
- e) Microsatellites

Q3. Which of the following organisms contain a 4 chromosome genome?

- a) Fruit fly
- b) Yeast
- c) Mouse
- d) Corn
- e) Cow

Q4. The first draft of the human genome was complete in which of the following time periods?

- a) 1900s
- b) 1910s
- c) 1950s
- d) 2000s
- e) 2010s

Q5. In isolation of DNA for manipulation, alcohol is used to perform which of the following functions?

- a) To create short pieces of RNA and ribonucleotides
- b) To separate intracellular structures from membrane structures
- c) To allow DNA to fall out of the aqueous phase
- d) To allow destruction of the cell membrane
- e) To allow destruction of protein debris

Q6. Which of the following may be appropriate for separating very small pieces of DNA molecules?

- a) Polyvinilydine membrane
- b) Ethidium bromide
- c) Agarose gel
- d) 0.2 micrometer sieve
- e) Polyacrylamide gel

Q7. Which of the following techniques would be used to determine how closely DNA from two different sources are related?

- a) Southern blotting
- b) Northern blotting
- c) Gel electrophoresis
- d) Mass spectrometry
- e) Western blotting

Q8. In the chemical structure of nucleic acids, the Z-form of DNA is a left-handed helix containing which of the following?

- a) 6 base pairs per turn
- b) 8 base pairs per turn
- c) 10 base pairs per turn
- d) 12 base pairs per turn
- e) 14 base pairs per turn

Q9. Which of the following is a eukaryotic centromere sequence that keeps a plasmid in the correct location during mitosis and meiosis in yeast?

- a) A transposon
- b) A cen sequence
- c) A shuttle sequence
- d) A telomere
- e) A lambda sequence

Q10. Which of the following techniques may be used to find genes that are missing from a given individual?

- a) Cloning
- b) Transformation
- c) Pulse field gel electrophoresis
- d) Gradient gel electrophoresis
- e) Subtractive hybridization

Q11. Which of the following is the right time for injecting transgenes into fertilized eggs in the process of creating transgenic animals?

- a) Just before fusion of the male and female pronuclei
- b) Just after fusion of the male and female pronuclei
- c) One day after fusion of the male and female pronuclei
- d) Two days after fusion of the male and female pronuclei
- e) Just after the first division of the fertilized egg cell

Q12. Targeting of transgenes to specific locations requires which of the following processes?

- a) Random integration
- b) Heterologous integration
- c) Heterologous recombination
- d) Homologous recombination
- e) Heterochromatin integration

Q13. Which of the following describes any genetic element that can hold any piece of foreign DNA for further manipulation?

- a) A chromosome
- b) A cistron
- c) A plasmid
- d) A cloning vector
- e) A recombinant DNA

Q14. Which of the following cell types are preferentially infected by HIV?

- a) Cells carrying CD4 molecules
- b) Cells carrying CD8 molecules
- c) Cells carrying TCR molecules
- d) Cells carrying MHC molecules
- e) Cells carrying BCR molecules

Q15. Tandemly repeated genes may code for which of the following?

- a) Introns
- b) Cistrones
- c) Histones
- d) Exones
- e) mRNAs

Q16. The field of nanotechnology opened up in response to the development of which of the following instruments?

- a) Light microscope
- b) Electron microscope
- c) Fluorescence microscope
- d) Scanning probe microscope
- e) Light and electron microscope

Q17. Silver nanocrystals may be assembled by which of the following organisms?

- a) Pseudomonas bacteria
- b) Staphylococcus bacteria
- c) Escherichia bacteria
- d) Nieceria bacteria
- e) Streptococcus bacteria

Q18. Carbon nanotubes are cylinders of pure carbon with diameters ranging from

- a) 1 to 50 nm
- b) 100 to 150 nm
- c) 200 to 300 nm
- d) 300 to 400 nm
- e) 500 to 600 nm

Q19. The conductivity of nanotubes is dependent on which of the following factors?

- a) Materials of the tube (whether metals or non-metals)
- b) Diameter and torsion
- c) 3D structure of the tubes
- d) Color of the tubes
- e) Texture of the tubes

Q20. In the structure of nucleic acids, each phosphate connects two sugars through which of the following interactions?

- a) Disulfide bonds
- b) Phosphodiester bonds
- c) Hydrogen bonds
- d) Peptide bonds
- e) Van der waals forces

Q21. An attometer is equivalent to which of the following measurements?

- a) Radius of a proton
- b) Size of a typical virus
- c) Radius of an atom
- d) Molecular diameter of water
- e) One turn of a DNA double helix

Q22. Which of the following amino acids is used to make "handles" that DNA molecules can be attached to control change of protein shape?

- a) Glycine
- b) Histidine
- c) Cysteine
- d) Serine
- e) Arginine

Q23. The aim of nanoengineering of DNA is to

- a) Produce specific proteins of interest
- b) Advance cloning of animals including humans
- c) Make structures using DNA molecules
- d) Manipulate genetic information
- e) Produce DNA vaccines

Q24. Nucleoside analogs work by which of the following mechanisms to antagonize viral infections?

- a) Preventing attachment by binding to receptors
- b) Preventing viral entry into host cells
- c) Preventing viral assembly
- d) Preventing virion release from host cells
- e) Preventing DNA replication

Q25. Interferons work against viral infections by using which of the following mechanisms?

- a) Preventing gene expression
- b) Preventing reverse transcription
- c) Preventing viral attachment
- d) Preventing viral entry to host cells
- e) Preventing viral release from host cells.

Q26. Natural resistance to AIDS results from defects in

- a) CD8 molecules
- b) TCR molecules
- c) BCR molecules
- d) CCR5 molecules
- e) MHC molecules

Q27. Which of the following best describes kuru?

- a) A disease of sheep and goats
- b) A disease of cannibals
- c) A slow infectious disease of the nervous system caused by infectious prions
- d) A disease of the poor
- e) A systemic disease caused by an accumulation of proteins

Q28. Which of the following describes the concept that genes are made of DNA which are expressed as an RNA intermediate and decoded to proteins?

- a) One gene one polypeptide
- b) Central dogma of genetics
- c) Gene expression
- d) Expression of proteins
- e) Paradigm of gene expression

Q29. Which of the following techniques is used to detect pathogenic prions?

- a) Mass spectrometry
- b) Nuclear magnetic resonance
- c) Protease treatment followed by western blotting
- d) Electron microscopy
- e) Sequencing

Q30. Which of the following have the advantages of being cheap to prepare, bypass the need to purify antigens, and induce immune responses in localized muscles thereby avoiding many side effects?

- a) Edible vaccines
- b) Subunit vaccines
- c) DNA vaccines
- d) Protein vaccines
- e) Denatured vaccines

Section B

Question 31

- a) Perform gel electrophoreses of proteins (10 marks)
- b) Identify five DNA replication proteins and state their functions (10 marks)

Question 32

- a) Illustrate the process of creating transgenic animals using the standard scenario (15marks).
- b) Explain five uses of nanoparticles (5 marks)