UNIVERSITY OF AGRICULTURE, FAISALABAD
Department of Plant Breeding and Genetics

Question Bank for GAT/GRE   **Subject: Plant Breeding and Genetics**

1. In line x tester cross mating is done between:
    a) Males & females   b) Among males   c) Among females   d) All of these
2. Line x tester analysis does not permit mating between:
    a) Males & females   **b) Among males**   c) Among females   d) b and c
3. Line x tester analysis provides information about:
    a) GCA & SCA variances b) GCA & SCA effects c) D & H components   **d) All of these**
4. Productive flowers in sunflower are known as
    a. Ray floret   **b. Disc floret,**   c. Both,   d. Male flower
5. Best quality edible oil available from plants is
    a. Olive oil,   b. Corn oil   c. Sunflower oil   d. Cotton oil
6. Auto polyploidy have been successfully exploited in
    a. Sugar beat   b. Sugarcane   c. Maize   d. Sunflower
7. Drying capacity of oil depends upon
    a. Iodine %   b. Saponification   c. Carbon chain length   d. %age of erusic acid
8. In spermatogenesis, each spermatogonium increases in size to form a
    a. Spermatozoa   b. Spermatid   c. Primary oocyte   **d. Spermatocyte**
9. Who said that "sports" are of no significance in evolution?
    a. Joseph Kolreuter   b. Vavilov   c. Dobzhansky   **d. Darwin**
10. A mature ovule is known as
    a. Endosperm   **b. Seed**   c. Ovary   d. Fruit
11. An alternate form of a gene is known as
    a. Gamete   b. Chromatid   **c. Allele**   d. Locus
12. In human being the blood groups are characterized by
    a. 2 antigens   b. 3 antigens   c. 4 antigens   d. 5 antigens
13. Line x tester cross is a modified form of:
    a. Top cross   b. Polycross   c. Back cross   d. None of these
14. Maximum number of parents can be evaluated for combining ability at a time by:
    a) Diallel cross   b) Partial diallel cross
    c) Line x tester cross   d) Polycross
15. Best quality oil for paint industry is made with the help of vegetable oil
    a. Linn oil   b. Sesame oil   c. Safflower oil   d. Sunflower oil
16. Canola types of brassica originated in
    a. Canada   b. Australia   c. USA   d. China
17. At present number of sugar mills working in Pakistan for extraction of sugar
    a. 80   b. 70   c. 65   d. 68
18. Bt cotton has been evolved through
    a. Bulk method   b. Pedigree   **c. Genetic engineering** d. Mass selection
19. Which of the following are main fruiting branches in cotton
    a. Monopodial   **b. Sympodial**   c. both   d. None
20. Jute fibre is obtained from
    a. Leaves   **b. Stem**   c. Root   d. Flower
21. The adaptation of a plant to changed climate to a new climate is called as
    a. Diversification   b. Introduction   **c. Acclimatization**   d. Competition
22. Type of infertility due to the failure of plants with normal pollen and ovules of set seed due to some physiological hindrance that prevents fertilization is called
    a. Pseudogamy, b. Sterility, **c. In compatibility** , d. Parthenogenisis
23. A good tester should possess:
    a) Brood genetic base   b) Wider adaptability
    c) Low yield potential   **d) All of these**
24. According to the 2nd Law of inheritance the members of all gene pairs assort _____ and form all possible combinations.
    a. Randomly   b. Frequently   c. Independently   d. Simultaneously
25. The individual having genotype TtAa is known as
    a. Monohybrid   **b. Dihybrid**   c. Homologous   d. True breeding

26. The plant *Oenthera* was studied extensively by
    a. Gartner   b. Andrew Knight   c. Rhoad   **d. deVries.**
27. The types of gametes produced by the genotype PpRr will be.
    a. 8   b. 6   **c. 4**   d. 2
28. The types of combinations produced by the cross PpRr x PPRr will be
    a. 10   b. 12   **c. 8**   d. 16
29. A progeny descendent solely by self-pollination from a single homozygous plant is known as
    a. Hybrid   b. Multiline   **c. Pure line**   d. None of these
30. In pedigree selection after hybridization, the selection for the plant is started in
    a. F_1 **b. F_2**   c. F_4 d. F_5
31. Selection leads to
    a. Accumulation of favorable genes   b. Creation of new combination
    c. Both these,   **d. None of these**
32. Genetic variance refers to:
    a) Additive variance   b) Dominance variance   c) Epistatic variance   **d) All of these**
33. Intra allelic (intra locus) interaction refers to:
    a) Complete dominance   b) Incomplete dominance c) Over dominance   **d) All of these**
34. Non-allelic interaction (inter-locus interaction) refers to:
    a) Incomplete dominance b) Complete dominance   c) Over dominance   **d) None of these**
35. In fruit fly the total chromosome number is:
    a. 6   **b.8**   c. 10   d. 12
36. Undifferentiated mass of cells produced *in vitro* is called
    a. Callus   b. Tissue   c. Organ   d. Clone
37. Which international center is responsible for breeding triticale, barley, wheat and corn
    a. ICRISAT   b. ICARDA   c. AVRDC   **d. CIMMYT**
38. Flower contain all four floral organs are known as
    a. Perfect flower   b. Bisexual flower   **c. Complete flower**   d. Incomplete flower
39. Imperfect flowers are always
    a. Complete   **b. Incomplete**   c. Bisexual   d. Unisexual
40. Einkorn wheat has the chromosome number:
    a. 7 chromosome   **b. 7 chromosomes pairs** c. 14 chromosomes pairs   d. 21 chromosomes pairs
41. In a DNA molecule the base cytosine (C) is linked with guanine (G) through
    a. 1 hydrogen bonds   b. 2 hydrogen bonds **c. 3 hydrogen bonds**   d. 4 hydrogen bonds
42. Contemporary theory of evolution was developed by
    a. Mendel   b. Smith   c. Hallet   **d. No one.**
43. The enzyme DNAase degrades
    a. Protein   b. RNA   **c. DNA**   d. Aminoacids
44. Which of the following types of epistasis is fixable?
    a. Additive × additive   b. Additive × dominance   c. Dominance × dominance   d. None of these
45. Important component in plant breeding is to increase genetic variability through
    a. Mutation   b. Polyploidy **c. Hybridization**   d. Genetic engineering
46. Egg and pollen grain after their formation receive genes
    a. One pair   b. Two pair   **c. One of a pair of genes** , d. Three pair of gene
47. The transfer of pollen from anther to stigma is know as
    a. Fertilization **b. Pollination** c. Cross fertilization d. self pollination
48. Additive gene action refers to:
    a. Additive variance b. Additive × additive epistasis **c. a and b**   d. None of these
49. Fixable gene action includes:
    a. Additive variance b. Additive × additive epistasis   **c. a and b** d. Additive × dominance epistasis
50. In the process of protein synthesis the required amino acids are brought into a polypeptide chain by
    a. mRNA   **b. tRNA**   c. rRNA   d. snRNA
51. Union of male and female gametes is known as
    a. Pollination   **b. Fertilization**   c. Double fertilization d. Crossing
52. Fertilization resulting from the union of gametes produced
    a. Autogamy   b. Allogamy   c. Anemophillus   d. Hydrophillus
53. Plant having different alleles in their chromosome is known as
    a. Hemizygous   **b. Hetrozygous**   c. Homozygous   d. Hetrostylous
54. Recessive mutations are uncovered by
    a. Cross fertilization b. Self pollination   **c. Self fertilization** d. Cross pollination

55. A group of cells carrying out the same function is known as
a. Tissue   b. Organ   c. Callus   d. Clone

56 The study of living organisms at the cell level is termed as
a. Histology   **b. Cytology**   c. Biotechnology   d. Ecology

57. The genetic makeup of an individual is called as
a. Phenotype   **b. Genotype**   c. Phenocopy   d. Pleiotropy

58. The phenotypic variation in a population is increased through the process of
a) meiosis   b) linkage   c) mitosis   d) None of these

59 Additive genes show:
a) Lack of dominance   b) Incomplete dominance   c) Complete dominance   d) Over dominance

60. Dominant genes exhibit:
a) Incomplete dominance   b) Complete dominance   c) Over dominance   **d) All of these**

61. Which of the following is predominant in the natural breeding populations?
a) Dominance variance   **b) Additive variance**   c) Epistatic variance   d) Phenotypic variance

62. The study of plant life in relation to its environment is known as
a. Plant Ecology   b. Taxonomy   c. Pathology   d. Physiology

63. Impact of inbreeding depression in self fertilized plant is
a. Expected   **b. None**

64. Plants bear flowers of only one sex on a plant are called
a. Dioecious   b. Monoecious   c. Complete   d. Incomplete

65. Monoecious plants have
a. Separate male and female organs on different plants,   **b. Separate flowers on same plant**
c. Male and female parts in same flower   d. None

66. Type of apomoxis when a cell in the integument divides into an embryo
a. Adventitious embryo   b. Apospory   c. Diplospory   d. Apmoixis

