

Some Important Facts

Genetics, Plant Breeding and Economic Botany

1. The science that deals with principles of heredity and variation is called as – **Genetics**
2. The passing of traits from parents to their offspring is called as – **Heredity**
3. The transmission of genetic information from parents and ancestors to offspring is called as – **Inheritance**
4. Genetics is the study of – **Structure, Behaviour, composition, function of genes.**
5. The differences among individuals of a single species for a particular character's is called as – **Variation**
6. The unit of inheritance is – **Gene**
7. The study of chromosomes in relation to genetics is called as – **Cytogenetics**
8. The term cell was given by – **Robert Hook (1665)**
9. The term Genetics was coined by – **William Bateson**
10. Theory of pangenesis was proposed by – **Darwin**

11. The concept of Genotype and Phenotype was introduced by – **Johanssen**
12. The first man to produce first artificial hybrid plant was – **Thomas Fairchild**
13. The dominant forms in F1 and segregation of various characters in F2. This statement was given by – **Knight**
14. Hybrids races and species of plants are often luxurient than either of the parents, this statement was given by – **Naudin**
15. Who discovered nucleus in the flowering plants – **Robert Brown**
16. The cell theory was given by – **Schleiden and Schwann**
17. The Protoplasm theory was given by – **Schultzee**
18. Chromosome theory of heredity was proposed by— **Sutton**
19. Who proposed mitosis in cell – **Flemming**
20. The term of meiosis was given by – **Farmer and Moore**
21. Who worked with *Mirabilis jalapa* (4'O' clock plant) and established the first conclusive example for Extrachromosomal inheritance – **Carl Erich Correns**
22. The term Mutation coined was by – **Hugo devries**
23. Germ plasm theory was put forward by – **Weismann**
24. The evidence for semiconservative replication of DNA was first presented by— **Meselson and Stahl in 1958**
25. Bridges discovered genic balance theory of sex determination and gene duplication in – **Drosophila.**
26. The X- rays speed up the natural process of mutation is given by – **Muller, H.J.**
27. Who discovered transposons/jumping genes in Maize – **Barbara Mc Clintock**

28. The term cistron was coined by – **Benzer**
29. The development of haploid embryos/planelets from pollen grains is termed as – **Androgenesis**
30. Who Proposed the central Dogma of Molecular Biology – **F.H.C. Crick (1958)**
31. The concept of operon was given by – **Jacob and Monad**
32. Who discovered reverse transcription – **Temin and Baltimore (1970)**
33. A study of the structural and functional within a cell is known as— **Cytology.**
34. Main function of cell is **definite shape; mechanical support and strength to tissues and organs**
35. Cell wall of differentiated cell has three distinct parts 1. . **Middle lamella, 2. Primary cell wall, 3. Secondary cell wall**
36. **Primary cell wall** lies between middle lamella and plasma lemma
37. **Secondray cell wall** lies between primary cell wall and plasma lemma
38. Membrane enclosing cytoplasm of cell is known as – **plasma lemma or plasma membrane**
39. The model of unit membrane organization was given by – **Davson –Danieli**
40. Function of plasma membrane is to – **Regulate movement of various molecules into and out of cytoplasm**
41. A mechanism by which cells ingest extracellular fluid and its contents known as— **Pinocytosis**
42. The process by which a cell engulfs particles such as bacteria, other microorganisms etc. is known as— **Phagocytosis**

43. The ions are transported into the cytoplasm with energy provided ATP, this process is known as— **Active transport**
44. The ions are transported into the cytoplasm without energy used as ATP, this process is known as — **Passive transport**
45. The organelle from which the r-RNA is synthesized — **Nucleolus**
46. The substance except nucleus surrounded by plasma lemma is known as— **Cytoplasm**
47. The portion of cytoplasm other than the structures are known as — **Hyaloplasm**
48. The protein synthesis take place in— **Ribosome**
49. Vacuole sac is bounded by a single membrane called — **Tonoplanst**
50. Function of vacuole is : **1.storage of various substances including waste products 2.Contribute to the osmotic properties of the cell**
51. The organ which contain digestive (hydrolytic) enzymes is — **Lysosomes**
52. The nick name of lysosome is also known as — **Suicide bags**
53. Master control of cellular functions via its genetic material (DNA) is — **Nucleus**
54. The non chromatin components of the nucleus containing materials for building DNA and messenger RNA is known as— **Nucleoplasm**
55. The power house of cell is— **Mitochondria**
56. The storage depots for food molecules, such as starches or oils is— **Leucoplasts**
57. The process of reproduction or formation of new cells from the pre- existing cells is referred to as— **cell division.**
58. The process that does not involve reduction in chromosome number is called as — **Mitosis**

59. The process that involves reduction in chromosome number is --**Meiosis**
60. The phase between telophase and S phase is referred to as— **G1 phase**
61. Under which phase protein and RNA synthesis takes place—**G1 phase and G2 phase**
62. Under which phase chromosome and DNA replication takes place— **S phase**
63. Resting phase after DNA replication, is also called —**Post DNA replication phase (G2 phase)**
64. Who coined the term Mitosis and he was the first to study cell division —**Flemming (1882)**
65. The nucleus of a dividing somatic cell undergo series of changes called —**Mitosis**
66. The suitable materials for studying Mitosis is— **Root tips/ shoot tips**
67. Complete synaptonemal complex is found in which stage—**Zygotene**
68. Synthesis of DNA is completed in Meiosis— **Zygotene**
69. The Division of nucleus is called as - **Karyokinesis**
70. The Division of cytoplasm is called as – **Cytokinesis**
71. The first visible step in nuclear division in mitosis is —**Prophase**
72. The movement of chromosomes to the middle and their orientation on the equatorial plate is termed as—**Metakinesis**
73. Under which phase chromosomes can be easily counted and their size and shape can be determined – **Meta phase**
74. Under which phase the chromosome gets more condensed – **Anaphase**

75. The last visible stage of nuclear division in mitosis is—
Telophase
76. The process happens either through formation of cell plate in between the two newly formed daughter nucleus known as – **Cytokinesis**
77. The longest stage of cell division is – **Interphase**
78. The shortest phase of mitosis is –**Anaphase**
79. The production of identical progenies in vegetatively propagated crops is due to – **Mitosis**
80. The reduction in chromosome number takes place during cell division is known as – **Meiosis**
81. Who was the first to point out the reduction of chromosome number in the reproductive cells — **Weisman**
82. Meiosis I results in reduction in chromosome number in each new cell to half of the mother cell, referred to as—
Reductional division
83. In which stage of meiosis dose, the synapsis takes place –
Zygotene
84. There is a reciprocal exchange of segments between homologous non sister chromatids called —**Crossing over**
85. The crossing over take place in meiosis at which phase –
Pachytene
86. Bivalents may also be called—**tetrad**
87. The chiasma becomes clearly visible at which phase—
Diplotene
88. The development of the embryo is called – **Embryogenesis**
89. In organisms that reproduce sexually, once a sperm fertilizes an egg cell, the resultant cell is called as
–**Zygote**

90. The process that produces a plant embryo from a fertilized ovule by asymmetric cell division and the differentiation of undifferentiated cells into tissues and organs is known as — **Plant embryogenesis**
91. The structure of chromosome was discovered by— **Strasburger (1875)**
92. The term chromosome was coined by — **Waldeyer (1888)**
93. Somatic chromosome number — **2n**
94. Gametic chromosome number — **n**
95. The basic chromosome number is— **2x**
96. Lowest $2n = 4$ in — ***Haplopappus gracilis* of Compositae**
97. Highest $2n = >1200$ in— ***Ophioglossum* of Pteridophyta**
98. Unusual forms of chromosomes (species specific) — **Lampbrush chromosomes, Polytene chromosomes, B chromosomes**
99. The DNA show negative charge due to— **Phosphate group**
100. The basic structural unit of chromatin— **Nucleosome**
101. Highly condensed portions of chromatin are called — **Heterochromatin**
102. The term heterochromatin was coined by— **Heitz (1928)**
103. Human blood group type is an example of — **Multiple alleles**
104. The variation in heterochromatin level helps in studying the — **Biodiversity**
105. The change in total DNA amount due to repeated DNA sequences of heterochromatin results in— **Evolution**
106. Sister chromatids derived from same chromosome while Non-sister chromatids are from— **Homologous chromosome**
107. Some heavily stained, bead like projections are seen along the entire length of the chromosome called — **Chromomeres**

