

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) <i>Trypanosoma gambiense</i>
II) Yellow fever	ii) Zika virus
III) Microcephaly	iii) <i>Rickettsia sp.</i>
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?

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| (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?

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|-------------------------------|---------------------------------------|
| (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