



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN CELL AND MOLECULAR BIOLOGY

SBC 220: GENETICS II

DATE: MONDAY, 2ND APRIL 2012

TIME: 8.00 A.M. – 10.00 A.M.

INSTRUCTIONS: WRITE ALL YOUR ANSWERS IN THE EXAMINATION ANSWER BOOKLET

Section A: Attempt All Questions each is 1 Mark

1. The following statements are true about epistasis except?
A. the alleles are on same chromosome or may be on different chromosomes
B. form of Genetic interaction between a single locus
C. an allele at one locus suppresses the phenotypic effects of another affecting
D. these interactions affect the same part of the organism
2. If two persons, heterozygous for albinism (a recessive condition), have 5 children, what is the probability that the first four will be normal and the last one albino?
A. 27/256 B. 9/64 C. 81/1024 D. 54/192
3. Marfan's syndrome results from a mutation in the gene coding:
A. Collagen B. elastin C. fibrillin D. keratin
4. Genes occurring in the same chromosome are _____.
A. alleles B. homologous C. Co-dominants D. linked genes
5. The _____ generally do not contain operons
A. Viruses B. Bacteria C. Plants and Animals D. Fungi
6. What is the probability of tossing three pennies at once and getting one head and 2 tails?
A. 1/3 B. 3/8 C. 5/16 D. 2/3
7. Genes may be considered unlinked when _____.
A. are in same chromosome but close
B. only when frequent cross-over occur
C. are in the same chromosome but are far apart
D. are in different chromosomes but close
8. A wild type strain which has all nutrition requirement genes and needs no supplements in growth medium is called
A. auxotroph B. autotroph C. prototroph D. lithotroph
9. Assuming a 1:1 sex ratio case, what is the probability that five children produced by the same parents will consist of three daughters and two sons
A. 3/32 B. 6/16 C. 9/64 D. 5/16
10. Mendel's law of segregation states that
A. Two factors for the same trait separate in the production of gametes

- A. Two factors for the same trait separate in the production of gametes
 B. Two different traits will be inherited independently of each other
 C. Two factors for the same trait may act codominantly
 D. Two factors for the same trait separate one is dominant and one is recessive
11. What genes serve as sex switches in human beings and *Drosophila*?
 A. ZW and XY
 B. Histocompatibility Y antigen
 C. Sex-lethal and testis-determining factor
 D. Y and X
12. What is the chi square value for the of the following would be Mendel's data, on the basis of 3:1 ratio of 794 tall plants and 282 dwarf plants
 A. 0.92 B. 0.75 C. 0.6 D. 0.25
13. In the chi square tests, what would be the degree of freedom for testing seven phenotypes?
 A. 6 B. 8 C. 7 D. 5
14. Which of the statements is not true about Sex-Linked Dominant Inheritance?
 A. Affected males must come from affected mothers.
 B. Trait often skips generations
 C. Affected females come from affected mothers or fathers.
 D. All the daughters, but none of the sons, of an affected father are affected
15. The kind of arrangement of genes in a chromosome as shown below is called?

$$\begin{array}{cc} W & m \\ w & M \end{array}$$

 A. Repulsive B. Coupling C. Locus D. Centi-morgan
16. How many Barr bodies would you see in the nuclei of persons with the following sex chromosomes?
 i. X0 ii. XX iii. XY iv. XXY v. XXX
 A. 1,2,1,2 & 3 respectively
 B. 0,1,0,1 & 2 respectively
 C. 0,0,0,1 & 1 respectively
 D. 1,0,0,1 & 2 respectively
17. _____ is a process in which E. coli F⁺ infers F factor to F⁻, which is partially diploid of two copies of a gene but the rest of the genes remain haploid.
 A. Sex-duction B. Ex-conjugation C. Transformation D. Transduction
18. In special transduction,
 A. Phages carries bacterial chromosomes
 B. Only certain section of the chromosome can be transduced
 C. a pili is formed for the transfer
 D. F⁻ and F factor are induced
19. Which statement is correct about Hfr-C bacterial strain
 A. It originates when F factor integrates into the bacterial chromosome by several cross-over
 B. It can mate with F⁻ and F⁺
 C. When F factor is integrated it can replicate itself several times
 D. In Hfr crossing with F⁻, F⁻ almost never acquires F⁺ phenotype
20. Another way to test the segregation rule is to use the following except?
 A. a cross of organism with a recessive homozygote
 B. P1 crossings
 C. testcross
 D. backcross

Section B: Attempt All Questions Each is 5 Marks

1. Discuss briefly the an epitasis occurrence in *Antirrhinum majus* 5 marks
2. Describe the Sex-Limited and Sex-Influenced Traits 5 marks
3. Mendel self-fertilized a dihybrid plant that had round, yellow peas. In the offspring generation:
 - i. What is the probability that a pea picked at random will be round and yellow?
 - ii. What is the probability that five peas picked at random will be round and yellow?
 - iii. What is the probability that of five peas picked at random, four will be round and yellow, and one will be wrinkled and green?5 marks
Show how you arrive at your answer
4. a. What is the difference between penetrance and expressivity? 2 marks
b. i. What is dosage compensation? 1 mark
ii. Explain how dosage compensation is accomplished 2 marks
5. Describe the lysogenic life cycle of a temperate phage 5 marks
- 6.a. Define coefficient of coincidence 1 mark
b. Describe the life cycle of Life cycle of *Neurospora* 4 marks

Section C: Attempt Any Two Questions Each is 10 marks

1. Discuss the Dominant and Recessive types of inheritance 10 marks
2. a. Find the phenotypic ratio of F₂ in Zea mays corn when two P₁ white varieties AAbb X aaBB are crossed. Show how you arrive at your answer 5 marks
b. Describe two possible mechanisms of the ratio achieved in (2a) above 5 marks
3. Discuss in details, various types of probabilities and their inter-relationship 10 marks