108. The term telomere was coined by— **H.J.Muller**
109. Telomeres occur usually at the ends of the —
Chromosomes
110. Function of telomere is to— **Stop chromosome degradation**
111. Telomeres can be stained by— **T- banding technique**
112. The unit representing a map unit between the linked gene—
CentiMorgan
113. A group of species with a common evolutionary ancestry is called as — **Clade**
114. Nucleolus staining is visualised by — **Silver Nitrate**
115. **Classification of chromosomes on the basis of position of the centromere decides the shape of chromosome**
- ❖ **Metacentric - two equal arms - V shaped**
 - ❖ **Submetacentric - sub median position -L shaped**
 - ❖ **Acrocentric- before end - J shaped**
 - ❖ **Telocentric - towards end - rod shaped**
116. **Classification of chromosomes on the basis of number of centromere**
- ❖ **Monocentric (one centromere - usual)**
 - ❖ **Dicentric (two centromere - wheat)**
 - ❖ **Polycentric (many centromeres - Ascaris)**
 - ❖ **Acentric (without centromere - do not survive)**
117. Photomicrographs of the chromosome of a single somatic metaphase cell are clipped out and arranged in homologous pairs according to their size known as —**Karyogram**
118. The graphical representation of the karyotype is referred to as — **Idiogram**
119. Techniques for identifying specific chromosome segments—
Fluorescent staining, Chromosome banding

120. The chromosome that is darkly stained at interphase – **Heterochromatin**
121. The chromosome that is lightly staining at interphase – **Euchromatin**
122. Polytene chromosomes is also called as— **Giant chromosomes / Salivary gland chromosomes**
123. Polytene chromosomes was first reported by – **Balbani in 1881**
124. Lampbrush chromosomes was discovered by – **Flemming (1882)**
125. World's first chromosome map was produced by – **Alfred Sturtevant (1913)**
126. B-Chromosomes are also called as – **Accessory chromosome / Super numerary chromosome**
127. B-Chromosomes recorded was by – **Longley and Randolph in Maize (1927)**
128. The chromosome in which both arms are identical – **Isochromosome**
129. The chromosome that has lost one of its arms and replaced it with an exact copy of the other arm is called as – **Isochromosome**
130. The $2n$ no. of chromosomes in *Drosophila* is – **8**
131. Haploid-Diploid type of sex determination is seen in – **Honey bee and wasps**
132. In man X-isochromosome causes the disease called – **Gonadal dysgenesis**
133. Any change which alters the normal structure of a chromosome is known as – **Chromosomal mutations**
134. Type of structural chromosomal aberration— **Deletion, Duplication, Inversion, Translocation**
135. When aberrations remain confined to a single chromosome of a homologous pair, they are called – **Intrachromosomal / homosomal aberrations**

136. Loss of a portion of segment from a chromosome is referred to – **Deletion / Deficiency**
137. The occurrence of a segment twice in the same chromosome is called as— **Duplications aberration**
138. Duplications aberration was reported by – **Bridges (1919) in Drosophila**
139. Genic balance theory of sex determination was proposed by – **Bridges**
140. The shifting of a part of one chromosome to another non homologous chromosome is known as – **Translocation**
141. The chromosome rearrangement involving the exchange of chromosome segments between two chromosomes that do not belong to the same pair of chromosomes is referred to – **Reciprocal translocation**
142. Additions or subtractions of individual chromosomes is known as – **Aneuploidy**
143. Alterations in whole chromosome sets are referred to – **Euploidy**
144. The additional chromosome in a telocentric chromosome is known as – **Telocentric trisomics**
145. There are two different extra chromosomes ($2n + 1 + 1$) in – **Double trisomics**
146. Turner's Syndrome is due to – **Monosomics ($2n-1$)**
147. Klinefelter's Syndrome is due to— **Trisomics ($2n+1$)**
148. Down syndrome is also referred to as – **Trisomy 21**
149. Klinefelter Syndrome is a chromosomal disorder, caused by – **Nondisjunction disorder**
150. Any change in the chromosome number from the diploid is referred to – **Heteroploidy**
151. A basic or monoploid set of chromosomes of an individual is known as— **Genome**

152. Improvement of crop plants through manipulation of chromosome number is called as—**Ploidy breeding**
153. Any organisms with more than two sets of chromosomes or genomes is known as – **Ployploid**
154. The effective method to obtain autopolyploids is—**Colchicine**
155. Important triploid plants are – **Bananas, Watermelons and Winesap apples**
156. Examples of autotetraploids are – **Alfalfa, Coffee, Fnuts and McIntosh apples**
157. The polyploids with chromosomes derived from different species are known as — **Allopolyploids**
158. Inheritance of acquired characters was given by — **Lamarck**
159. Theory of natural selection was given by – **Darwin and Wallace**
160. Who proposed germplasm theory— **Weismann**
161. Monohybrid phenotypic ratio is – **3:1**
162. Monohybrid genotypic ratio is – **1:2:1**
163. Law of inheritance was proposed by – **Gregor J. Mendel**
164. Who gave the statement “Genes must be carried on the chromosomes” – **Sutton & Boveri**
165. Discovery of non disjunction of X chromosomes in— **Fruit fly Drosophila**
166. Two alleles separate during meiosis to form gametes – **Law of Segregation**
167. The each trait separates independently of each other – **Law of Independent Assortment**
168. The physical characteristics of an organism is referred to – **Phenotype**

169. The genetic makeup of an organism is known as – **Genotype**
170. Two dominant genes exist for a single trait is known as – **Codominance**
171. Unit of inheritance located at a fixed position on a chromosome – **Gene**
172. Alternative form of a gene is known as – **Allele**
173. The term Homozygote and Heterozygote was given by—**Bateson**
174. The degree to which a genotype is expressed phenotypically is called – **Expressivity**
175. An organism derived from the union of gametes of similar genetic constitution is known as—**Homozygote**
176. An organism derived from the union of gametes of dissimilar genetic constitution is known as – **Heterozygote**
177. The plant cells are connected with the help of – **Plasmodesmata**
178. The gene occupying a fixed position in the chromosome is referred to as – **Locus**
179. The progeny obtained by crossing two pure breeding parents of different genotypes is known as—**Hybrid**
180. A cross between parents differing in a single gene are referred to as – **Monohybrid**
181. A cross which involves parents differing for two pairs of contrasting characters are referred to as—**Dihybrid Cross**
182. The progeny from a cross between parents differing in three genes – **Trihybrid**
183. A cross which involves parents differing for many pairs of contrasting characters – **Polyhybrid**
184. A cross between hybrid and any one of the parents are referred to as – **Backcross**

185. A cross between hybrid and a recessive homozygote are referred to as – **Testcross**
186. The second cross involving the same characters as the first but with the sexes of the parents interchanged are known as – **Reciprocal crosses**
187. The interaction between genes belonging to different pairs of alleles, the dominant allele in one of the pairs preventing the dominant allele in the other pair from expressing itself is referred to as— **Epistasis**
188. **Non allelic interaction with modification in Mendelian ratio**
- ❖ **Dominant epistasis —12:3:1**
 - ❖ **Recessive epistasis—9:3:4**
 - ❖ **Duplicate and additive epistasis—9:6:1**
 - ❖ **Duplicate dominant epistasis—15:1**
 - ❖ **Duplicate recessive epistasis—9:7**
 - ❖ **Dominant and recessive epistasis—13:3**
189. The genetic interactions occur in between the two alleles of a single gene is referred as – **Allelic interaction**
190. The dominant allele at one locus mask the expression of both dominant and recessive alleles at another locus are known as – **Dominant epistasis**
191. The recessive allele at one locus mask the expression of both dominant and recessive alleles at another locus is referred to as – **Recessive epistasis**
192. The dominant alleles at either of the two loci mask the expression of recessive alleles at the two loci are known as – **Duplicate dominant epistasis**

193. Duplicate dominant epistasis is also called— **Duplicate gene action**
194. When recessive alleles at either of the two loci mask the expression of dominant alleles at the two loci it is called as — **Duplicate recessive epistasis**
195. Duplicate recessive epistasis is also called— **Complementary Epistasis**
196. The dominant and recessive alleles at one locus mask the expression of both dominant and recessive alleles at second locus is referred to—**Dominant and recessive epistasis**
197. Dominant and recessive epistasis is also called — **Inhibitory gene action**
198. Two dominant alleles have similar effect when they are separate but produced enhanced effect when they are together, they are known as— **Duplicate and additive epistasis**
199. Duplicate and additive epistasis is also called — **Polymeric gene action**
200. Single gene controlling more than one character is called as — **Pleiotropy**
201. The phenotype becomes altered by the environment in such a way that the new phenotype resembles another phenotype produced by known genes. The induced phenotype is not inherited, this is called as — **Phenocopy.**
202. Inability of a viable pollen to fertilize the ovule of the same plant is called as — **Self incompatibility**
203. **Stages of Self incompatibility**
- ❖ **Failure to germinate at stigmatic surface.**
 - ❖ **Failure to penetrate stigma**
 - ❖ **Slow growth of Pollen tube**
 - ❖ **Embryo degenerates.**

