KATHMANDU UNIVERSITY
End Semester Examination [C]
January, 2019

Marks Scored:

Level : B. Tech.
Year : II

JAN 0 2 2019

Course : BIOT 208
Semester: II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date :

SECTION "A"
[20 Q ×1 =20 marks]

Choose and tick [✓] the most appropriate answer.

1. The digestive tube of an individual is derived from:
[ ] mesoderm [ ] ectoderm [ ] endoderm [ ] germ cell

2. Parthenogenetic organisms are characterized by:
[ ] haploid gametes [ ] diploid gametes
[ ] require fusion of gametes [ ] sperm are non-motile

3. High level of Glial cell line Derived Neurotrophic Factor (GDNF) is responsible for:
[ ] differentiation of spermatogonia [ ] self-renewal of spermatogonia
[ ] transition to spermatogenesis [ ] removal of basal bodies

4. The physiological changes that allow the sperm to be competent to fertilize the egg is termed:
[ ] acrosomal reaction [ ] capacitation
[ ] chemotaxis [ ] morphogenesis

5. Blastomeres in fish, reptile and birds contain dense yolk throughout most of the cell due to:
[ ] isolecithal cleavage [ ] mesolecithal cleavage
[ ] telolecithal cleavage [ ] centrolecithal cleavage

6. Failure to close the entire neural tube to close over the entire body axis is:
[ ] Spina bifida [ ] Craniorachischisis
[ ] Anencephaly [ ] Neurulation

7. Which of the following gene pair is responsible for formation of testis from bipotential gonads?
[ ] *sry/wt1* [ ] *dax1/sox9* [ ] *wt1/dax1* [ ] *sry/sox9*

8. The proportion of Sex: Autosomal chromosome in *Drosophila melanogaster* that lead to development of metamale is:
[ ] 1:3 [ ] 2:3 [ ] 1:2 [ ] 3:4

9. Histone methylation at 38th amino acid of H3 tail is signaled for:
[ ] transcriptional elongation [ ] silent heterochromatin
[ ] transcriptional memory [ ] cell cycle elongation

10. The coordinates for the expression of genes responsible for development of salivary glands in *Drosophila melanogaster* along the anterior posterior axis is mediated by:
[ ] activation of *scr* gene [ ] inhibitory effect of *dpp* gene
[ ] inhibitory effect of *dorsal* gene [ ] activation of *dpp* gene

11. In general, the hierarchical order of gene expression in early Drosophila development is:
[ ] Maternal effect, Gap, Pair-rule, Segment Polarity
[ ] Maternal effect, Pair-rule, Segment Polarity, Gap
[ ] Maternal effect, Segment Polarity, Gap, Pair-rule
[ ] Maternal effect, Gap, Segment Polarity, Pair-rule

12. Which of the cadherin is expressed only in epithelial tissues of embryos and adults?
[ ] P-cadherin [ ] R-cadherin [ ] N-cadherin [ ] E-cadherin

13. In vertebrates, differentiation of gut and cartilage is mediated by:
[ ] Wnt pathway [ ] Sonic hedgehog [ ] Indian hedgehog [ ] Desert hedgehog

14. Which of the following does not belong to a core set of transcriptional factors that can create induced pluripotent cells?
[ ] Oct4 [ ] Nanog [ ] Sox2 [ ] Myc

15. Somatic maintenance of cells:
[ ] limits lifespan [ ] enhances lifespan
[ ] accelerates somatic damage [ ] increases age related disorders

16. If regeneration occurs through re-patterning of existing tissues, the process is called:
[ ] Epimorphosis [ ] Morphollaxis
[ ] Compensatory regeneration [ ] Stem cell mediated regeneration

17. Absence of Pitxl gene expression resulting in loss of pelvic spine in freshwater stickleback fish is due to mutation in:
[ ] thymus enhancer [ ] hind limb enhancer
[ ] sensory neuron enhancer [ ] nasal pit enhancer

18. Plants having vascular tissues and reproduction by dispersal of spores are classified into:
[ ] Bryophytes [ ] Pteridophytas
[ ] Gymnosperms [ ] Angiosperms

19. A flower arrangement in which, the ovary is attached to the receptacle above other floral parts is called as:
[ ] Hypogynous [ ] Perigynous
[ ] Mesogynous [ ] Epigynous

20. In ABC model of flower development; mutation in B gene produces (in sequence from outside to inside of the flower) the following phenotype:
[ ] Carpel, Stamen, Stamen, Carpel [ ] Sepal, Sepal, Carpel, Carpel
[ ] Sepal, Petal, Petal, Sepal [ ] Petal, Petal, Stamen, Carpel

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Time : 2 hrs. 30 mins.

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F. M. : 55

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

Attempt *ANY THREE* questions

1. Explain the various mechanisms by which the differentiated state of a cell can be maintained, after a set of genes have been expressed to determine the cell type.

2. Define the terms used for various types of stem cells. Explain the immortal strand hypothesis of stem cell.

3. What are the ways in which change in level of gene expression can act as mechanisms for evolutionary changes? Describe each in detail.

4. Define Meristematic tissues. Differentiate meristematic tissues on basis of origin, position & function. Explain the development of meristematic tissue and apical dominance.

SECTION "C"
(Short answer questions)
[6Q. × 4 =24 marks]

Attempt *ANY SIX* questions.

5. How the decision to enter meiosis or mitosis & become an egg or a sperm is dictated in case of *Caenorhabditis elegans* ?

6. Explain the modes of gastrulation employed by various organisms.

7. Explain the location dependent sex determination in *Crepidula fornicata*.

8. How does DNA methylation institute transcriptional control?

9. Fibroblasts can be reprogrammed to form induced pluripotent stem cell (iPS). Explain the transcription waves responsible for the reprogramming.

10. How does head activation gradient highest at hypostome of Hydra function?

11. Explain the function of homeotic genes involved in development of flower.

SECTION "D"

[5Q. × 2 =10 marks]

Write very short notes (*ANY FIVE*).

12. Explain the importance of cholesterol in functioning of Sonic hedgehog protein

13. Name the three important axes and the parts of the body they divide into

14. Explain briefly the epigenetic causes of Aging

15. Why do insects have six legs but other arthropods have many?

16. Differentiate Haplontic, diplontic & haplo-diplontic life cycles.

17. How does ovarian hormone and gonadotropins cycle during Human menstrual cycle?