

THE OPEN UNIVERSITY OF SRI LANKA

B. Sc. DEGREE PROGRAMME – LEVEL 04  
FINAL EXAMINATION – 2011/12



ZLU2182/ZOU2166 – ANIMAL DEVELOPMENT

DATE: 27<sup>th</sup> December 2011

Time: 9.30 a.m. – 11.30 a.m.

Index No: .....

ANSWER QUESTION (1) AND ANY THREE (3) OF THE OTHER 5 QUESTIONS

ANSWERS TO QUESTION (1) SHOULD BE WRITTEN IN THE SPACES PROVIDED ON THE QUESTION PAPER.

ANSWERS OF QUESTIONS (2) – (6) SHOULD BE ILLUSTRATED WITH CLEARLY LABELLED DIAGRAMS, WHERE NECESSARY.

(1) This structured essay question is based on early development of frog.

(i) Frogs lay eggs seasonally, especially during rainy season.

a. What is the term used to describe the amount of yolk in frog eggs?  
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b. What is the term used to describe the distribution of yolk in frog egg?  
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c. Name the hormone involved in ovulation. ....

d. Describe the method utilize by frogs to ensure fertilization of eggs by sperms.  
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e. The physical nature of egg surface changes just after coming into contact with water. What is the reason for this change?  
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f. Write two advantages of the change mentioned in Question (1).(i).e.

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g. Draw a schematic diagram to show the structure of a frog egg at the time it is laid.

(ii) As soon as a sperm enters the egg, the pigment distribution of the egg changes.

i. Describe the change of pigment distribution in a frog egg.

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j. What is the name given for the special area formed due to the change of pigment distribution? .....

k. What is the relationship between this area and the first cleavage furrow?

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l. What is the relationship between this area and the dorsal lip formed during gastrulation?

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m. Describe the initial cell movements during frog gastrulation.

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n. Draw a labeled sagittal section of the early gastrula of frog.

o. Briefly describe the formation of lateral lips in frog embryo.

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p. Draw a suitable labeled diagram to show how the mesoderm moves inside the embryo at the time of the formation of ventral lip.

q. What is the method involved in the formation of coelom in frog embryo?

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(iii)

r. When pieces of tissues (explants) from different regions of frog early blastulae were cultured in simple media, the explants from the animal region formed balls of epidermal cells, whilst explants from the vegetal region formed endodermal tissues. According to this observation, what is the method involved in determination of these two tissue types?

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- s. An embryologist, who wanted to study cell determination in frog early embryos, wanted to see whether ectoderm induces endodermal cells to become mesodermal cells. Write the procedure that he would have followed for the investigation, stating the steps in order.

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- t. In another set of experiments carried out, the blastomeres of the 4-cell stage of frog early embryos were separated in two different ways.

- When the 4 cells were separated along the first cleavage plane both halves developed normally. But, the resultant tadpoles were smaller in size than the tadpoles that are formed normally.
- When the 4 cells were separated along the second cleavage plane, one half produced tadpole like organisms lacking endodermal organs while the other half produced just balls of cells.

Based on these observations, what can you conclude about the involvement of morphogenetic determinants in the development of frog embryos?

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2. Describe the major events that take place in the process of spermatogenesis. State the importance of these events for the function of spermatozoa.
  3. Discuss the effect of quantity and distribution of yolk on cleavage of eggs.
  4. Describe the growth and differentiation of the fore limb of chick.
  5.
    - (i) How does differential protein production in an embryo cause cell differentiation?
    - (ii) Explain the process of transcription of nuclear mRNA.
    - (iii) How can the process of transcription be regulated for differential protein production?
  6. Write short notes on any 2 of the following;
    - (a) Prevention of polyspermy in sea urchin
    - (b) Extra-embryonic membranes of chick
    - (c) Amphibian metamorphosis
    - (d) Assisted reproductive technologies
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