

2023**BOTANY — HONOURS****Paper : DSE-A-1 and DSE-A-2***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words
as far as practicable.***Paper : DSE-A-1****(Biostatistics)****Full Marks : 50****1. Answer *any five* questions :****2×5**

- (a) What do you mean by conditional probability?
- (b) What do you mean by mode? Mention one advantage of mode.
- (c) Define sample and sampling.
- (d) What is null hypothesis?
- (e) State two limitations of biometry.
- (f) Differentiate between primary and secondary data.
- (g) Define co-efficient of variation.
- (h) What do you mean by frequency distribution?

2. Answer *any two* questions :

- (a) Write a short note on uses of Statistics in Biology. **5**
- (b) How different factors can alter the Hardy Weinberg equilibrium in a population? **5**
- (c) What is Chi-square test? Describe its characteristics. What is degree of freedom? How do we calculate degree of freedom in Chi-square test? **1+2+1+1**
- (d) Find out the Standard error value from the following data set : **5**

No. of leaves / plant	1-3	4-6	7-9	10-12	13-15	16-18	19-21
No. of plants	11	15	16	20	15	13	10

3. Answer *any three* questions :

- (a) What do you mean by dependent and independent events? State the additive and multiplicative rules of probability with explanation. In a bag there are 6 red balls and 8 white balls. What will be the probability of taking out 1 red ball and 1 white ball in 2 consecutive events, without replacement of ball? **3+4+3**

Please Turn Over

- (b) In a plant breeding experiment in F_2 generation the following types of seeds were obtained :

Small and red seeds : 502

Small and white seeds : 171

Large and red seeds : 159

Large and white seeds : 48

Analyse the data statistically on the basis of Mendelian dihybrid ratio and comment on the genetic control of phenotypic characters of seeds.

(Chi-square value 7.82 at 3 degree of freedom at 0.05 probability level)

What is the utility of Chi-square test in plant breeding?

5+3+2

- (c) Define genetic drift and mention two ways in which it can arise. What effect does genetic drift have on a population? A total of 6129 samples were blood typed for the MN locus, which is determined by two codominant alleles L^M and L^N . The following data were obtained :

Blood type	Number
M	1787
MN	3039
N	1303

Calculate the allele frequency value for the above.

2+2+2+4

- (d) What are the different measures of Central tendency? Which one is statistically more accepted?

Find out the *mean* and *standard deviation* from the following data :

No. of Seeds / Plant	17-19	20-22	23-25	26-28	29-31	32-34	35-37	38-40
No. of Plants	8	15	18	21	26	19	12	7

(3+1)+(3+3)

- (e) Distinguish between the following (*any four*) :

2½×4

- Population parameter and Sample statistic
- Cumulative frequency and Relative frequency
- Mean deviation and Standard deviation
- Normal distribution and Binomial distribution
- Allele frequency and Genotype frequency.

Paper : DSE-A-2**(Industrial and Environmental Microbiology)****Full Marks : 50***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words
as far as practicable.*

1. Answer **any five** questions : 2×5
 - (a) Why is eutrophication considered to be a problem?
 - (b) What are the industrial uses of amylase?
 - (c) Define bioventing
 - (d) What is Hartig net? State its function.
 - (e) Name one free living and one symbiotic N₂-fixing microbe present in soil.
 - (f) What are fluidized bed bio-reactors?
 - (g) What is dilution plate method?
 - (h) Explain reverse osmosis.
 2. Write short notes on (**any two**) : 5×2
 - (a) Air lift fermenter
 - (b) Water bloom
 - (c) Biological Oxygen Demand.
 3. Answer **any three** questions :
 - (a) Write down the role of microbes in domestic sewage treatment system. State the differences between primary and secondary waste water treatment methods. 5+5
 - (b) Discuss the process of isolation of microorganisms from water. State the different types of microorganisms that occur in air with examples. What is droplet nuclei and bioaerosol? 5+3+1+1
 - (c) Describe the different types of mycorrhizae. How does arbuscular mycorrhiza colonize in plant roots? 5+5
 - (d) Discuss the fermentation conditions and process of industrial production of citric acid. Discuss the use of ultrafiltration and centrifugation in industrial microbiology. 7+(1½×2)
 - (e) Distinguish between cell disruption and solvent extraction. What are bio-reactors? What are its different types? State the limitations of fixed bed bioreactors. 3+2+3+2
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