204. Self incompatibly alleles in plants are controlled by – **Multiple allelic**
205. The existence of more than two alleles at the same locus of a homologous chromosome is referred to as—**Multiple alleles**
206. **Examples of Multiple Alleles**
- ❖ **Fur color in Rabbits**
 - ❖ **Wing type in Drosophila**
 - ❖ **Eye colour in Drosophila**
 - ❖ **Self incompatibility alleles in Plants**
 - ❖ **ABO Blood group in man**
207. The ability of a gene or gene combination to be expressed phenotypically to any degree is called – **Penetrance**
208. When all the individuals which carry a particular gene exhibit its phenotypic effect is called as – **Complete Penetrance**
209. Heterozygous condition unable to express fully the normal phenotype are referred to as – **Incomplete penetrance**
210. The degree of phenotypic expression of a gene in the different individuals is known as— **Expressivity**
211. Who proposed the multiple factor hypothesis for the inheritance of quantitative characters – **Nilson-Ehle**
212. Genes having individually small but cumulative effect on a character, they govern quantitative character is known as – **Polygenes**
213. The term polygenes was coined by – **Mather(1943)**
214. The appearance of individuals in F₂ with very higher or lower intensity of expression than their both parents is known as – **Transgressive segregation**

215. The genes that can either initiate or block the expression of other genes is known as – **Regulator genes**
216. Test cross ratio of dihybrid is— **1:1:1:1**
217. The tendency of two or more genes to stay together during inheritance is known as – **Linkage**
218. The Group of genes situated on the same chromosome is known as— **linkage group**
219. Who first reported on sex linkage in the Drosophila – **T.H. Morgan (1910)**
220. Any two genes on a particular chromosome is very close to each other and move together to the gametes and no recombination/cross overs/chiasma between these two loci is called as – **Completely linked genes**
221. Any two genes on the same chromosome but show moderate level of cross overs is known as – **Incompletely linked**
222. The exchange of strictly homologous segments between non sister chromatids of homologous chromosomes is called as – **Crossing over**
223. If genes at two loci are on separate chromosomes, then they segregate independently. These loci are said to be — **Unlinked**
224. The term crossover was first used by— **Morgan and Cattell (1912)**
225. The points at which the chromosomes actually cross over are called – **Chiasmata**
226. A line drawing showing the linked genes and the recombination frequencies between them is known as— **Linkage map, Genetic map or Chromosome map**
227. The frequency of recombination between two linked genes cannot exceed —**50%**

228. Map unit is also known as – **Morgan unit (1 centimorgan = 0.1 map unit)**
229. The tendency of one crossover to reduce the chance of another crossover in its adjacent region is called— **Interference**
230. Sex chromosomes were first discovered by – **Mc Lung in 1902, in grass hoppers**
231. Sex linked gene passes from male to female then back to male; such an inheritance pattern is known as – **Criss-cross inheritance**
232. The plant bears both female and male inflorescences on the same plant are referred to as – **Monoecious plant**
233. Inheritance due to genes located in cytoplasm is called as – **Cytoplasmic inheritance**
234. The sum total of genes present in the cytoplasm of a cell or an individual is known as – **Plasmon**
235. First case of cytoplasmic inheritance was reported by— **Correns in 1909 in four 'O' clock plant**
236. Synthesis of protein (polypeptide chain) from m RNA molecule are referred to as – **Translation**
237. Deoxyribonucleic acids and their ability to form polynucleotide chain were discovered by – **Levene (1931)**
238. The amount of DNA present in the haploid genome of an organism is known as – **C-value**
239. The evidence for semiconservative replication of DNA was first presented by – **Meselson and Stahl in 1958**
240. The unwinds in the DNA is due to – **DNA helicase**
241. The junction between the unwound part and the open part is called – **Replication fork**
242. Anticodon is present in the — **tRNA**

243. Initiation codon for protein synthesis is—AUG (methionine)
244. Stop codons—UAA,UAG,UGA
245. The characteristic fruit of the family Poaceae is—
Caryopsis
246. Few species of plants other than those of poaceae which produce small grains and used as food as in the of cereals are referred to as – **Pseudo cereals**
247. Tillering habit is more common in cereals except – **Maize and Sorghum**
248. The inflorescence in rice is called as – **Panicle**
249. Study of Vegetables is known as— **Olericulture**
250. Study of Fruits is known as – **Pomology**
251. Growing of special crops for adding organic matter and Nitrogen to the soil and ploughing them in situ is called – **Green manuring.**
252. Stamens are usually three in the cereals crops except – **Rice (6)**
253. Origin of rice is — **India or Africa**
254. Putative parents in rice is – **Asian rice *O. sativa* and African rice, *O. glaberrima***
255. The both Asian rice and African rice arise from a common parent — ***O. perennis***
256. How many wild species are there in rice – **22**
257. Among the 22 wild species of rice which is having diploid in nature – ***O. sativa* and *O. glaberrima***
258. The process of removing the hull is known as— **Hulling**
259. The hulling percentage of rice is – **20%**
260. After hulling the produce obtained is known as – **Brown rice**

261. The process the paddy is steeped in water for 24 hrs and then steamed under pressure is known as – Par boiling of rice
262. Which one is called as wonder Rice – IR8
263. The variety of IR8 is made of cross between—— Peta x Dee Gee Woo Gen
264. Most cultivated species of wheat is – Hexaploid
265. Example of Diploid species of wheat
- ❖ *T. boeoticum*
 - ❖ *T. monococum*
266. Example of Tetraploid species of wheat
- ❖ *T.dicoccoides*
 - ❖ *T.dicoccum*
 - ❖ *T.durum*
 - ❖ *T.persicum*
 - ❖ *T.turgidum*
 - ❖ *T.polonicum*
 - ❖ *T.timopheevi*
267. Example of Hexaploid species of wheat
- ❖ *T.aestivum*
 - ❖ *T.compactum*
 - ❖ *T.sphaerococcum*
 - ❖ *T.spelta*
 - ❖ *T.macha*
268. An ancestor for all the cultivated species of wheat is – *T. boeoticum*
269. Species of wheat having Grains containing high glutien— *T. durum*
270. The dwarfing genes in the wheat – NORIN-10
271. Wheat revolution in India was started by——M.S. Swaminathan
272. Wheat revolution in World was started by—— Norman Borlaug

273. Origin of maize is – Southern Mexico
274. Which type of pollination occur in the maize plant – Cross pollinated
275. Type of corn
- ❖ Dent corn: *Zea mays var. indentata*
 - ❖ Flint corn: *Zea mays var. indurata*
 - ❖ Sweet corn: *Zea mays var. saccharata*
 - ❖ Flour corn or soft corn: *Zea mays var. amylacea*
 - ❖ Wax corn: *Zea mays var. cerata*
 - ❖ Pop corn: *Zea mays var. everta*
 - ❖ Pod corn: *Zea mays var. tunicata*
276. In the maize plant available protein zein predominates and deficient in tryptophan and lysine this can be increased by— Opaque-2
277. In the maize plant protein found in the endosperm is known as— Zein
278. In maize plant male flower is called as – Tassel
279. In maize plant female flower is called as – Cub
280. Origin of sorghum is – Africa
281. What is sorghum poisoning: The aerial shoot of sorghum contain the cynogenic glycoside dhurrin, which by enzyme action hydrolizes to give hydrocyanic acid, (HCN)
282. Fruit type of ragi is – Utricle
283. All pulses belong to the sub family— Papilionaceae
284. Protein content in soybean – 40%
285. Oil content in soybean – 20%

286. Oil content in groundnut — 45 to 50%
287. Gingelly is also called as – Sesame or Til.
288. Castor seed have toxic protein such as – Ricin
289. Castor seed contain a unique hydroxy fatty acid called—**Ricinoleic acid.**
290. Castor seed oil is stored in – **Endosperm**
291. Oil content of castor seed—**50%**
292. Family of Sunflower is – **Asteraceae**
293. Oil content of Sunflower— **40—50 %**
294. Sunflower are major source of – **Semi drying oils**
295. How much content of poly unsaturated fatty acid (PUFA) are there in the sunflower oil – **90%**
296. Scientific name of safflower is – ***Carthamus tinctorius***
297. Fruit type of mustard is— **Siliqua**
298. Banarasi rai is variety of – **Black or true mustard**
299. The fibers are separated by stem through the process called as— **Retting**
300. Old world cotton is also called as – **Desi cotton or diploid cotton**
301. Example of diploid cotton
 - ❖ ***G. herbaceum*** (Uppam cotton)
 - ❖ ***G. arboreum*** (Karunkanni cotton)
302. American cotton is also called as— New world cotton or Tetraploid cotton
303. Examples of Tetraploid cotton
 - ❖ ***G. hirsutum*** (Upland cotton)
 - ❖ ***G. barbadense*** (Sea Island cotton)