67. Protein synthesis takes place in the part of cell known as
a. Lysosomes   **b. Ribosomes**   c. Mitochondria   d. Centriole

68. When the plants are regenerated *in vitro* through the vegetative parts of the plants is known as
a Cuttings   b. Budding   c. Layering   **d. Tissue culture**

69. In cells the functions of mitochondria is
a. Digestion   **b. Power generation**   c. Respiration   d. Photosynthesis

70. Selection is effective for traits which are governed by:
a. Additive genes   b. Additive × additive epistasis   **c. a and b**   d. Dominant genes

71. In cross pollinated species which of the following breeding methods should be used if there is preponderance of additive gene action?
a) Synthetic breeding   b) Composite breeding   c) Heterosis breeding   **d) a and b**

72. An organism having a pair of identical alleles is called
a. Heterozygous   b. Hemizygous   c. Heterogametic   **d. Homozygous**

73. Corn ear has grain rows
a. Even   b. Odd   c. Mixed   d. none

74. Most appropriate centre of origin of maize is
a. Central America,   b. South America,   c. Paraguay,   d. Mexico

75. Maize plant inflorescence is normally
a. Complete   b. Perfect   c. Dioecious   **d. Monoecious**

76. The re-examination of Darwin's theory in the light of discoveries of gene and chromosomes is known as
a. Neo-Darwinism   b. law of segregation   c. blending inheritance   d. mutation theory

77. The trait which does not express itself in F_1 generation is called
a. Partially dominant   b. Dominant   **c. Recessive**   d. Codominant

78. In DNA molecule Adenine pairs with
a. Proline   b. Guanine   c. Cytosine   **d. Thymine**

79. Type of polyploidy have a chromosome No. other than an exact multiple
a. Euploidy   **b. Aneuploidy**   c. Polyploidy   d. Heteroploidy

80. Nullisomic are
a. 2n-1   **b. 2n-2**   c. 2n +1   d. 2n + 2

81. Seed produced from foundation seed is called
a. Breeder seed   b. Foundation seed   c. Registered seed   **d. Certified seed**

82. One seeded dry fruit with thin pericarp adherent to the seed is called
a. Seed   **b. Caryopsis**   c. Fruit   d. Ovary

83. The tRNA brings the required _____ to ribosomal RNA during the process of protein synthesis
   a. Fatty acid   b. Nitrogen   **c. Amino acid**   d. Phosphate
84. If there is prepondence of non-additive gene action which of the following breeding method should be used:
   a) Mutation breeding   **b) Heterosis breeding** c) Line breeding   d) Backcross
85. Selection is not effective for a trait which is governed by:
   a) Dominance variance   b) Additive × dominance epistasis
   c) Dominance × dominance epistasis   **d) All of these**
86. Compound inflorescence with pediceled flowers usually loose or irregular
   a. Spike   **b. Panicle**   c. Spikelet   d. Disc floret
87. Mature ovary wall around the ovule
   a. Pericarp b. Mesocarp, c. Endocarp, d. Actocarp
88. Flower pollinated by wind is called
   a. Ento mophilous, b. Hydro philous, c. Zoo philous, d. **Anemo phious**
89. Selection is practiced in segregating germination in F_5 or F_6
   a. Single seed descent method, b. Pedigree method, c**. Bulk population method** , d. Double haploid
90. The ratio of genotypic variance to phenotypic variance refers to:
   a) Broad sense heritability   b) Narrow sense heritability
   c) a and b above   d) None of these
91. The DNA that has been made by combining the segments of DNA from two different organisms is termed as
   a. Recombinant DNA   b. Repetitive DNA   c. Clone   d. Ramet
92. Pollination in line seed is accomplished by
   a. Wind, b. Insects, c. Both, **d. None**
93. Peanut belongs to family
   a. Graminneae, b. Malvaceae, c**. Leguminosae,** d. Cruciferae
94. Genome of brassica carinata
   a. AACC, b. AABB, c. AACB, **d. BBCC**
95. A good source of vegetable protein is in
   a. Pulses , b. Maize, c. Wheat, d. All three
96. Fertilization in plants in 1879 was first recognized by
   a. Sutton   b. Hertwig   **c. Strausburger**   d. Von Baer
97. Heritable and non-heritable variation was distinguished by
   a) Mendel b) Wiesmann **c) Johannsen** d) Biffen.
98. Chromosome theory was proposed in the year:
   a. 1902   b.1947   c. 1910   d. 1884
99. Mendel's work was rediscovered by three biologists Tschermak, deVries and Correns in
   a. 1857   b. 1940   **c. 1900**   d. 1865
100. According to blending theory hereditary factors are mixed and give rise to
   a. Phenotype of male **b. Intermediate   phenotype** c. Other than male and female
   d. Phenotype of female
101. Most of the prokaryotes range in size of
   a.1-10 μm   b. 10-100 μm   c. 1-5 μm   d. 50-100 μm
102. The ratio of additive variance to phenotypic variance refers to:
   a) Broad sense heritability   **b) Narrow sense heritability**
   c) Coheritability   d) Repeatability
103. Nicotiana tabacum has 2n chromosome number
   a. 38   b. 40   c. 42   **d. 48**
104. Genome of spring wheat is
   a. AABB,   b. AABBCC,   c. BBCCDD,   **d. AABBDD**
105. In Pakistan spring wheat is growing in
   a. Spring   **b. Winter**   c. Summer   d. Autumn
106. Pollen grain of *T. turgidum* has chromosome No.
   a. 14 ,   b. 7,   c. 21,   d. 42
107. The formula V_g x $\sqrt{V_P}$ x K is used for calculation of:
   a. Genetic gain   **b. Genetic advance** c. Selection differential   d. Selection intensity
108. The formula (G CovX_1 X_2) x 100}/ P Cov X_1X_2 is used for calculation of:
   a. Combining ability   b. Repeatability   **c. Coheritability**   d. None of these
109. High value of genetic advance indicates that the character is governed by:

a. Additive genes   b. Dominant genes   c. Epistatic genes   d. All of these

110. In cotton extra floral nectars are present on
     a. Leaves   b. Steam   **c. Bracts**   d. None
111. Inflorescence of rice is called
     a. Panicle   b. Spike   c. Tassel   d. Spadix
112. Which is the crop is cross pollinated
     a. Finger millet   b. Foxtail millet   c. Proso millet   **d. Pearl millet**
113. Which is the crop is self pollinated
     a. Red clover   **b. Burr clover**   c. White clover   d. None of these
114. Low value of genetic advance indicates that the character is governed by:
     a. Additive genes   **b. Non-additive genes**   c. Epistatic genes   d. a and b
115. High estimates of narrow sense heritability are indicative which gene action:
     a. Additive   b. Dominance action   c. Non-additive gene action   d. Overdominance gene action
116. The chromosomes are organized in the centre on equatorial plate during
     a. Telophase   b. Prophase   **c. Metaphase**   d. Anaphase
117. The gradual replacement of one allele by another one is known as
     a. Quantitative inheritance   b. Qualitative inheritance   **c. Transient polymorphism**   d. Mutation.
118. Chromosomal material duplicates during
     a. Interphase   b. Prophase   c. Diakinesis   d. Metaphase
119. One gene may hide the effect of a second gene when both are present
     a. Complementary action   **b. Masking action**   c. Inhibiting action   d. None of these
120. An abnormal type of fertilization in which male gamete fertilizes an egg
     a. Apogamy   **b. Semigamy**   c. Diplospory,   d. None of these
121. The tissue culture induce mutation are referred to as
     a. Induced mutation,   **b. Somaclonal variation** , c. Mutation,   d. None of these
122. F_1 is crossed back with its parent is called
     a. Back cross,   b. Test cross,   c. Cross,   d. None of these
123. Microspores in the anthers mature into pollen grain. During this maturation each haploid nucleus of microspore divides and ultimately gives rise to
     a. 1 gamete   **b. 2 gametes**   c. 3 gametes   d. 4 gametes
124. The difference between mean phenotypic values of the progeny of selected plants and original population is called:
     a. Genetic advance   b. Genetic gain   **c. Selection differential**   d. None of these
125 The gca variance includes:
     a. Additive variance   b. Additive × additive epistasis   **c. a and b**   d) Dominance variance
126. The petals of a flower are collectively called
     a. Calyx,   **b. Corolla ,**   c. Endroceum,   d. Gyneceium
127. Transfer of pollen grain from anther to stigma called
     a. Fertilization, b. Double fertilization, **c. Pollination** , d. Cross pollination
128. The enlarged basal portion of the pistil in which seed are born
     a. Ovule,   **b. Ovary** ,   c. Stigma,   d. None of these
129. The transfer of pollen from an anther of a flower on one plant to a stigma in a flower on a different plant is called:
     a. Fertilization b. Cross fertilization, c. Self pollination, d. **Cross pollination**
130. The SCA variance includes:
     a. Dominance variance   b. Additive × dominance epistasis
     c. Dominance × dominance   **d. All of these**
131. The phenotype realized depends on the
     a. Interaction of genes and environment b. Genotype   c. Environment
     d. Interaction of all the genes
132. AB blood groups in human are due to
     a. Codominant alleles b. Dominant alleles c. Incompletely dominant alleles
     d. Recessive alleles
133. Stalk of stamen which supports the anther is called
     a. Pedicel,   b. Petiole,   **c. Filament**,   d. None of these
134. Group of identical plants originating by the vegetative propagation from a single plant
     a. Variety,   b. Line,   c. Species,   **d. Clone**
135. Group of similar looking plants that has approved for general cultivation in an ecological zone is called

a. Strain,   b. Advance line, c. Clone,   **d. Variety**

136   The word genetics was coined by
     a. Bateson   b. Mendel   c. Weismann   d. Watson & Crick

137.   Dried fodder used as livestock feed is called
     a. Hay   b. Sillage,   c. Pasture,   d. None of these

138.   A condition in which pollen is absent or non functional in flowering plants are called
     a. Sterility,   **b. Male sterility,**   c. Incompatibility,   d. None of these

