S.S.R. DEGREE COLLEGE, (AUTONOMOUS)
NIZAMABAD (C.C:5029)
I SEMESTER INTERNAL ASSESSMENT-II EXAMINATIONS
BIOTECHNOLOGY
QUESTION BANK

Unit III: Principles and Mechanism of Inheritance

1. Mendel conducted his famous hybridization experiments on:
a) Fruit flies (Drosophila)
b) Garden pea (Pisum sativum)
c) Snapdragon (Antirrhinum)
d) Maize (Zea mays)
Answer: b) Garden pea (Pisum sativum)

2. The Law of Segregation states that:
a) Alleles for different traits assort independently of each other.
b) In a heterozygote, one allele may conceal the presence of another.
c) During gamete formation, the two alleles for a gene segregate from each other.
d) Hybrids display a blend of parental characteristics.
Answer: c) During gamete formation, the two alleles for a gene segregate from each other.

3. The phenotypic ratio of a monohybrid cross in the F2 generation is:
a) 9:3:3:1
b) 1:2:1
c) 3:1
d) 1:1
Answer: c) 3:1

4. A cross between two individuals resulting in a 9:3:3:1 ratio in the offspring is a:
a) Test cross
b) Monohybrid cross
c) Dihybrid cross
d) Back cross
Answer: c) Dihybrid cross

5. In *Mirabilis jalapa*, a cross between a red-flowered plant (RR) and a white-flowered plant (rr) produces all pink-flowered offspring (Rr). This is an example of:
a) Co-dominance
b) Multiple allelism
c) Incomplete Dominance
d) Epistasis
Answer: c) Incomplete Dominance

6. The MN blood group system in humans, where both M and N antigens are expressed equally, is an example of:
a) Pleiotropy
b) Incomplete Dominance

c) Co-dominance
d) Linkage
Answer: c) Co-dominance

7. When the expression of one gene masks or modifies the effect of another gene, the interaction is called:
a) Penetrance
b) Pleiotropy
c) Epistasis
d) Expressivity
Answer: c) Epistasis

8. A situation where a single gene influences multiple, seemingly unrelated phenotypic traits is known as:
a) Pleiotropism
b) Multiple allelism
c) Penetrance
d) Co-dominance
Answer: a) Pleiotropism

9. The ABO blood group system in humans is a classic example of:
a) Pleiotropy
b) Polygenic inheritance
c) Multiple allelism
d) Genomic imprinting
Answer: c) Multiple allelism

10. In humans, the 'XX' and 'XY' sex chromosomes are responsible for which type of sex determination?
a) ZZ-ZW type
b) XX-XO type
c) Genic balance type
d) XX-XY type
Answer: d) XX-XY type

11. Hemophilia and Color blindness are examples of:
a) Y-linked inheritance
b) Autosomal dominant inheritance
c) X-linked recessive inheritance
d) Mitochondrial inheritance
Answer: c) X-linked recessive inheritance

12. Genes that are located on the Y chromosome and are passed only from father to son are called:
a) Sex-linked genes
b) Holandric genes
c) X-linked genes
d) Autosomal genes
Answer: b) Holandric genes

13. The phenomenon where genes located close to each other on the same chromosome tend to be inherited together is called:

a) Recombination
b) Segregation
c) Linkage
d) Dominance
Answer: c) Linkage

14. The cytological proof of crossing over was provided by:
a) Gregor Mendel
b) Thomas Hunt Morgan
c) Carl Correns
d) Barbara McClintock
Answer: b) Thomas Hunt Morgan

15. Recombination frequency is used to:
a) Determine the number of chromosomes
b) Map the positions of genes on a chromosome
c) Calculate mutation rates
d) Measure gene expression
Answer: b) Map the positions of genes on a chromosome

16. Which of the following is an example of a Y-linked (holandric) trait in humans?
a) Hypertrichosis pinnae auris (Hairy ears)
b) Hemophilia
c) Color blindness
d) ABO blood group
Answer: a) Hypertrichosis pinnae auris (Hairy ears)

17. In birds, the sex determination system is:
a) XX-XY, male heterogamety
b) ZZ-ZW, female heterogamety
c) XX-XO, male heterogamety
d) Genic balance system
Answer: b) ZZ-ZW, female heterogamety

18. Waardenburg syndrome, which can cause hearing loss and changes in pigmentation, is often cited as an example of variable:
a) Penetrance and Expressivity
b) Multiple allelism
c) Co-dominance
d) Epistasis
Answer: a) Penetrance and Expressivity

19. If an individual with the genotype AaBb produces four different types of gametes in equal proportions, it indicates:
a) Complete linkage
b) Incomplete dominance
c) Independent assortment
d) Pleiotropy
Answer: c) Independent assortment

