CHUKA UNIVERSITY
SPECIAL/RESIT EXAMINATIONS
ZOOL 331: DEVELOPMENTAL BIOLOGY

STREAMS: Bsc; B.ED [Sc]; Bsc[BIO]

SECTION A (30 MARKS)
Answer ALL questions.

1. **(a)** Distinguish between the following pairs of terms:
   (i) **Holoblastic cleavage** and **Meroblastic cleavage** (1 mark)
   (ii) **Determinate cleavage** and **Indeterminate cleavage** (1 mark)
   (iii) **Isolecithal eggs** and **Telolecithal eggs** (1 mark)
   (b) State **two techniques** used for establishing fate maps. (2 marks)
2. **(a)** Explain why cleavage in birds is described as **"meroblastic."** (2 marks)
   (b) Describe the term **holometabolous development** and provide an example. (2 marks)
   (c) Identify **two** types of polyspermy in animals. (1 mark)
3. **(a)** Describe the process of **primary neurulation** in vertebrate embryos. (3 marks)
   (b) What is the significance of the **neural crest cells** in vertebrate development? (2 marks)
4. **(a)** Identify the germ layer origin of the following structures:
   (i) Kidney tubules (1 mark)
   (ii) Lungs (1 mark)
   (iii) Cardiac muscle (1 mark
   (b) Explain **two types of cellular potency** in embryology, providing examples for each. (2 marks)
5. **(a)** Describe the **cortical reaction** in sea urchin fertilization. (2 marks)
   (b) Explain the role of the following molecules in development:
   (i) **Bindin** (1 mark)
   (ii) **Izumo protein** (1 mark)
   (iii) **Progesterone** (1 mark)
6. **(a)** Explain the concept of **epigenesis** in embryology and provide an example. (2 marks)
   (b) Describe the key findings of **Roux and Driesch's experiments** on frog and sea urchin embryos. (3 marks)

SECTION B (40 MARKS)
Answer ANY TWO questions.

7. (a) Outline the **sequence of events** during mammalian fertilization, from sperm-egg contact to zygote formation. (8 marks)
(b) Explain the **mechanism of sperm capacitation** in mammals, including biochemical and physiological changes. (12 marks)

8. (a) Describe the processes of **blastulation** and **gastrulation** in mammalian embryos, highlighting their key events and significance. (10 marks)
(b) Explain how **teratogens** such as alcohol and thalidomide disrupt normal embryogenesis. Provide specific examples. (10 marks)

9. Describe the **types of regeneration** observed in animals, providing specific examples for each type. (20 marks