139.   Genetic constitution of an organism is refereed as
     a. Phenotype,   b. Phenocopy,   **c. Genotype,**   d. None of these

140.   An inflorescence with a more or less elongated axis having sessile spikelets are called
     a. Raceme,   b. Racemose,   c. Panicle,   **d. Spike**

141.   The upper of the two bracts enclosing each floret in the grasses termed as
     a. Lemma,   **b. Palea,**   c. Gluves,   d. None of these

142.   In the *Ac-Ds* family of transposons in corn, the Ac element is
     a. Autonomous   b. Stable   c. Nonautonomous   d. Both b and c are correct

143.   Development of 'corbonaria' phenotype in *Biston betularia* is due to
     a. dominant mutation   b. recessive mutation   c. epistasis   d. multiple alleles.

144.   The deficiency of X chromosome in female results into
     a. Intersex   b. Klinefelter syndrome   c. Down syndrome   **d. Turner syndrome**

145.   Which breeding method would be rewarding, when there is preponderance of additive gene action?
     a) Heterosis breeding   **b) Progeny selection**
     c) Simple recurrent selection   d) None of these

146.   The lower of the bracts enclosing the grass floret is called
     a. Lemma,   b. Palea,   c. Glume,   d. Bracts

147.   The outer husks or bracts of each spikelets covering the floret in grasses is called
     a. Lemma,   b. Palea,   **c. Glume,**   d. Bracts

148.   An individual having single set of chromosome is called
     a. Haploid,   b. Monoploid, c. Diploid,   d. TetraPloid

149.   The efficiency of selection depends upon the availability of
     a. Breeding methods, b. Heterosis, c**. Variability,** d. Apomixis

150.   Which breeding method would be effective when there is preponderance of non-additive gene action?
     a) Progeny selection   b) Reciprocal recurrent selection
     c) Heterosis breeding   d) All of these

151.   Higher value of GCA than SCA indicates preonderance of :
     a) Dominance   b) Epistasis   c**) Additive genes**   d) Linkage

152.   Quantitative traits are developed as a result of the action of
     a. Monogene   **b. Polygenes**   c. Multiple alleles   d. Isoalleles

153.   Way the yield in cross pollinated crops decreases by continuous selfing
     a. Out breeding ,   b. In breeding,   c. Random mating, **d. In breeding depression**

154.   A progeny descendent solely by self pollination from a single homozygous plant is called
     a. Line breeding,   b. Advance line,   **c. Pure line,**   d. In breed line

155.   A hybrid from a cross between two single crosses is known as
     a. Three way cross,   b. Multiple hybrid,   c. Dihybrid,   **d. Double cross**

156.   The chromosomes other than sex chromosomes are called
     a. Hetrochromatin, b. Euchromatin,   **c. Auto   some,**   d. Chromosomes

157.   The kind of homozygous recessive genotypes in F_2 generation derived from a cross of contrasting homozygous parents is always
     a. 1   b. 2   c. 3   d. 4

158.   Linkage maps of chromosomes are derived from the
     a. Backcross   b. 3-way cross   c. F_2 data   **d. Testcross data**

159.   Incase of bread wheat the linkage groups are
     a. 42   b. 7   c. 14   **d. 21**

160.   Gene pool is the sum total of ……… within the reproductive cells of members in a population.
     a. genotypes   b. phenotypes   **c. alleles**   d. gametes

161.   The cross between and inbred line and an open-pollinated variety of maize is know as
     a. Three way cross,   **b. Top cross,** c. Poly cross,   d. Single corss

162.   Selection is delayed upto F_6 generation in
     a. Recurrent selection, b. Pedigree method, c. SSD method, **d. Bulk method**

163.   The phenomenon of change in chromosome number is called

a. Hetroploidy,　　b. Euploidy,　　　c. Aneuploidy, d. Amphiploidy

164. In double cross over there is change in the position
     a. Non of the genes　**b. Central gene**　　c. Genes on ends　　d. All genes

165. Higher value of sca variance than gca variance reveals preponderance of:
     a. Additive gene action　**b. Non-additive gene action**　　c. a and b above　　d. Lethal genes

166. The GCA variance has positive association with:
     a. Narrow sense heritability　b. Adaptability　　c. Hybrid vigour　　d. All of these

167. The SCA variance has positive association with:
     a. Adaptability　**b. Heterosis**　　　c. Linkage　　d. Heritability (ns)

168. The ability of plants to grow and breed successfully in new environments is called
     a. Introduction,　b. Selection,　　c. Mass selection,　　**d. Acclimatization**

169. Crossing scheme where one parent is used recurrently is named as
     a. Recurrent selection, b. Mass selection, c. Test cross, **d. Back cross**

170. Reciprocal exchange chromosomal segments between non-homologous chromosome is called
     a. Trans location, b. Crossing over, **c. Reciprocal translocation,** d. Inversion

171. In segregating populations the appearance of plants superior to the parents is termed as
     a. Better parent, b. heterosis, c. Heterobeltisis, **d. Trangressive segregates**

172. The ability of an inbred line to transmit its average performance to its hybrid progeny is termed
     a. General combining ability,　　　b. Specific combining ability,
     c. Combining ability,　　　　d. Heritability

173. Which of the following types of epistasis contributes to heterosis?
     a. Additive × additive　b) Additive × dominance　**c) Dominance × dominance** d) All of these

174. Mendel was able to conclude the law of independent assortment because of the absence of
     a. Crossing over　　b. Mutation　　**c. Linkage**　　d. Epistasis

175. If the crossing over percentage in two genes is 20 then the distance between the genes would be
     a. 20 cM　　　b. 10 cM　　c.1 cM　　d. 2 cM

176. In the absence of mutation, genetic drift, migration and selection the proportion of genotypes in outbreeding population according to Hardy-Weinberg Law is
     a. 2pq　　　b. p^2+q^2　　c. $2p^2 + 2pq$　　**d. $p^2 + 2pq + q^2$**

177. Heterosis can be fixed by:
     a) Asexual reproduction　b) Apomixis　c) Polyploidy　**d) All of these**

178. Heterobeltiosis is estimated over:
     a) Mid-parent　**b) Better parent**　c) Popular variety　d) Popular hybrid

179. Useful heterosis is estimated over:
     a) Mid parent　**b) Popular variety**　c) Better parent　d) Best parent

180 The formula $\{(F_1 – BP)$ x 100$\}$/BP is used for calculation of:
     a) Heterobeltiosis　b) Mean heterosis　　c) Useful heterosis　　d) Pseudo heterosis

181. Exchange of segments between non-homologous chromosomes is termed
     a. Crossing over　　b. Deficiency　**c. Translocation**　d. Duplication

182. Inheritance in M & N blood groups in human beings is due to
     a) Partial dominance b) complete dominance **c) co-dominance** d) over dominance.

