Zoology (XL-T)

Q.1 – Q.7 Multiple Choice Question (MCQ), carry ONE mark each (for each wrong answer: – 1/3).

Q.1	**Ichthyophis belongs to which of the following Class?**
(A)	Mammalia
(B)	Reptilia
(C)	Amphibia
(D)	Aves

Q.2	**The two homologous genes occurring in different species are called**
(A)	paralogous
(B)	orthologous
(C)	pseudologous
(D)	prologous

Q. 3	**The expression of holandric genes causes which of the following genetic trait in humans?**
(A)	Haemophilia
(B)	Sickle cell anaemia
(C)	Down's Syndrome
(D)	Hypertrichosis

Q.4	Assume that the anticodon for an unknown amino acid is 3′ AUG 5′. The corresponding code on DNA sequence would be
(A)	3′ TAC 5′
(B)	5′ TAG 3′
(C)	3′ ATG 5′
(D)	5′ ATG 3′

Q. 5	The Organ of Corti is found in which of the following parts of human body?
(A)	Heart
(B)	Inner ear
(C)	Kidney
(D)	Nasal cavity

Q. 6	In adult athletes, muscles grow larger when exercised and are capable of regeneration after injury. This is due to proliferation and differentiation of
(A)	satellite cells
(B)	myelin sheath
(C)	oxyntic cells
(D)	choanocytes

Q. 7	The term innate behavior is a sort of animal behavior that is
(A)	triggered by an environmental change
(B)	learnt by hit-and-trial approach
(C)	trained and taught by the parent
(D)	fixed developmentally at the genetic level

Q.8 – Q.10 Numerical Answer Type (NAT), carry ONE mark each (no negative marks).

Q.8	**A man, whose mother and father had blood groups A and O respectively, marries a woman with blood group AB. If the man has blood group A, then the number of different blood groups possible among their children will be _____ (*in integer*).**

Q. 9	**A population of snakes in an isolated island is in Hardy–Weinberg equilibrium for a gene with only two alleles (*A* and *a*). If the allelic frequency of *A* is 0.6, then the genetic frequency of *Aa* is _____ (*round off to 2 decimal places*).**

Q.10	**In the structure of a polypeptide, one α-helix (3.6_{13} helix) contains 32 intra-chain hydrogen bonds. The number of turns in the helix will be _____ (*in integer*).**

Q.11 – Q. 16 Multiple Choice Question (MCQ), carry TWO marks each (for each wrong answer: – 2/3).

Q.11	**Match the terms in Column I with the specific descriptions in Column II** **Column I** — **Column II** P. Zygote — (i) A hollow sphere of cells Q. Morula — (ii) A newly born offspring R. Blastocyst — (iii) A cell that results from fertilization S. Ovum — (iv) An embryo T. Neonate — (v) An unfertilized egg U. Fetus — (vi) A compact mass of cells
(A)	P-(iii), Q-(vi), R-(i), S-(v), T-(ii), U-(iv)
(B)	P-(v), Q-(ii), R-(iii), S-(vi), T-(i), U-(iv)
(C)	P-(ii), Q-(iv), R-(vi), S-(v), T-(i), U-(iii)
(D)	P-(iii), Q-(vi), R-(ii), S-(v), T-(iv), U-(i)

Q. 12	**Match the autoimmune diseases in Column I for the self-antigens in Column II** **Column I** — **Column II** P. Rheumatoid arthritis — (i) Myelin Q. Systemic lupus erythematosus — (ii) Connective tissue R. Myasthenia gravis — (iii) DNA S. Multiple sclerosis — (iv) Acetylcholine receptors
(A)	P-(i), Q-(ii), R-(iii), S-(iv)
(B)	P-(ii), Q-(iii), R-(iv), S-(i)
(C)	P-(iii), Q-(i), R-(iv), S-(ii)
(D)	P-(iv), Q-(i), R-(ii), S-(iii)

Q. 13 **Match the types of cell movements during gastrulation in Column I with the descriptions in Column II**

Column I		Column II
P. Invagination	(i)	Migration of individual cells from the surface into the embryo's interior
Q. Involution	(ii)	Infolding of a sheet (epithelium) of cells during the formation of endoderm in sea urchin
R. Ingression	(iii)	Splitting of one cellular sheet into two nearly parallel sheets
S. Delamination	(iv)	Inward movement of an expanding outer layer of cells so that it spreads over the internal surface of the remaining external cells

(A) P-(ii), Q-(iii), R-(iv), S-(i)

(B) P-(iv), Q-(i), R-(iii), S-(ii)

(C) P-(ii), Q-(iv), R-(i), S-(iii)

(D) P-(iii), Q-(ii), R-(iv), S-(i)

Q. 14 **Match the therapeutic factors in Column I with the applications in Column II**

Column I		Column II
P. Humulin	(i)	Cancer therapy
Q. Erythropoietin	(ii)	Diabetes
R. Plasminogen activator	(iii)	Osteoporosis
S. Cathepsin K inhibitor	(iv)	Anaemia
T. Leptin	(v)	Myocardial infraction
	(vi)	Obesity

(A) P-(ii), Q-(iv), R-(v), S-(iii), T-(vi)

(B) P-(ii), Q-(v), R-(i), S-(iv), T-(iii)

(C) P-(v), Q-(vi), R-(iv), S-(iii), T-(i)

(D) P-(iii), Q-(iv), R-(ii), S-(v), T-(vi)

Q. 15	**Match the cell organelles in Column I with the appropriate functions in Column II** **Column I** P. Peroxisome Q. Endoplasmic reticulum R. Glyoxysome S. Golgi complex T. Centrioles **Column II** (i) Conversion of lipid to carbohydrate (ii) Oxidation of fatty acids (iii) *N*-linked glycosylation (iv) Microtubule organization center (v) *O*-linked glycosylation
(A)	P-(ii), Q-(iii), R-(v), S-(i), T-(iv)
(B)	P-(iv), Q-(v), R-(i), S-(ii), T-(iii)
(C)	P-(iv), Q-(v), R-(iii), S-(i), T-(ii)
(D)	P-(ii), Q-(iii), R-(i), S-(v), T-(iv)

Q. 16	**Cohesin and Condensin proteins of eukaryotes belong to which one of the following groups?**
(A)	Structural maintenance of chromosomes (SMC) proteins
(B)	Histones
(C)	DNA polymerases
(D)	Topoisomerases

Q.17 – Q.18 Multiple Select Question (MSQ), carry TWO mark each (no negative marks).

Q. 17	**Which of the following options represent the animals as Endemic to India?**
(A)	Pygmy Hog
(B)	Mountain Bongo
(C)	Hirola
(D)	Purple Frog

Q. 18	**Which of the following amino acids contain more than one chiral center?**
(A)	Leucine
(B)	Isoleucine
(C)	Serine
(D)	Threonine

Q.19 – Q.20 Numerical Answer Type (NAT), carry TWO mark each (no negative marks).

Q. 19	**An enzyme catalyzes the conversion of 30 µM of a substrate to product at reaction velocity of 9.0 µM s^{-1}. When $[E_t]$ = 30 nM and K_m = 10 µM, K_{cat} / K_m of enzyme will be $n \times 10^7$ M^{-1} s^{-1}. The value of n is _____ (*in integer*).**

Q. 20	**A cross is made between two animals of genotypes *AaBb* x *AaBb*, where loci *A* and loci *B* assort independently. The progeny of this dihybrid cross was then allowed to self-cross. The proportion of the progeny that showed segregation for loci *A* (i.e., produce *A*- and *aa* progeny) in % will be _____ (*in integer*).**

END OF THE QUESTION PAPER