

- | | |
|-----|---|
| 1. | (A)/ Biomass of fish exceeds that of phytoplankton |
| 2. | (B)/ Bacterial cell |
| 3. | (C)/ <i>Monascus purpureus</i> – Citric Acid |
| 4. | (C)/ Antihistamine |
| 5. | (C)/ 1-(iii), 2-(iv), 3-(i), 4-(ii) |
| 6. | (C)/ 30 tall and 30 dwarf |
| 7. | (C)/ it is penetrated by the sperm cell. |
| 8. | (C) /0.48 |
| 9. | (D)/Homologous structures are a result of convergent evolution. |
| 10. | (A)/ degenerates |
| 11. | (C) /anti-parallel and complementary |
| 12. | (D)/ 3' end of the coding strand. |
| 13. | (C) /Assertion (A) is true, but Reason (R) is false |
| 14. | (B)/ Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A). |
| 15. | (A)/ Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). |
| 16. | (A)/ Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). |

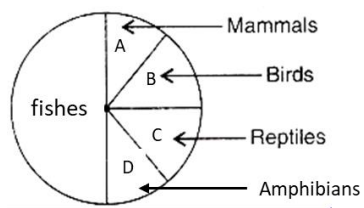
SECTION – B

- | | | | | | | | | | |
|--|--|-------------|---------------------|---|------------------------------|---------------------------------------|---|--|--|
| 17. | <table border="1"> <tr> <td>Haemophilia</td> <td>Sickle cell anaemia</td> </tr> <tr> <td>Sex linked/X- linked recessive disorder</td> <td>Autosomal recessive disorder</td> </tr> <tr> <td>More males than females are affected.</td> <td>Affects both males and females equally.</td> </tr> <tr> <td>Carrier/unaffected female transmits the disease to some of her male offspring.</td> <td>When both the parents are carriers, the disease is transmitted to the offspring.</td> </tr> </table> | Haemophilia | Sickle cell anaemia | Sex linked/X- linked recessive disorder | Autosomal recessive disorder | More males than females are affected. | Affects both males and females equally. | Carrier/unaffected female transmits the disease to some of her male offspring. | When both the parents are carriers, the disease is transmitted to the offspring. |
| Haemophilia | Sickle cell anaemia | | | | | | | | |
| Sex linked/X- linked recessive disorder | Autosomal recessive disorder | | | | | | | | |
| More males than females are affected. | Affects both males and females equally. | | | | | | | | |
| Carrier/unaffected female transmits the disease to some of her male offspring. | When both the parents are carriers, the disease is transmitted to the offspring. | | | | | | | | |
| (any two corresponding differences) | | | | | | | | | |
| 18 | <p>(A) – Heroin/smack/diacetylmorphine</p> <p>(B) – Cardiovascular system</p> <p>(C) – Cocaine/coca alkaloid/coke/crack</p> <p>(D)–Stimulates central nervous system /produces a sense of euphoria and increased energy/hallucination.</p> | | | | | | | | |

SECTION - C

22.

(a)



(b) Dodo, Quagga, Thylacine, Steller's Sea Cow, 3 subspecies (Bali, Javan, Caspian) of tiger
(or any other correct example - any two)

23.	- Predators act as conduits for energy transfer across trophic levels. for example→ Grass → Goat → Lion / Lion (Predator) transfers the energy fixed by plants and the Ecosystem. (or any other correct example) - Predators keep prey populations under control. e.g. Cactus feeding predator (moth) control the spreading of the prickly pear cactus. (or any other correct example) - Predators help in maintaining species diversity by reducing the intensity of competition among competing prey species. e.g. extinction of more than 10 species of invertebrates due to removal of starfish <i>Pisaster</i> (predator) (or any other correct example)
24.	(a) Disorder is caused due to the deletion of gene coding for adenosine deaminase. (b) Bone marrow transplantation, enzyme replacement therapy, gene therapy (any two) (c) The gene isolated from bone marrow cells producing ADA, if introduced into cells at early embryonic stage could be a permanent cure.
25.	- In vitro fertilization (IVF)-ova and sperms collected from donor induced to form zygote under simulated conditions in laboratory followed by embryo transplant, - Zygote intra fallopian transfer (ZIFT)-zygote upto 8 blastomeres transferred to fallopian tube, - Intra uterine transfer (IUT)- embryos with more than 8 blastomeres transferred uterus, - Gamete intra fallopian transfer (GIFT)- transfer of an ovum collected from donor into the fallopian tube of another female who can produce one but can provide suitable environment for further development, - Intra-cytoplasmic sperm injection (ICSI)-the sperm is directly injected into the ovum, - Artificial insemination (AI)- sperm collected from male is artificially introduced into female. (any 3 techniques with explanation)
26.	(a) (i) • Karyotype - 44 + XXY/47-XXY/AA+XXY, • Genetic disorder - Klinefelter's syndrome

(ii) Gynaecomastia/development of breast, Sterile Individuals, , overall masculine development **(any two symptoms)**

(iii) Failure of segregation of chromatids or chromosomes/non-disjunction of chromatids or chromosomes during cell division or gametogenesis.

OR

(b) DNA fingerprinting is the basis of paternity testing, high degree of polymorphism in DNA, the polymorphisms are inheritable.

//

Isolation of DNA and amplification by PCR, Digestion of DNA, Separation of DNA fragments by electrophoresis, blotting and hybridisation, detection of hybridised fragments by autoradiography, matching the DNA bands of father and child.

27.

- (a) Population size grows exponentially, compete for resources only some survive and grow and others or weaker perish, organisms with favourable variations survive and reproduce called survival of the fittest, favourable variations get accumulated over a period of time and get naturally selected so that new forms arise.
- (b) Microbes divide fast with shorter life span and, variations can be observe in larger population within short time.

