QP Code: 24/PT/14/VIA

POST-GRADUATE DEGREE PROGRAMME

Term End Examination — December, 2024

ZOOLOGY

Paper-6A : QUANTITATIVE BIOLOGY AND BIOTECHNOLOGY

Time : 2 hours] [Full Marks : 50

Weightage of Marks : 80%

Special credit will be given for accuracy and relevance in the answer. Marks will be deducted for incorrect spelling, untidy work and illegible handwriting. The weightage for each question has been indicated in the margin.

Use of scientific calculator is strictly prohibited.

1. Answer the following : $9 \times 1 = 9$

A) i) Define standard deviation, standard error, and variance.

$2 + 2 + 2$

ii) What is meant by regression line and regression equation ? 3

OR

B) i) Standard deviation 2·4, Mean 15·4; calculate co-efficient of variation.

ii) What is null hypothesis ? Define Type – I error.

iii) $\sum dx\,dy = 59; \sum dx^2 = 60; \sum dy^2 = 60$. Calculate '$r$'.

$3 + (1 + 2) + 3$

2. Answer the following : $9 \times 1 = 9$

A) State the basic principle of centrifugation. Mention the limitation of Beer-Lambert law. What is optical density ? What is dot blot ?

$3 + 3 + (1\frac{1}{2} + 1\frac{1}{2})$

OR

B) Define chromatography : Mention the basic principle of paper chromatography. What is thin layer chromatography ? What is partition coefficient ? 2 + 3 + 2 + 2

3. Answer *three* questions taking at least *one* from each unit : 6 × 3 = 18

Unit - I

A) What is bar diagram ? State the working procedure for drawing the frequency polygon. 2 + 4

B) Find the mode of the following distribution :

Marks	1-5	6 – 10	11 – 15	16 – 20	21 - 25
Number of Students	7	10	16	32	24

C) Two curly wing flies when mated 61 curly and 35 straight wing flies are produced. Use Chi-square test to determine whether these numbers fit 3 : 1 ratio.

$x^2_{0\cdot05(1)} = 3\cdot84$ $x^2_{0\cdot05(2)} = 5\cdot99$ $x^2_{0\cdot05(3)} = 7\cdot82$

Unit - II

D) What is agarose gel electrophoresis ? Mention the steps of gel electrophoresis. 2 + 4

E) What is cryopreservation ? What is apoptosis ? What are caspases ? 2 + 2 + 2

F) What are colorimetry and photometry ? What is ELISA ? 2 + 2 + 2

4. Answer *two* questions taking at least *one* from each unit : 4 × 2 = 8

Unit - I

A) What is chromosome painting ? Mention its significance ? 2 + 2

B) Mention the basic principle of scanning electron microscopy. What is resolution or resolving power of a microscope ? 3 + 1

Unit - II

C) If a man and woman are heterozygous for a gene and if they have three children, what is the probability that all three also be heterozygous ? 4

D) Mention the differences between correlation and regression. 4

5. Answer *two* questions taking at least *one* from each unit : $3 \times 2 = 6$

Unit - I

A) What do you mean by skewness and kurtosis ? 3

B) What are paired and unpaired ' *t* ' test ? 3

Unit - II

C) What is radioactive decay ? What is fluorophore ? 2 + 1

D) State the basic principle of NMR. What is FACS ? 3