# 2022
# ZOOLOGY
## ZOOL-3056
## (Integrative Biology)
## Total Marks : 60
## Time : 3 Hours

*Total number of printed pages -6*
*The figures in the margin indicate full marks for the questions*

1. Answer the following questions : 1×20=20

(a) Cell signaling is _____.

(i) Intercellular (ii) Intracellular

(iii) Both (i) and (ii) (iv) None of the above

(b) Which of the following G-protein takes part in the regulation of vision?

(i) Golf (ii) Gi family

(iii) Gs family (iv) Gq family

(c) The secondary messenger, which opens calcium ions pores in Endoplasmic reticulum and plasma membrane is –

(i) diacylglycerol

*(ii) cAMP*

*(iii) phosphatidylinositol biphosphate*

*(iv) inositol triphosphate*

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(d) The signaling pathway, followed by T-lymphocytes in response to antigenic stimulation, is _____

(i) Endocrine signaling (ii) Paracrine signaling

(iii) Autocrine signaling (iv) Juxtacrine signaling

(e) How many transmembrane alpha-helices are present in the G-protein coupled receptors?

(i) Two (ii) Four

(iii) Five (iv) Seven

(f) Competitive inhibition of an enzyme can be reduced by –

(i) Reducing the amount of the substrate

(ii) Increasing the amount of the substrate

(iii) Decreasing the amount of the enzyme

(iv) Diluting the reaction mixture

(g) When the velocity of enzyme activity is plotted against substrate concentration, which of the following is obtained?

(i) Hyperbolic curve

(ii) Parabola

(iii) Straight line with positive slope

(iv) Straight line with negative slope

(h) Which of the following RNAs can induce gene silencing?

(i) miRNA (ii) snoRNA

(iii) ssRNA (iv) ncRNA

(i) Dicer is _____.

(i) DNAse-like enzyme

(ii) RNAse-like enzyme

(iii) An endonuclease

(iv) An exonuclease

(j) By which of the following methods, a pattern of inheritance can be traced in a family?

(i) Pedigree analysis (ii) Chromosomal analysis

(iii) Nuclear analysis (iv) Cytoplasm analysis

(k) Which of the following represents nullisomic conditions?

(i) 2n-1 (ii) 2n-2

(iii) 2n+1 (iv) 2n+2

(l) Colour blindness is a example of –

(i) Autosomal dominant trait

(ii) X-linked dominant trait

(iii) X-linked recessive trait

(iv) None of these

(m) Coupling and repulsion and are two faces of

(i) mutation (ii) chiasmata

(iii) linkage (iv) crossing over

(n) Percentage of crossing over is more when

(i) genes are located in a different cell

(ii) genes are not linked

(iii) linked genes are located close to each other

(iv) linked genes are located far apart from each other

(o) What is the other name of DSB repair pathway?

(i) RecBAD pathway (ii) RecBCD pathway

(iii) RecABD pathway (iv) RecDCB pathway

**P.T.O**

(p) Which of the following disorder causes dopamine neurons to die?

(i) Seizure disorder (ii) Multiple sclerosis

(iii) Parkinson's disease (iv) Lou Gehrig's disease

(q) Which of the following promotes strand exchange?

(i) DBS formation

(ii) Heteroduplex formation

(iii) Strand invasion protein

(iv) Branch migration

(r) Which of the following phenomenon truly represent the coat colour variation in mice?

(i) Pleiotropy (ii) Epistasis

(iii) Genetic drift (iv) Codominance

(s) The phenomenon of genetic drift is most likely to occur in population –

(i) When it is a small and inbreeding population.

(ii) When it is undergoing gene flow.

(iii) When it is allopatric speciation

(iv) When it is large and panmictic population

(t) Resolution of Holliday junction performed by -

(i) Rad 51 (ii) Ruv C

(iii) Spo 11 (iv) None of the above

2. Answer the following questions briefly : 2×10=20

(a) How the heterotrimeric G-proteins associated with the membrane?

(b) Differentiate between isozymes and allozymes.

(c) Mention the significance of quorum sensing mechanism in bacteria.

(d) What are differences between Broad Sense and Narrow Sense Heritability?

(e) State Hardy Weinberg Principle.

(f) What is inbreeding depression?

(g) Graphically represent "DIAUXIC GROWTH" in a microbial population.

(h) Write the difference between ordered and unordered tetrad analysis.

(i) The map distance between genes A and B is 3 units; between B and C is 10 units and between C and A is 7 units. What will be the order of genes in a linkage map constructed from the above data?

(j) Write the concept of genetic drift with suitable example.

3. Answer any four from the following : 5×4=20

(a) A panel of cell lines was created by human-mouse somatic-cell hybridization. Each cell line was examined for the presence of human chromosomes and for the production of three enzymes. The following results were obtained :

| Cell line | Presence of enzyme | | | | Human Chromosomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 8 | 9 | 12 | 15 | 16 | 17 | 22 | X |
| A | + | - | + | - | - | + | - | + | + | - | - | + |
| B | + | - | - | - | - | + | - | - | + | + | - | - |
| C | - | + | + | + | - | - | - | - | - | + | - | + |
| D | - | + | + | + | + | - | - | - | + | - | - | + |

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On the basis of these results, give the chromosomal locations of the genes encoding enzyme1, enzyme 2, and enzyme 3.

(b) Write in brief about the P-element in Drosophila. Mention the significance of transposition.

(c) Explain the Rec BCD pathway of Homologous Recombination with diagram.

(d) Describe the individuals with the following chromosomal abnormalities (any two) :

(i) Trisomy at chromosome 21

(ii) XXY

(iii) XO

(e) Write about the siRNA and miRNA mediated gene silencing.

(f) Write in detail about the nucleosomal model of DNA packaging in eukaryotic cells with a suitable diagram.

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