304. In cotton longer out growth fiber is called as – Lint
305. In cotton short out growth fiber is called as – Fuzz
306. Cotton species having only lint – - *G. barbadense*
307. The process of removal of lint from epidermal layer of the cotton seed is called as – Ginning
308. The ratio between lint and seed in cotton seed is called as – Ginning percent
309. Which type of pigment present is in cotton seed – Gossypol
310. Oil content of cotton seed is – 20%
311. Family of jute is – Tiliaceae
312. Commercial jute fiber is obtained from—— 1. *Corchorus capsularis* (white or bitter jute), 2. *C. olitorius* (Tossa jute)
313. The ideal phase of harvest of fiber from the just is——
Plants are in small pods
314. Silk cotton is obtained from – Inner wall of the fruit
315. Cultivated species of sugarcane
- ❖ Noble cane ($2n=80$) : *Saccharum officinarum*.
 - ❖ Indian cane ($2n=82-124$) : *S. barberi*
 - ❖ Chinese cane ($2n=118$) : *S. sinense*
316. Wild species of sugarcane
- ❖ Wild cane ($2n=40-128$): *S. spontaneum*
 - ❖ Wild cane ($2n=60-194$): *S. Robustum*
317. Inflorescence in sugarcane called as – Arrow
318. Bye products of sugar cane
- ❖ Mollases
 - ❖ cane wax
 - ❖ Trash
 - ❖ Baggasse
 - ❖ Press mud

319. The Plants which are, cultivated as forages crops and they are cut and fed to animals in stalls are known as – Fodders
320. The grasses and legumes are grown in pasture lands where the animals are led to graze are known as – Pastures
321. Scientific name of napier grass – *Pennisetum purpureum*
322. Scientific name of guinea grass – *Panicum maximum*
323. Scientific name of Buffel grass— *Cenchrus ciliaris*
324. Scientific name of johnson grass – *S. halapense*
325. The Queen of fodder is – Lucerne (or) Alfalfa
326. Scientific name of Subabul – *Leucaena leucocephala*
327. Example of green manure crops
- ❖ Sunnhemp : *Crotalaria juncea*
 - ❖ Dainchia : *Sesbania aculeata*
328. Example of green leaf manure
- ❖ Neem: *Azadirachta indica*
 - ❖ Pungam.: *Pongamia glabra*
 - ❖ Glyricidia : *Glyricidia sepium*
329. Example of short duration (<100Days) variety of rice is—
CR 666, Akashi, CO 41
330. Which variety of rice is resistant to cold temperature—
MDU 2, Japonica rice
331. Which variety of rice is resistant to Blast disease – IR 20,
CO 37, CO 25
332. Which variety of rice is resistant to Stem borer – TKM
6,IR 20
333. Basmati rice is having aromatic component due to presence
of – Pandamarilactone

334. Variety of rice suitable for export is — **Basmati 370**
335. Variety of rice resistant to Drought is — **CO 31**
336. Example of mutation variety of rice is — **Jagannath, Parbhani, Satari**
337. Who is father of hybrid rice — **Yuan Long Ping**
338. Abbreviation of Breeding techniques
- ❖ **CGMS: Cytoplasmic Genetic Male Sterile**
 - ❖ **CMS: Cytoplasmic Male Sterile**
 - ❖ **GMS: Genetic Male Sterility**
 - ❖ **EGMS: Environmentally Induced Genetic Male Sterility**
 - ❖ **PGMS: Photosensitive Genetic Male Sterility**
 - ❖ **TGMS: Thermosensitive Genetic Male Sterility**
339. Semi dwarf varieties of wheat are — **Sonara 63, Sonara 64, Mayo 64, Lerma Roja 64**
340. Ear to Row Selection was first proposed by— **Hopkins**
341. Modified ear to row method was proposed by — **Lonquist**
342. Example of Single cross hybrid varieties in maize — **COH 1, COH 2**
343. Example of tree way cross hybrids varieties in maize — **Ganga 5**
344. Example of double cross hybrid varieties in maize — **COH 3**
345. Example of double top cross hybrid varieties in maize — **Ganga safed 2, Histarch, Ganga 4**
346. Example of short duration (<70 Days) variety in sorghum — **CO22**
347. Which one is red grain variety of sorghum — **Paiyur 2**

348. Sorghum is an – Often cross pollinated crop
349. BN1 (Cumbu napier hybrid) is a cross between – *P.glaucum* × *P.purpureum*
350. Tift 23 is – Highly susceptible to downy mildew
351. Example of minor millet
- ❖ Fox tail millet: *Setaria italica*
 - ❖ Kodo millet: *Paspalum scrobiculatum*
 - ❖ Barn yard millet: *Echinochloa colona*
 - ❖ Proso millet: *Panicum miliaceum*
352. Example of short duration variety in red gram – Prabhat, ICPL 87
353. Example of YMV (Yellow mosaic virus) resistance variety in black gram is – VBN 1, VBN 2, VBN 3
354. Pusa do fasli is a variety of – Cowpea
355. Origin of groundnut is – Brazil
356. Which is first hybrid of sunflower in India – BSH 1
357. Cytoplasmic inheritance
- ❖ T cytoplasm - Maize
 - ❖ Tift 23A cytoplasm - Cumbu Susceptible to disease.
 - ❖ C and M cytoplasm of maize resistant to Helminthosporium.
 - ❖ L 111A and 732 A cytoplasm resistant to downy mildew in cumbu.
358. The ability of a plant to complete its life cycle before serious soil and plant water deficit occurs is referred to – Drought escape

359. The Process of bringing a wild species under human management is called as – **Domestication**
360. First artificial hybrid was developed by – **Thomas Fairchild**
361. Who developed individual plant selection method – **Nilson-Ehle**
362. Who proposed the pureline theory – **Johannsen**
363. PIRRCOM means : **Project of Intensification of Regional Research on Cotton, Oilseeds and Millets**
364. The All India Coordinated Maize Improvement Project was started in – **1957**
365. Who proposed centres of origin – **N.I. Vavilov(1926)**
366. Crop plants evolved from wild species in the areas showing great diversity are known as – **Primary centres of origin**
367. In some areas, crop species show considerable diversity of forms although they did not originate there, such areas are known as – **Secondary centres of origin**
368. Who gave this statement 'Law of Homologous Series in Variation'— **N.I. Vavilov**
369. Eight main centres of origin were originally proposed by – **N.I. Vavilov**
370. Eight main centres of origin
- | | |
|--------------------------|------------------------|
| ❖ China | ❖ Hindustan |
| ❖ Central Asia | ❖ Asia Minor |
| ❖ Mediterranean | ❖ Abyssinia |
| ❖ Central America | ❖ South America |
371. Within the large centres of diversity, small areas may exhibit a much greater diversity than the centre as a whole; these areas are known as— **Microcentres**
372. The sum total of hereditary material present in a crop species and its wild relatives is referred to as – **Germplasm**

373. Primitive cultivars selected and cultivated by farmers for many generations are known as – **Landrace**
374. Gene pool concept was proposed by— **Harlan and De Wet in 1971**
375. The conservation of germplasm under natural conditions is referred to as – **In situ conservation**
376. The preservation of germplasm in gene banks are known as – **Ex - situ conservation**
377. Germplasm is stored as seeds of various genotypes which are known as – **Seed bank**
378. The Seeds which can be dried to low moisture content and stored at low temperature without losing their viability for long periods of time is known as – **Orthodox seeds**
379. Seeds which show very drastic loss in viability with a decrease in moisture content below 12 to 13% are known as – **Recalcitrant seeds**
380. Example of Orthodox seeds – **corn, wheat, rice, carrot, papaya, pepper, chickpea, cotton, sunflower**
381. Example of Recalcitrant seeds – **citrus, cocoa, coffee, rubber, oilpalm, mango, jack fruit**
382. IPGRI (International Plant Genetic Resources Institute) is located at— **Rome**
383. NBPGR (National Bureau of Plant Genetic Resources), is located at – **New Delhi**
384. Directorate of Plant Protection Quarantine and Storage is located at – **Faridabad**
385. An organisms does not involve fusion of male and female gametes. New plants may develop either from vegetative parts of the plant (vegetative reproduction) or they may arise from embryos that develop without fertilization are known as – **Asexual reproduction**

386. The seeds are formed but the embryos develop without fertilization is called as— **Apomixis**
387. An organism reproduction involves fusion of male and female gametes to form a zygote, which develops into an embryo are known as – **Sexual reproduction**
388. The progeny test was developed by **Louis de Vilmorin**
389. In the plants, male and female gametes are produced in specialized structures known as – **Flowers**
390. In the plants, meiotic division of specific cells take place in – **Stamen and Pistil**
391. Productions of microspores and megaspores are known as – **Sporogenesis.**
392. Microspores can produce—**Anther**
(*microsporogenesis*)
393. Megaspores can produce — **Pistil (*megasporogenesis*)**
394. The production of male and female gametes in the microspores and the megaspores respectively, is known as – **Gametogenesis**
395. When the pollen fall onto the stigma of a flower, it is known as – **Pollination.**
396. The Pollen, along with the pollen tube, is known as—**Microgametophyte**
397. The pollen tube enters the ovule through a small pore known as— **Micropyle**
398. The development of embryo sac from a megaspore is known as— **Megagametogenesis**
399. The fusion of one of the two sperms with the egg cell producing a diploid zygote is known as – **Fertilization**
400. Pollen from an anther may fall on to the stigma of the same flower is called as – **Self- pollination or Autogamy.**

