THE OPEN UNIVERSITY OF SRI LANKA

B. Sc. DEGREE PROGRAMME – LEVEL 04
FINAL EXAMINATION – 2015/16

ZLU2182 – ANIMAL DEVELOPMENT

DATE: 04th July 2016 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.

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(1) This structured essay question is based on the organogenesis of chick embryos.

1.1 Indicate the approximate time of establishment of the following organs, their parts or organ rudiments in chick embryo, referring to **one** of the developmental stages; 24, 33, 48, 72 or 96 hours old chick embryo.

Organ/ part of the organ	Stage of development
Fore, mid and hind brains	.....
Neural tube	.....
Optic vesicle	.....
Eye lens	.....
Heart with chambers	.....
Limb buds	.....
Liver and Pancreas	.....
Lung buds	.....

1.2 The limb development occurs later in the embryonic development compared to other organs. Can you suggest a reason for this?

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1.3 Which germinal layer is mainly responsible for the formation of the fore limb of the chick?

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1.4 Which part of that germinal layer makes the mesenchymal core of the limb bud?

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1.5 Which part of that germinal layer makes the muscles cells of the limb bud?

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1.6 How does the mesodermal cells involve in forming a thickened epidermis (limb disc) in the place where the limb bud forms?

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1.7 What is the name given for the thickened epidermis mentioned in 1.6?

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1.8 Describe the structure of the limb bud.

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1.9 Draw a cross section of a chick embryo and indicate the cell layers involved in limb bud formation and the position where the limb bud is formed.

1.10 What is the cell activity responsible for the outgrowth of the limb bud?

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1.11 What is the name given to the region in the limb bud covered by the thickened epidermis mentioned in 1.6?

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1.12 What is the cell activity that occurs in the region mentioned in 1.11?

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1.13 Briefly indicate the inductive interactions that takes place between the thickened ectodermal cells and the region immediately below it?

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1.14 What will happen to the cells leaving the region mentioned in 1.11?

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1.15 How do bones form in the limb bud?

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1.16 Name the bone that forms first in the developing forelimb.

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1.17 Name the bones that forms last in the developing forelimb.

.....

1.18 Mention the organizing centers that pattern the limb formation along the following directions.

Proximal distal axis: .....

Anterior posterior axis: .....

Dorsal ventral axis: .....

1.19 Draw a sketch of the developing limb and mark where the organizing centers for proximal distal axis and anterior posterior axis are located in the limb bud.

1.20 If the organizing center of proximal distal axis is removed during limb development, what is the defect that you will be able to see in the developed limb?

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1.21 If an organizing center of proximal distal axis is grafted to the dorsal side of a normally developing limb bud, what will the graft develop into?

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1.22 If an organizing center of anterior posterior axis is grafted to the anterior side of a normally developing wing bud, what is the defect that you will be able to see in the developed wing?

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1.23 When do the cellular precursors of limb muscles migrate into the limb buds?

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1.24 A fine capillary network in the limb bud supplies blood to the developing limb initially. Explain how the major blood vessels arise from this capillary network.

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1.25 When do nerves grow into the limbs?

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1.26 How do the digits of the limbs separate?

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2. Describe the major events that take place in the process of spermatogenesis. (85 marks)

   State the importance of these events for the function of spermatozoa. (15 marks)

3. What is cleavage? (5 marks)

   How do cleavage divisions differ from normal cell divisions? (25 marks)

   Explain how spiral cleavage takes place in developing embryos. (70 marks)

4. What are the major types of morphogenetic movements that occur during gastrulation? (20 marks)

   Describe the process of gastrulation in frog embryo. (80 marks)

5. (i) Describe an experiment which proved that the determination of neural plate takes place at the late gastrula stage of the chick embryo. (50 marks)

   (ii) Describe an experiment which proved that the cells of the three germ layers separated and mixed in different ways, re-aggregate to reflect their embryonic positions. (50 marks)

6. Write short notes on **any 2** of the following;

   (a) Prevention of polyspermy in sea urchin
   (b) Chick extra-embryonic membranes
   (c) Amphibian metamorphosis
   (d) Animal cloning

   (50 marks for each)

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