XL (T): Q. 1 – Q. 10 carry one mark each & Q. 11 – Q. 20 carry two marks each.

Q.1 Animals belonging to phylum Echinodermata are closer to chordates than other invertebrate phyla. Which ONE of the following reasons can account for this relatedness?

(A) Highly evolved nervous system
(B) Radially symmetric body plan
(C) Deuterostomic development
(D) Well-developed muscles

Q.2 A zoologist recovered some tissue from preserved skin of a woolly mammoth. Further genetic analysis requires DNA isolation and increasing its amount. Which ONE of the following techniques would be most useful for increasing the amount of DNA?

(A) RFLP analysis
(B) Polymerase chain reaction (PCR)
(C) Electroporation
(D) Chromatography

Q.3 In a chemical reaction where the substrate and product are in equilibrium in solution, what will occur if an enzyme is added?

(A) The equilibrium of the reaction will not change.
(B) There will be a decrease in product formed.
(C) Additional substrate will be formed.
(D) The free energy of the system will change.

Q.4 Tay-Sachs disease is a human genetic disorder that is associated with defects in which ONE of the following cellular organelles?

(A) Endoplasmic reticulum
(B) Mitochondria
(C) Golgi apparatus
(D) Lysosome

Q.5 Increase in the existent population of grey peppered moth, *Biston betularia*, during industrial revolution in Britain is an example of which ONE of the following evolutionary processes?

(A) Neutral selection
(B) Disruptive selection
(C) Directional selection
(D) Stabilizing selection

Q.6 Which ONE of the following is NOT a characteristic of a cancer cell?

(A) Increase in cell motility
(B) Loss of contact inhibition
(C) Decrease in apoptosis
(D) Uncontrolled meiosis

Q.7 Cardiac and cerebral tissues are derived from the following germ layers respectively

(A) Ectoderm and mesoderm
(B) Mesoderm and ectoderm
(C) Mesoderm and endoderm
(D) Endoderm and ectoderm

Q.8 An animal's ability to escape from a predator by using the explored knowledge of home area is an example of

(A) Latent learning (B) Insight learning (C) Mimicry (D) Imprinting

Q.9 Bowman's capsules are present in which ONE of the following organs/ tissues?

(A) Renal cortex (B) Urinary bladder (C) Renal medulla (D) Ureter

Q.10 Which ONE of the following is the primary function of lung surfactants?

(A) Remove dust particles from bronchi
(B) Provide immunity to respiratory tract
(C) Prevent alveoli from collapsing by decreasing surface tension
(D) Aid in carbon dioxide exchange

Q.11 Match the disorders/diseases listed in Column I to their respective causative agents listed in Column II.

	Column I		Column II
I)	African tick bite fever	i)	*Trypanosoma gambiense*
II)	Yellow fever	ii)	Zika virus
III)	Microcephaly	iii)	*Rickettsia sp*.
IV)	Sleeping sickness	iv)	Flavivirus

(A) I-iv, II-iii, III-ii, IV-i
(B) I-iii, II-iv, III-ii, IV-i
(C) I-iii, II-iv, III-i, IV-ii
(D) I-iii, II-i, III-iv, IV-ii

Q.12 Glucose monomers are joined together by glycosidic linkages to form a cellulose polymer. During this process, changes in the free energy, total energy, and entropy respectively are represented correctly by which ONE of the following options?

(A) $+\Delta G, +\Delta H, +\Delta S$.
(B) $+\Delta G, -\Delta H, -\Delta S$.
(C) $-\Delta G, +\Delta H, +\Delta S$.
(D) $+\Delta G, +\Delta H, -\Delta S$.

Q.13 In *Drosophila melanogaster*, a mutation in *Ultrabithorax* which defines the third segment of the thorax or T3 leads to development of four winged flies, as the halteres develop into a second pair of wings. Which ONE of the following phenotypes in fly will result from overexpression of *Ultrabithorax* in the second thoracic segment?

(A) Four winged flies.
(B) Two wings and two halteres flies.
(C) Flies with four halteres.
(D) Flies with two halteres.

Q.14 Which ONE of the following is TRUE in case of respiratory acidosis?