401. When pollen grains from flowers of one plant are transmitted to the stigmas of flowers of another plant, it is known as – **Cross pollination or Allogamy**
402. When pollen from a flower of one plant falls on the stigmas of other flowers of the same plant, it is known as – **Geitonogamy**
403. In some species flower does not open at all in the situation called as— **Cleistogamy**
404. In some species the flowers open but only after pollination has taken place in the situation called as – **Chasmogamy**
405. Staminate and pistillate flowers occur in the same plant known as—**Monoecy**
406. The male and female flowers are present at different plants known as—**Dioecy**
407. Example of Monoecy plants – **Castor, Mango, Banana, Maize**
408. Example of Dioecy plants – **Papaya, datepalm**
409. Stamens and pistils of hermaphrodite flowers may mature at different times called as – **Dichogamy**
410. In some crop species pistils mature before stamens is called as – **Protogyny**
411. In some crop species stamens mature before pistils is called as – **Protandry**
412. Which plant exhibits both monoecy and protandry – **Maize**
413. The failure of pollen to fertilize the same flower or other flowers on the same plant are known as – **Self incompatibility**
414. The absence of functional pollen grains in otherwise hermaphrodite flowers is called as – **Ale sterility**
415. In which female gamete has equal chance to unite with every male gamete – **Random mating.**

416. The process that leads to the adaptation of a variety, line or population to a new environment is known as—
Acclimatization
417. The mating between genetically similar or closely related individuals are known as – **Inbreeding**
418. The mating between genetically dissimilar individuals or between less closely related individuals is referred to as –
Outbreeding
419. Genetic male sterility is caused by— **Nuclear genes**
420. Cytoplasmic male sterility is caused by— **Cytoplasmic genes**
421. How to maintain the male sterility line — – **Cross between (A line × B line)**
422. Male sterility line is also known as – **A line**
423. Cytoplasmic Genetic male sterility genes are controlled both by— **Cytoplasmic and Nuclear genes**
424. The chemicals used for chemically induced male sterility are called – **Male Gametocides**
425. The embryo develops from egg cell is called as –
Parthenogenesis
426. The ratio of genetic variance to the total variance is known as – **Heritability**
427. When the introduced variety is well adapted to the new environment, it is released for commercial cultivation without any alteration in the original genotype is called as – **Primary introduction**
428. Example of Primary introduction varieties – **Sonora 64, Lerma Rojo, IR8, IR28 and IR36**
429. The introduced variety may be subjected to selection to isolate a superior variety. Alternatively, it may be hybridized with local varieties to transfer one or few characters from this variety to the local ones is called as – **Secondary introduction**

430. Example of Secondary introduction varieties— **Kalyan Sona ,Sonalika**
431. Evaluation of the worth of plants on the basis of performance of their progenies is known as – **Progeny test**
432. Progeny test is also called as – **Vilmorin Principle**
433. The sudden heritable change is known as – **Mutation**
434. The mating or crossing of two plants or lines of dissimilar genotype is known as – **Hybridization**
435. The seeds as well as the progeny resulting from the hybridization are known as – **Hybrid**
436. The removal of stamens or anthers or the killing of pollen grains of a flower without affecting in any way the female reproductive organs is known as— **Emasculation**
437. When two species of the same genus are crossed, it is known as – **Interspecific hybridization**
438. When the species belong to two different genera, it is called as— **Intergeneric hybridization**
439. The parents involved in hybridization belong to the same species are known as— **Intra-specific hybridization**
440. The term self incompatibility was coined by – **Stout**
441. Modification of the bulk method is – **Single seed descent method**
442. A cross between a hybrid and one of its parents is known as – **Backcross**
443. The recipient parent repeatedly used in the backcross programme is known as – **Recurrent parent**
444. The donor parent used only once in the backcross programme is known as – **Non- recurrent parent**
445. In downy mildew resistant male sterile lines in bajra – **MS521A, MS541A, MS570A**

446. The ear-to-row method was developed by – Hopkins (1908)
447. Recurrent selection for specific combining ability (RSSCA) was first proposed by – Hull (1945)
448. Reciprocal recurrent selection was proposed by – Comstock, Robinson and Harvey (1949)
449. When an inbred is crossed with an open-pollinated variety it is known as—Topcross
450. When cross is made with an inbred hybrid, synthetic or open-pollinated variety the common parent used in the test-cross is known as – Tester
451. The group of plants produced from a single plant through asexual reproduction is called as – Clone
452. Mutations produced by changes in the base sequences of genes are known as — Gene or Point mutations
453. Some mutations changes in chromosome structure, or even in chromosome number are known as – Chromosomal mutations.
454. The agents that cause the mutation are termed as – Mutagens
455. Mutations occur in natural population at a low rate are known as— Spontaneous mutations
456. The frequency of spontaneous mutations is generally – 10^{-6}
457. Mutations may be artificially induced by a treatment with certain physical or chemical agents such mutations are known as – Induced mutations
458. The utilization of induced mutations for crop improvement is known as— Mutation breeding
459. An individual carrying the gametic chromosome number (n) is known as – Haploid

460. The first autopolyploid variety released for general cultivation in India is – **Pusa Giant Berseem**
461. The heterosis is estimated over the superior parent such an estimate is referred to as— **Heterobeltiosis**
462. The dominance hypothesis was first proposed by – **Davenport (1908)**
463. The Overdominance Hypothesis hypothesis was proposed by— **East and Shull (1908)**
464. **Parbhani Kranti** is a variety of— **Bhendi**
465. The term of protoplasm was coined by – **Purkinje (1840)**
466. Produced haploid plant in Vitro from pollen grain was developed by – **Maheshwari and Guha (1964)**
467. World's first pigeon pea hybrid is—— **ICPH 8**
468. The embryo develops directly from haploid nuclei other than egg cells are known as— **Apogamy**
469. The embryo develops directly from the somatic cell are known as— **Apospory**
470. Union of two similar gametes is called as – **Isogamy**
471. Union of two dissimilar gametes is called as – **Heterogamy**
472. Male and female sexual organs present in the same flower are known as – **Bisexual**
473. Male and female sexual organs mature at the same time are known as – **Homogamy**
474. Presence of physical barrier or mechanical obstacles between the anther and stigma ensures cross pollination are known as – **Herkogamy**

Seed Science and Technology

475. Ripened ovule is called as – Seed
476. Genetic purity of Nuclear seed is – 100%
477. Genetic purity of Breeder seed is – 99.9%
478. Genetic purity of foundation seed is – 99.5%
479. Genetic purity of certified seed is – 99%
480. National Seeds Corporation was established in – 1963
481. High yielding varieties (HYV) programme was started in – 1966
482. The Seeds Act was passed in – December, 1966
483. The Seeds Act was effective in – October, 1969
484. The National Seeds Programme (NSP) was launched in— 1977
485. Potato Breeder Seed scheme was initiated at – CPRI, Shimla
486. World's first Seed Testing Station was established by – Prof.F. Nobbe
487. International Seed Testing Association (ISTA) was established in – Norway
488. First Five Year Plan was started with an aim to – Multiply and distribute seeds
489. The first Vegetable Seed Testing Station was established in – IARI, New Delhi
490. First Indian vegetable hybrid — Pusa Meghadoot (Bottle gourd)

491. Seed Control Order – 1983
492. The distance which separates seed crop from the crop of lower standards belonging to same variety or another variety is known as – **Isolation distance**
493. The cotyledons are pushed out during germination above the soil is called as – **Epigeal germination**
494. The cotyledons are not pushed out during germination remain below the soil is called as – **Hypogeal germination**
495. Example of epigeal germination—**Bean, Bengal gram, cotton, papaya, gourd, castor and onion**
496. Example of hypogeal germination – **Rice, Pea, mango, maize, rice, gram and groundnut**
497. The effect of a pollen on the maternal tissues of fruit – **Mataxenia**
498. The removal of off type plants from seed crops is called as – **Roguing**
499. The first hybrid sorghum (CSH 1) was released in – **1964**
500. Presence of B line plants in A line are called— **Pollen shedders**
501. Presence of A line in B line are called as— **Off type**
502. Presence of R line in B line are called as— **Rogue**
503. In maize crop cob is covered by the leaf like structures called— **Husk**
504. The removal of tassel from female parent in maize are known as – **Detaselling**
505. The visible effects of the pollen on endosperm and related tissues in the formation of a seed colour due to – **Xenia**
506. Example of Interspecific hybrid in cotton – **Varalakshmi, Jayalakshmi**
507. Example of Intraspecific hybrid in cotton – **Suguna, Savitha**

