THE OPEN UNIVERSITY OF SRI LANKA

B. Sc. DEGREE PROGRAMME – LEVEL 04
FINAL EXAMINATION – 2017/18

ZLU2182 – ANIMAL DEVELOPMENT

DATE: 19th September 2018 Time: 1.30 p.m. – 3.30 p.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 question is based on the amphioxus and its embryonic development.

(a). What is the Phylum and Subphylum to which amphioxus belongs?

Phylum: .....

Subphylum: .....

(06 marks)

(b). Describe the habitat of amphioxus.

.....

(03 marks)

(c). Where do their gametes fertilize?

.....

(03 marks)

(d) Describe the amount and distribution of yolk in amphioxus eggs using technical terms.

Amount: ..... Distribution: .....

(06 marks)

(e) What is the reason for having the amount of yolk mentioned in Q 1(d) in amphioxus egg?

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(03 marks)

(f) Draw a fully labeled median longitudinal section of a late blastula of amphioxus.

(06 marks)

(g) Usually eggs at late blastula stage are used to construct fate maps of embryos. Assume the importance of constructing fate maps at this stage?

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(06 marks)

(h) What is gastrulation?

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(06 marks)

(i) What is the major cell movement type that occur in amphioxus embryo during gastrulation?

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(03 marks)

(j) What is the first visible sign of gastrulation in the blastula of an amphioxus?

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(03 marks)

(k) How does the gastrulation movement proceed in amphioxus early gastrula?

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(03 marks)

(l) When do the lips of the blastopore establish in an amphioxus gastrula?

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(03 marks)

(m) State the presumptive cell types lying at the 4 lips.

Dorsal lip – .....

Lateral lips - .....

Ventral lips – .....

(06 marks)

(n) Draw a fully labeled median section of amphioxus early-gastrula indicating the prospective areas.

(06 marks)

(o) Explain how the presumptive notochordal and mesodermal areas moves into the gastrula of amphioxus.

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(09 marks)

(p) Draw a fully labeled suitable diagram to show how the presumptive notochordal and mesodermal areas move as gastrulation proceeds.

(06 marks)

(q) As gastrulation proceeds, what morphological change in the embryo contracts the rim of the blastopore, shifts the presumptive notochord and mesodermal crescent to the dorsal side of the internal wall and stretches the presumptive material of the nervous system to form it as a longitudinal band?

.....

(03 marks)

(r) Draw a fully labeled median section of amphioxus late-gastrula indicating the prospective areas.

(06 marks)

(s) At the end of gastrulation, the presumptive materials of the notochord, mesoderm and endoderm of gastrula separate from one another by formation of crevices along their boundary lines. Briefly describe the formation of following structures.

Notochord - .....

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Alimentary canal - .....

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Coelomic cavities - .....

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(10 marks)

(t) At the end of gastrulation, which morphological movement changes the two-layered structure to a three-layered structure?

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(03 marks)

2. (i) Describe the development of spermatozoa within the seminiferous tubules of a vertebrate testis. (85 marks)

(ii) Discuss how the structure of a spermatozoon is suitably adapted to perform its function. (15 marks)

3. Discuss the effect of quantity and distribution of yolk on cleavage of eggs. (100 marks)

4. (i) Outline the process of vertebrate eye formation and differentiation of lens.

(88 marks)

(ii) Considering the formation of eye as an example explain, primary, secondary and tertiary inductions taking place during organogenesis.

(12 marks)

5. (i) Describe an experiment which proved the instructive and permissive nature of induction process that determined cells in an embryo. (35 marks)

(ii) Describe an experiment which proved that the differentiated adult cells (e.g., mammary gland cells) can de-differentiate. (65 marks)

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

(a) Prevention of polyspermy in sea urchin

(b) Chick extra-embryonic membranes

(c) Hormonal regulation in insect metamorphosis

(d) Assisted reproductive technologies

(50 marks for each)