Meghalaya Board
Class XII
Bio-Zoology
Sample Paper 1 – Solution

GROUP A

1. Vaccine produces active immunity and colostrum produces passive immunity.

2. A tandem repeat from a single genetic locus in which the number of repeated DNA segments varies from individual to individual. It is used in DNA fingerprinting.

3. Spleen is the secondary lymphoid organ that stores lymphocytes and act as reservoir to store erythrocytes.

4. The bacterium *Propionibacterium sharmanii* is involved in the production of Swiss cheese.

5. A population shows J-shaped growth curve because it shows rapid growth, but there is a corresponding decrease in the availability of food, which is finally exhausted and causes mass starvation and mortality.

6. The act is referred to as biopiracy. Biopiracy permits the piracy of gene resources and knowledge from non-western countries.

GROUP – B

7. Absence of one X chromosome leads to 'XO' abnormality. The individuals are sterile females with rudimentary ovaries. They have shield shaped thorax, webbed neck, showpoor development of breasts, short stature, small uterus and puffy fingers.

Or

The uterine environment is not ideal for the survival of gametes. If directly transferred to the uterus, gametes will undergo degeneration or could be phagocytosed, and hence, viable zygotes would not be formed.

8. Parturition is the act of expelling the fully developed young one (foetus) from the mother's uterus at the end of gestation period. Oxytocin and relaxin hormones are involved in parturition.

9. A low level of lac operon occurs due to the absence of formation of permeases. Permeases are necessary for the transport of lactose from medium into cells. Due to the failure of transport of lactose into the cell, it will not act as inducer.

10. Cro-Magnon man had large skull, strong jaws with teeth, wisdom teeth, high forehead, broad flat face, narrow elevated nose which resembles the characteristics of modern man. They also had developed art and have left paintings and carvings in the caves.

GROUP – C

11. The phenomenon in which all organisms who reach reproductive stage reproduce with varying degree of success, some reproduce more offspring and some reproduce only few is called differential reproduction.
The phenomenon in which the individual belonging to same species reproduce among themselves to maintain the integrity of species is called reproductive isolation.
Differential reproduction and reproductive isolation are used in reference to natural selection.

12.

S-shaped curve	J-shaped curve
It comprises the lag phase, exponential phase and stationary phase.	It comprises only two phases - lag phase and exponential phase.
Population becomes stable with zero growth rate and the curve levels.	Population faces mass mortality, and the curve stops.
It is observed by most species including humans.	It is observed in few organisms such as reindeer and annual plants.

Or

A transgenic organism contains functional foreign gene experimentally introduced into their genome by genetic engineering from another species. Hence, it differs from the rest of the population in having one or more extra genes apart from the gene pool of that population.
Examples of transgenic organisms:
(i) Transgenic *E. coli* with gene for human insulin
(ii) Transgenic mice with gene for human growth hormone

13.

(a) Male heterogamety

(b) Female heterogamety

(c) Male heterogamety

GROUP - D

14.

(a) Corpus luteum secretes progesterone which is important for the maintenance of endometrium for the implantation of fertilized egg in the uterus. So, corpus luteum is important even though it is the remains of a ruptured follicle.

(b) Progesterone/estrogen can be used as birth control pills. These hormones will inhibit ovulation and thus, prevent conception.

(c) Estrogen causes proliferation of endometrium to replace the layer lost during previous menstruation. In this way, it regulates menstrual cycle.

(d) FSH stimulates ripening of follicles, maturation of ovum and secretion of estrogen. LH stimulates ovulation, development of corpus luteum and synthesis of progesterone by corpus luteum.

Or

(a) As the BOD of sewage or waste water is reduced to about 10-15%, the effluent is passed into a settling tank where the bacterial flocs undergo sedimentation. The sediment is called activated sludge.

(b) A small part of the activated sludge is pumped back into the aeration tank to serve as the inoculum. The remaining part of the activated sludge is pumped into large tanks called anaerobic sludge digesters. The aerobic microbes get killed and the anaerobic bacteria digest the organic matter as well as the aerobic bacteria and fungi in the sludge and produce a mixture of gases like methane, hydrogen sulphide and CO_2 which constitute biogas.

15. Adaptation is the quality of the organism which enables the organism to survive and reproduce in its habitat. It helps organisms to live in different types of habitats.

The adaptations of desert plants are

(i) Desert plants have a cuticle to minimise transpiration.

(ii) In some desert plants, the leaves modify into spines to minimise loss of water.

(iii) They have long roots and adaptations to reduce transpiration. Example: Acacia

The adaptations of desert animals are

(i) Urine of desert animals is concentrated for minimum loss of water. Example: Kangaroo rat

(ii) Desert animals absorb heat from the Sun when the body temperature drops below the comfort zone.

(iii)They live in burrows during the hot season and have little water requirement.

16. Five factors are known to affect Hardy- Weinberg genetic equilibrium such as genetic drift, gene flow, mutation, non-random mating and natural selection.

(i)Genetic Drift- This represents random changes in small gene pools due to sampling errors in propagation of alleles. The bottleneck effect and founder effect are prime examples of genetic drift.

(ii)Gene Flow- The movement of alleles into and out of a gene pool is called gene flow. Migration of an organism into different areas can cause the allelic frequencies of that population to increase.

(iii)Mutation-These changes in the genome of an organism are an important source of natural selection.

(iv)Nonrandom mating-Inbreeding is a popular form of nonrandom mating. Individuals will mate more frequently with close individuals than more distant ones.

(v)Natural Selection- Populations vary in the types of individuals and their reproductive success. Those individuals, who leave more offspring behind than others, pass on more of their alleles and have a better success rate in dominating the population.