183. Watson and Crick model of DNA was described in
     a.1952　　　b.1902　　c.1882　　d. 1962

184. Group of similar appearing plants are selected and their seed is composite is know as
     a. Mass selection, b. composite variety, c. Synthetic variety, d. Pure line selection

185. Selfing of a plant belonging to open-pollinated group is called
     a. Pure line,　b. line breeding,　**c. Inbred line,**　　　d. Synthetic

186. In vegetatively propagated crops segregation occurs in
     a. F_1,　　　b.F_2,　　　c. F_4,　　d. F_6

187. First evidence that DNA is genetic material was reported by Avery, Macleod and McCarty in
     a.1900　　**b.1944**　　c. 1880　　d. 1952

188. In DNA model of Watson and Crick the diameter of DNA molecule is about
     a. 20 A°　　b. 50 A°　　c. 10 A°　　d. 100 A°

189. The distance between one nitrogen base to the next in DNA molecule is
     a. 5.75 A°　　b. 10 A°　　**c. 3.4 A°**　　d. 4.5 A°

190. The formula $F_1 – F_2 / F_1×$ 100 is used for estimation of:
     a. Useful heterosis　b. Heterobeltiosis　c. Average heterosis　**d. Inbreeding depression**

191. The organism with chromosome number not exact multiple of the monoploid set is called as
     a. Euploid,　b. Polyploid,　c. Hetroploid,　**d. Aneuploid**

192. Extraction of sugar from sorghum is not possible due to the presence of
    a. Invert sugar, b. Lower percentage of sugar, c. Machinery problem, d. Crushing problem
193. Sugar beat belong to family
    a. Chenopodeace, b. Malvaceae, c. Poaceae, d. Curbitaceae
194. Negative heterosis is important for:
    a) Earliness b) Plant height in cereals c) Low toxic substances **d) All of these**
195. A cross between two inbreds is called:
    a) Single cross b) Three way cross c) Double cross d) Multiple cross
196. In general the GC content is assumed as
    a. 40.7 b. 60.5 c. 45.5 **d. 50**
197. Which species is important from breeding point of view
    a) morphological species **b) biological species** c) evolutionary species d) phylogenetic
198. Replication of DNA is
    a. Discentigrated b. Conservative **c. Semi conservative** d. Disruptive
199. In lagging chain of DNA replication is done by fragments called
    a. Okazaki b. Suzuki c. Operon d. Cistron
200. Highest uniformity is observed in a
    a) Single cross b) Three-way cross c) Double cross d) Multi cross
201. If you want to have a sugarcane variety grow seedlings
    a. 0.1 million, b. 0.2 million, c. 0.8 million, d. 1.5 million
202. Best marcotting media for flowering sugarcane
    a. Horse dung + soil + N, b. Saw of wood + soil + N, c. Sand + Soil + N, d. Sand + Soil
203. Head of sugarcane is know as
    a. Arrow, b. Capitlumn, c. Spike, d. Raceme
204. Sugarcane required sets for plantation of one acre
    a. 80 mounds, b. 60 mounds, c. 70 mounds, d. 50 mounds
205 Mating between a single cross and an open pollinated variety is called:
    a) Polycross b) Composite cross **c) Double top cross** d) Top cross
206 Heterosis can be fully exploited in the form of
    a) Hybrids b) Composites c) Synthetics d) Multilines
207. Sett roots of sugarcane emerge from
    a. Root band of set, b. Primary roots, c. Secondary roots, d. From bud
208. Sesame contain protein in its seed
    a. 60%, b. 55%, c. 55%, d. 40%
209. Freezing temperature of jojoba oil is
    a. -7°C, b. -1°C, c. 0°C, d. 4°C
210. The information on DNA molecule is coded in the form of a set of
    a. Three nucleotide b. Two nucleotide c. Four nucleotide d. Five nucleotide
211. Which of the following phenotypes is the result of transposable elements?
    a. Spotted kernels in corn b. Spotted peas c. Green colour in peas d. all of the them
212. The cross pollinated species are also called as
    a) Outbreeders b) Allogamous species **c) a and b** d) Autogamous species
213. Boiling temperature for oil of jojoba is
    a. 398°C, b. 400°C, c. 410°C, d. 250°C
214. Water of coconut fruit contain carbohydrates
    a. 5%, b. 8%, c. 10%, d. 20%.
215. Safflower originated in region
    a. Ethiopia and Afghanistan, b. USA, c. USSR, Brazil
216. Self pollinated species are also termed as
    a) Autogamous species b) Inbreeders **c) a and b** d) Allogamous species
217. The concept of combing ability analysis was first proposed in 1942 by
    a) Wright b) Hayman **c) Sprague & Tatum** d) Jinks and Jones
218. Genotypes with broad genetic base have
    a) Poor adaptability b) Average stability **c) Wide adaptability** d) None of these
219. Which of the following species would have the highest rate of mutation.
    a. Human **b. Bacteria** c. Maize plant d. Wheat
220. If a species is divided into two or more races is called
    a) Evolutionary species **b) Polytypic species** c) Allopatric species d) Morphological species
221. The viruses capable of attacking bacteria are called

a. Bacteriophage   b. E coli   c. Recto virus   d. Yellow musaic

222. Largest producer of castor is
a. Brazil, b. India, c. China, d. USSR

223. Most common shape of flower of linseed
a. Funnel, b. Tubuler, c. Star, d. Crimbed

224. *Brassica juncea* contain genomes with 36 chromosomes
a. AABB, b. AACC, c. BBCC, d. AADD

225. Ground nut ranks in vegetable oil production in world
a. 10th, b. 5th, c. 15th, d. 20th

226. For indirect transformation of DNA in plants ----------- are used
a. *Agrobacterium*   b. Virus   c. Fungus   d. Spores

227. Stability analysis is based on:
a) One season data   b) Multi seasonal data   c) Multi locational data   **d) b and c**

228. The degree of suitability of an organism to its environment is called:
a) Heritability   b) Co-heritability   **c) Adaptability**   d) None of these

229. Half diallel does not permit estimation of:
a) GCA effects   b) SCA effects   **c) Maternal effects**   d) All of these

230. How many genetical assumptions are involved in diallel analysis:
a) Three   b) Four   c) Seven   **d) Six**

231. To block the translation of a functional mRNA molecule a small complementary sequence of RNA is used named
a. tRNA   b. rRNA   **c. Anti sense RNA**   d. Primer

232. Pakistan extract percentage of vegetable oil from groundnut for edible purposes
a. 0%, b. 10%, c. 20%, d. 30%

233 Linolenic acid contains carbon chain
a. 18:3, b. 18:2, 18: 4

234. The phenomenon of adaptation of an exotic genotype in the new ecological conditions is _____
a) Introduction   **c) Acclimatization**
b) Migration   d) Domestication

235. The modification of genetic material without sexual means is called
a. Genetic Engineering   b. Genetics   c. Breeding   d. Grafting

236. Graphical approach of diallel analysis provides information about:
a) D and H_1 b) H_2 and E
c) F and h^2 **d) All of these**

237. Griffing proposed the numerical approach of diallel cross analysis in:
a) 1947   b) 1953
c) 1956   d) 1957

238. Estimation of environmental path is based on:
a) Environmental correlations   b) Simple correlations
c) Partial correlations   d) None of these

239. A single stranded DNA molecule i.e. complementary to the complex mRNA is called
a. zDNA   b. tRNA   c. mRNA   **d. cDNA**

240. Individuals of all species that live in the same geographic area are said to be
a) sympatric b) allopatric c) monotypic d) None of these

241. A mutation that changes a gene from its wild form to a mutant form is called
a.Nonsens mutation   **b. Forward mutation**   c. Missense mutation   d. Back mutation

242. The technique used to detect RNA from a mixture of nucleic acid is termed as
a. Northern Blotting b. SSR   c. Southern Blotting d. PCR

243. All possible phenotypic correlation among 'n' variables are required for estimation of
a) Genotypic path   **b) Phenotypic path**
c) Environmental path   d) All of these

244. Maturation of anthers before the stigma of the same flower is termed as _____
a) **Protandry**   c) Chasmogamy
b) Protogyny   d) Dichogamy

245. _____ is the type of apomixes in which megaspore mother cell degenerates and unreduced embryo sac is formed from somatic cell of ovule.
a) Diplospory   b) Apogamy

c) Parthenogenesis **d) Apospory**

246. _____ is considered to be the first method of breeding for the improvement of crop plants.
    a) Hybridization
    b) Selection
    c) Back crossing
    d) Introduction

247. Path diagram is constructed before estimation of:
    a) Direct effects
    b) Indirect effects
    c) Residual effects
    d) All of these

248. Genotypic correlation are used for estimation:
    a) Genotypic path
    b) Phenotypic path
    c) Environmental path
    d) All of these

249. The method of introducing DNA directly into the host cell is
    a. Blotting
    b. Bio informatics
    c. Biolistics
    d. Blending

250. To obtain quantitative data on any possible effects of X-ray on mutation rate CLB method was used by
    a. Muller
    b. Morgan
    c. Gardner
    d. Sutton

251. Phenotypic variance includes:
    a) Genotypic variance
    b) Error variance
    c) a and b
    d) None of these

252. Phenotypic variation is measured in terms of:
    a) Genotypic variance
    b) Phenotypic variance
    c) Error variance
    d) None of these

253. A group of plants developed from a single homozygous plant through contiunous self-pollination is known as _____
    a) Clone
    b) Inbred line
    c) Pure line
    d) Isogenic line

254. _____ are the primitive varieties adapted to the ecological conditions of a particular area.
    a) Breeding lines
    b) Land races
    c) Cultivars
    d) Strains

255. Loss of variability from the genetic resources of crop plants is _____.
    a) Vulnerability
    b) Linkage drag
    c) Adulteration
    d) Genetic erosion

256. Cluster diagram is related to:
    a) Path analysis
    b) D^2 statistics
    c) Metroglyph analysis
    d) All of these

257. Glyph is related to:
    a) D^2 statistics
    b) Diallel analysis
    c) Metroglyph analysis
    d) Path analysis

258. Which one of the following is not inherited disease
    a. Malaria
    b. Color blindness
    c. Haemophilea
    d. Baldness

