KATHMANDU UNIVERSITY
End Semester Examination [C]
April/May, 2023

Marks Scored:

Level : B.Tech.
Year : II

Course : BIOT 208
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : 3 May-023

SECTION "A"
[20Q. × 1 = 20 marks]

Encircle the most appropriate option.

1. Which protein does regulate Sex-specific courtship behaviors in *Drosophila*?
   a. Sex-lethal b. Doublesex c. Transformer d. Fruitless

2. The sheep "Dolly" was created by the fusion of
   a. sperm and ovum
   b. adult cell and mammary gland cell
   c. somatic cell cytoplasm and oocyte nucleus
   d. somatic cell nucleus and oocyte cytoplasm

3. Which of the following is an autosomal testis-determining gene?
   a. *Sry* b. *Sox9* c. *Dax1* d. *Wnt4*

4. The following transcription factors are involved in lens induction in *Xenopus laevis* **EXCEPT**
   a. Pbx2 b. Pax6 c. Otx2 d. Sox3

5. Endosperm in most angiosperms is
   a. Haploid b. diploid c. triploid d. tetraploid

6. Which stem cells are able to give rise to bone, cartilage, muscle, and fat lineages?
   a. Hematopoietic stem cells
   b. Mesenchymal stem cells
   c. Epithelial stem cells in the lining of the digestive tract
   d. Skin stem cells occur in the basal layer of the epidermis

7. Forkhead transcription factor in mouse is
   a. *Foxo* b. *dFoxo* c. *DAF-16* d. *AGE-1*

8. The organism in which diploid phase is represented by a zygote but there is no free living sporophyte is
   a. Algae b. Bryophytes c. Gymnosperms d. Pteridophytes

9. Spinal cord is formed from
   a. Mesoderm b. Lateral mesoderm
   c. Ectoderm d. Endoderm

10. When basal disc tissue from one hydra is transplanted into the middle of another hydra,
    a. the transplanted tissue forms a new apical-basal axis extending hypostome outward
    b. the transplanted tissue forms a new apical-basal axis extending basal disc outward
    c. the transplanted tissue cannot form new axis
    d. the transplanted tissue forms several new axes

Fill in the blanks.

11. _____ was the first embryologist to publish the first microscopic account of chick development in 1672.

12. _____ is a process of cellular rearrangements by which the embryo differentiates into three germ layers: the ectoderm, the endoderm, and the mesoderm.

13. The best understood of the Colony Stimulating Factors (CSFs) that act as hormones is the glycoprotein _____, which is produced in the kidneys and regulates *erythropoiesis*, the formation of red blood cells.

14. A rapid-aging syndrome, _____ is the result of a dominant mutation in the gene that encodes lamin A, a nuclear membrane protein.

15. In *Drosophila*, the bicoid mRNAs are carried by Dynein proteins to the _____ end of the egg.

16. Extracellular matrix that forms a fibrous mat around the mammalian eggs is called _____

17. _____ regeneration is characteristic of the mammalian liver.

18. _____ genes are genes which regulate the development of anatomical structures in various organisms.

19. _____is a popular model organism used in plant development studies.

20. A carpel is the female reproductive part of the flower usually composed of the _____, _____ and _____.

KATHMANDU UNIVERSITY
End Semester Examination [C]
April/May, 2023

03-May-023

Level : B.Tech.
Year : II
Time : 2 hrs. 30 mins.

Course : BIOT 208
Semester : I
F.M. : 55

SECTION "B"
[3Q × 7 = 21 marks]

Attempt *ANY THREE* questions.

1. What is Spermiogenesis? What are the changes that occur during spermiogenesis?
2. Illustrate the proposed regulatory cascade for *Drosophila* sex determination.
3. Define induction. Discuss with an example the induction involving interaction between epithelial cells with adjacent mesenchymal cells.
4. What is megasporogenesis? Describe with diagram the process of formation of female gametophyte in angiosperm.

SECTION "C"
[6Q × 4 = 24 marks]

Attempt *ANY SIX* questions.

5. State von Baer's laws of embryology.
6. Discuss the translocation of sperm during mammalian fertilization.
7. Differentiate embryonic stem cells, adult stem cells and induced pluripotent stem cells.
8. How does insulin signaling pathway affect aging?
9. What are the different levels at which eukaryotic gene expression are regulated?
10. Where does bud forms in hydra's body? Explain.
11. Differentiate between sporophyte and gametophyte body in plants.

SECTION "D"
[5Q × 2 = 10 marks]

12. Write short notes on (*ANY FIVE*).
    a. Evidence for Genomic Equivalence
    b. Dichogamy
    c. Histone acetylation
    d. Silencers
    e. Cytokinin signaling
    f. Conclusions of Townes and Holtfreter experiments
    g. Self-incompatibility in plants