Duration: 2 Hours **Maximum Marks: 50**

Instructions-

1. **All questions are compulsory.**
2. **All questions carry equal marks.**
3. **Draw neat and labeled diagram wherever necessary.**
4. **Answer precisely with suitable example if necessary**

Q. 1) Attempt **any four** questions from the following. **10**

a) List the various characteristics of research.
b) Define hypothesis and state its function in research.
c) What are secondary sources of data collection?
d) Explain the purpose of the Mann-Whitney test.
e) Enlist and write the importance of any 2 types of reference management software.
f) Explain the concept of impact factors in research journals.
g) What are model organisms and why are they important in scientific research?
h) List advantages and limitations of using *Drosophila* in research.

Q. 2) Attempt **any two** questions from the following. **10**

a) Explain the different types of research with examples.
b) Describe the process of reviewing literature and its significance.
c) Explain the strategies for determining sample size in research design.

Q. 3) Attempt **any two** questions from the following. **10**

a) Describe any three types of charts used in data presentation.
b) Explain multivariate analysis with a focus on ANOVA and its types.
c) Discuss the importance of level of significance and p-value in hypothesis testing.

Q. 4) Attempt **any two** questions from the following. **10**

a) What is the difference between single-blind and double-blind peer review?
b) Explain research grants, scholarships, & fellowships available to Indian students.
c) What is the process of obtaining an ISSN?

Q. 5) Attempt **any two** questions from the following. **10**

a) Explain the importance of earthworms in regeneration studies.
b) List the advantages and limitations of using *Mus musculus* in research.
c) What is RNAi, and how was it discovered using *C. elegans*?

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Duration: 1 Hours **Maximum Marks: 25**

General instructions-

1. **All questions are compulsory.**
2. **All questions carry equal marks except question no. 1 that carries 9 marks.**
3. **Draw neat and labelled diagram wherever necessary.**
4. **Answer precisely with suitable example if necessary.**

Q. 1 Attempt **any three** questions from the following. **9**

a) Describe structure of Cytochrome 'c in eukaryotes
b) Describe concept of haemogobin as model of evolution
c) Write major events in evolutionary time scale
d) Describe concept of pseudogenes
e) Describe concept of overlapping genes
f) Describe strategies of gene cloning

Q. 2 Attempt **any two** questions from the following. **8**

a) Describe theory of evolution of sex chromosomes
b) Explain concept of frozen Zoo
c) Explain maternal mtDNA inheritance in humans

Q. 3 Attempt **any two** questions from the following. **8**

a) Explain concept of structural genes with example
b) Explain theory of evolution of split genes
c) Explain applications of gene cloning in DNA analysis in research

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X51Y196BACX51Y196BACX51Y196BACX51Y196BAC

Duration: 2 Hours **Maximum Marks: 50**

Instructions-

1. **All questions are compulsory.**
2. **All questions carry equal marks.**
3. **Draw neat and labeled diagram wherever necessary.**
4. **Answer precisely with suitable example if necessary**

Q. 1 Attempt **any four** questions from the following. **10**

a) Write a note on capacitation of sperm.
b) Explain coelom formation in protostomes.
c) Write a note on conditional specification.
d) Give an account on potency.
e) Explain pattern of cleavage in *Drosophila.*
f) Explain autonomous cell specification in *C. elegance.*
g) Explain polyembryony in *Fasciola sp.*
h) Write a note on amphiblastula larva of porifera.

Q. 2 Attempt **any two** questions from the following. **10**

a) Briefly explain the significance of amphimixis.
b) Explain the role of binding protein in species specific recognition of gametes.
c) Explain germ layer formation in detail.

Q. 3 Attempt **any two** questions from the following. **10**

a) Compare and contrast mosaic and regulative development.
b) Explain the role of induction in embryonic development.
c) Describe autonomous specification and its role in embryonic development.

Q. 4 Attempt **any two** questions from the following. **10**

a) Explain anterior-posterior axis formation in *C. elegans.*
b) Explain the process of blastulation in *Drosophila.*
c) Investigate the roles of homeo selector gene complexes in *Drosophila.*

Q. 5. Attempt **any two** questions from the following. **10**

a) Describe metagenesis in detail with suitable example.
b) Explain types of metamorphosis in insects.
c) Explain pheromones in invertebrates and their role as sex attractants.

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