Principles of Inheritance and Variation

Question 1.
If a genetic disease is transferred from a phenotypically normal but carrier female to only some of the male progeny, the disease is
(a) autosomal dominant
(b) autosomal recessive
(c) sex-linked dominant
(d) sex-linked recessive.
Answer:
(d) sex-linked recessive.

Question 2.
In sickle cell anaemia glutamic acid is replaced by valine. Which one of the following triplets codes for valine ?
(a) GGG
(b) A AG
(c) G A A
(d) GUG
Answer:
(d) GUG

Question 3.
Person having genotype IA IB would show the blood group as AB. This is because of
(a) pleiotropy
(b) co-dominance
(c) segregation
(d) incomplete dominance.
Answer:
(b) co-dominance

Question 4.
ZZ/ZW type of sex determination is seen in
(a) platypus
(b) snails
(c) cockroach
(d) peacock
Answer:
(d) peacock

Question 5.
A cross between two tall plants resulted in offspring having few dwarf plants. What would be the genotypes of both the parents ?
(a) TT and Tt
(b) Tt and Tt
(c) TT and TT
(d) Tt and It
Answer:
(b) TtandTt

Question 6.
In a dihybrid cross, if you get 9 : 3 : 3 : 1 ratio it denotes that
(a) the alleles of two genes are interacting with each other
(b) it is a multigenic inheritance
(c) it is a case of multiple allelism
(d) the alleles of two genes are segregating independently.
Answer:
(d) the alleles of two genes are segregating independently.

Question 7.
Which of the following will not result in variations among siblings ?
(a) Independent assortment of genes
(b) Crossing over
(c) Linkage
(d) Mutation
Answer:
(c) Linkage

Question 8.
Mendel's Law of independent assortment holds good for genes situated on the
(a) non-homologous chromosomes
(b) homologous chromosomes
(c) extra nuclear genetic element
(d) same chromosome.
Answer:
(b) homologous chromosomes

Question 9.
Occasionally, a single gene may express more than one effect. The phenomenon is called
(a) multiple allelism
(b) mosaicism
(c) pleiotropy
(d) polygeny.
Answer:
(c) pleiotropy

Question 10.
In the F2 generation of a Mendelian dihybrid cross the number of phenotypes and genotypes are
(a) phenotypes – 4; genotypes – 16
(b) phenotypes – 9; genotypes – 4
(c) phenotypes – 4; genotypes – 8
(d) phenotypes – 4; genotypes – 9.
Answer:
(d) phenotypes – 4; genotypes – 9.

Question 11.
The colour based contrasting traits in seven contrasting pairs, studied by Mendel in pea plant were
(a) 1

(b) 2
(c) 3
(d) 4
Answer:
(c) 3

Question 12.
_____ pairs of contrasting traits were studied by Mendel in pea plant.
(a) 6
(b) 7
(c) 8
(d) 10
Answer:
(b) 7

Question 13.
Which of the following characters was not chosen by Mendel ?
(a) Pod shape
(b) Pod colour
(c) Location of flower
(d) Location of pod
Answer:
(d) Location of pod

Question 14.
Genes which code for a pair of contrasting traits are known as
(a) dominant genes
(b) alleles
(c) linked genes
(d) none of these
Answer:
(b) alleles

Question 15.
A recessive allele is expressed in
(a) heterozygous condition only
(b) homozygous condition only
(c) F3 generation
(d) both homozygous and heterozygous conditions.
Answer:
(b) homozygous condition only

Question 16.
The characters which appear in the first filial generation are called
(a) recessive characters
(b) dominant characters
(c) holandric characters
(d) lethal characters
Answer:
(b) dominant characters

Question 17.
What will be the distribution of phenotypic features in the first filial generation after a cross between a homozygous female and a heterozygous male for a single locus ?
(a) 3 : 1
(b) 1 : 2 : 1
(c) 1 : 1
(d) None of these
Answer:
(c) 1 : 1

