KATHMANDU UNIVERSITY
End Semester Examination [C]
November/December, 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 29 NOV 2023

SECTION "A"
[20Q. × 1 = 20 Marks]

Encircle the most appropriate option.

1. "All animals, even mammals, originate from eggs" was first hypothesized by
   a. Von Baer
   b. Aristotle
   c. Marconi Malpighi
   d. William Harvey

2. Gonadotropin-releasing hormone stimulates the pituitary to release
   a. FSH and LH
   b. Estrogen
   c. Progesteron
   d. Prolactin

3. A mode of gastrulation by which the cells split transversely, converting the one-layered wall of the embryo to a two-layered one is
   a. Invagination
   b. Epiboly
   c. Delamination
   d. Involution

4. During male development, the Wolffian duct differentiates into the following **EXCEPT**
   a. testis
   b. epididymis
   c. vas deferens
   d. seminal vesicle

5. Each histone octamer is composed of two copies each of the histone proteins
   a. H1, H2, H3, H4
   b. H1, H2A, H2B, H3
   c. H1, H2A, H2B, H4
   d. H2A, H2B, H3, H4

6. Downregulation of the insulin signaling pathway
   a. influence metabolism, increasing mitochondrial electron transport
   b. increase fertility
   c. decrease lifespan
   d. increases the production of enzymes that prevent oxidative damage

7. If human mesenchymal stem cells are placed on soft matrices of collagen-coated polyacrilamide, these stem cells differentiate into
   a. cartilage
   b. bone
   c. muscles
   d. neurons

8. During the development of a dicot embryo, the cells of plerome give rise to
   a. epidermis
   b. cortex
   c. stele
   d. suspensor

9. Sporophyte is dominant in
   a. Mosses
   b. Liverworts
   c. Chlamydomonas
   d. Ferns

10. Pollination which takes place with the help of bats is called
    a. Ornithophily
    b. Chiropterophily
    c. Entomophily
    d. Anemophily

Fill in the blanks

11. According to the _____view, all the organs of the adult were prefigured in miniature within the sperm or (more usually) the egg. Organisms were not seen to be "constructed" but rather "unrolled".

12. During capacitation, the fluidity of the sperm plasma membrane is altered by the removal of cholesterol by _____ proteins found in the female reproductive tract.

13. β-catenin prevents the accumulation of _____, a protein crucial for testis determination.

14. A lack of oxygen or a shortage of erythrocytes stimulates specialized cells in the _____ to synthesize and secrete increased amounts of erythropoietin into the bloodstream.

15. The _____ is a T/A-rich sequence that is usually located 25–35 base pairs upstream of the transcription start sites.

16. When proteins synthesized by one cell can diffuse over small distances to induce changes in neighboring cells, the event is called a _____ interaction.

17. p53 can stop the cell cycle, cause cellular senescence in rapidly dividing cells, and instruct the _____ genes to initiate cellular apoptosis,

18. The type of regeneration in planarian flatworm is _____.

19. The ploidy level of Sporophyte body of angiospermic plant is _____.

20. The _____ transcription factor activates floral meristem identity genes such as APETALA1 (AP1), LEAFY (LFY), AGAMOUS (AG), and PISTILLATA (PI).

KATHMANDU UNIVERSITY
End Semester Examination [C]
November/December, 2023

29 NOV 2023

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. Illustrate the developmental cascades for *Drosophila* somatic sex determination.

2. What would happen if a graft of subhypostomal tissue of one hydra is placed in the
   i. apical (subhyposomal) region of another experimental hydra?
   ii. apical (subhyposomal) region of another decapitated experimental hydra?
   iii. lower (towards basal) region of another experimental hydra?
   Explain the results.

3. Discuss sexual incompatibility in plants and explain the mechanisms that govern the sporophytic and gametophytic self-incompatibility.

4. Discuss with diagram the development of a typical monocot embryo.

SECTION "C"
[6Q × 4 = 24 marks]

Attempt *ANY SIX* questions.

5. Write any four differences between spermatogenesis and oogenesis.

6. Describe the concept of genomic equivalence and provide its evidence.

7. Define cleavage. What are the different patterns of embryonic cleavage found in animals.

8. Illustrate the structural and functional component of flagellum of sperm.

9. What are the various controllable parameters that influence the fate of a stem cell?

10. What happened in the final configuration when the cells from the three germ layers were mixed together by Townes and Holtfreter? How was the result interpreted?

11. Discuss the mechanisms by which differential RNA processing occurs.

12. Summarize the anterior-posterior axis specification in *Drosophila*.

SECTION "E"
[5Q × 2 = 10 marks]

13. Write short notes on (*ANY FIVE*).
   a. Epigenesis
   b. SRY
   c. Capacitation
   d. Genes involved in aging or its prevention
   e. ABCDE model of flower development
   f. Auxin signaling
   g. Microgametogenesis