(A) Increased rate of ventilation is a cause of respiratory acidosis
(B) Blood pH more than 7
(C) Increased levels of carbon dioxide in blood
(D) Acidosis can be compensated through reduction of bicarbonate levels in plasma

Q.15 Match the proteins / molecules listed in column I with the cellular location mentioned in the column II.

	Column I		Column II
I)	Galactosyl transferase	(i)	Vesicles
II)	Cytochrome oxidase	(ii)	Cytosol
III)	Clathrin	(iii)	Golgi complex
IV)	Tubulin	(iv)	Mitochondria

(A) I-ii; II-iii; III-i; IV-iv
(B) I-iii; II-iv; III-i; IV-ii
(C) I-iii; II-iv; III-ii; IV-i
(D) I-iv; II-iii; III-ii; IV-i

Q.16 In an experiment, nucleus from a Drosophila oocyte was transplanted into the anterior part of another oocyte, at a region opposite to the existing nucleus. Which ONE of the following phenotypes will the developing egg show?

(A) A ventralized egg with no dorsal appendages
(B) A dorsalized egg with two dorsal appendages
(C) A ventralized egg with two dorsal appendages
(D) A dorsalized egg with four dorsal appendages

Q.17 Match the organisms listed in Column I with the features listed in Column II

	Column I		Column II
I)	Tapeworm	(i)	Bioluminescence
II)	Jellyfish	(ii)	Viviparous
III)	Trichinella	(iii)	Lateral heart
IV)	Earthworm	(iv)	Microvilli on the body surface

(A) I-iii; II-i; III-iv; IV-ii
(B) I-ii; II-iv; III-i; IV-iii
(C) I-iv; II-i; III-ii; IV-iii
(D) I-iv; II-iii; III-ii; IV-i

Q.18 Which ONE of the following statements is NOT part of the classical Darwinian theory of evolution by natural selection?

(A) A trait which is constantly used will get inherited by next generation.
(B) Phenotypic variations exist among the individuals of a population of a species
(C) Individuals that best fit into a given environment are more likely to survive
(D) Each population can randomly acquire a distinct and separate suite of variations.

Q.19 A population of rabbits was determined to have a birth rate of 200 and mortality rate of 50 per year. If the initial population size is 4000 individuals, after 2 years of non-interfered breeding the final population size will be _____.

Q.20 In a population which is in Hardy-Weinberg equilibrium, the frequency of occurrence of a disorder caused by recessive allele (q) is 1 in 1100. The frequency of heterozygotes in the population will be _____. (Give the answer to three decimal places).

END OF THE QUESTION PAPER

Q.No.	Type	Section	Key/Range	Marks
1	MCQ	GA	A	1
2	MCQ	GA	C	1
3	MCQ	GA	B	1
4	MCQ	GA	B	1
5	MCQ	GA	B	1
6	MCQ	GA	A	2
7	MCQ	GA	D	2
8	MCQ	GA	D	2
9	MCQ	GA	B	2
10	MCQ	GA	C	2
1	MCQ	XL-P	A	1
2	MCQ	XL-P	D	1
3	MCQ	XL-P	D	1
4	NAT	XL-P	11 to 11	1
5	NAT	XL-P	4 to 4	1
6	MCQ	XL-P	D	2
7	MCQ	XL-P	D	2
8	MCQ	XL-P	A	2
9	MCQ	XL-P	D	2
10	MCQ	XL-P	A	2
11	MCQ	XL-P	C	2
12	MCQ	XL-P	B	2
13	NAT	XL-P	1.39 to 1.43	2

Q.No.	Type	Section	Key/Range	Marks
14	NAT	XL-P	7.39 to 7.54	2
15	NAT	XL-P	-13.40 to -13.36	2
1	MCQ	XL-Q	B	1
2	MCQ	XL-Q	A	1
3	MCQ	XL-Q	C	1
4	MCQ	XL-Q	C	1
5	MCQ	XL-Q	D	1
6	MCQ	XL-Q	C	1
7	MCQ	XL-Q	D	1
8	MCQ	XL-Q	B	1
9	NAT	XL-Q	12 to 12	1
10	NAT	XL-Q	50 to 50	1
11	MCQ	XL-Q	A	2
12	MCQ	XL-Q	A	2
13	MCQ	XL-Q	D	2
14	MCQ	XL-Q	B	2
15	MCQ	XL-Q	B	2
16	NAT	XL-Q	512 to 512	2
17	NAT	XL-Q	20 to 20	2
18	NAT	XL-Q	0.8 to 0.8	2
19	NAT	XL-Q	77 to 77	2
20	NAT	XL-Q	-8862 to -8862	2
1	MCQ	XL-R	A	1

