KATHMANDU UNIVERSITY
End Semester Examination
May/June, 2022

Marks scored:

Level : B.Tech.
Year : II
Course : BIOT 208
Semester : II
Exam Roll No :
Time : 30 mins.
F.M. : 20
Registration No:
Date :

SECTION "A"
[10Q. × 1 = 10 marks]

Encircle the most appropriate option.

1. Which of the following functional proteins are formed in female *Drosophila*?
   a. Sex-lethal only
   b. Sex-lethal and Doublesex
   c. Sex-lethal, Transformer and Doublesex
   d. All Sex-lethal, Transformer, Doublesex and Fruitless

2. If a Salamander limb is denervated and amputated
   a. the salamander cannot regenerate its amputated limb.
   b. the remaining limb cells are able to reconstruct a complete new limb, with all its differentiated cells arranged in the proper order.
   c. the salamander cannot survive and dies.
   d. the remaining limb cells are able to reconstruct a complete new limb but the differentiated cells are not arranged in the proper order.

3. Which of the following represents the correct sequence of events
   a. Spermatogenesis ->Spermiogenesis ->Acrosomal reaction -> Capacitation -> Sperm-Zona recognition
   b. Spermiogenesis -> Spermatogenesis ->Acrosomal reaction -> Sperm-Zona recognition -> Capacitation
   c. Spermatogenesis ->Spermiogenesis -> Sperm-Zona recognition -> Capacitation->Acrosomal reaction
   d. Spermatogenesis ->Spermiogenesis -> Capacitation -> Sperm-Zona recognition ->Acrosomal reaction

4. Which of the following has little role in the developmental process?
   a. Cell growth
   b. Cell movement
   c. Cell signaling
   d. Cell multiplication

5. Which of the following histones is bound to the linker DNA between the nucleosomes?
   a. H1 b. H2 c. H3 d. H4

6. In what way is the DNA of a nerve cell different from the DNA of a muscle cell?
   a. The DNA is the same but each cell contains different genes
   b. The DNA is different, but each cell contains the same genes
   c. The DNA is the same but different genes are turned on in each cell
   d. Each cell has its own unique DNA

7. The hedgehog gene that is expressed in the Sertoli cells of the testes is
   a. *dhh* b. *bhh* c. *ihh* d. *shh*

8. How many sperm do the pollen tube of an angiospermic plant delivers into female gametophyte?
   a. 1 b. 2 c. 3 d. 4

9. 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

10. _____ are trans-acting factors.
   a. Silencer elements
   b. Enhancer sequences
   c. Promoters
   d. MicroRNAs

SECTION "B"
[10Q. × 1 = 10 marks]

Fill in the blanks.

11. A blastocyst has _____ that will become placenta and _____ that will become the rest of the embryo.

12. During sperm maturation, histones are replaced by_____

13. MyoD transcription factors are involved in the development of _____ cell.

14. DNA methylation mostly occurs at_____ dinucleotide sequences.

15. Bryophytes have dominant_____ generation whereas Pteridophytes have dominant _____ generation.

16. _____ in egg are the membrane-bound, golgi-derived structures containing proteolytic enzymes, mucopolysaccharides, adhesive glycoproteins, and hyalin protein.

17. The renewal of worn-out cells in the lining of the small intestine is an example of _____ regeneration.

18. The sex of a Drosophila having 3 X-chromosomes and 4 set of autosomes is _____.

19. During human male development, the _____ duct differentiates to become the epididymis (adjacent to the testis) and the vas deferens.

20. According to the ABC model of flower development in angiosperm, Stamens are formed in the whorl 3 as a result of interaction between class _____ and class _____ genes.

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SECTION "C"

(Long answer questions)
[3Q. × 7 = 21 marks]

Attempt *ANY THREE* questions.

1. What are the different types of regeneration mechanisms found in animals? Describe any one in detail with example.

2. Illustrate the role of *Sex-lethal* gene in the sex determination of *Drosophila*.

3. What are the different mechanisms of gene regulation at the level of translation? Describe any one in brief.

4. Show the interaction between cytokinin and auxin in the root and shoot apical meristem.

SECTION "D"

[6Q. × 4 = 24 marks]

Attempt *ANY SIX* questions.

5. Discuss the role of retinoic acid in sexual differentiation of mammalian germ cells.

6. What facilitates external fertilization in sea-urchin? Explain briefly.

7. Describe the mechanism of prevention of polyspermy in mammals.

8. What are induced pluripotent stem cells? List the transcriptional regulators involved in reprogramming fibroblasts to iPS cells?

9. Illustrate with a diagram, "alternation of generation in bryophytes".

10. Briefly explain Townes and Holtfreter's experiment and analysis.

11. Differentiate between sporophytic and gametophytic self-incompatibility.

SECTION "E"

[5Q. × 2 = 10 marks]

12. Write short notes on (*ANY FIVE*):
    a. Preformation vs. Epigenesis
    b. DNA methylation
    c. Gametophyte and Sporophyte
    d. Dichogamy
    e. Silencers
    f. Histone acetylation
    g. Double fertilization in angiosperm.