QP Code: 22/PT/14/VIIA

POST-GRADUATE COURSE

Term End Examination — June, 2022/December, 2022

ZOOLOGY

Paper-7A : DEVELOPMENTAL BIOLOGY

Time : 2 hours] [Full Marks : 50

Weightage of Marks : 80%

Special credit will be given for precise and correct answer. Marks will be deducted for spelling mistakes, untidiness and illegible handwriting. The figures in the margin indicate full marks.

1. Answer *two* questions : $9 \times 2 = 18$

   a) Explain the genetic events during supermatogenesis in *Drosophila*. Describe any two experiments by which the role of polar cytoplasm in *Drosophila melanogaster* can be established. 5 + 4

   b) Discuss the basic steps to follow in In vitro fertilization (IVF). Comment on the two mechanisms in sea urchin to prevent polyspermy. 5 + 4

   c) What is metamorphosis ? Illustrate the role of different hormones and glands in insect metamorphosis by a suitable schematic diagram and proper explanation. 2 + 7

   d) Briefly discuss the different types of stem cells on the basis of their potency. How can the Embroynic Stem Cells be useful ? 6 + 3

2. Answer *three* questions : $6 \times 3 = 18$

   a) Define teratogenic drugs with examples. What are the teratogenic effects of thalidomide ? 3 + 3

   b) Briefly discuss the role of 'maternal effect genes' in the development of *Drosophila*.

   c) How does Immunocontraception differ from Contraception ? How can Zona pellucida be effective in controlling wildlife population ? 3 + 3

d) Write a short note on accessory reproductive structures in mammalian male. Comment on the organic and inorganic constituents of seminal fluid. 3 + 3

e) Discuss the molecular mechanism involved in maintaining pluripotency or totipotency in stem cells.

f) What is the significance of stems cells in our body ? Explain totipotency on the basis of any experiment performed on *Xenopus*. 3 + 3

3. Answer *two* questions : $4 \times 2 = 8$

a) Name the active genes involved in the male germ line of *Drosophila*. What is 'Nebenkern' ? 2 + 2

b) How are the stem cells different from the other somatic cells ? What are the sources of Embryonic Stem Cells ? 2 + 2

c) Predict and analyse the result of the following two hypothetical situations in case of an insect having five instars at larval stage :

i) Corpora allata were removed from a third-instar larva.

ii) Corpora allata from a fourth-instar larva were implanted into a fifth-instar larva. 2 + 2

d) What is the role of ZP3 as sperm receptor ? Why is capacitation important for mammalian sperm ? 2 + 2

4. Answer *two* questions : $3 \times 2 = 6$

a) What will be the consequences of mutations in Gap genes, Pair-rule genes and Homeotic genes in the development of *Drosophila* ?

b) Comment on the regulation of the thyroid hormones by hormone receptors.

c) What is the significance of nurse cells in the development of different invertebrates ?

d) What are the limitations of IVF procedure ?