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

   (i) Population parameter and Sample statistic

  (ii) Cumulative frequency and Relative frequency

 (iii) Mean deviation and Standard deviation

 (iv) Normal distribution and Binomial distribution

  (v) Allele frequency and Genotype frequency.

Paper : DSE-A-2
(Industrial and Environmental Microbiology)
Full Marks : 50

The figures in the margin indicate full marks.
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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 N_2-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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