259. Phylogenetic species has been defined by
    a) Bruce
    b) McFadden
    c) George Gaylord
    d) Shull.

260. The plants which are genetically modified by artificial means are called
    a. Plasmid
    b. Cybrids
    c. Hybrids
    d. GM Plants

261. In plant breeding population variability is important for:
    a) Disease resistance
    b) Adaptability
    c) Effective selection
    d) All of these

262. Analysis of polygenic traits is based on:
    a) Means
    b) Variances
    c) Co-variances
    d) All of these

263. Better performance of segregating generations over the parents is called _____.
    a) Heterosis
    b) Inbreeding depression
    c) Transgressive segregation
    d) Hybrid vigour

264. Variation due to the average cumulative effects of the alleles of the genes at all segregating loci is termed as _____.

a) **Additive variation**   c)   Environmental variation
b)   Dominance variation   d)   Epistatic variation

265. The degree to which variation in a character is transferred to the next generation is _____.
    a)   Heterobeltiosis   **c)   Heritability**
    b)   Heredity   d)   Heterosis

266 Analysis of oligogenic character is based on:
    a) Variances   b) Co-variances
    c) Means   **d) Frequencies**

267. First chemical mutagen was discovered by Auerbach and Robson in
    a. 1901   **b. 1941**   c. 1931   d. 1921

268. The first transgenic animal produced in 1997 was named
    a. Colly   b.Bolly   **c. Dolly**   d. Polly

269. The extra cellular DNA molecules present in bacteria other than the genomic DNA is known
    a. Virus   b. Vector   c. Plastid   **d. Plasmid**

270. Oligogenic characters are measured in terms of:
    a) Colour   b) Shape
    c) Surface   **d) All of these**

271. Polygenic traits are measured in terms of:
    a) Height and weight   b) Length and width
    c) Duration   **d) All of these**

272. Selection is started in _____ generation in bulk population method.
    a) F_2 **c) F_6**
    b) F_4 d) F_8

273. Average performance of a line in hybrid combinations is termed as _____.
    a)   Hybrid vigour   **c)   General combining ability**
    b)   Specific combining ability   d)   Breeding value

274. When the plants of two varieties of asexually propagated crops are crossed, the segregation starts in _____ generation.
    a) F_0 c) F_2
    b) F_1   d) F_3

275. Common features of oligogenic and polygenic characters include:
    a) Linkage   b) Segregation
    c) Mutation   **d) All of these**

276. Measure of uncontrolled variation refers to:
    a) Standard error   b) Standard deviation
    c) Mean   d) Range

277. In the binomial system of taxonomy developed by C. Linnaeus, the first word of an organism's name (e.g., *Triticum aestivum*) is its
    a. Species   **b. Genus**   c. Race   d. Family

278. Phenomenon of transferring desirable genes from one species to another is called
    a) transgression **b) introgression** c) speciation d) None of these

279. The highest group in the taxonomic classification is
    a. Class   b. Species   c. Order   **d. Phylum**

280. The term "linkage drag" is used to explain
    a)   Transfer of unfavourabel genes along with favourable genes
    b)   Combining recessive alleles of different genes together
    c)   Epistatic gene masks the effect of lined hyhpostatic gene
    d)   Process of breaking linkage groups

281. Triticale is the best example of _____
    a)   Auto-ploidy   c)   Inter-specific hybridization
    b)   Allo-ploidy   d)   Aneuploidy

282. The cross between plants of *Triticum aestivum* and *Triticum durum* is _____
    a)   Inter-generic hybridization   c)   Intra-varietal hybridization
    b)   Inter-varietal hybridization   **d)   Inter-specific hybridization**

283. In back cross method of breeding self-pollinated crops the parent that is used in each back cross is known as _____
    a) Non-recurrent parent
    c) Recipient parent
    b) Recurrent parent
    d) Maternal parent

284. A variety produced by crossing the lines, which combine well with each other, in all possible combinations is called _____.
    a) Composite variety
    c) Synthetic variety
    b) Hybrid variety
    d) Cultivar

285. A group of plants that is well adapted to the environmental conditions of a particular area is termed as _____
    a) Ecotype
    c) Prototype
    b) Ideotype
    d) Pathotype

286. Viruses are chemically
    a. Nucleic acid
    b. Carbohydrate
    c. Nucleo Protein
    D. Proteins

287. The difference between the lowest and the highest value in a sample refers to:
    a) Range
    b) Mean
    c) Standard error
    d) Standard deviation

288. The square root of the variance refers to :
    a) Standard deviation
    b) Mean deviation
    c) Standard error
    d) None of these

289. First degree of statistics deals with:
    a) Mean
    b)Variances
    c)Co- variances
    d) All of these

290. Plant viruses contain RNA
    a. Always
    b. Mostly
    c. Rarely
    d. Never

291. _____ is the process of inducing mutations by using certain agents.
    a) Mutation breeding
    c) Mutant
    b) Mutagenesis
    d) Mutagen

292. _____ is an organism produced by doubling the chromosome number of the hybrid between two diverse parents.
    a) Alloploid
    c) Amphiploid
    b) Autoploid
    d) Aneuploid

293. Group of plants raised from a single plant through tissue culture is known as _____.
    a) Clone
    c) Somaclone
    b) Micropropagation
    d) Cybrid

294. The seed of the improved variety developed by the breeder by crossing two varieties is called _____.
    a) Nucleus seed
    c) Registered seed
    b) Foundation seed
    d) None of these

295. Animal viruses contain DNA
    a. Always
    b. Mostly
    c. Rarely
    d. Never

296. Viruses are believed to be living because
    a. They can grow
    b. Have nucleic acid
    c. Undergo mutation
    d. All of these

297. Development of *Triticale* is the best example of
    a) natural evolution
    b) **artificial evolution**
    c) natural mutation
    d) induced mutation.

298. The hereditary material in viruses may be
    a. DNA
    b. RNA
    c. DNA or RNA
    d. Both

299. The gene expression in eukaryotes involves
    a. Transcription
    b. Translation
    c. Splicing
    d. All the three

300. Second degree of statistics deals with:
    a) Variance
    b)Co-variance
    c) Variances & Co- variances
    d) None of these

301. A group of similar looking plants which are recommended for cultivation is a particular area is termed as _____.
    a) Cultivar
    c) Land race
    b) Variety
    d) Strain

302. All the entries are crossed in all possible combinations in _____ mating design.
   a) North Carolina
   c) Diallel
   b) Line x Tester
   d) Biparental
303. Third degree statistics deals with:
   a) Skewness
   b) Kurtosis
   c) Co-vaiances
   d) a and b
304. Standard deviation is the square root of:
   a) Range
   b) Variance
   c) Standard error
   d) None of these
305. A viron is a
   a. Virus
   b. Viral protein
   c. Viral lysozyme
   d. Viral gene
306. The recombination of linked gene is always accompanied by a physical exchange of segments between
   a. Paternal chromosome
   b. Maternal chromosome
   c**. The maternal and paternal chromosome**
   d. Other than maternal & paternal
307. In flowering plants, the products of meiosis are called _____.
   a) Antipodals
   c) Meiospores
   b) Meiocytes
   d) Synergids
308. Homologous chromosomes synapse during the _____ phase of Prophas-I of meiosis.
   a) Pachytene
   c) Leptotene
   b) Zygotene
   d) Diplotene
309. The genes present on Y chromosome are known as _____.
   a) Lethal genes
   c) Oncogenes
   b) Holandric genes
   d) Cosmids
310. Blood groups in human beings is a good example of _____.
   a) Intermediate dominanace
   c) Over dominance
   b) Complete dominance
   d) Co domianace
311. An isolated virus is not considered living, since it
   a. Becomes inert
   b. Can't metabolize
   c. Looses genome
   d. Denatured
312. Tests of significance includes:
   a) Z-test
   b) t-test
   c) F-test
   d) All of these
313. Principles of experimental designs include:
   a) Replication
   b) Randomization
   c) Local control
   d) All of these
314. In which design, the number of treatments and replication is the same:
   a) CRD
   b) RCBD
   c) LSD
   d) All of these
315. _____ is the phenomenon when dominant genes are present on one chromosome.
   a) Homozygosity
   c) Linkage
   b) Coupling
   d) Recombination
316. Exchange of parts between the non-homologous chromosomes is termed as _____.
   a) Translocation
   c) Duplication
   b) Crossing over
   d) Intercalary deficiency
317. _____ is the most accepted mechanism to explain the phenomenon of crossing over in the organisms.
   a) Belling's hypothesis
   c) Breakage reunion hypothesis
   b) Copy choice model
   d) Hybrid polaron DNA model
318. A sudden heritable change at one chromosomal locus is known as _____.
   a) Chromosomal mutation
   c) Gene mutation
   b) Forward mutation
   d) Somatic mutation
319. DNA gyrase is an example of _____ enzymes responsible for the supercoiling of DNA.
   a) Helicase
   c) Polymerase
   b) Topoisomerase
   d) Ligase

