

2 0 1 3

ZOOLOGY

( Major )

Paper : 5.4

( **Biological Techniques and Biostatistics** )

Full Marks : 60

Time : 3 hours

*The figures in the margin indicate full marks  
for the questions*

1. Answer the following very briefly : 1×7=7
- (a) What do you mean by limit of resolution?
  - (b) Define  $R_f$ .
  - (c) What is vitrification?
  - (d) Name a tripple stain which is used in histological preparation.
  - (e) What is the range of the value of correlation coefficient?
  - (f) Define mode.
  - (g) Find out the median from the given ungrouped data.

2. Answer the following : 2×4=8

(a) Discuss briefly the process of block making in microtomy.

(b) Explain the principle of paper chromatography.

(c) Discuss the working principle of fluorescence microscope.

(d) State the uses of chi-square test in biology.

3. Answer any *two* of the following : 5×2=10

(a) Write the differences between light and electron microscopes. 5

(b) Describe the basic principle of electrophoresis. Discuss the differences between horizontal and vertical electrophoreses. 2+3=5

(c) Give a brief account of autoradiography with its principle. 5

4. The amount of different constituents in dry muscle tissue of a catfish is estimated as follows :

Constituent	Amount(in g)
Crude protein	1.54
Lipid	0.91
Crude fibre	1.47
Ash	0.86
Others	5.22

Draw a pie chart from the above data. 5

Or

What are the properties of standard deviation? Why is it considered as one of the best measures of dispersion?  $3+2=5$

5. What is cryopreservation? State the significance of cryopreservation of semen (sperm). Describe the process of cryopreservation of egg.  $2+2+6=10$

Or

Give an account of construction of spectrophotometer. Add a note on its application.  $6+4=10$

6. Answer any *two* of the following :  $10 \times 2 = 20$

(a) Define Student's *t*-test. What are the properties of *t*-distribution? State the applications of *t*-distribution.  $2+5+3=10$

(b) Discuss different sampling techniques used in population study in biology. 10

(c) What do you mean by data in context of computer? Discuss data storage and data processing.  $4+3+3=10$

(d) In a study, the length of fish (female) and number of ova per fish are noted as below :

Length (cm)	18	25	25	32	35	20	30
Number of Ova	200	250	330	350	400	260	300

Length (cm)	13	30	30	37	40	20	25
Number of Ova	150	250	370	430	420	230	280

Length (cm)	27	40	15	23	35	23
Number of Ova	330	450	200	200	330	300

Find out the regression equation.

10

Or

In guinea pig, black colour and short hair are dominant to brown colour and long hair respectively. In a dihybrid cross between homozygous black short hair and brown long hair guinea pigs, the number of  $F_2$  progeny obtained are black short hair—560, black long hair—190, brown short hair—195 and brown long hair—65. Test whether the experimental result supports Mendel's law of independent assortment [table  $\chi^2$  at 5% level—7.81 for 3 degree of freedom].

★ ★ ★