



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF MEDICAL SCIENCES

UNIVERSITY EXAMINATION FOR:

BMLS

AML 4315 : MOLECULAR BIOLOGY AND CLINICAL GENETICS

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 1

Q1. Which of the following is characterized by blindness, seizures, paralysis, and early death?

- a) Cystic fibrosis
- b) Tay Sachs Disease
- c) Glaucoma
- d) Cataracts
- e) Galactosemia

Q2. The following comprise of eukaryotic cells except?

- a) Animals
- b) Plants
- c) Fungi
- d) Archaea
- e) Protists

Q3. Which of the following DNA contains histones?

- a) Bacteria
- b) Yeast
- c) Viruses
- d) Protists
- e) Plasmids

Q4. The study of all transcripts that an organism makes in a specific time period is called

- a) Proteomics
- b) Translation
- c) Proteome
- d) Translatome
- e) Transcriptomics

Q5. What would be the genotype of a male that has a sex-linked recessive trait and do not express it if “A” is dominant and “a” is recessive?

- a) $X^A Y$
- b) $X^a Y$
- c) XY^A
- d) XY^a
- e) $X^A Y^A$

Q6. To identify a vector in a host, vectors contain which of the following?

- a) Selectable markers
- b) Replication origin
- c) Multiple cloning sites
- d) Circular DNA
- e) Insert

Q7. The *Bam*HI enzyme was obtain from which of the following enzymes?

- a) *Bacillus amyloquifaciens*
- b) *Haemophilus influenza*
- c) *Streptomyces albus*
- d) *Brevibacterium albidum*
- e) *Escherichia coli*

Q8. Which of the following is a method of capturing an image of radioactive materials on film?

- a) Probing
- b) Hybridization
- c) Autoradiography
- d) FISH
- e) Electrophoresis

Q9. Which of the following is the function of type I topoisomerase?

- a) To replicate DNA molecule
- b) To prevent annealing of the DNA molecule during replication
- c) To create isomers of the DNA molecules
- d) To cut DNA molecules into fragments
- e) To relax negative supercoiled DNA molecules

Q10. The following is another name of post-transcriptional gene silencing except

- a) Gene silencing
- b) RNA silencing
- c) RNA interference
- d) Co-suppression
- e) Quelling

Q11. Which of the following is the second step in a given cycle when performing PCR?

- a) Annealing
- b) Heating
- c) Denaturation
- d) Extension
- e) Amplification

Q12. Which of the following is more advanced than prokaryotic cells?

- a) Archaea
- b) Viridae
- c) Eukaryae
- d) Plasmids
- e) BACs

Q13. The following can be template samples for PCR except?

- a) Egyptian mummies
- b) Extinct organisms
- c) Inanimate objects
- d) Buccal swabs
- e) Insects in amber

Q14. Which of the following is an ideal primer length?

- a) 8 to 10 bp
- b) 18 to 30 bp
- c) 42 to 50 bp
- d) 55 to 60 bp
- e) 99 to 65 bp

Q15. Which of the following does not optimize PCR products?

- a) T_m temperature not more than 60 degree centigrade
- b) Primers ending in G or C
- c) GC content of 40 to 60%
- d) Primers ending in CG
- e) Primer length greater than 30

Q16. Which of the following is true of sex-linked traits?

- a) They are mostly dominant traits
- b) They determine the sex of an individual
- c) They are produced by genes only on the X chromosome
- d) They are produced by genes only on the Y chromosome
- e) They are produced by genes on the X and Y chromosomes

Q17. Random mating is archived in which of the following sexual population?

- a) Humans
- b) Cattle
- c) Cats
- d) Whales
- e) Sea urchin

Q18. Polyploidy is common in which of the following individuals?

- a) Humans
- b) Plants
- c) Animals
- d) Fruit flies
- e) Viruses

Q19. Which of the following frequency of recombination will be observed for genes located on different chromosomes?

- a) 20%
- b) 30%
- c) 40%
- d) 50%
- e) 60%

Q20. Which of the following was the first to associate a specific gene with a specific chromosome?