28.

(a)

	Humoral immune response	Cell-Mediated immune response
(i)	Mediated by B-lymphocytes	Mediated by T- lymphocytes
(ii)	Antibodies are produced by B-lymphocytes in the blood.	T- cells do not secrete antibodies but help B-cells to produce them.
(iii)	This is not responsible for graft rejection.	This is responsible for the graft rejection.

(any two corresponding differenc

(b)

SECTION - D

29.

- (a)
- Macrophages,
 - virus replication (RNA genome)
- (b) • Enzyme-linked immuno-sorbent assay (ELISA) /Polymerase Chain Reaction (PCR)
- Treatment available – Antiviral drugs that are only partially effective as they only prolong the life of the patient.
- (c) Making blood HIV safe in blood banks, use of only disposable needles and syringes in hospitals, free distribution of condoms, controlling drug abuse, advocating safe sex, regular check-ups for HIV susceptible population. **(Any two)**

OR

(c) This is because of drastic reduction of helper T-lymphocytes that are responsible to fight infections, person become immune-deficient, unable to protect oneself from other bacterial or viral or fungal or parasitic infection.

30.

- (a) Sertoli cells in seminiferous tubule, induces release of some factors which induce spermiogenesis.

OR

(a) LH acts on Leydig cells, and stimulates the synthesis and secretion of androgens for spermatogenesis.

(b) (i) Spermatogonia $\xrightarrow{\text{mitosis/differentiation}}$ Primary Spermatocyte

(ii) Primary Spermatocyte $\xrightarrow{\text{meiosis I}}$ Secondary Spermatocyte
 $\xrightarrow{\text{meiosis II}}$ Spermatid

(c) Rete testis, vasa efferentia

SECTION - E

31.

(a) (i)

- Since Sulphur is component of protein so they used radioactive Sulphur to label protein coat of the virus
 - Since Phosphorus is the component of the DNA so they used radioactive Phosphorus to label DNA.
- (ii) (1) To remove viral coats from bacteria or *E.coli* by agitating..
(2) The viral particles were separated from bacteria or *E.coli* by spinning in a centrifuge.
- (iii) - No radioactive S^{35} detected in the cells but detected in the supernatant in case of radioactive S^{35} labelled protein capsule of bacteriophage
- Radioactive P^{32} detected in cells but not in the supernatant in case of viruses having radioactive P^{32} labelled DNA.
- (iv) DNA is the genetic material.

OR

(b) (i)

- Initiation-DNA dependent RNA polymerase attaches at 3'-end of the DNA template using sigma factor.
 - Elongation- by using nucleotide triphosphates as substrate polymerization in template dependent fashion occurs by following rule of complementarity.
 - Termination-on reaching terminator region polymerase binds with rho factor leads to separation of nascent RNA and polymerase.
- (ii) (1) one in prokaryotes
(2) three in eukaryotes

32.

(a) (i)

- DNA is a hydrophilic molecule and cannot pass through the cell membrane.
- A bacterial cell is made competent by treating the bacterial cell with a specific concentration of a divalent cation such as calcium,

which increases efficiency with which the DNA enters through pores in its cell wall/This creates certain transient pores in its cell and increases the efficiency of the cell to take up DNA.

(ii) (1) Separation of DNA fragments .

(2) DNA fragments are negatively charged molecules, they can be separated according to their size by forcing them to move toward the anode under an electric field through agarose gel.

(3) To stain the DNA to visualize by exposure to UV radiation.

OR

(b) (i) Specific Bt toxin gene *cry IAc/cry II Ab*, isolated from *Bacillus thuringiensis* bacteria and incorporated into the cotton plant to provide resistance to bollworm.

(ii) *Bacillus thuringiensis* forms toxic insecticidal protein or Bt toxin protein during a particular growth phase, Bt toxin protein exist as inactive pro-toxin, on ingestion by the bollworm inactive toxin is converted into active form due to alkaline pH of the gut, activated toxin binds to the surface of the mid-gut epithelial cells, create pores and causes cell swelling, lysis and death of the insect.

33.

(a) (i)

- Pollen tube passes down the style, generative cell divides mitotically into two male gametes and male gametes are discharged into the embryo sac through the micropyle,

-One of the male gamete + Egg/ovum $\rightarrow$ Zygote (2n)/zygote is diploid, Process is known as syngamy.

-Other male nucleus (n) + secondary nucleus (2n) $\rightarrow$ PEN/Primary Endosperm Nucleus(3n)/PEN is triploid, this is known as triple fusion,

(Ploidy of zygote and PEN)

Since two types of fusion (syngamy and triple fusion) in an embryo sac called double fertilization.

- Filiform apparatus of synergids guide entry of the pollen tube (at the micropylar end).

(ii) To provide assured nutrition to the developing embryo.

OR

(a) (i)

- Ampullary-isthmic junction/ampulla of fallopian tube ,
- A sperm comes in contact with zona pellucida (layer of ovum), the secretion of the acrosome of the sperm helps the sperm to enter into the cytoplasm of the ovum, this induces completion of meiosis II to form haploid ovum (ootid), haploid nucleus of the sperm and of the ovum fuse together to form the diploid zygote.

On contact of sperm with zona pellucida induces changes in the membrane of the ovum that blocks the entry of the additional sperms.

(ii)

- Blastocyst
- Trophoblast layer of the blastocyst gets attached to the endometrium, inner cell mass gets differentiated into an embryo, the uterine cells divide rapidly and blastocyst gets embedded in the endometrium of the uterus.