

2024

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.*

DSE-A-1

(Biostatistics)

Full Marks : 50

1. Answer *any five* questions :

2×5

- What do you mean by random sampling?
- State one use and one limitation of Biostatistics.
- What is degree of freedom?
- What is test of significance?
- What is mutually exclusive event?
- State the Hardy Weinberg Principle.
- What do you mean by 'Bottleneck Effect'?
- Compare variable and variant.

2. Answer *any two* questions :

- What do you mean by measures of dispersion? Briefly explain the different measures of dispersion. 1+4
- State the rules of probability with explanation. 5
- In a human population a sample of 100 individuals for MN blood group character shows 50 MM, 20 MN and 30 NN individuals. Find out the allele frequencies of the M and N alleles. 5
- Find out the Standard error from the following data set : 5

| | | | | | | |
|----------------|------|-------|-------|-------|-------|-------|
| Length of pods | 0–10 | 10–20 | 20–30 | 30–40 | 40–50 | 50–60 |
| No. of pods | 12 | 18 | 27 | 20 | 17 | 06 |

Please Turn Over

(0379+0396)

3. Answer *any three* questions :

- (a) Define Central Tendency. What is frequency distribution?

Frequency distribution of height of plants is given below :

| Height (in inches) | 1-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 |
|--------------------|------|-------|-------|-------|-------|-------|
| No. of plants | 04 | 06 | 20 | 10 | 07 | 03 |

Calculate the mean height, variance and standard deviation.

2+2+2+2

- (b) Define 'Goodness of fit'. In a plant breeding experiment, one yellow seeded pea plants produced 50 yellow seeds and 46 green seeds in F₂. Calculate the segregating ratio and determine the χ^2 (Chi-square) value. Comment on your analysis. [probability 0.05, degree of freedom 1, table value of $\chi^2 = 3.841$]

2+2+3+3

- (c) What is co-efficient of variation? Mention one merit and one demerit of standard deviation. In two different populations (Batch - I and Batch - II), the seed number per fruit is calculated.

| | |
|------------|--|
| Batch - I | 10, 10, 07, 09, 07, 06, 08, 09, 07, 09 |
| Batch - II | 11, 09, 10, 11, 12, 11, 06, 07, 05, 08 |

Find out the co-efficient of variation and comment on observation.

2+1+1+5+1

- (d) (i) Mention the factors affecting gene frequency.
- (ii) A bag contains 5 white and 3 black balls. Two balls are drawn at random, one after the other without replacement. Find the probability of both the balls drawn are black.

5+5

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

2½×4

- Sample and Population
- Primary and Secondary data
- Discrete variable and Continuous variable
- Relative frequency and Cumulative frequency
- Null hypothesis and Alternative hypothesis
- Independent and Dependent Event.

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

Full Marks : 50

1. Answer *any five* questions : 2×5
 - (a) What are the industrial uses of glutamic acid and lipase?
 - (b) What is the use of penicillin acylase enzyme?
 - (c) What is the difference between biochemical and biological oxygen demand?
 - (d) What are the functions of vesicle and arbuscule in VAM?
 - (e) Name a microbe used in industrial production of ethanol.
 - (f) Write down the advantages of lyophilization.
 - (g) State one use of centrifugation in industry.
 - (h) What is fluidized bed reactor?

 2. Answer *any two* questions : 5×2
 - (a) Write the importance of mycorrhizal association in plant health.
 - (b) Compare solid and liquid fermentation process.
 - (c) Discuss about the properties of microbial indicator organisms and their uses.

 3. Answer *any three* questions :
 - (a) What is bioremediation? Discuss the different types of microbes involved in bioremediation of contaminated soil. 2+8
 - (b) Discuss the fermentation conditions and process of industrial production of penicillin. Mention the various uses of penicillin. 8+2
 - (c) What is enzyme immobilization? What are its main advantages and disadvantages? Discuss about the different types of enzyme immobilization used industrially with suitable examples. 2+(2+2)+4
 - (d) Discuss the process of isolation of microorganisms from soil. State the different types of microorganisms that occur in soil with examples. What is aeromicrobiology? 5+4+1
 - (e) What is biological nitrogen fixation? State the process of isolating a root nodulating bacteria. 2+8
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