508. Which chemical is used for seed treatment in cotton—
 H_2SO_4

509. In groundnut dark plumule disorder occur due to — **Calcium deficiency**

510. The sample taken by seed inspector is known as — **Official sample**

511. The sample taken by seed certification officer from the seed lot is called— **Certified sample**

512. Commercial hybrids produced

- ❖ **Single cross (A×B) in — Bajra, Brinjal, Carrot, Castor, Chillies, Cotton, Cucurbits**
- ❖ **Double cross (A×B) × (C×D) in —Maize, Sugarbeet**
- ❖ **Three way cross (A×B) × C in — Sweet maize**
- ❖ **Double Top cross (A×B) × OPV in —Maize**
- ❖ **Triple cross (A×B)×C×(D×E)×F in —Cabbage**
- ❖ **All types of hybrid can be found in— Potato and sugarcane etc.**

513. Isolation distance of different crops

Sl. No.	Name of group (Crops)	Isolation in metres	
		Foundation 3	Certified 4
1	2		
1	Cole crops		
	Cabbage		
	Cauliflower	1600	1000
	Chinese cabbage	1600	1000
	Knol-khol	1600	1000
2	Fruits/Vegetables	1600	1000
	Brinjal		
	Capsicum (chillies)	200	100
		400	200

	Tomato	50	25
	Okra	400	200
3	Bulbous vegetables		
	Garlic	10	5
	Onion	1000	500
4	Root vegetables		
	Beetroot	1600	800
	Carrot	1000	800
	Radish	1600	1000
	Turnip	1600	1000
5	Tuber vegetables		
	Sweet potato	10	5
	Potato	10	5
6	Rhizomatous vegetables		
	Ginger	10	5
	Turmeric	10	5
7	Legume vegetables		
	Cluster bean	50	25
	Cowpea	50	25
	French bean	50	25
	Indian bean	50	25
	Lima bean	50	25
	Peas	10	5
8	Leafy vegetables		
	Amaranths	400	200
	Beet leaf	1600	1000
	Coriander	800	400
	Fenugreek	50	25
	Spinach	1600	1000
9	Curcubits (All crops)	1000	500

514. The plants of the same kind growing naturally from seed that remains in the field from a previous crop is called as—
— Volunteer Plants
515. Plant that differs in morphological characters from the rest of the populations of a crop variety is called as – Off Type
516. A line is – Male sterile line
517. B line is – Maintainer line
518. R line is – Restorer line

Agricultural Microbiology

519. Example of Monotrichous flagellum— – *Pseudomonas aeruginosa*
520. Example of Lophotrichous flagella -*Pseudomonas fluorescens*
521. Example of Amphitrichous flagella -*Aquaspirillum serpens*
522. Example of Peritrichous flagella -*Salmonella typhi*
523. In bacteria cytoplasmic membrane invagination in the form of tubular or vesicle shaped are known as – Mesosomes
524. The cell division of bacteria is referred as— Transverse binary fission
525. In bacteria time required to form two daughter cells from a single cell is called as— Generation time
526. Psychrophiles bacteria growth at which temperature — —
Low temperature- 15°C
527. Mesophiles bacteria growth at which temperature— 35°C
to 40°C

528. Thermophiles bacteria grows at which temperature—
– 55 to 65°C
529. Hyper thermophiles bacteria grows at which temperature—
– 80 to 100°C
530. Microorganisms which grow at an optimum pH well below neutrality (7.0) are called—**Acidophiles**
531. Microorganisms which grow well at neutral pH are called—**Neutrophiles**
532. Microorganisms which grow well at alkaline pH are called—**Alkaliphiles**
533. *Thermus aquaticus* is an example for – **Hyper thermophiles**
534. Bacteria that are able to grow at moderate salt concentrations are called – **Halotolerant**
535. Bacteria that are able to grow at high in sugar concentrations are called – **Osmophiles**
536. Organisms which live in dry environments are called—**Xerophiles**
537. Milk is pasteurized to eliminate spoilage bacteria – ***Lactobacillus bulgaricus* and *Streptococcus thermophilus***
538. The change in cell number or cell mass per unit time is referred to – **Growth rate**
539. Father of Microbiology— **Anton Von Leeuwenhoek**
540. Who proved that dust carries the germs and if no dust in the air, the sterile broth remained free of microbial growth for indefinite period – **John Tyndall (1820 -1893)**
541. Who first developed vaccines for small pox disease – **Edward Jenner (1798)**
542. Term vaccines was coined by – **Edward Jenner (1798)**
543. The term virus was coined by – **Beijerinck**
544. Who is father of Modern surgery— **Joseph Lister (1827 - 1912)**

545. Who was the first to reveal the importance of bacteria in fixing the atmospheric nitrogen— **S.W. Winogradsky**
546. Who discovered first antibiotic (streptomycin)— **Selman A. Waksman**
547. Prions were discovered by — **S.B. Prusiner**
548. The first recombinant vaccine was developed against — **Hepatitis B**
549. The term antibiotic was coined by— **Selman A. Waksman**
550. The streptomycin is isolated from— ***Streptomyces griseus***
551. Father of antibiotic is— **Selman A. Waksman**
552. Three domain classifications was proposed by— **Carl Woese**
553. Who provided the evidence that deoxyribonucleic acid (DNA) was the genetic material and carried genetic information during transformation— **Oswald T. Avery, Colin M. MacLeod, and Maclyn McCarty**
554. The substances that can be used as cryoprotectants— **DMSO and Glycerol**
555. Peptidoglycan is absent in— **Archaeobacteria**
556. The size of microbial filter used to filter bacteria is— **0.22mm to 0.45mm**
557. The unidirectional relationship between two organisms in which one species is benefited but the other is in no way affected are referred to— **Commensalism**
558. *E coli* is — **Gram negative**
559. Two population/ micro-organism co-exist as their metabolic activities help their survival are referred to— **Syntrophism**
560. The specific enzyme present in Retrovirus is— **Reverse transcriptase**
561. Storage granules present in bacteria is — **Glycogen, Volutin granules**

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562. The beneficial association that exists between two different organisms and both the partners are benefited by this **Associate**
563. Peptidoglycan is made up of–**N.Acetyl Glucosamine and N-Acetyl Glucuronic acid**
564. The size of filter used to filter virus is – **22nm**
565. TEMPHE IS PREPARED FROM SOYABEAN USING – ***Rhizopus nigricans***
566. Example of symbiosis organism – between Azolla – **Anabaena; BGA- fungus (lichens),**
567. There are certain microorganisms which rely on other living organisms to meet out their nutritional is known as – **Parasitism**
568. The genetic material in Viroid is a – **SS circular RNA**
569. The cell wall of bacteria is made up of – **Peptidoglycan**
570. Viruses that feed on bacteria are called– **Bacteriophages**
571. Some microbes in the soil prey on bacteria and thereby curtail the population of bacteria are called – **Predation**
572. Acid fast staining technique was started by Robert Koch to stain for – ***Mycobacterium tuberculosis***
573. Smallest virus is – **Polio virus**
574. Some microorganisms are known to secrete some secondary metabolite which can inhibit the growth of other organisms that compound are known as – **Antibiosis**
575. Capsomeres (units of capsid) are chemically – **Protein**
576. Which bacteria's will produce endospores during adverse condition–**Bacillus, Clostridium**
577. Penicillin was isolated from – ***P.notatum (or) P.chrysogenum***
578. Bacteria without cell wall is–**Mycoplasma**

579. For clearing oil spills, which microorganism is used -
Pseudomonas putida
580. Which of the compound is specific to endospores -
Dipicolinic acid
581. Symbiotic nitrogen fixing bacteria — *Rhizobium*,
Azospirillum, *Anabaena azollae*
582. Example of Free living nitrogen fixers- *Azotobacter*,
Beijerinckia, *Clostridium pasteurianum*
583. All nitrogen fixing bacteria use highly conserved enzyme
complex called— Nitrogenase
584. Example of grass-bacteria associative symbioses-
Azospirillum
585. The process in which organic nitrogen is converted in to
inorganic (NH_4) are called - Ammonification
586. The enzyme present in tears, saliva, and sweat—Lysozyme
587. The conversion of Ammonium ion (NH_4^+) to Nitrite ion
(NO_2^-) mediated by - *Nitrosomonas*
588. The conversion of Nitrite ion (NO_2^-) to Nitrate ion
(NO_3^-) mediated by — *Nitrobacter*
589. The conversion of Nitrate ion (NO_3^-) to N_2 is mediated by
- *Pseudomonas*, *Thiobacillus denitrificans*
590. The process conversion of N_2 to Ammonia (NH_3) is called
as - Nitrogen fixation
591. The conversion of nitrate(NO_3^-) and nitrite (NO_2^-) into
molecular nitrogen (N_2) through microbial process is known
as - Denitrification
592. *Agrobacterium tumefaciens* is a - Gram negative
bacteria
593. Which stain is used for endospores—Malachite Green
594. Teichoic acid is present in the cell wall of—Gram +ve