320. _____ proposed the one gene one enzyme hypothesis of gene function.
   a) Meselson and Stahl   c) Watson and Crick
   b) Beadle and Tatum   d) Maxam and Gilbert

321. Non-coding nucleotide sequences in the DNA strand are called _____.
   a) Cistrons   c) Codons
   b) Introns   d) Exons

322. Genus *Triticum* belongs to the family
   a) Poaceae b) Malvaceae c) Solanceae d) Leguminoseae.

323. The first convincing evidence of mitotic crossing over was reported by Stern (1936) in
   a. Arabidopsis   b. Bacteria   c. Mouse   **d. Drosophilla**

324. Which one of the following reproduces only in the host cell?
   a. Bacteria   **b. Viruses**   c. Nostoc   d. Fungus

325. Dihybrid mendelian 9:3:3:1 ratio remain same due to which gene interaction
   a. Factor interaction b. Dominant epistasis   c. Recessive epistasis
   d. Double dominant epistasis

326. Local control is not adopted in:
   a) CRD   b) RCBD
   c) LSD   d) Lattice design

327. Which of the following designs consist of main plots and subplots:
   a) CRD   b) Lattice design
   c) Split plot design   d) Augmented design

328. Which design is suitable for evaluating several hundred lines of germplasm:
   a) Lattice design   b) RCBD
   c) Augmented design   d) CRD

329. The process in which the genetic material shifted from one bacterium to another through a bacteriophage is called
   a. Asexual reproduction b. Conjugation   c. Transformation   **d. Transduction**

330. Bacteriophage is composed of
   a. DNA & RNA   b. DNA & Ribose   **c. DNA & Protein**   d. Protein & RNA

331. _____ technique is used to identify RNA fragments separated through gel electrophoresis.
   a) Southern blotting   c) Western blotting
   b) Northern blotting   d) Eastern blotting

332. The bead like structures present on the chromosomes are known as _____.
   a) Nucleosomes   c) Knobs
   b) Centromeres   d) Satellites

333. The type of mutation in which a pyrimidine is substituted for a purine is known is _____.
   a) Transition   c) Frameshift
   b) Transversion   d) Tautomeric shift

334. Which species was crossed in nature with *Gossypium herbaceum* for the evolution of *Gossypium hirsutum* ?
   a) *Gossypium tomantosum*   **b) *Gossypium raimondii***   c) *Gossypium arboretum*
   d) None of these

335. mRNA is synthesized by
   a. DNA polymerase   **b. RNA polymerase** c. RNA ligase   d. None of these

336. Which of following are nonsense codon
   a. AUG   **b. UAA**   c. CUA   d. All of these

337. Analysis of variance permits estimation of:
   a) Phenotypic variance   b) Genotypic variance
   c) Environmental variance   **d) All of these**

338. The value of degree of dominance more than one indicates the presence of _____.
   a) Intermediate dominance   **c) Over dominance**
   b) Complete dominance   d) No dominance

339. The chromosomes having centromere in the centre are called as _____.
   a) Telocentric   **c) Metacentric**
   b) Sub metacentric   d) Acrocentric

340. _____ is not a PCR based method of DNA finger printing.
   a)   AFLP   **c)   RFLP**
   b)   RAPD   d)   SSR

341. Multiple molecular forms of an enzyme exhibiting similar or identical catalytic properties are termed as _____
   a)   Holoenzymes   c)   *Taq* Polymerase enzymes
   b)   Isozymes   d)   Endonucleases

342. The ratio of treatment variance to error variance is called:
   a) Critical difference   b) Correction factor
   c) F-value   d) t-value

343. Application of statistical concepts and procedures to the study of biological problem is called
   a) Biometrics   b) Biometry
   c) Biostatistics   **d) All of them**

344. The mutant gene causing sickle cell disease is also responsible for resistance against
   a. Flue   b. Small pox   c. Typhoid   **d. Malaria**

345. Great contribution to the understanding of genes and chromosomes was made by
   a. Watson & Crick   b. McCarty   **c. T.H. Morgan**   d. Mendel

346. Which one of the following pointed out the relationship of genes and chromosomes
   a. Sutton and Boveri b. DeVeries   c. Morgan   d. Beadle

347. In prokaryotes the expression of groups of genes are coordinately controlled by same regulatory genes. Such a group of genes is known as _____
   a)   Oligogenes   **c)   Operon**
   b)   Oncogenes   d)   Transgenes

348. A triplet of nucleotides carried by tRNA is named as _____ which are complementary to the nucleotide triplet in mRNA.
   a)   Anticodon   c)   Exon
   b)   Codon   d)   Cistron

349. A fragment of DNA produced from an RNA sequence by reverse transcription is called _____
   a)   Clone   c)   Intron
   b)   Codon   **d)   cDNA**

350. Most of the crop species were evolved through
   a) polyploidy b) mutation c) hybridization d) genetic engineering.

351. When the phenotypic and genotypic ratio in the F_2 generation is same, it is an example of
   a. Qualitative inheritance b. Dihybrid cross
   c. Cytoplasmic inheritance **d. Incomplete dominance**

352. If all the genotypes carrying a particular gene show the expected phenotype, then penetrance of gene would be
   a. 80%   b. 45%   c. 90%   **d. 100%**

353. Oligogenic variation is studied in
   a) Quantitative generation   b) Mendelian genetics
   c) Population genetics   **d) (b) and (c)**

354. Quantitative genetics calls with inheritance of :
   a) Plolygenic characters   b) Quantitative characters
   c) Metric traits   **d) All of them**

355. _____ is a hybrid in which nucleus is derived from one parent and cytoplasm from both the parent.
   a)   Somaclone   **c)   Cybrid**
   b)   Callus   d)   Transgene

356. Doubling of chromosome number without the division of nucleus is called _____.
   a)   Allopolyploidy   c)   Aneuploidy
   b)   Endomitosis   d)   Chromosomal aberration

357. A complete basic set of chromosomes inherited as a unit from one parent is _____.
   a)   Genome   c)   Genotype
   b)   Linkage group   d)   Homologous chromosomes

358. Polygenic variation can be assessed through.
   a) Metroglyph analysis   b) D^2 statistics
   c) Measure of dispersion   **d) All of them**
359. Individual cross can be evaluated for component of genetic variance by
   a) Generation mean analysis   b) Metroglyph anlysis
   c) D^2 statistics   d) All of these
360. The central dogma states that biological information flows:
   a**. DNA--RNA--Protein**   b. RNA—DNA--Protein
   c. DNA—Protein--RNA   d. RNA—Protein--DNA
361. Genes are made up of
   a. Ribonucleotide   **b. Deoxyribo-nucleotide** c. Polypeptides d. Polysaccharides
362. With 4 alleles a gene can exist in different diploid forms
   a. 4   b. 5   **c. 10**   d. 20
363. Most of the biological species are the result of
   a) seasonal isolation   b) ecological isolation
   c) geographical isolation   d) hybrid sterility.
364. If the sequence of nucleotides on one strand of DNA is A-T-A-G-C, the sequence in the other strand will be
   a. T-T-C-G-G   b. C-A-T-A-T   c. G-T-A-C-C   **d. T-A-T-C-G**
365. _____ is not a method of gene transformation from one organism to another one.
   a)   Ballistic gun transformation   **c)   Log transformation**
   b)   Agrobacterium transformation   d)   Co-cultivation
366. Several single crosses can be evaluated at a time for combining ability variances and effects by
   a) Diallel cross   b) Partial diallel cross
   c) Line × tester cross   **d) All of these**
367. Combining ability analysis provides information about
   a) Gene action   b) Good general combiner
   c) Specific combiner   **d) All of these**
368. Additive gene action refers to
   a) Dominance variance   b) Additive variance
   c) Additive × Additive epistasis   **d) (b) and (c)**
369. Non-additive gene action refers to
   a) Dominance variance   b) Additive × Dominance variance
   c) Dominance × dominance epistasis   **d) All of these**
370. Self incompatibility in *Nicotiana* due to a series of multiple alleles at the S locus was determined by
   a. East & Manglesporf b. F.D. John   c. J.H.Shull   d. S. Wright
371. Which of the followings is not an amino acid
   a. Aspartic acid   b. Methionine   c. Arginin   **d. Tubulin**
372. In case of self incompatibility, there will be no fertilization by the pollen grains produced by pollen mother cell carrying S_1S_2 alleles if the female parent has
   a. S_2S_3 b. S_3S_4 c. S_1S_3 **d. S_1S_2**
373. The famous books " Biometrical Methods in Quantitative Genetic Analysis" was authored by
   a) C.R Rao   b) Nagehwar Rao
   c)Singh and Choudhary   d) Mather and Jinks
374. _____ method of DNA finger printing involves the use of radioactive probes.
   a)   RAPD
   b)   DAF
   c)   RFLP
   d)   SSR

375. Which of the following properties of an individual is considered heritable?
a) Morphological   b) Physiological
c) Biochemical   **d) All of these**

