

Ex/SC/BT/PG/333T/2024

MASTER OF SCIENCE EXAMINATION, 2024

(2nd Year, 1st Semester)

BIOTECHNOLOGY

PAPER : PG/333T

(Animal and Developmental Biotechnology)

Time : Two Hours

Full Marks : 40

GROUP—A

(Answer *any three* questions, each carries 5 marks, Total 15)

1. (a) How are the two termini of Drosophila specified? 2
(b) “Frozen cells are revived in culture medium for performing tissue culture experiments”. What kind of inductive interaction is happening in this condition? 1
(c) What would be the effect of calcium ionophore and acidic pH on acrosomal exocytosis? 2
2. (a) If you remove a set of cells from an early embryo, you may expect two possible outcomes. (i) The adult organism lacks the structure that would have been formed from those cells **OR** (ii) the adult organism is developed normally. What kind of specification do you see in each case? 2

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[Turn Over]

(2)

- (b) How do segment polarity genes regulate the segment formation during development in *Drosophila*? 3
3. (a) What are involution and delamination during gastrulation? 2
- (b) What would be the phenotype of loss-of-function and gain-of-function mutant of “ultrabithorax” gene in *Drosophila*? 2
- (c) How would low sodium concentration in the extracellular space affect polyspermy? 1
4. (a) What are the properties of an “Organizer” in an amphibian embryo? 2
- (b) If you suppress one of the adhesion molecules from the early stage of blastula in *Xenopus*, what will happen to the developing embryo? 1
- (c) What is “Grey Crescent Area” and “Nieuwkoop Centre” during amphibian development? 2
5. (a) What kind of cleavage is seen in chick embryo? Explain it. 1
- (b) Give an example of regional specific induction with proper explanation. 2
- (c) Explain autonomous and conditional specification in determining the cell fate. 2

(5)

GROUP—D

19. Differentiate between adherent culture and suspension culture. Write briefly the role of CO₂ and bicarbonate as buffering system of the cell culture media. What are the different changes found in the colour of phenol red to indicate the pH changes in the media? 2+2+1=5

(OR)

20. Differentiate between primary culture and continuous (permanent) culture. Write briefly about how cell culture is used for production of viral like particles in preparation of antiviral vaccines. Write the name of one therapeutic enzyme and growth factor produced through recombinant mammalian cells. 2+2+1=5

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(3)

6. (a) What is the molecular mechanism or the main signaling event that determines the left/right patterning in mouse embryo during development? 2.5
- (b) "Hensen's node is known as the avian equivalent of amphibian dorsal blastopore lip". Justify the statement with proper experiment. 2.5

GROUP—B

Answer *any five* questions : 2×5

7. How is Q-Fish used in telomere research? Give one application of centromere specific probes in chromosome research.
8. Outline a strategy to produce edible vaccine using plant.
9. Mention the advantages of using *Lactobacillus*-based vaccines.
10. Why is pseudo type virus used for detecting presence of antibody against deadly virus?
11. Why are patient sera heated before subjected to complement fixation test?
12. Mention the importance of using *Clostridia* as cancer therapy.

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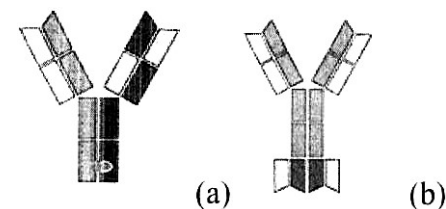
(4)

13. Why, during recombinant insulin production, is methionine inserted between β -galactosidase and insulin?
14. Give basic principle of phase display to produce human antibody.

GROUP—C

Answer *any two* questions : 5×2=10

15. State the difference between active and passive targeting of drugs. What is Biomimetic modification and homologous targeting of drugs? What is liposome? In which disease can we target leukosomes? 1+2+1+1=5
16. State the difference between chimeric and humanized antibody. Define Fab, scFv, and sdAb. 2+3=5
17. Define any 3 methods of Fc region engineering. State the Ig subtypes of following diagrams. 3+2=5



18. Define IgG1 FUSION PROTEINS. What is electroporation? What is proton sponge effect? State the advantage of HSV-1 delivery system. 2+1+1+1=5

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