595. The energy generation component is referred as – **Catabolism**
596. The buildup of macromolecules and cell organelles are referred as— **Anabolism**
597. *Escherichia coli* is – **Mesophile**
598. The production lactic acid is mediated by – ***Lactobacillus***
599. The highest resolving power of light microscope—**0.2 μm**
600. What type of electron microscope would you use to observe the bacterial nucleoid – **TEM(Transmission electron microscopy)**
601. The production of acetic acid is mediated by— ***Acetobacter***
602. The production of butric acid and acetone mediated by— ***Clostridium acetobutylicum***
603. The production of propionic acid mediated by— ***Propionibacterium***
604. The production of ethanol is mediated by— ***Saccharomyces***
605. The growth of large quantities of cells under anaerobic or aerobic conditions within a vessel called — – **Bioreactor**
606. The highest resolving power of light electron microscope – **0.2nm**
607. Sauerkraut is fermented product of –**Cabbage**
608. Which enzyme is used in PCR (polymers chain reaction) – **Taq Polymerase**
609. Cheese is a fermented product of –**Milk**
610. Largest virus is – **Small pox virus**
611. Malt whisky is produced by the fermentation of– **Barley**
612. Father of microbiology is – **Louis Pasteur**
613. PFA means – **Prevention of Food Adulteration Act**

614. Which microscope is used to see living specimen without staining – **Phase contrast microscope**
615. Biogas is a mixture of – **Methane (50-60%), CO₂ (30-40%), Hydrogen (5-10%)**
616. The plant virus which was first isolated in crystalline form – **TMV (tobacco mosaic virus)**
617. The process conversion of Nitrite ion (NO₂⁻) to Nitrate ion (NO₃⁻) is called as – **Nitrification**
618. The process conversion of Ammonium ion (NH₄⁺) to Nitrate ion (NO₃⁻) is called as – **Nitrification**
619. The effective nodules are pink colored due to presence of – **Leghaemoglobin**
620. The Vitamin B2 (riboflavin) is mediated by *Ashbya gossypii*
621. In mycorrhiza transfer of 'P' from fungus to the root system is called – **Arbuscules**
622. The Electron Microscope used to observe the surface features of specimens is – **SEM (scanning electron microscope)**
623. In mycorrhiza transfer of 'P' from fungus to the root system in the form stored is called – **Vesicles**
624. Rhizosphere is a site of intense interactions between plant root and soil moisture introduced by – **Hiltner (1904)**
625. Who is the father of techniques in microbiology – **Robert Koch**
626. Who introduced 'agar' as a solidifying agent – **Walter Hesse and Fanne**

627. Some important microbial species used in industry

Classes of final product	Microorganism	Actual final product
Alcohols and Solvents	<i>Saccharomyces cerevisiae</i> <i>Kluveromyces fragilis.</i> <i>Clostridium acetobutylicum</i>	Ethyl alcohol
Organic Acids	<i>Aspergillus niger</i> <i>Lactobacillus delbrueckii.</i>	Citric Acid Lactic Acid
Enzymes	<i>Aspergillus niger</i> <i>Bacillus subtilis</i> <i>Trichoderma reesi</i> <i>Saccharomyces cerevisiae</i> <i>S. lipolytica</i> <i>Aspergillus spp.</i> <i>Bacillus spp.</i>	Glucoamylase Amylase Cellulose Invertase Lipase Pectinases Proteases
Amino acids	<i>Cornybacterium</i> Pectinases <i>Brevibacterium spp.</i>	L-lysine Glutamic acid
Vitamins	<i>Ashbya gossypii</i> <i>Pseudomonas denitrificans</i> <i>Proionibacterium shermanii</i>	Riboflavin Vitamin B ₁₂ Vitamin B ₁₂
Polysaccharides	<i>Leuconostoc mesenteroides</i> <i>Xanthomonas campestris</i>	Dextran Xanthan

Bioinsecticides	<i>Bacillus thuringiensis</i> <i>Bacillus popilliae</i>	Anti-larval products for control of mosquitoes etc.
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Plant Physiology

629. The specialized for the storage of lipids in plants—**Elaioplast**
630. The specialized for the storage of starch in plants—**Amyoplast**
631. The cell organelle Peroxisomes is related to—**Photorespiration**
632. In which region of the cell oxidative phosphorylation takes place – **Mitochondria**
633. In plant cell water content is more in – **Vacuole**
634. Which one is having a single layer membrane—**Vacuole, Peroxisome, oil bodies**
635. Cohesion-Adhesion Theory is related to— **Transpiration**
636. Which one is the heaviest particulate component of the cell – **Nucleus**
637. In plant the exchange of material takes place – **Diffusion, Active and passive transport, or bulk transport**
638. Mitochondrial DNA is— **Circular double stranded**
639. The cellular organelles called “suicidal bags” are – **Lysosomes**

640. Ribosomes were discovered by— **George Emil Palade**
641. Cell wall shows— **Complete permeability**
642. An outer covering membrane is absent in the cell —
Nucleolus, Ribosome
643. Names of Schleiden and Schwann are associated with—
Cell theory
644. The inner membrane of the mitochondria is, usually, highly convoluted forming a series of infoldings known as —
Cristae
645. The organelles is located near the nucleus and contains a collection of flattened membrane bound cisternae— **Golgi apparatus**
646. The large subunit of the enzyme ribulose 1,5 –bisphosphate carboxylase-oxygenase (Rubisco) is encoded by —
Chloroplast
647. The small subunit of the enzyme ribulose 1,5 –bisphosphate carboxylase-oxygenase (RuBisCO) is encoded by **Nucleus**
648. Which cell organelle is concerned with glycosylation of protein — **Endoplasmic reticulum**
649. In chloroplasts, chlorophyll is present in the — **Thylakoids membrane**
650. Plasmamembrane is made of — **Proteins, lipids and carbohydrates**
651. Phytochrome is involved in— **Phototropism, photoperiodism**
652. In soil, the water available for root absorption is — **Capillary water**
653. In C3 plants energy required to fix one molecule of CO_2 in Calvin cycle — **3ATP and 2NADPH**
654. In C4 plant energy required to fix one molecule of CO_2 —
5ATP and 2NADPH

655. The assimilatory power requirement for the synthesis of one molecule of sucrose without PCOC – **36 ATP & 24 NADPH**
656. How many ATP molecules could be derived from one NADH molecule – **3ATP**
657. Net gain from the complete oxidation of one molecule of Glucose is – **38ATP**
658. is important for starch biosynthesis – **ATP glucose**
659. The coenzyme required for CO₂ transfer reactions in beta oxidation– **Biotin**
660. Photorespiration is maximum in – **Rice**
661. Respiratory quotient for malic acid is–**1.33**
662. Number of ATP molecule required to fix one molecule of nitrogen by Nitrogenase enzyme of rhizobium is – **16ATP**
663. Which is the single most abundant organic molecule in the biosphere – **Cellulose**
664. The substrate for photorespiration is – **Glycolate**
665. In C₄ plants, Calvin cycle operates in–**Stroma of bundle sheath chloroplasts**
666. Kranz anatomy is present in – **C₄ plant**
667. The first carbon dioxide acceptor in C₄-plants is–**(PEPCO) Phosphoenol-Pyruvate Carboxylase**
668. Dark reactions of photosynthesis occurs in— **Stroma**
669. Which technique has helped in investigation of Calvin cycle— **Radioactive isotope technique**
670. The enzyme that catalyses carbon dioxide fixation in C₄ plants is— **PEP carboxylase**
671. Photosystem II occurs in – **Grana**

672. Chlorophyll 'a' occurs in— **All photosynthetic autotrophs**
673. Example of C3 plants—**Rice, Wheat and Potato**
674. Example of C4 plants – **Corn, sorghum, Amaranthus and sugar cane**
675. Example of CAM plants— **Pineapple, Succulents, and Agaves**
676. The carbon dioxide acceptor in C3-plants is— **Ribulose 1, 5-diphosphate (RuBP)**
677. Plants, but not animals, can convert fatty acids to sugars by a series of reactions called— **Glyoxylate cycle**
678. The CO₂ fixation during C4 pathway occurs in the chloroplast of— **Mesophyll cells**
679. What will be the number of Calvin cycles to generate one molecule of hexose – **6**
680. The law of limiting factors was proposed by— **Leibig**
681. NADPH₂ is generated through— **Photosystem I**
682. The core metal of chlorophyll is – **Mg**
683. The rate of photosynthesis is higher in—**Red light**
684. The first step for initiation of photosynthesis will be— **Photolysis of water**
685. Photosynthetic Active Radiation (PAR) has the following range of wavelengths – **400-700nm**
686. Carbon dioxide is released during – **Krebs cycle**
687. Which PGR is synthesized from the amino acid – **IAA**
688. Name the scientist who worked on flowering Maryland Mammoth Tobacco – **Garner & Allard**
689. Name of the Russian scientist who worked on Vernalisation— **Lysenko**

