PG/IS/ZOOL/106/24

M.Sc. 1st Semester Examination, 2024

ZOOLOGY

(*Methods in Biology*)

PAPER—ZOO-106

Full Marks : 25

Time : 1 hour

Answer **all** questions

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

GROUP – A

1. Answer any *two* questions from the following : 2×2

(*a*) Write the principle of agarose gel electrophoresis. Mention its biological applications.

(*b*) Mention the roles of alkaline phosphatase and bacteriophage T4 DNA ligase in making recombinant DNA.

(*c*) Name two anion exchanger. State the function of ampholytes in 2D electrophoresis.

(*d*) Write the principle of Fluorescence in Situ Hybridization (FISH).

GROUP – B

2. Answer any *two* questions from the following : 4×2

(*a*) Write the principle of plasmid DNA isolation by alkaline lysis method. How many bands will you observe after analysing plasmid DNA by agarose gel electrophoresis ? $3 + 1$

(*b*) Draw a yeast expression vector with all the components. Mention the function of each component. $2 + 2$

(*c*) Which parameters are considered during designing of PCR primers ? How will you calculate the melting temperature (Tm) of a primer ? If the Tm of a primer is 65°C, What will be its maximum annealing temperature ? 2 + 1 + 1

(*d*) Define Bioremediation. Mention the factors which influence biodegradation process. Differentiate between in situ and ex situ bioremediation process. 1 + 1 + 2

GROUP – C

3. Answer any *one* question from the following : 8 × 1

(*a*) (*i*) How does RT-PCR differ from real time PCR ?

(*ii*) Write two applications of RT-PCR.

(*iii*) Write the principle of real time PCR using SYBR green dye.

(*iv*) How will you quantitate initial template DNA from real time PCR ? 1 + 2 + 3 + 2

(*b*) (*i*) Write the principle of flow cytometry.

(*ii*) What do you mean by Forward light scatter and side light scatter ? Mention the parameters of cells that are measured by these light scatters.

(*iii*) Draw a flow cytometry pattern (curve) of a typical exponentially growing cell population (by putting value of DNA content in X axis and cell population in Y axis).

(*iv*) How does flow cytometry differ from FACS ? 3 + 2 + 2 + 1

[Internal Assessment — 5 Marks]
