Shivaji University, Kolhapur
Question Bank for Mar 2022 (Summer) Examination

Subject Code: **79688** Subject Name: **Botany Paper IX**

Syllabus
SEMESTER V B.Sc. Part- III Botany
CREDITS: 2, LECTURE PERIOD: 3 PER WEEK, MARKS: 40+10
Paper- IX DSE –E25
Genetics and Plant Breeding

Unit 1: Mendelism: Introduction, Definition and Basic terminologies in genetics. 1.2 Principles of inheritance a) Law of Dominance b) Law of Segregation c) Law of independent assortment. 1.3 Gene Interaction-a) Complementary gene interaction b) Supplementary gene interaction.

Unit 2: Linkage and Recombination 2.1 Linkage: Definition, Linkage group, Types, Coupling and Repulsion phase, Significance. 2.2 Recombination (Crossing over): Definition, Types , Mechanism of crossing over, Significance 2.3 Mutation – Definition, Spontaneous and Induced mutation. Types of mutagen Physical and Chemical, Significance.

Unit 3: Chromosomes structure and Variation 3.1 Chromosome structure - Introduction, types (based on position of centromere) 13 3.2 Multiple allelism: Introduction, Definition, Self-incompatibility in plants 3.3 Quantitative inheritance: a) Polygene inheritance- Concept, examples- Kernel colour in wheat, b) Population genetics- Hardy-Weinberg's law. 3.4 Maternal inheritance- Mendelian versus cytoplasmic inheritance, Plastid inheritance in Mirabilis jalappa. 3.5 Alternation in genetic make-up and its significance a) Change in chromosome structure- Deletion, Duplication, Inversion and Translocation. b) Change in chromosome number- Euploidy and Aneuploidy.

Unit 4: Plant Breeding 4.1 Introduction, Definition of plant breeding. 4.2 Aims and objectives of plant breeding 4.3 Methods of plant breeding a) Introduction and acclimatization b) Selection- i) Mass selection ii) Pure line selection iii) Clonal selection c) Hybridization techniques in self and cross pollinated crops. d) Male sterility and its significance e) Mutation breeding- Gamma garden

Question Bank

Q1) Rewrite the following sentences by choosing correct alternatives. **(Each carries 1 mark)**

1) The cross of F_1 individual with its homozygous recessive parent is called……
   A) back cross **B) test cross**
   C) reciprocal cross D) self-cross
2) Alleles are …….
   A) alternate forms of genes B) linked genes
   C) chromosomes that have crossed over D) homologous chromosome
3) The tendency of an offspring to resemble with its parent is known as…….
   A) Variation B) mutation
   C) Heredity D) morphology

4) …… is known as 'Father of Modern Genetics'.
   A) Hugo de Vries B) Carl Correns
   C) Gregor Johann Mendel D) E. Von Tschermak
5) In a Mendelian cross single character controlled by single pair of allele is considered. Such cross is called as ……..
   A) monohybrid cross B) dihybrid cross
   C) trihybrid cross D) final cross
6) The term 'genotype' represents ……
   A) visible character **B) genetic character**
   C) physical character D) morphological character
7) Mendel used …….. plant for his experiments of hybridization.
   A) *Rosa indica* B) *Hibiscus rosa-sinensis*
   C) *Pisum sativum* D) *Gossypium hirsutum*
8) The cross of F_1 individual with either of the parents is known as …..
   A) reciprocal cross B) test cross
   C) forward cross **D) back cross**
9) 'Law of purity of gametes' is also known as …….
   A) Law of dominance B) Law of transformation
   C) Law of segregation D) Law of independent assortment
10) After crossing homozygous tall plant (TT) with dwarf plant (tt), the ratio of F_1 will be ……..
   A) all tall B) all dwarf
   C) 3 tall: 1 dwarf D) 1 tall: 3 dwarf
11) If there is no linkage, then a test cross of heterozygous dihybrid individual will produce ……. phenotypic ratio
   A) 9:3:3:1 B) 1:7:7:1
   C) 7:1:1:7 **D) 1:1:1:1**
12) In a cross between tall and dwarf plants, all F1 progeny appeared as tall plants. This proves …..
   A) Law of dominance B) Law of independent assortment
   C) Law of segregation D) Law of transformation

13) There are 4 pairs of chromosomes in Drosophila, the number of linkage groups in it are ……
   A) 4 B) 5 C) 8 D) 16
14) Linkage results in formation of more number of ……
   A) parental offsprings B) recombinant offsprings
   C) intermediate individuals D) dominant individuals
15) Repulsion and coupling are phases of ……..
   A) mutation B) chaisma C) multiplication **D) linkage**
16) The linkage is directly proportional to the distance ……...
   A) between two genes B) between telomeres
   C) from telomere D) of gene from centromere
17) In coupling phase of linkage the ratio obtained is……
   A) 1:7:7:1 B) 3:4
   C) 7:1:1:7 D) 9:3:3:1
18) The distance between two genes is measured in……unit.
   A) Millimeter B) Centimeter
   C) micron **D) centiMorgan**
19) Linkage groups are equal to …. number of chromosomes

A) haploid B) diploid
C) triploid D) tetraploid

20) Crossing over results in ….
A) mutation B) selection
C) inversion **D) genetic recombination**

21) Morgan used …….. for study of linkage.
A) *Drosophila* B) *Neurospora*
C) *Arabidopsis* D) yeast

22) Phenomenon that works opposite to linkage is ……..
A) segregation B) separation
C) crossing over D) bonding

