



(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

(MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2017/2018 ACADEMIC YEAR

FOURTH YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DEGREE

OF

BACHELOR OF SCIENCE IN MEDICAL LABORATORY SCIENCES

COURSE CODE: BML 411

COURSE TITLE: MOLECULAR DIAGNOSTICS

EXAM: SUPPLEMENTARY

DATE:

TIME:

INSTRUCTIONS TO CANDIDATES

This paper is divided into three sections, A, B and C, carrying respectively: carrying respectively: Multiple Choice Questions (MCQ), short answered Questions (SAQs) and Long Answer (LAQs). Answer all Questions.

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating.

This paper consists of 6 printed pages. Please Turn Over.

SECTION A: Answer ALL Questions in this Section [20 Marks]

1. Nucleoside is a pyrimidine or purine base
 - A. covalently bonded to a sugar
 - B. ionically bonded to a sugar
 - C. hydrogen bonded to a sugar
 - D. none of the above

2. A 48 year-old woman presents with breast tenderness and nipple discharge for the past 2 months. An ultrasound examination reveals cystic degeneration and the presence of focal calcifications in her right breast. A fine needle aspirate is performed in the mammography suite, and subsequent testing reveals the presence of HER2 gene amplification. **Which of the following methodologies was most likely utilized to obtain this result?**
 - A. ELISA
 - B. FISH
 - C. PCR
 - D. Southern Blot
 - E. Western Blot

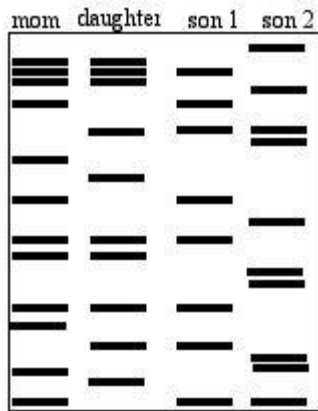
3. A quality assurance project in the laboratory reveals that over 90% of specimens submitted for polymerase chain reaction (PCR) testing for an uncommon organism were reported as positive in the past month. **Which of the following is the most likely reason for this observation?**
 - A. Increased prevalence of gene mutations in the organism
 - B. Mislabeling of specimens submitted
 - C. Reporting errors in the laboratory information system
 - D. Specimen cross contamination
 - E. Technical errors in test performance

4. For isolating DNA from plants the most suitable method is
 - A. CTAB
 - B. SDS-phenol extraction
 - C. SDS-proteinase K treatment
 - D. All of these

5. Which of the following reagents is used for precipitating DNA?
- A. Isopropanol
 - B. Ethanol
 - C. Both A and B.
 - D. None of these
6. Which of the following reagents is used in quantifying DNA?
- A. Chloroform
 - B. CTAB
 - C. Dansyl chloride
 - D. Diphenylamine
7. This DNA fingerprint is being viewed with a special light. In order to see DNA on in an agarose gel, the samples must first be treated with a _____ "tag" that matches to special sequence of nucleotides



- A. Name
 - B. Flag
 - C. Fluorescent
 - D. Radioactive
8. DNA has a _____ charge
- A. Positive
 - B. Opposite
 - C. Negative
 - D. Attractive
9. In a talk-show scandal, it is revealed that one of three siblings has a different father. GASP! Using the DNA fingerprint of just the mother, daughter and two sons, which sibling has a DIFFERENT father.



- A. Daughter
 - B. Daughter
 - C. son 2
 - D. All have the same father
10. The p53 protein normally promotes
- A. DAN replication
 - B. Cell division
 - C. Tumour formation
 - D. Apoptosis
11. A 44-year-old man is worried about colon cancer because his sister was diagnosed with colon carcinoma at age 46. His aunt died from endometrial carcinoma at age 40. He is offered genetic testing. **Which of the following is the greatest risk to him with performance and reporting of these tests?**
- A. Inability to obtain insurance
 - B. Increased risk for colon cancer
 - C. Radiation-induced carcinoma
 - D. Separation from his spouse
12. Fearing that the child to be born may have a genetic disorder, a couple goes to a doctor. Which one of the techniques will be suggested by the doctor cure genetic disorder?

- A. Hybridoma technology B. Gene therapy
C. ELISA D. DNA finger printing
13. The work 'Hybridization' in DNA finger printing means
- A. Pairing between the nucleotides of DNA sample with probe
 - B. Pairing between the nucleotides of DNA and mRNA
 - C. Pairing between the nucleotides of probe with mRNA
 - D. Pairing between the nucleosides with mRNA
14. Ribozymes are:
- A. Enzymes with catalytic activity
 - B. RNAs with catalytic activity
 - C. Proteins with catalytic activity
 - D. Nucleic acids with catalytic activity
15. Which of the following is **NOT** an essential attribute that a biological molecule would need to be a useful genetic material?
- A. It must carry all of the information needed to direct the specific organization and metabolic activities of the cell
 - B. It must replicate accurately so that the information it contains is precisely inherited by the daughter cells
 - C. It must be capable of undergoing occasional mutations, such that the information it carries is altered in a heritable way
 - D. It must have highly repetitive DNA sequences.
16. Chromatin has
- A. DNA
 - B. DNA and Proteins
 - C. DNA, RNA and Proteins
 - D. None of these
17. Fearing that the child to be born may have a genetic disorder, a couple goes to a doctor. Which one of the techniques will be suggested by the doctor cure genetic disorder?
- A. Hybridoma technology B. Gene therapy
 - C. ELISA D. DNA finger printing

18. Those mutations that occur by environmental damage or mistakes during DNA replications are
- A. Acquired mutations
 - B. Inherited mutations
 - C. A and B
 - D. Non-of them
19. Proto-oncogene in normal cells
- A. Code for proteins involved in the stimulus of cell division
 - B. Suppresses progression through the cell cycle in response to DNA damage
 - C. Initiates apoptosis
 - D. Non-of the above
20. During the recent tsunami disaster a child was separated from its parents in Srilanka. Later with the help of a technique the child was made to reunite with its true parents. The technique is
- A. DNA finger printing
 - B. Gene therapy
 - C. Tissue culture
 - D. Hybridoma technology

SECTION B: Answer ALL Questions in this Section [40 Marks]

21. Define the following terminologies as used in Biotechnology [6 Marks]
- a) Gene library
 - b) Recombinant DNA
 - c) Cloning vector
22. With specific examples, explain restriction endonucleases [5 Marks]
23. Outline the factors that need to be considered in designing a probe? [5 Marks]
24. Describe the steps needed in performing PCR if the target nucleic acid is RNA? [6 Marks]
25. Explain the characteristics of DNA's structure that contribute most to the 'melting point' determination [6 Marks]
26. Explain the application of gel electrophoresis in molecular diagnostics [6 Marks]
27. State the ethical considerations in molecular diagnostics [6 Marks]

Section C: Answer ANY Two Questions from this Section [40 Marks]

28. Describe the construction of a genomic library and state its applications in Molecular Diagnostics. [20 Marks]
29. Discuss cDNA cloning. [20 Marks]
30. With specific examples, explain Fluorescence Insitu Hybridization(FISH) [20 Marks]