CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE, BACHELOR OF EDUCATION SCIENCE AND BACHELOR OF SCIENCE (BIOLOGY)

ZOOL 331: DEVELOPMENTAL BIOLOGY

STREAMS: BSC., B.ED (Sc.), BSc. (BIO) **TIME: 2 HOURS**

DAY/DATE: FRIDAY 25/04/2025 **8.30 A.M. – 10.30 A.M.**

INSTRUCTIONS

- **Answer all questions in section A and two other questions in section B**

SECTION A (30 Marks) ***Answer ALL questions.***

1. (a) Distinguish between the following pairs of terms:

(i) Isolecithal and Telolecithal eggs (1 mark)

(ii) Epimorphosis and Morphallaxis (1 mark)

(iii) Blastula and Morula (1 mark)

(b) Explain the term "**fate map**" and give an example of any one type. (2 marks)

2. (a) Explain why mammalian cleavage is described as **"rotational".** (2 marks)

(b) Describe the mechanism of superficial cleavage, specifying the types of animals in which this pattern is observed. (2 marks)

(c) Identify two types of metamorphosis found in insects. (1 mark)

3. (a) Explain briefly three distinct morphogenetic movements that occur during gastrulation. (3 marks)

(b) What is the significance of the **primitive streak** during mammalian gastrulation? (2 marks)

4. (a) Identify the germ layer origin of the following:

(i) Skin epidermis (1 mark)

(ii) Cardiac muscle (1 mark)

(b) Explain the concept of **cellular potency** in embryology. (3 marks)

5. (a) Describe the acrosome reaction in sea urchins. (2 marks)

(b) Explain the role of the following molecules in fertilization:

(i) Mucopolysaccharides (1 mark)

(ii) Juno (1 mark)

(iii) Zona pellucida glycoproteins (1 mark)

6. (a) State two historical theories of development. (2 marks)

(c) Describe the key observations and conclusions of William Harvey's experiments on chick embryo development. (3 marks)

SECTION B (40 Marks)

Answer any TWO questions.

7. (a) Describe the events that occur during spermiogenesis. (8 marks)

(b) Illustrate a mammalian sperm cell with a detailed labeled diagram and explain how each part aids in the sperm's ability to reach and fertilize the egg. (12 marks)

7. Discuss the roles of teratogens, maternal health conditions, and the uterine environment in influencing the development of congenital malformations. Provide specific examples. (20 marks)

9. Discuss the development of the mammalian digestive system. (20 marks)

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