Question 18.
In a monohybrid cross between two heterozygous individuals, percentage of pure homozygous individuals obtained in F_1 generation will be
(a) 25 %
(b) 50 %
(c) 75 %
(d) 100 %
Answer:
(b) 50 %

Question 19.
What is the probability of production of dwarf offsprings in a cross betweeen two heterozygous tall pea plants ?
(a) Zero
(b) 50 %
(c) 25 %
(d) 100 %
Answer:
(c) 25 %

Question 20.
Which of the following crosses will give tall and dwarf pea plants in same proportions ?
(a) TT × tt
(b) Tt × tt
(c) TT × Tt
(d) tt × tt
Answer:
(b) Tt × tt

Question 21.
Which of the following is incorrect regarding ZW – ZZ type of sex determination ?
(a) It occurs in birds and some reptiles.
(b) Females are homogametic and males are heterogametic.
(c) 1:1 sex ratio is produced in the offsprings.
(d) All of these
Answer:
(b) Females are homogametic and males are heterogametic.

Question 22.
A couple has six daughters. What is the possibility of their having a girl next time ?

(a) 10 %
(b) 50 %
(c) 90 %
(d) 100 %
Answer:
(b) 50 %

Question 23.
Number of autosomes present in liver cells of a human female is
(a) 22 autosomes
(b) 22 pairs
(c) 23 autosomes
(d) 23 pairs
Answer:
(b) 22 pairs

Question 24.
Haplodiploidy is found in
(a) grasshoppers and cockroaches
(b) birds and reptiles
(c) butterflies and moths
(d) honeybees, ants and waspe.
Answer:
(d) honeybees, ants and waspe.

Question 25.
Rate of mutation is affected by
(a) temperature
(b) X-rays
(c) gamma rays
(d) all of these.
Answer:
(d) all of these.

Question 26.
Two or more independent genes present on different chromosomes which determine nearly same phenotype are called
(a) supplementary genes
(b) complementary genes
(c) duplicate genes
(d) none of these.
Answer:
(c) duplicate genes

Question 27.
Select the incorrect statement regarding pedigree analysis.
(a) Solid symbols show unaffected individuals.
(b) Proband is the person from which case history starts.
(c) It is useful for genetic counsellors.
(d) It is an analysis of traits in several generations of a family.

Answer:
(a) Solid symbols show unaffected individuals.

Question 28.
To determine the genotype of a tall plant of F_2 generation, Mendel crossed this plant with a dwarf plant. This cross represents a
(a) test cross
(b) back cross
(c) reciprocal cross
(d) dihybrid cross.
Answer:
(a) test cross

Question 29.
Which of the following is a test cross ?
(a) TT × TT
(b) Tt × Tt
(c) tt × tt
(d) Tt × tt
Answer:
(d) Tt × tt

Question 30.
Mendal formulated the law of purity of gametes on the basis of
(a) monohybrid cross
(b) dihybrid cross
(c) test cross
(d) back cross.
Answer:
(a) monohybrid cross

Question 31.
The inheritance of flower colour in Antirrhinum (dog flower) is an example of
(a) incomplete dominance
(b) co-dominance
(c) multiple alleles
(d) linkage.
Answer:
(a) incomplete dominance

Question 32.
In Antirrhinum (dog flower), phenotypic ratio in F_2 generation for the inheritance of flower colour would be
(a) 3 : 1
(b) 1 : 2 : 1
(c) 1 : 1
(d) 2 : 1
Answer:
(b) 1 : 2 : 1

Question 33.
Phenotypic and genotypic ratio is similar in case of
(a) complete dominance
(b) incomplete dominance
(c) over dominance
(d) epistasis.
Answer:
(b) incomplete dominancec

Question 34.
What can be the blood group of offspring when both parents have AB blood group ?
(a) AB only
(b) A, B and AB
(c) A, B, AB and O
(d) A and B only
Answer:
(b) A, B and AB

