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MM : 70

**Mock Test Paper**  
**CBSE Board Exam.-2024**  
**Class-XII**  
**BIOLOGY**

Time : 180 min.

**SOLUTIONS**

**SECTION-A**

**Multiple Choice Questions**

- A1.** Answer (2) [1]  
Wheat, sugarcane and rice are monocots.
- A2.** Answer (1) [1]  
Sticky ends are also called cohesive ends.
- A3.** Answer (4) [1]  
The unequivocal proof that DNA is a genetic material came from the experiments of Alfred Hershey and Martha Chase.
- A4.** Answer (4) [1]  
Fertilisation can only occur if the ovum and sperms are transported simultaneously to the ampullary region of fallopian tube. The blastocyst becomes embedded in the endometrium of the uterus. This is called implantation and it leads to pregnancy.
- A5.** Answer (1) [1]  
*Dryopithecus* was more ape like.  
*Ramapithecus* was more man-like primate but was older than *Australopithecus*.
- A6.** Answer (2) [1]  
Marijuana is extracted from *Cannabis sativa*.
- A7.** Answer (3) [1]  
Law of dominance was proposed by Mendel on the basis of his observations. This law explains the expression of only one of the parental character in  $F_1$  generation of a monohybrid cross. This law is not universally applicable.
- A8.** Answer (2) [1]  
In amniocentesis, some of the amniotic fluid surrounding the developing foetus is taken to analyse fetal cells and dissolved substances.
- A9.** Answer (3) [1]  
Cyclosporin A, that is used as an immunosuppressive agent in organ-transplant patients, is produced by the fungus *Trichoderma polysporum*.

- A10.** Answer (3) [1]  
A relationship between fig tree and wasp is an example of mutualism.
- A11.** Answer (1) [1]  
GFC is the major conduit of energy flow in an aquatic ecosystem.
- A12.** Answer (1) [1]  
Alexander von Humboldt gave species – area relationship.
- A13.** Answer (1) [1]  
In angiosperms, endosperm is the result of triple fusion and thus the endosperm cells are triploid.
- A14.** Answer (1) [1]  
Zygote carrying XX would develop into a female baby and XY would form a male baby.  
There is an equal probability of fertilization of the ovum with the sperm carrying X-chromosome the zygote develops into a female (XX) and the fertilization of ovum with Y chromosome carrying sperm results into male offspring. Therefore, genetic makeup of the sperm determines the sex of the child.
- A15.** Answer (1) [1]  
Smoking increases carbon monoxide (CO) content in blood and reduces the concentration of haem bound oxygen. This causes oxygen deficiency in the body.
- A16.** Answer (4) [1]  
Tertiary treatment of sewage water is a physico-chemical process. It does not involve microbes. Action of aerobic microbes reduces the BOD of waste water.

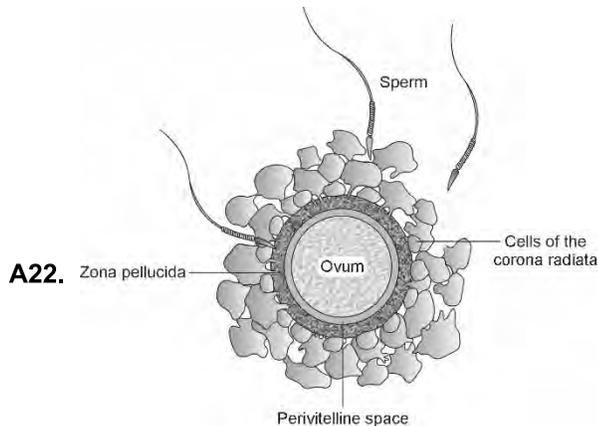
### SECTION-B

- A17.** Difference between vasa efferentia and vas deferens are:

	Vasa efferentia		Vas deferens
1.	They arise from rete testis	1.	They arise from epididymis
2.	Carry spermatozoa from rete testis to epididymis	2.	Carry spermatozoa from epididymis to ejaculatory duct

- [1]
- [1]
- A18.** Decomposers are saprophytic micro-organisms. They derive their food material from organic matter present in dead remains of plants and animals.  
They play an important role in ecosystem, such as:  
They are natural scavengers as they reduce organic remains of Earth. They replenish the soil naturally with minerals that are essential for growth of plants. Hence, they help in maintenance of ecosystem. [2]
- A19.** IUDs increase phagocytosis of sperms within the uterus and the Cu ions released from copper releasing IUDs suppress sperm motility and the fertilising capacity of sperms. The hormone releasing IUDs, in addition make the uterus unsuitable for implantation and the cervix hostile to the sperms. [1+1]
- A20.** Presence of more than two alleles for a gene is known as multiple allelism. [1]  
ABO blood grouping in human beings is controlled by the gene *I* which has three alleles  $I^A$ ,  $I^B$  and  $i/I^O$ . [1]
- A21.** DNA polymerase can polymerise nucleotides only in 5' → 3' direction. Since the two strands of DNA run in antiparallel directions, the two templates provide different ends for replication. Replication over the two templates thus proceeds in opposite directions. One strand with polarity 3' → 5', have formation of its complementary strand continuously because 3' end of the latter is always open for elongation. Replication is discontinuous on the other template with polarity 5' → 3' because only a short segment of DNA strand can be built in 5' → 3' direction due to exposure of a small stretch of template at one time. [2]