- a) Walter Sutton
- b) Theodor Boveri
- c) Mary Lyon
- d) Hunt Morgan
- e) Gregory Mendel

Q21. Which of the following is not a chromosomal system that offers a mechanism of determining sex?

- a) Z-W system
- b) X-O system
- c) X-Y system
- d) Haploid-diploid system
- e) X-T system

Q22. In humans, the anatomical signs of sex first appear when the embryo is about?

- a) One month old
- b) Two months old
- c) Three months old
- d) Four months old
- e) Five months old

Q23. Which of the following is the site for synthesis of sex hormones?

- a) Gonads
- b) Liver
- c) Spleen
- d) Hypothalamus
- e) Kidney

Q24. Which of the following represents the Turner Syndrome?

- a) 45, X
- b) 45, XXY
- c) 47, XXX
- d) 47, XXY
- e) 45, Y

Q25. Which of the following is Charles Darwin's theory?

- a) Cells come from other cells
- b) Species give rise to other species
- c) Species are the basic unit of life
- d) Cells are the basic unit of life
- e) All cells must die at some point in time

Q26. Which of the following refers to the presence of more than one allele in more than 1% of the population?

- a) Frequent genes
- b) Heterozygous genes
- c) Homozygous genes
- d) Polymorphic genes
- e) Allelic genes

Q27. The following are necessary conditions for Hardy-Weinberg equilibrium to be true except?

- a) No new mutations
- b) No selection
- c) No random mating
- d) Very large population
- e) No migration

Q28. An initial genetic message THE FAT CAT ATE THE RAT changes to THE FAT ATE THE RAT. This type of change is referred to as

- a) Substitution
- b) Insertion
- c) Deletion
- d) Duplication
- e) Inversion

Q29. Huntington's disease is an example of which of the following disorders?

- a) Autosomal dominant disorder
- b) Autosomal recessive disorder
- c) Sex-linked recessive disorder
- d) Sex-linked dominant disorder
- e) Chromosomal disorder

Q30. The following are advantages of real-time PCR except?

- a) Amplification can be monitored real-time
- b) No post-PCR processing of products
- c) Narrower dynamic range of up to 10,000 fold
- d) Requires 1000 fold less RNA than conventional PCR
- e) Confirmation of specific amplification by melting curve analysis

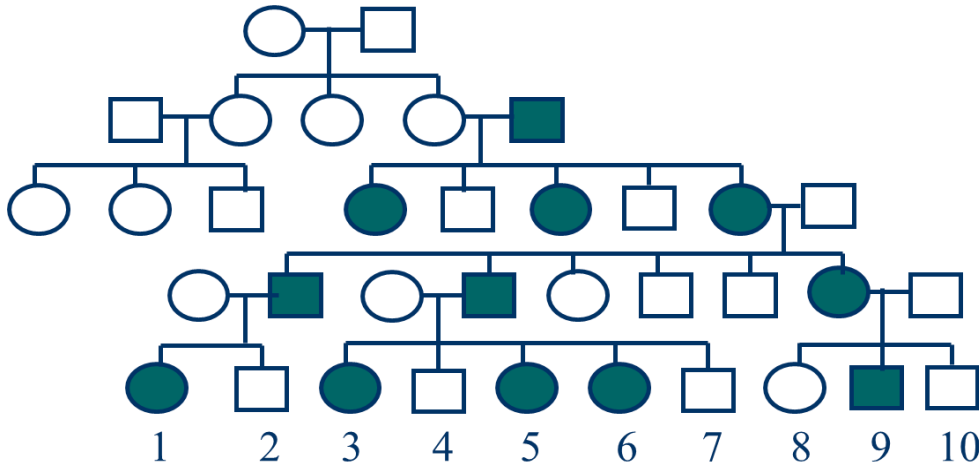
Section B (40 marks)

Question 31

Describe how you would clone and express a given gene (20 marks)

Question 32

- i) Explain the five types of chromosomal mutations (10 marks)
- ii) Study the pedigree with a rare disease below and answer the questions



- a. What is the most likely mode of inheritance? (2 marks)
- b. What would be the outcomes of the cousin marriages 1x9, 1x4, 2x3, and 2x8? (8 marks)