Question 35.
Inheritance of roan coat in cattle is an example of
(a) incomplete dominance
(b) codominance
(c) multiple allelism
(d) none of these
Answer:
(b) codominance

Question 36.
ABO blood grouping in human beings cites the example of
(a) incomplete dominance
(b) co-dominance
(c) multiple allelism
(d) both
(b) and (c)
Answer:
(b) and (c)

Question 37.
In mice, Y is the dominant allele for yellow fur an y is the recessive allele for grey fur. Since Y is lethal when homozygous, the result of cross Yy × Yy will be
(a) 3 yellow : 1 grey
(b) 2 yellow : 1 grey
(c) 1 yellow : 1 grey
(d) 1 yellow : 2 grey
Answer:
(b) 2 yellow : 1 grey

Question 38.
How many types of gametes can be produced by a diploid organism who is heterozygous for 4 loci ?

(a) 4
(b) 8
(c) 16
(d) 32
Answer:
(c) 16

Question 39.
Which of the following is correct for the condition when plant YyRr is back crossed with the double recessive parent ?
(a) 9 : 3 : 3 : 1 ratio of phenotypes only
(b) 9 : 3 : 3 : 1 ratio of genotypes only
(c) 1 : 1 : 1 : 1 ratio of phenotypes only
(d) 1 : 1 : 1 : 1 ratio of phenotypes and genotypes
Answer:
(d) 1 : 1 : 1 : 1 ratio of phenotypes and genotypes

Question 40.
Law of independent assortment can be explained with the help of
(a) dihybrid
(b) test cross
(c) back cross
(d) monohybrid cross
Answer:
(a) dihybrid

Question 41.
Mendel's work was rediscovered by three scientists in the year
(a) 1865
(b) 1900
(c) 1910
(d) 1920
Answer:
(b) 1900

Question 42.
Which three scientists independently rediscovered Mendel's work ?
(a) Avery, McLeod, McCarty
(b) Sutton, Morgan and Bridges
(c) Bateson, Punnet and Bridges
(d) de Vries, Correns and Tschemark
Answer:
(d) de Vries, Correns and Tschemark

Question 43.
Chromosomal theory of inheritance was given by
(a) Morgan et al
(b) Sutton and Boveri
(c) Hugo deVries
(d) Gregor J. Mendel

Answer:
(b) Sutton and Boveri

Question 44
Experimental verification of 'chromosomal theory of inheritance' was done by
(a) Sutton and Boveri
(b) Morgan et al
(c) Henking
(d) Karl Correns.
Answer:
(b) Morgan et al

Question 45.
Genes located very close to one another on same chromosome tend to be transmitted together and are called as
(a) allelomorphs
(b) identical genes
(c) linked genes
(d) recessive genes
Answer:
(c) linked genes

Question 46.
What is true about the crossing over between linked genes ?
(a) No crossing over at all
(b) High percentage of crossing over
(c) Hardly any crossing over
(d) None of these
Answer:
(c) Hardly any crossing over

Question 47.
Chromosome maps/genetic maps were first prepared by
(a) Sutton and Boveri (1902)
(b) Bateson and Punnett (1906)
(c) Morgan (1910)
(d) Sturtevant (1911)
Answer:
(d) Sturtevant (1911)

Question 48.
The distance between the genes is measured by
(a) angstrom
(b) map unit
(c) Dobson unit
(d) millimetre
Answer:
(c) Dobson unit

Question 49.
Which of the following is suitable for experiment on linkage ?
(a) aaBB x aaBB
(b) AABB x aabb
(c) AaBb x AaBb
(d) AAbb x AaBB
Answer:
(b) AABB x aabb

Question 50.
Mendel's law of independent assortment does not hold true for the genes that are located closely on
(a) same chromosome
(b) non-homologous chromosomes
(c) X-chromosome
(d) autosomes
Answer:
(a) same chromosome

