



Technical University of Mombasa

Faculty of Applied and Health Sciences

DEPARTMENT OF MEDICAL SCIENCES
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF MEDICAL
LABORATORY SCIENCES

AML 4211: MOLECULAR BIOLOGY AND GENETICS

SPECIAL/SUPPLEMENTARY EXAMINATION

FEBRUARY 2013 SERIES

2 HOURS

Instructions to candidates:

This paper consist of **TWO** sections **A** and **B**

Section A –Contains MCQS, any wrong response will be penalised. Answer **ALL** questions in **Section B**.

SECTION A – MCQs – (30marks)

1. The sequence of one strand of DNA is 5' CGTAT 3'. The sequence of complementary strand would be?
 - a) 5'GCATA 3'
 - b) 5'GCTU3'
 - c) 5'ATCTCA 3'
 - d) 5'ATACG 3'

2. What would be the dimensions of the punnet square for the cross Ww X Ww
 - a) 4 x 4
 - b) 2 x 2
 - c) 2 x 1
 - d) 1 x 1

3. If the molar amount of G in a DNA sample is 20%, what is the molar amount of T in the sample?
 - a) 20%
 - b) 30%
 - c) 40%
 - d) 60%

4. Northern blotting is used for separation of
 - a) DNA
 - b) mRNA
 - c) Protein
 - d) Protein-DNA interactions

5. Which of the following genotypes causes klinefelter syndrome?
 - a) XO
 - b) XX
 - c) XXY
 - d) XYY

6. When you notice that someone has unusually blue eyes, you're noticed their
 - a) Phenotype
 - b) Genotype
 - c) Allele
 - d) Hybridization

7. How many hydrogen bonds form between T and A in a Watson-crick pair interactions?
- a) 3
 - b) 2
 - c) 1
 - d) 0
8. Which of the following enzyme is required for end to end joining of DNA
- a) DNA POI I
 - b) DNA POI III
 - c) RNA Polymerase
 - d) DNA Ligase
9. Which of the following techniques is used for the detection of gene of interest
- a) Southern Blotting
 - b) DNA fool printing
 - c) Polymerase chain reaction
 - d) Northern blotting
10. Which of the following sugar is found in RNA?
- a) 2-deoxy Ribose
 - b) 3-deoxy ribose
 - c) D-Ribose
 - d) D-Xylulose
11. Out of the following, one class of RNA characteristically contains unusual
- a) tRNA
 - b) rRNA
 - c) mRNA
 - d) 16s RNA

12. The melting temperature of DNA is the temperature where
- a) DNA anneals to DNA
 - b) DNA denatures into single strands
 - c) DNA is degraded
 - d) RNA binds to the ribosome
13. If a piece of DNA breaks off a chromosome and attaches itself to a nonhomologous chromosome at another location, what type of change has occurred?
- a) Translocation
 - b) Duplication
 - c) Deletion
 - d) Inversion
14. Which is true of the melting temperature of G-C pairs compared to A-T pairs in DNA?
- a) The T_m are equal
 - b) T_m of G-C is less than T_m of A-T
 - c) T_m of G-C is greater than the T_m of A-T
 - d) None of the above
15. All of the following are used in PCR except
- a) Taq polymerase
 - b) Restriction enzymes
 - c) Oligonucleotide primers
 - d) Deoxynucleoside triphosphates

16. The following are features of DNA replication except:
- a) Semi-conservative
 - b) Semi-discontinuous
 - c) Unidirectional
 - d) Chain growth in the 5' → 3' direction
17. Which of the following statements is true?
- a) An allele is either dominant or recessive, not in between
 - b) A particular gene can have only two alleles
 - c) A single trait can be affected by many different genes
 - d) The environment is irrelevant to gene expression
18. Which of the following about base pairing in DNA is false?
- a) Purine pair with pyrimidines
 - b) Adenine pairs with Thymine
 - c) Guanine pairs with adenine
 - d) Cytosine pair with guanine
19. All are true for DNA polymerase except one
- a) Has exonuclease activity
 - b) Works only in 5' to 3' direction
 - c) Edits nucleotide sequence
 - d) Synthesizes RNA primer to initiate DNA synthesis
20. Which of the following result is provided by Western Blot analysis
- a) Detects DNA molecules
 - b) Detects protein molecules
 - c) Detects RNA molecules
 - d) Determines Chromosomal structure

21. Which of the following would have the same base sequencing in their DNA?
- a) A mole parent and his mole offspring
 - b) A female parent and her offspring
 - c) Siblings
 - d) Identical twins
22. The RNN primer is removed from Okazaki fragments by:
- a) DNA polymerase
 - b) DNA ligase
 - c) Primase
 - d) RNA polymerase
23. Why are there more males with colour blindness than females?
- a) The gene for colour blindness is found in Y chromosome
 - b) The recessive gene is usually masked by another X chromosome in females
 - c) Colour blindness is a X-linked dominant trait
 - d) All the sons of an affected male will have the disorder
24. One map unit or centimorgan represents
- a) 1% recombination frequency
 - b) 10% recombination frequency
 - c) 2% recombination frequency
 - d) 50% recombination frequency
25. Turner syndrome in females has the genotype
- a) XXY
 - b) XO
 - c) XYY
 - d) XOY

26. Which of the following disorder is caused by structurally altered chromosome?
- a) Cholera
 - b) HIV
 - c) Chronic myelogenous leukemia
 - d) Malaria
27. The condition where pairs of homologous chromosomes do not separate normally during meiosis is called?
- a) Nondisjunction
 - b) Annealing
 - c) Duplication
 - d) Tight junction
28. Which of the following characteristics was not associated with fruit flies during Morgan's genetic studies
- a) Produce many offspring
 - b) Have only four pairs of chromosomes
 - c) A generation can be bred every two weeks
 - d) Can self-fertilize
29. In genetics genome is defined as?
- a) Organisms with one gene copy
 - b) Organisms with two gene copy
 - c) One of several forms of a gene
 - d) Collection of all genes in an organism

30. The Austrian monk who is referred to as the “father of genetics” is:

- a) Aristotle
- b) Gregor Mendel
- c) Oswald Avery
- d) Rosalind Franklin

SECTION B – (40marks) Answer ALL questions

- 1. Briefly describe steps involved in the polymerase chain reaction. **(10marks)**
- 2. Explain the FOUR changes as a result of chromosome breakage **(10marks)**
- 3. Describe steps involved in the DNA fingerprinting **(10marks)**
- 4. Explain the main characteristics of Ribonucleic Acid (RNA) **(10marks)**