Q.No.	Type	Section	Key/Range	Marks
2	MCQ	XL-R	B	1
3	MCQ	XL-R	C	1
4	MCQ	XL-R	D	1
5	MCQ	XL-R	B	1
6	MCQ	XL-R	C	1
7	MCQ	XL-R	A	1
8	MCQ	XL-R	A	1
9	MCQ	XL-R	B	1
10	NAT	XL-R	28.00 to 31.00	1
11	MCQ	XL-R	D	2
12	MCQ	XL-R	D	2
13	MCQ	XL-R	C	2
14	MCQ	XL-R	B	2
15	MCQ	XL-R	C	2
16	MCQ	XL-R	D	2
17	MCQ	XL-R	A	2
18	MCQ	XL-R	B	2
19	NAT	XL-R	20.25 to 20.25	2
20	NAT	XL-R	11.00 to 12.00	2
1	MCQ	XL-S	B	1
2	MCQ	XL-S	A	1
3	MCQ	XL-S	A	1
4	MCQ	XL-S	D	1

Q.No.	Type	Section	Key/Range	Marks
5	MCQ	XL-S	D	1
6	MCQ	XL-S	C	1
7	MCQ	XL-S	D	1
8	MCQ	XL-S	B	1
9	MCQ	XL-S	A	1
10	NAT	XL-S	1.38 to1.42	1
11	MCQ	XL-S	C	2
12	MCQ	XL-S	C	2
13	MCQ	XL-S	A	2
14	MCQ	XL-S	D	2
15	MCQ	XL-S	B	2
16	MCQ	XL-S	A	2
17	NAT	XL-S	2.60 to 2.80	2
18	NAT	XL-S	0.5 to 0.5	2
19	NAT	XL-S	45.50 to 46.50	2
20	NAT	XL-S	30.5 to 31.5	2
1	MCQ	XL-T	C	1
2	MCQ	XL-T	B	1
3	MCQ	XL-T	A	1
4	MCQ	XL-T	D	1
5	MCQ	XL-T	C	1
6	MCQ	XL-T	D	1
7	MCQ	XL-T	B	1

Q.No.	Type	Section	Key/Range	Marks
8	MCQ	XL-T	A	1
9	MCQ	XL-T	A	1
10	MCQ	XL-T	C	1
11	MCQ	XL-T	B	2
12	MCQ	XL-T	D	2
13	MCQ	XL-T	C	2
14	MCQ	XL-T	C	2
15	MCQ	XL-T	B	2
16	MCQ	XL-T	D	2
17	MCQ	XL-T	C	2
18	MCQ	XL-T	A	2
19	NAT	XL-T	5270 to 5310	2
20	NAT	XL-T	0.056 to 0.062	2
1	MCQ	XL-U	B	1
2	MCQ	XL-U	A	1
3	MCQ	XL-U	C	1
4	MCQ	XL-U	A	1
5	MCQ	XL-U	D	1
6	MCQ	XL-U	D	1
7	NAT	XL-U	1.55 to 1.65	1
8	NAT	XL-U	103.0 to 103.2	1
9	NAT	XL-U	54 to 56	1
10	NAT	XL-U	0 to 0	1

Q.No.	Type	Section	Key/Range	Marks
11	MCQ	XL-U	B	2
12	MCQ	XL-U	C	2
13	MCQ	XL-U	C	2
14	MCQ	XL-U	A	2
15	MCQ	XL-U	D	2
16	MCQ	XL-U	A	2
17	MCQ	XL-U	B	2
18	NAT	XL-U	9.8 to 10.2	2
19	NAT	XL-U	1.1 to 1.8	2
20	NAT	XL-U	10 to 10	2