20. The term for the percentage of individuals with a specific genotype who actually show the expected phenotype is:
a) Expressivity
b) Penetrance
c) Dominance
d) Lethality
Answer: b) Penetrance

Unit IV: Biostatistics - Basic Concepts

1. The branch of statistics that deals with data related to living organisms is called:
a) Geostatistics
b) Econometrics
c) Biostatistics
d) Psychometrics
Answer: c) Biostatistics

2. A variable like "Blood Type" (A, B, AB, O) is an example of a:
a) Continuous variable
b) Discrete quantitative variable
c) Qualitative/Categorical variable
d) Ordinal variable
Answer: c) Qualitative/Categorical variable

3. Which sampling method gives every individual in the population an equal chance of being selected?
a) Purposive sampling
b) Quota sampling
c) Random sampling
d) Convenience sampling
Answer: c) Random sampling

4. A diagram that uses rectangular bars to represent the frequency of data in specific intervals is a:
a) Line diagram
b) Pie diagram
c) Histogram
d) Frequency polygon
Answer: c) Histogram

5. The most appropriate diagram to represent the percentage composition of different components is a:
a) Bar diagram
b) Line diagram
c) Scatter plot
d) Pie diagram
Answer: d) Pie diagram

6. The mean of a data set is calculated by:
a) The middle value when data is ordered

b) The sum of all values divided by the number of values
c) The most frequently occurring value
d) The difference between the highest and lowest value
Answer: b) The sum of all values divided by the number of values

7. In a positively skewed distribution, the relationship between mean, median, and mode is:
a) Mean = Median = Mode
b) Mean > Median > Mode
c) Mode > Median > Mean
d) Median > Mean > Mode
Answer: b) Mean > Median > Mode

8. Which measure of dispersion is based on all the values in a dataset?
a) Range
b) Mean Deviation
c) Standard Deviation
d) Both b and c
Answer: d) Both b and c

9. The square of the standard deviation is known as:
a) Variance
b) Standard Error
c) Mean Deviation
d) Coefficient of Variation
Answer: a) Variance

10. The standard error of the mean measures:
a) The variability within the sample
b) The accuracy of the sample mean as an estimate of the population mean
c) The range of the data
d) The skewness of the distribution
Answer: b) The accuracy of the sample mean as an estimate of the population mean

11. If the probability of an event A is P(A), its value can range from:
a) 1 to 100
b) -1 to +1
c) 0 to 1
d) 0 to ∞
Answer: c) 0 to 1

12. A symmetric, bell-shaped distribution that is completely defined by its mean and standard deviation is the:
a) Binomial distribution
b) Poisson distribution
c) Normal distribution
d) Chi-square distribution
Answer: c) Normal distribution

13. The Poisson distribution is typically used for:
a) Modeling the number of successes in a fixed number of trials
b) Modeling the number of events occurring in a fixed interval of time or space

c) Modeling continuous data that is normally distributed
d) Testing the independence of two categorical variables
Answer: b) Modeling the number of events occurring in a fixed interval of time or space

14. The initial hypothesis that a researcher tries to disprove is the:
a) Alternative hypothesis
b) Research hypothesis
c) Null hypothesis
d) Biased hypothesis
Answer: c) Null hypothesis

15. The Student's t-test is most appropriately used when:
a) The sample size is large (n > 30) and the population variance is known.
b) Comparing the means of two small samples when the population variance is unknown.
c) Testing the association between two categorical variables.
d) Testing the goodness-of-fit for a distribution.
Answer: b) Comparing the means of two small samples when the population variance is unknown.

16. The Z-test is typically used when:
a) The sample size is small and the population variance is unknown.
b) The data is not normally distributed.
c) The sample size is large, or the population variance is known.
d) We are comparing more than two group means.
Answer: c) The sample size is large, or the population variance is known.

17. The Chi-square test is used primarily for:
a) Comparing sample means
b) Calculating correlation coefficients
c) Testing hypotheses about categorical data (frequencies)
d) Estimating population variance
Answer: c) Testing hypotheses about categorical data (frequencies)

18. A high value of the calculated Chi-square statistic generally leads to:
a) Acceptance of the null hypothesis
b) Rejection of the null hypothesis
c) Acceptance of the alternative hypothesis
d) No conclusion can be drawn
Answer: b) Rejection of the null hypothesis

19. Which measure of central tendency is most affected by extreme outliers?
a) Mean
b) Median
c) Mode
d) Range
Answer: a) Mean

20. If the p-value obtained from a statistical test is less than the significance level (α=0.05), we:
a) Fail to reject the null hypothesis
b) Accept the null hypothesis
c) Reject the null hypothesis

d) Conclude the test is invalid

Answer: c) Reject the null hypothesis