376 Qualitative characters is also called :
a) Major gene character   b) Oligogenic trait
c) Monogenetic trait   **d) All of these**

377. Deoxyribose contains
a. 5 carbon sugar   b. 3 carbon sugar   c. No sugar   d. 4 carbon sugar

378. Which mode of selection is important from plant breeding point of views?
a) stabilizing selection   **b) directional selection**
c) disruptive selection   d) None of these

379. The presence or absence of Rh antigen has found to be controlled by
a. Three gene   b. Two gene   **c. One gene**   d. four genes

380. In western countries the percentage of people having Rh positive is
a. 85%   b. 15%   c. 80%   d. 50%

381. Quantitative character is also known as
a) Minor gene character   b) Polygenic character
c) Variable character   **d) All of these**

382. Polygenic trait is also termed as :
a) Quantitative character   b) Multiple factor character
c) Minor gene character   **d) All of these**

383. The term diallel was coined by
a) Yates   b) Hayman
c) Griffing   **d)Kempthorne**

384. The transmission of genetic information from cell to cell and from generation to generation and orderly release of information to control cellular functions and development are the major activities of _____.
a) DNA   b) RNA   **c) Chromosomes**   d) Proteins

385. _____ proposed that total concentrations of purines will be equal to concentration of pyramidine.
a) Mendel   **b) Charghaff** c) Morgan   d) Watson

386. Alternative strands of double stranded DNA are held together by _____ bonds.
a) Hydrogen   b) Covalant   c) Hydrophobic   **d) All of these**

387. The organic acid which is mostly confined to the nucleus of cell is
a. DNA   b. Oxalic acid   c. Acetic acid   d. RNA

388. A man and woman both having blood group 'A' can not expect a baby with the genotype
a. $I^A i$ b. ii   **c. $I^A I^B$**   d. $I^A I^A$

389. The term diallel was coined in
a) 1953   b)1954
c) 1947   d)1956

390 In a half diallel, total number of crosses among parents would be
a) n(n-1)/2   b) n(n+1)/2
c) n(n-1)   d) n(n+1)

391. Each chromosome contains _____ large molecule of DNA.
a) One   b) Two   c) Three   d) Four

392. On the basis of sizes, human chromosomes are classified into _____ groups.

a) Four   b) Five   c) Six   **d) Seven**

393. Genetic material must perform _____ functions.
a) Replication   b) Mutation c) Gene expression **d) All of these**

394. _____ were first of all reported by Friedrich Miescher.
a) Proteins   b) Enzymes c) Chromosomes **d) Nucleic acids**

395. How many components can be obtained by graphical approach of diallel
a) 2   b) 4
c) 5   **d) 6**

396. Traits like colour, shape and height are controlled by genes located on
a. Autosomes   b. Satellite chromosomes
c. Plasmid   d. Sex chromosomes

397. A group of interbreeding natural population that share common morphological characteristics and are reproductively isolated from other such group is called
a) variety **b) species** c) genus d) family.

398. What makes DNA capable of transferring genetic information?
a. Nitrogenous bases b**. Self replication** c. Hydrogen bonds d. Proteins

399. DNA contains _____ sugar.
a) 2-deoxy b) 3-deoxy c) 4-deoxy   d) 5-deoxy

400. _____ catalyzes formation of supercoils in DNA during its replication.
a) Ligase   **b) Gyrase** d) Endonuclease   d) Proteinase

401. The DNA molecule present in chromosomes are _____ supercoiled.
a) Negatively   b) Positively c) Neutrallly d) None of these

402. Gene mutation is a change in the DNA which results in the formation of an abnormal
a. Carbohydrates **b. Protein**   c. Lipids   d. Sugars

403. For diallel seven genetical assumptions were proposed by
a) Yates b) Smith **c) Hayman** d) Griffing

404. In diallel cross, the proportion of genes with positive and negative effects in the parents is estimated as
a) h^2/H_2 b) H_1/D **c) $H_2/4H1$** d) D/H_1

405. Mutations are
a. Always useful   b. Always harmful c. Mostly useful **d. Rarely useful**

406. The parallel behaviour between genes and chromosome was pointed out in 1902 by
a. Robert Brown   b. Mendel **c. W.S. Sutton** d. T.H. Morgan

407. Mutations are inherited only if they occur in:
a. Tissue cell   **b. Gametes**   c. Muscle cells d. Somatic cell

408. Such a barrier which prevents the gene exchange is called
a) genetic drift b) migration **c) isolating mechanism** d) founder effects.

409 In diallel cross, average degree of dominance is estimated as
a) h^2/H_2 b) H_1/D c) $H_2/4H1$ **d) None of these**

410. Kinetochore is a _____ stretch at the centromere that functions in chromosome movement.
a) DNA   b) RNA   **c) Protein**   d) Enzymes

411. A deletion in long arm of chromosome 19 of human genome could be written as_____.
a) $19p^-$ b) $19P^-$ c) $19q^-$ d) $19Q^-$

412. Hemophilia is _____ linked disease.
a) X   b) Y   c) Autosome d) None of these

413. Genes that are present on _____ chromosomes are called as Pseudoautosomal genes.

a) X   b) Y   **c) Both X and Y**   d) None of these

414. The concept of partial diallel was proposed in 1957 by
a)Yates   b)Hayman c)Griffing **d)Kempthorne**

415. Partial diallel is also known as:
a) Fractional diallel b) Incomplete diallel   **c) a and b**   d) None of these

416. The number of autosomes in Drosophila are
a. 4   b. 8   c. 6   d. 12

417. One gene one enzyme theory was proposed by
a. Watson & Crick   **b. Beadle & Tatum** c. Wilkin & Chargaff   d. Muller & Batson

418. Of the human genome, _____ chromosome is the shortest one.
a) X   **b) Y**   c) 13   d) All of these

419. Down syndrome is due to _____.
a) Monosomy   **b) Trisomy**   c) Nullisomy   d) None of these

420. Turner syndrome is the result of _____
a) Deletion   b) Addition   c) Transversion   d) Inversion

421. For DNA replication, _____ primer is required.
a) DNA   **b) RNA**   c) YAC   d) None of these

422. For a particular gene, the strand of DNA which is not coded for a product and does not undergo transcription is called
a. Antisense strand   b. Missense strand
c. Complimentary strand   d. Nonsense strand

423. Partial diallel utilizes only a part from diallel crosses of:
a) Direct crosses   b)Reciprocal crosses
c) Both a and b   d)None of these

424. In partial diallel, each parent has chance to mate with :
a) All other parents   **b) Few other parents**
c) A common set of parents   d) None of these

425. Partial diallel provides information about:
a) GCA variance   **b) SCA variance**
c) GCA effects   d) All of these

426. The two strands of DNA are
a. Template   b. Non complementary c. Parallel   **d. Complementary**

427. During protein synthesis tRNA carries
a. Sucrose   **b. Amino acids**   c. Maltose   d. Sulphur

428. On the basis of quantity, _____ RNA is least in total RNA.
a) Messenger   b) Transfer   c) Ribosomal   d) Cytoplasmic

429. Environment comprises the sum of all factors_____ an organism.
a) Inside   b) Outside   **c) Both a and b**   d) None of a and b

430. All the energy present in the biological world, and in fossil fuels, is _____ energy.
a) Petroleum   b) Other chemicals   **c) Solar**   d) None of these

431. Most restriction enzymes purified from E.coli work better at.
a) 10^oC **b) 37^oC**   c) 50^oC d) 100^oC

432. Transgenic sheep and goats are developed by.
a) Fusing sheep embryo and goat embryo
b) Mixing eggs from sheep with sperms from goat
c) Separating the embryo at the four cell stage, to give four identical progeny

d) Injecting new DNA directly into the nucleus of fertilized eggs

433. *E.coli* is used for many genetic manipulations because
    a.   It has the simplest genome of living organisms
    b.   It has more bacterial plasmids than any other species
    c.   It can be grown at an extra ordinary range of temperatures
    d.   **It is proved to be relatively simple to work with**

434. Transfer of genes between populations by the movement of gametes, individuals, or groups of individuals from one population to another, is known as
a) genetic load   b) genetic death   **c) gene flow** d) immigration

435. The property of genetic code where more than one codons designate the same amino acid is called as
a. Variation   b. Duplication   **c. Degeneracy**   d. Universal

436. Nucleic acids are polynucleotide chains in which nucleotides are linked to each other by
a. Hydrogen bond   b. Peptide linkage   **c. Ester linkage**   d. Covalent bond

437. Partial diallel does not provides information about:
a) Additive variance b) Dominant variance c) GCA effect   **d) SCA effect**

438. Which of the following is not related to partial diallel?
a) D and H components   b) GCA variance
c) SCA variance   **d) Vr-Wr graph**

439. The best plasmid contains
    a)   A selectable marker
    b)   Selectable marker and a poly linker
    c)   A poly linker and an origin of replication
    d)   **A selectable marker, a poly linker and an origin of replication**

440. Acrylamide gels are used to separate
    a) **Small segments of DNA**
    b) b) Medium segments of DNA
    c)   Large segments of DNA
    d)   All of the above

441. Ethedium bromide is a dye that binds to
    a. DNA   b) RNA   c) Both a and b   d) Nothing

442 In partial diallel, additive genetic variance is equal to:
a) gca variance **b) Twice gca variance** c) sca variance d) None of these

443. The separation of chromosome at anaphase of cell division is called as
a. Disjunction   b. Dissociation   c. Partition   d. Division

444. The enzymes that can cut phosphodiester bond in a DNA chain is called
a. Proteases   b. DNAse   c. Ligase   **d. Nucleases**

445. Hairs and nails in human beings and animals are chemically
a. Cellulose   **b. Protein**   c. Lipids   d. Carbohydrates

446. Development of cord grass *Spartina townsendii* is the result of
a) mutation   **b) polyploidy** c) biotechnology   d) adaptive radiation.