690. The phytohormone related to Richmond Lang effect -
Cytokinin
691. Gibberellins promote - **Seed germination**
692. Hormone primarily connected with cell division is—
Cytokinin
693. Leaf fall can be prevented with the help of— **Cytokinin**
694. The hormone that can replace vernalisation - **GA**
695. Phototropic and geotropic movements are linked to - **Auxin**
696. Abscisic acid controls - **Leaf fall and dormancy**
697. Highest auxin concentration occurs on - **Growing tips**
698. A chemical believed to be involved in flowering is -
Florigen
699. The hormone responsible for apical dominance is - **Auxin**
700. Abscisic acid causes - **Stomatal close**
701. Which is employed for artificial ripening of banana fruits -
Ethylene
702. Dwarfness can be controlled by treating the plant with—
Anti-gibberellin
703. Which hormone is produced during water stress that brings
stomatal closure—**ABA**
704. The growth regulator which retards ageing/senescence of
plant parts is - **ABA**
705. Removal of apical bud results in— **Formation of lateral
branching.**
706. A plant hormone used for inducing morphogenesis in plant
tissue culture is - **Auxin and Cytokinin**
707. Which hormone breaks dormancy of potato tuber - **GA**
708. The hormone that prevents the fall of fruits—**NAA**

709. Seed dormancy is due to the – IAA
710. Differentiation of shoot is controlled by— high cytokinin :
Auxin ratio
711. Plants deficient of element zinc, show its effect on the biosynthesis of plant growth hormone – **Auxin**
712. Coconut milk factor is – **Cytokinin**
713. Cell elongation in internodal regions of the green plants takes place due to—**GA**
714. Example of Synthetic Auxins – **NAA and 2,4-D**
715. Commercially available ethylene is – **Ethopen and Ethral**
716. Which is immediate precursor of ethylene – **S-adenosyl methionine**
717. Which hormone rapidly increase during anoxia condition – **Ethylene**
718. Flowering in long-day and short-day plants is controlled by a pigment called – **Phytochrome.**

Plant Pathology

719. Bengal famine of rice was occurred in India due to – **Brown spot of rice (*Helminthosporium oryzae*)**
720. Who first proved that disease are caused by microorganism—
Prevost
721. Who described physiological races –**Erikson**
722. Who discovered artificial culturing of microorganisms—
Brefeld
723. Who was the first director of imperial mycological institute—
E.J.Butler

724. Who reported that gene for gene hypothesis for the resistance and susceptibility of host—**H.H.Flor**
725. Principles of fungicidal action was written by—**J.G.Horsefall**
726. Father of biological control—**S.D.Garett**
727. Pure culture technique was established by—**Robert Koch**
728. Group of symptoms is known as—**Syndrome**
729. Hard resting structure produced by *fusarium* is—**Chlamyospore**
730. Who discovered the satellite viruses—**Kassians**
731. The word endemic means—**Prevalent**
732. Udbatta disease in rice is an example of—**Sporadic disease**
733. First viroid disease in plants—**Potato spindle tuber disease**
734. Love-vine is an example of—**Total stem parasite**
735. The phenomenon of heterothallism in Mucorales was first discovered by —**Blackslee (1904)**
736. Sac like structure found in which subdivision of fungi group—**Ascomycotina**
737. Basidiospore is a sexual spore result of—**Karyogamy and meiosis**
738. Which family has knob -like Haustoria—**Albugonaceae**
739. Largest group of plant pathogenic fungi is found in—**Ascomycotina**
740. DIPA Act was enacted during-**1914**
741. First state quarantine act was formulated at —**Madras**
742. Loose smut of wheat is—**Internally seed borne disease**
743. Brown spot of rice is—**Externally seed borne disease**
744. The study of relation between an antigen and an antibody is called—**serology**

745. The substrate used in ELISA test is -p-nitrophenyl phosphate (PNP)
746. *Mycosphaerella musicola* produces asci within-Locules
747. Parasexuality in fungi was first discovered by- Pontecarvo and Roper
748. Porins are present in bacterial cell wall component- LPS layer
749. Alternate host for wheat stem rust-Barbery and mahonia
750. Demicyclic rust lack of -Uredospore
751. Micro cyclic rust is lack of -Teliospores and basidiospores
752. Alternate host for Leaf rust-Thallictrum sp
753. Alternate host for cumbu rust-Brinjal
754. Father of Indian phtyotopathology-E.J.Butler
755. Father of Forest pathology-Robert hartig
756. Who reported karnal bunt for the first time in india-Mitra
757. Sugarcane ratoon stunting is caused by- *Cavibacter xyli* sub sp *xyli*
758. Blast of Rice is caused by- *Magnaporthe grisea*
759. Cleistothecium containing several asci bearing definite rigid appendages with coiled tips is characteristic of genus-Uncinula
760. Ribosomes in Prokaryotes-70 s
761. International Mycological Institute is located at - England
762. Panama disease of banana is caused by - *Fusarium oxysporium* f sp. *Cubense*
763. Pineapple disease is also known as-Set rot
764. Sulphur fungicides are very effective against- Powdery mildew

765. Cigar end rot of banana is caused by- *Verticillium theobromae*
766. Pseudo stem injection is mainly used to control-Bunchytop disease of banana
767. Kattee disease of cardamom is transmitted by-*Pentalonia nigronervosa*
768. Wedge- or V-shape symptoms are associated with-Black rot of crucifers
769. Black leg of crucifers is caused by-*Phoma lingam*
770. First viral disease of crop plants is-Fire blight of pear
771. Father of Epidemiology-J.E. Vander Plank
772. Khaira disease of paddy is due to - Zn deficiency
773. Who gave fourth rule of Koch postulates-E.F.Smith
774. Dolipore septum found in- *Basidiomycotina*
775. Hard, compact resting body, made up of mass of mycelium produced after a vigorous active growth- *Sclerotium*
776. Localized swellings of the tip of germ tube for attachment in the infection- *Appressorium*
777. *Biotrophs* - obligate parasites which are cultured under laboratory condition
778. Zoospore is also known as-*Planospore* or motile spore
779. The asexual fruiting bodies produced by the fungi are- *Synnemata*, *Sporodochia* , *Acervuli*, *Pycnidia*, *Sorus*
780. Loose aggregation of erect conidiophore similar to mycelial strand is - *Synnemata*
781. Fusion of two nuclei which are compatible or of opposite sexes and fused cells are called as- *zygote*
782. Spermatization is sexual reproduction found in-*Rust*
783. Diploid resting spore are -*Oospore*, *Zygospore*

784. Existence of bacteria was discovered by -Anton von Leeuvanhoeck
785. Majority of the bacteria measures approximately : 0.5 – 1.00 μm \times 2.0 – 5.0 μm
786. Atrichous type of flagella is found in -*Xyllella* sp
787. Pili is present on-Gram negative bacteria
788. Endospore is resting non reproductive spore mostly produced by-*Bacillus and colestridium*
789. Oldest viral disease in plants – Tulips color breaking virus
790. Mature virus particle is called- Virion
791. Vector of Gingelly phyllody is- *Orosius albicinctus*
792. Xylem inhabiting gram positive fastidious bacteria is- *Clavibacter xyle* subsp. *Xyli*
793. A disease when occurs at irregular intervals, location and in relatively few instances is referred as - Sporadic
794. Example for Simple interest disease is -Wilt and soil borne smut
795. Alkaline soil are useful during the development of - Fusarial wilt of cotton, Common scab of potato
796. Wheat rust cycle study was conducted by— K.C. Mehta
797. First quarantine law was formulated at-France
798. TN Madras Agricultural pests and diseases Act- 1919
799. Quinone fungicides are— Chloranil, Dichlone
800. Chemical substance produced by one microorganism which in low concentration can inhibit or even kill other microorganisms is-Antibiotics
801. Aureofungin is a anti-fungal antibiotics produced by — *Streptoverticillium*

802. Sexual stage of *Helminthosporium oryzae* is — *Cochliobolus miyabeanus*
803. False smut of rice is also known as— Lakshmi disease
804. The bacteria associated with tundu disease of wheat is— *Clavibacter tritici*
805. Green ear of cumbu is caused by— *Sclerospora graminicola*
806. Powdery mildew of grapes is caused by— *Uncinula necator*
807. Early blight of tomato and potato is caused by— *Alternaria solani*
808. Been yellow mosaic is caused by— Virus
809. Post harvest losses due to diseases in vegetables and fruits is— 20-30%
810. Death chair is also known as — Toadstools
811. Inkycap is — *Coprinus comatus*
812. *Amanita verna* is — Fool's mushroom
813. Directorate of mushroom research is located at — Solan
814. Mushroom city of India is — Himachal Pradesh
815. Indian phytopathological society is located at— New Delhi
816. Indian type culture collection centre is located at— New Delhi (IARI)
817. Who established Indian phytopathological society— B.B.Mundkar
818. Who reported Khaira disease of rice in india— Y.L.Nene
819. Father of Indian phyto bacteriology— M.K.Patel