23) …… linkage groups are present in *Drosophila.*
A) 4 B) 8 C) 14 D) 46

24) …….type of chromosome appears 'V'-shaped during anaphase.
A) Metacentric B) Sub-metacentric
C) Acrocentric D) Telocentric

25) The centromere is that part of the chromosome where ……
A) chromatids are attached B) replication start
C) crossing over occurs D) linkage occurs

26) A chromosome with one very short arm and other very long arm is referred to as ……
A) Metacentric B) Sub-metacentric
C) Acrocentric D) Telocentric

27) In telocentric chromosome, centromere is ……. in position
A) Middle B) sub-median
C) terminal D) sub-terminal

28) The condition wherein a gene is represented by three or more alleles is called …...
A) Mendelism B) linkage
C) multiple allelism D) polyploidy

29) Wheat kernel colour is an example of ……..
A) monogenic inheritance **B) polygenic inheritance**
C) cytoplasmic inheritance D) maternal inheritance

30) Law of population inheritance is also known as …….
A) Mendel's Law B) Griffithii's Law
C) Darwin's Law **D) Hardy Weinberg's Law**

31) Quantitative study of frequency of alleles and genotypes in populations is known as……
A) Evolution **B) Population genetics**
C) Mutation D) speciation

32) According to Hardy Weinberg Law, frequency of alleles in population remains constant if there is ……
A) mutation B) migration
C) natural selection **D) no mutation, migration and natural selection**

33) Wheat is an example of …….
A) haploid plant B) diploid plant
C) allopolyploid plant D) autopolyploid

34) Down's syndrome of human being is due to …… of chromosome.
A) monosomy B) nullisomy
C) trisomy D) tetrasomy

35) Nullisomy is represented by …….

A) 2n – 1 **B) 2n – 2**
C) 2n + 1 D) 2n + 2

36) Mutual exchange of segments between two non-homologous chromosomes is …...
A) deletion B) inversion
C) reciprocal translocation D) duplication

37) Transfer of a fragment of a chromosome to another part of the same or different chromosome is known as …….
A) deletion B) inversion
C) translocation D) duplication

38) Plant breeding is art and science of ……
A) improvement of plants B) nomenclature of plants
C) classification of plants D) mutation of plants

39) The first and basic phase of plant breeding is ……
A) domestication B) hybridization
C) genetic engineering D) distant hybridization

40) Objective of plant breeding includes development of …….
A) high yielding variety B) disease and insect resistant variety
C) nutrient rich variety **D) variety with all desirable characters**

41) Transfer of plants into a new area where they were not being grown before is called ….
A) introduction B) pure selection
C) mass selection D) hybridization

42) The progeny of single, self-pollinated homozygous species is called ……
A) pureline B) hybrid
C) heterozygous D) variant

43) Selection is mainly carries out based on …….characters
A) genotypic **B) phenotypic**
C) anatomical D) reproductive

44) The disadvantage of introduction of plants is ……..
A) entry of diseases B) exchange of established crops
C) import of new crop variety D) easy method to introduce new crops

45) ……. method is useful for breeding of the plants in which viable seeds are not formed.
A) Mass selection B) Pure line selection
C) Clonal selection D) Bulk selection

46) Clonal selection is best suited method for improvement of ……
A) Jowar B) wheat C) maize **D) banana**

47) ---------- is done to avoid the contamination of pollen grains and undesirable cross pollination during hybridization.
A) Tagging B) Emasculation C**) Bagging** D) Crossing

48) Sonalika and Kalyan Sona are high yielding varieties of……
A) Rice B**) Wheat** C) Maize D) Sugarcane

49) Kurfi red variety of potato is developed by ----------
A) natural selection B) mass selection
C) **clonal selection** D) pure line selection

Q2) Attempt the following (Each question carries 8 Marks)

a) State law of segregation and explain it with suitable example.
b) State law of independent assortment and explain with suitable example.
c) Explain supplementary gene interaction with suitable example.
d) Explain complementary gene interaction with suitable example.
e) What is linkage? Explain various types of linkages.
f) What is crossing over? Elaborate mechanism of crossing over.
g) Define mutagen. Explain various types of mutagens.
h) What is mutation? Describe types of mutation based on its origin.
i) State the 'Hardy Weinberg's Law'. Explain the conditions under which a population follows Hardy Weinberg's equilibrium.
j) What is maternal inheritance? Explain plastid inheritance in *Mirabilis jalappa*.
k) Describe in brief any two types of changes in chromosomal structure
l) What is aneuploidy? Describe types and significance of aneuploidy.
m) Describe structure of chromosome. Add a note on types of chromosomes based on position of centromere.
n) Define plant breeding. Explain aims and scope of plant breeding.
o) What is selection? Describe mass selection. Add a note on its advantages.
p) What is hybridization? Explain steps involved in hybridization.
q) Describe methods of improvement in self-pollinated crops.
r) Describe any two methods of crop improvement.

Q3) write short notes on (Each question carries 4 Marks)

1) Mendel's Laws
2) Significance of Mendel's laws
3) Law of dominance
4) Law of segregation
5) Law of independent assortment
6) Complementary gene interaction
7) Supplementary gene interaction
8) Linkage
9) Crossing over
10) Significance of crossing over
11) Physical mutagens
12) Mutagens
13) Significance of mutation
14) Multiple allelism
15) Polygenic inheritance
16) Hardy Weinberg's Law
17) Cytoplasmic inheritance
18) Plastid inheritance
19) Translocation
20) Polyploidy
21) Trisomy
22) Scope of plant breeding
23) Introduction and acclimatization
24) Mass selection
25) Clonal selection
26) Pure line selection

27) Emasculation
28) Backcross
29) Gamma garden
30) Male sterility