



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 2

Q1. Which of the following particularly overlap with molecular biology?

- a) Genetics and biochemistry
- b) Biology and chemistry
- c) Immunopathology and genetics
- d) Immunology and Biology
- e) First Aid and Blood Transfusion

Q2. Which of the following is a domain of life?

- a) Animalia
- b) Flora and Fauna
- c) Archaea
- d) Plantae
- e) Viridae

Q3. Which of the following is a variant of a DNA sequence at a given locus?

- a) RFLP
- b) Allele
- c) Recessive
- d) RAPD
- e) Gene

Q4. Which of the following enzymes extends the RNA primers during replication of the DNA lagging strand?

- a) RNA polymerase
- b) DNA ligase
- c) Okazaki primase
- d) Primase
- e) DNA polymerase

Q5. The acquisition of new genetic material by incorporation of added exogenous, nonviral DNA by bacteria is called

- a) Restriction
- b) Transformation
- c) Infection
- d) Transfection
- e) Translation

Q6. Which of the following describes a recombinant DNA?

- a) A fragment of DNA that requires a specially engineered vector
- b) A DNA fragment created through transfection
- c) Two or more DNA molecules from different sources joined together
- d) Two or more DNA fragments created by restriction digest
- e) Type III restriction endonucleases created DNA fragments

Q7. Which of the following is a single stranded nucleic acid molecules used to initiate replication of a paired template strand?

- a) RNAi
- b) Primer
- c) rRNA
- d) ddNTP
- e) Reporter probe

Q8. The DNA molecule was first isolated in which of the following time periods?

- a) 1989
- b) 1988
- c) 1985
- d) 1889
- e) 1869

Q9. Invitro amplification of nucleic acids was first achieved using which of the following enzymes?

- a) BamHI restriction enzyme
- b) EcoRI restriction enzyme
- c) E. coli DNA polymerase
- d) Taq DNA polymerase
- e) Taq RNA polymerase

Q10. Which of the following is not a PCR reagent?

- a) $MgCl_2$
- b) $Ca(PO_4)_2$
- c) DNA polymerase
- d) DNA template
- e) Primers

Q11. Which of the following DNA strands is synthesized continuously during replicatio?

- a) Lagging strand
- b) Leading strand
- c) New strand
- d) Semi-conserved strand
- e) Parental strand

Q12. During PCR, an increase in annealing temperature can result in which of the following?

- a) Non-specific binding
- b) Complimentary binding
- c) Reduction in yield
- d) Extension of too many new strands
- e) Optimal quality of products

Q13. The following are PCR virtues except?

- a) High sensitivity
- b) Detection of quantification of specific events
- c) Higher stability
- d) Higher durability
- e) Quantitative and qualitative

Q14. Which of the following is the genotype of an individual with an autosomal recessive trait if “A” is dominant and “a” is recessive?

- a) AA
- b) A
- c) a
- d) Aa
- e) aa

Q15. The appearance of only one X chromosome in males as opposed to two X chromosomes in females is referred to as

- a) homozygosity
- b) heterozygosity
- c) hemizyosity
- d) aneuploidy
- e) polyploidy

Q16. Which of the following is characterized by drastic premature aging of individuals resulting in death by age 13 years?

- a) Porgeria
- b) Neurofibromatosis
- c) Huntington’s disease
- d) Chronic simple Glaucoma
- e) Familial hypercholesterolemia

Q17. Which of the following is not an autosomal dominant disorder?

- a) Dwarfism
- b) Polydactyly
- c) Hypertension
- d) Hereditary edema
- e) Diabetes mellitus

Q18. A cross between an F1 plant and a homozygous recessive plant is called?

- a) Mating
- b) Crossing
- c) Recombination
- d) Test-cross
- e) Offspring

Q19. Which of the following organisms have eight chromosomes making up their genome?

- a) House dust mites
- b) Mice
- c) Rats
- d) Fruit flies
- e) Bacteria

Q20. Which of the following is not true of Down syndrome?

- a) Result from duplication of chromosomes during telophase I
- b) The frequency correlates with age of the mother
- c) Results from non-disjunction during gamete production
- d) Chromosome 21 appears in three copies
- e) The individual's phenotype is altered

Q21. Which of the following is a gamete produced by a parent containing the genotype YyRr?

- a) Y
- b) yR
- c) R
- d) r
- e) y

Q22. Which of the following is a gamete cell?

- a) Zygote
- b) Barr bodies
- c) Egg
- d) Microglial cells
- e) Leydig cells

Q23. Which of the following is a sex determining region?

- a) SRY gene on the X chromosome
- b) ZWH gene on the X chromosome
- c) SRY gene on the Y chromosome
- d) ZWH gene on the Y chromosome
- e) ZWH genes on both X and Y chromosomes

Q24. Which of the following organisms have their sex determined by sociological changes?

- a) Coral reef fish
- b) Cattle
- c) Humans
- d) *Bonellia verdis*
- e) Map turtles

Q25. Which of the following is the fundamental concept in evolutionary theory?

- a) Size
- b) Fitness
- c) Weight
- d) Height
- e) Intelligence

Q26. Which of the following is the main object of study in evolutionary genetics?

- a) Intelligence
- b) Probability of gene inheritance
- c) Frequency of alleles in a population
- d) Reproduction
- e) Interbreeding

Q27. Which of the following implies that any gamete in a population has an equal chance of fertilizing any other gamete including itself?

- a) Allele frequency
- b) Recombination frequency
- c) Gene frequency
- d) Random mating
- e) Fitness

Q28. Which of the following will reduce the number of heterozygotes in a given population?

- a) Assortative mating
- b) Inbreeding
- c) Random mating
- d) Genetic variation
- e) Gene pool

Q29. Which of the following is necessary to keep a species from fragmenting into several different species?

- a) Random mating
- b) Fitness
- c) New mutations
- d) Inbreeding
- e) Migration

Q30. The physical basis of recombination between unlinked genes occurs during which of the following phases?

- a) Metaphase I
- b) Anaphase II
- c) Telophase I
- d) Anaphase I
- e) Metaphase II

Section B (40 marks)

Question 31

Describe how PCR is done (20 marks)

Question 32

- i) Discuss the early and later ideas of inheritance (10 marks)
- ii) Describe Gregor Mendel's laws of inheritance (10 marks)