THE OPEN UNIVERSITY OF SRI LANKA

B. Sc. DEGREE PROGRAMME – LEVEL 04

ZOU 2166 – ANIMAL DEVELOPMENT
CAT 1 (NO BOOK TEST)

DATE: 16th September 2007 Time: 11.00 a.m. – 12.00 noon

REGISTRATION NUMBER: .....

Answer all questions
Answers should be written in the space provided

1. The questions 1.1 – 1.4 are on the formation and fusion of gametes in the developmental process of animals.

1.1 State the two phases of spermatogenesis.

(i) ..... (ii) .....

1.2 Briefly describe the processes occur during these two phases.

Phase 1

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Phase 2

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1.3 State the four (4) differences between the spermatogenesis and oogenesis in vertebrates.

(i) .....

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(ii) .....

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(iii).....

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(iv).....

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1.4 Using suitable words from the list given below fill in the blanks in the following paragraph.

hydrolytic enzymes, increase, fucose sulfate, decrease, bindin, in exchange, bindin receptor, jelly coat, small peptides, acrosomal filament

In the process of fertilization in sea urchin, when a sperm meets an egg, the following events are initiated. The ..... containing polysaccharide released by the ..... of egg binds to the receptors on the sperm membrane. This helps Ca^{2+} ions to diffuse into the sperm. This triggers pumping of H^{+} ions out ..... of Na^{+} ions. This causes pH inside the sperm to ..... and triggers acrosomal reaction. The outer membrane of acrosome breaks releasing ..... to digest a pathway for the entry of sperm. The posterior wall of the acrosome elongates and gives an ..... by the polymerization of actin molecules. Acrosomal process traverses the outer egg coat and makes contact with the vitelline membrane of the egg. A protein called ..... located on the surface of the acrosomal process binds to a specific ..... glycoprotein located on the surface of the vitelline envelop in a species specific manner.

2. The questions 2.1 and 2.2 are on the cleavage of animal zygotes.

2.1 State whether the following statements on cleavage are correct or incorrect by placing a '√' or 'X' respectively in the box. If the statement is incorrect, write the correct statement in the space provided.

☐ (a) In cleavage, as in normal cell divisions, cell cytoplasm divides and it is followed by division of the cell nucleus.

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☐ (b) All cell divisions of cleavage are mitotic and they occur rapidly one after the other without any growth of resulting blastomeres.

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☐ (c) Early divisions of cleavage are asynchronus while the later divisions of cleavage are synchronous.

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☐ (d) The ratio of the nucleus to cytoplasm is low at the beginning of cleavage and it is brought to the level of ordinary somatic cells at the end of the cleavage.

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☐ (e) The cellular organelles and the cytoplasm of an egg cell are displaced to a greater extent during cleavage.

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2.3. Draw the first **four (4)** cleavage divisions of a zygote possessing (a) radial cleavage and (b) spiral cleavage (draw the positions of mitotic spindles).

Radial cleavage

Spiral cleavage

3. **The question 3.1 is on organogenesis of chordates.**

3.1. Using suitable words from the list given below fill in the blanks in the following paragraph.

epidermis, mesodermal cells, distal end, growth factors, dorsal-ventral, visceral/splancnic layer of lateral plate, apical ectodermal ridge, mesoderm, reciprocal action, progress zone, proximo-distal, parietal/somatic layer of lateral plate

During the development of the forelimb of chick, cells of ..... mesoderm are transformed into mesenchyme cells. These cells aggregate underneath the epidermis and get attached to it to form limb bud. As a result, the ..... surrounding gets thickened and form apical ectodermal ridge (AER). During the growth of the wing bud, interactions occur between the AER and ..... The AER is maintained in an active stage by the continuing influence of the ..... The proliferation of mesodermal cell in a limb bud occurs at its .... and this region is known as the ..... . This cell proliferation causes growth of the limb bud along its ..... axis. The rapid cell divisions in limb bud are stimulated by the ..... through the mediation of ..... Thus, limb development of chick is a two-way inductive system and is known as .....

4. The questions 4.1 and 4.2 are on growth and the post embryonic development of animals.

4.1 State whether the following statements are correct or incorrect by placing a '√' or 'X' respectively in the box in front of the sentence.

☐ It has been observed that the rate of growth of an animal increases, with the increase of its age.

☐ The function of reserve cells in an animal is the replacement of the nonfunctional differentiated cells by producing new cells.

☐ Cell injuries or reduction in cell mass may induce some differentiated cells to divide to replace them.

☐ During the growth of an animal, different parts grow at different rates making a change in the proportion of the animal.

4.2 List 3 regressive changes that take place in the metamorphosis of Anurans.

(i) .....

(ii) .....

(iii) .....

4.3 List 3 progressive changes that take place in the metamorphosis of Anurans.

(i) .....

(ii) .....

(iii) .....

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