447. A deletion or addition of a base in DNA is called
a. Frame shift mutation b. Forward mutation
c. Non sense mutation   d. Missense mutation

448 With n =20 and s=11 how many crosses have to e made in partial diallel?
a) 220   b) 110

c) 190   **d) None of these**

449. Copy number of wheat genome could easily be calculated from
   a) Western blotting   b) Southern blotting   **c) Northern blotting** d) PCR

450. Paternal and maternal disputes can often be settled by DNA
   a) Finger printing   b) Foot printing
   c) blue printing   d) imprinting

451. Phenotypic ratio 3:1 can be changed due to_____.
   a) Co-dominance b) In complete dominance   c) Lethality   **d) All of these**

452. A partial diallel, how many methods of combining ability analysis are available?
   a) 1   b) 2
   c) 3   d) 4

453. Which of the following scientists is associated with partial diallel?
   a) Hayman   b) Griffing
   c) Kempthorne   d) Anderson

454. Chemical composition of cell membrane is mostly
   a. Lipids & Protein   b. Cellulose   c. Pectine   d. Hemicellulose

455. If a chromosome contains all genes in dominant form, the gene arrangement will be called as _____.
   a) Cis arrangement   b) Trans arrangement c) Both of the above   d) None of the above

456. In F_2 of a trihybrid cross _____ gametes are formed.
   a) Four   **b) Sixteen**   c) Sixty four   d) Two hundred fifty six

457. The part that gives shape to the chromosome is _____.
   a) Telomere   **b) Centromere**   c) Euchromatin d) Heterochromatin

458. The sum of mutant alleles in a population that have a detrimental effect and accumulate largely in heterozygotes is called
   a. Genetic death   b. Genetic drift   **c. Genetic load**   d. Genetic diversity

459. A gene whose presence is readily detected through phenotypic expression is called as
   a. Isozyme marker   b. Physiological marker
   c. **Morphological marker**   d. Cytogenetic marker

460. In line × tester analysis, additive genetic variance is equal to :
   a) GCA variance b) 2 GCA variance   c) $(vGCA)^{1/2}$ d) vGCA/2

461. In line × testes analysis, dominance variance is equal to:
   a) $(SCA\ variance)^{1/2}$ b) ½ SCA variane
   c) SCA variance   d) None of these

462. The concept of triallel analysis was developed in 1962 by :
   a) Mather and Jinks   b) Jinks and Hayman
   c) Rawlings and Cokerham   d) None of these

463. Who for the first time found white eye mutant in Drosophila
   a. Morgan   b. Correns   c. Bridges   d. Sutton

464. When the few races are combined together and have adaptability over longer area, it is known as
   a) Ecotype   b) Variety   c) Species   d) Prototype.

465. Which phenomenon reduces the chances of genetic recombination and variation among offsprings
   a. Crossing over   b. Dominance
   c. Independent assortment   **d. Linkage**

466. Triallel cross refers to :
    a) Three way crosses   b) Single crosses
    c)Double crosses   d)Multiple crosses
467. In trialle cross, each parent appears:
    a) Once   b)Twice
    c) Thrice   d)Four time
468. Karyotype is the arrangement of _____.
    a) DNA   b) Genes   **c) Chromosomes**   d) Proteins
469. Visual selection is essentially based on _____ of the plant.
    a) Phenotype   b) Genotype c) Both a and b   d) None of a and b
470. A pure line is a progeny of a single, _____, self-pollinated plant.
    a) Heterozygous   **b) Homozygous**   c) Both a and b   d) None of a and b
471. How many parents are involved in each triallel cross?
    a)1   b) 2   **c) 3**   d) 4
472. A genetic content of a single set of chromosome in a species is called as
    a. Genetic composition   b. Genotype   c. Genetic load   **d. Genome**
473. Most gametes have parental combinations but some gametes are different from parents due to
    a. Segregation   b. Assortment   c. Non disjunction   **d. Crossing over**
474. Variation within a pure line is purely _____.
    a) Phenotypical   b) Genotypical   **c) Environmental**   d) None of these
475. Generally mass selection is performed for _____ traits.
    a) Qualitative   b) Quantitative   **c) Both a and b**   d) None of a and b
476. The major objective of hybridization is to _____ genetic variability.
    a) Reduce   **b) Induce**   c) Both a and b d) None of a and b
477. The increase in homozygosity via selfing is by _____ % of that in previous generation.
    a) 25   **b) 50**   c) 75   d) 100
478. Basic proteins of low molecular weight that are complexed with the DNA of eukaryotes are called as
    a. Prolines   **b. Histones**   c. Glycogen   d. Protease
479. What is the risk of a colour blind daughter in a family when mother is colour blind and father has normal vision
    a. 0%   b. 25%   c. 50%   d. 100%
480. Using 10 parents in which of the following designs maximum crosses have to be effected?
    a) Diallel crosses   b) Partial diallel
    c)Triallel cross   **d) Quadriallel cross**
481. The concept of generation mean analysis was developed in 1958 by
    a) Hayman   b) Jinks and Jones
    c) a and b   d) Griffing
482. Scaling test was proposed in 1949 by:
    a)Smith   b) Hayman
    c) Mather   d) Griffing
483. Species exhibiting marked phenotypic variation within a population according to their degree of geographical isolation are known as
    a) evolutionary species   b) phylogenetic species
    c) polytypic species   d) primary species.

484. A chromosomal aberration involving two breaks in a chromosome followed by a reversal of the segment is
    a. Inversion   b. Translocation   c. Duplication   d. Deletion

485. If 50% of the offspring of a cross show dominant and 50% show the recessive trait, genotype of the parent must be
    a. AA × Aa   **b. Aa × aa**   c. AA × aa   d. none of them

486. Six parameter model of generation means analysis is based on
    a) Three populations   b) Four populations   c) Five populations   **d) Six populations**

487. Genetic variation within a pure line may arise by _____.
    a) Mechanical mixture   b) Natural hybridization   c) Mutations   **d) All of these**

488. Transgressive segregation is the production of plants in the ____ generation that are superior to both parents for one or more characters.
    a) F_1 **b) F_2**   c) F_3 d) F_4

489. If the frequency of "R" allele in a population under HW-equilibrium is 0.6, then the frequency of "r" allele will be_____.
    a) 1.4   b) 2.4   **c) 0.4**   d) 3.4

490. Six parameter model of generation means analysis provides information about which of the following parameters.
    a) m and d   b) h and I   c) j and l   **d) All of these**

491. An individual with two identical members of a pair of genetic factor is called
    a. Heterozygous   b. Hybrid   **c. Homozygous**   d. Hemizygous

492. The chromosome constitution of cell or individual is called
    a. Genotype   **b. Karyotype**   c. Phenotype   d. Heredity

493. A haploid plant cell derived from the meiotic division of a microspore mother cell in anther is called as
    a. Gametophyte   b. Gamete   c. Megaspore   **d. Microspore**

494. A single species may give rise to new species and this process is due to
    a) inter specific hybridization   b) intervarietal hybridization
    c) intraspecific hybridization   d) intergeneric hybridization.

495. The gene that can cause an increase in the rate of mutation in an organism is called as
    a. Mutagen   **b. Mutator gene**   c. Lethal gene   d. Muton

496. Instead of B_1 and B_2, F_3 population is used for generation means analysis of
    a) Six parameter model   **b) Five parameter model**
    c) Three parameter model   d) All of these

497. Which type of epistasis is not estimated in five parameter model of generation mean analysis?
    a) Additive × additive   b) Additive and dominance
    c) Dominance dominance   d) All of these

498. A gene that can initiate and maintain a tumerous state in an organism and arises from a gene of normal cell is called as
    a. Mutant   b. Lethal gene   c. Mutagen   **d. Oncogene**

499. If 15 genotypes are evaluated using three replications in a randomized complete block design, the error will have _____ degree of freedom.
    a) 20   **b) 28**   c) 18   d) 45

500. Selection before pollination is _____ effective than selection after pollination.
    a) Twice   b) Thrice   c) Four times   d) Does not matter