Question 51.
If linkage was known at the time of Mendel then which of the following laws, he would not have been able to explain ?
(a) Law of dominance
(b) Law of independent assortment
(c) Law of segregation
(d) Law of purity of gametes
Answer:
(b) Law of independent assortment

Question 52.
Which of the following are reasons for Mendel's success ?
(i) Usage of pure lines or pure breeding varieties
(ii) Consideration of one character at a time
(iii) Maintenance of statistical records of experiments
(iv) Knowledge of linkage and incomplete dominance
(a) (i) and (ii) only
(b) (i), (ii) and (iii)
(c) (i) and (iv) only
(d) (ii), (iii) and (iv)
Answer:
(b) (i), (ii) and (iii)

Question 53.
XO type of sex determination and XY type of sex determination are the examples of
(a) male heterogamety
(b) female heterogamety
(c) male homogamety
(d) both (b) and (c)
Answer:
(a) male heterogamety

Question 54.
Grasshopper is an example of XO type of sex determination in which the males have
(a) one X chromosome
(b) one Y chromosome
(c) two X chromosomes
(d) no X chromosome
Answer:
(a) one X chromosome

Question 55.
In XO type of sex determination
(a) females produce two different types of gametes
(b) males produce two different types of gametes
(c) females produce gametes with Y chromosome
(d) males produce gametes with Y chromosome.
Answer:
(b) males produce two different types of gametes

Question 56.
If both parents are carriers for thalassaemia, which is an autosomal recessive disorder, what are the chances of pregnancy resulting in an affected child ?
(a) 25 %
(b) 100 %
(c) No chance
(d) 50 %
Answer:
(a) 25 %

Question 57.
Select the disease which is caused by recessive autosomal genes when present in homozygous conditions.
(a) Alkaptonuria
(b) Albinism
(c) Cystic fibrosis
(d) All of these
Answer:
(d) All of these

Question 58.
Which of the following trait is controlled by dominant autosomal genes ?
(a) Polydactyly
(b) Huntington's chorea
(c) PTC (phenylthiocarbamide) tasting
(d) All of these
Answer:
(d) All of these

Question 59.
Failure of segregation of chromatids during cell division results in the gain or loss of chromosomes, this is called as

(a) euploidy
(b) monoploidy
(c) aneuploidy
(d) polyploidy
Answer:
(c) aneuploidy

Question 60.
Trisomy is represented by
(a) (2n – 1)
(b) (2n – 2)
(c) (2n + 2)
(d) (2n + 1)
Answer:
(d) (2n + 1)

Question 61.
Mongolism is a genetic disorder which is caused by the presence of an extra chromosome number
(a) 20
(b) 21
(c) 17
(d) 23
Answer:
(b) 21

Question 62.
Klinefelter's syndrome is characterised by a karyotype of
(a) XYY
(b) XO
(c) XXX
(d) XXY
Answer:
(d) XXY

Question 63.
This abnormality occurs due to monosomy (2n – 1); the individual has 2n = 45 chromosomes with 44 + XO genotype.
(a) Edward's syndrome
(b) Down's syndrome
(c) Turner's syndrome
(d) Klinefelter's syndrome
Answer:
(c) Turner's syndrome

Question 64.
Females with Turner's syndrome have
(a) small uterus
(b) rudimentary ovaries
(c) underdeveloped breasts

(d) all of these.
Answer:
(d) all of these.

Question 65.
All genes located on the same chromosome
(a) form different groups depending upon their relative distance
(b) form one linkage group
(c) will not from any linkage groups
(d) form interactive groups that affect the phenotype.
Answer:
(b) form one linkage group

Question 66.
Conditions of a karyotype 2n±l and 2n + 2 are called
(a) aneuploidy
(b) polyploidy
(c) allopolyploidy
(d) monosomy.
Answer:
(a) aneuploidy

Question 67.
Distance between the genes and percentage of recontbfnatidnshows
(a) a direct relationship
(b) an inverse relationship
(c) a parallel relationship
(d) no relationship.
Answer:
(a) a direct relationship