## SECTION-C



[1+1+1]

**A23.** The four major causes of biodiversity loss or the evil quartets are:

- (1) Habitat loss and fragmentation
- (2) Over-exploitation
- (3) Alien species invasions
- (4) Co-extinctions

[ $\frac{1}{2} \times 4 = 2$ ]

In last 500 years, Steller's sea cow became extinct from Russia due to over exploitation by humans. Recently illegal introduction of African catfish is posing a threat to the indigenous catfishes in our rivers. [ $\frac{1}{2} + \frac{1}{2} = 1$ ]

**A24.** (a) (i) Anticodon for tRNA charged with amino acid phenylalanine is AAA

[ $\frac{1}{2} + \frac{1}{2}$ ]

(ii) Codon for phenylalanine on mRNA is UUU

(b) (i) 1 amino acid is coded by a codon which is a triplet.

[1]

1 amino acid = 3 nucleotides

10 amino acid =  $10 \times 3 = 30$  nucleotides

(ii) Zero, because there is no tRNA for any stop codons.

[1]

**A25.** (i) Coitus interruptus or withdrawal method is a type of natural method of contraception in which the male partner withdraws his penis from the vagina just before ejaculation so as to avoid insemination. [1]

(ii) In vasectomy, a small part of the vas deferens is removed or tied up through a small incision on the scrotum whereas in tubectomy, a small part of the fallopian tube is removed or tied up through a small incision in the abdomen or through vagina. [1+1]

[1+1]

**A26.** Theory of biogenesis states that life originated from pre-existing forms. [1/2]

[1/2]

In 1953, S.L. Miller, an American scientist created similar conditions in a laboratory scale. He created electric discharge in a closed flask containing  $\text{CH}_4$ ,  $\text{H}_2$ ,  $\text{NH}_3$  and water vapour at  $800^\circ\text{C}$ . He observed formation of amino acids. In similar experiments others observed, formation of sugars, nitrogen bases, pigment and fats. Analysis of meteorite content also revealed similar compounds indicating that similar processes are occurring elsewhere in space. With this limited evidence, the first part of the conjectured story, *i.e.*, chemical evolution was more or less accepted. [2 1/2]

[2 1/2]

OR

(a) *ori* stands for origin of replication which is a specific sequence of DNA bases and is responsible for initiating replication. It is also responsible for controlling the copy number of the linked DNA. [ $\frac{1}{2} + \frac{1}{2}$ ]

[ $\frac{1}{2} + \frac{1}{2}$ ]

(b) *rop* in pBR322 codes for the proteins involved in the replication of plasmid. [1]

[1]

(c) *Hind* III site is a restriction site in pBR322. It is the site where *Hind* III endonuclease makes a cut so that a foreign DNA segment can be introduced to this vector. [ $\frac{1}{2} + \frac{1}{2}$ ]

[ $\frac{1}{2} + \frac{1}{2}$ ]

**A27.** Transgenic animals are used to study contribution of genes in the development of a disease by serving as models for human disease, such as cancer, cystic fibrosis, rheumatoid arthritis and Alzheimer's disease.

Transgenic animals are being developed for use in testing the safety of vaccines before they are used on humans. They are made to carry genes which make them more sensitive to toxic substances than non-transgenic animals. [2+1]

[2+1]

- A28.** (a) The pollen grain represents male gametophyte in flowering plants. [1]
- (b) The period for which pollen grains can retain the ability to germinate upon landing on the stigma is called pollen viability. [1]
- (c) In cereals, pollen lose viability within 30 minutes of their release. In some members of family-Rosaceae maintain pollen viability for several months. [ $\frac{1}{2} \times 2 = 1$ ]

### SECTION-D

- A29.** Given features are found in person inflicted with Klinefelter syndrome. Thus
- (a) A is suffering from Klinefelter's syndrome
- (b) Genotype of 'A' will be = 44 + XXY
- (c) 'A' cannot have either normal or affected children as Klinefelter male are sterile and lack functional gonads as well as gametes. Hence, the statement is false.
- (d) Down's syndrome and Turner's syndrome are chromosomal disorder. [1 × 4]

#### OR

- (a) The process shown in figure-II occurs when lactose is provided in the growth medium of the bacterium. [1]
- (b) 'A' is repressor mRNA which is responsible for the synthesis of repressor protein.  
'B' is inducer that inactivates the repressor. [1]
- (c) C –  $\beta$ -galactosidase – Responsible for the hydrolysis of lactose into glucose and galactose [1]  
D – Permease – Increase permeability of the cell to  $\beta$ -galactosides [1]
- A30.** (a) Filariasis or elephantiasis [1]
- (b) Female *Culex* mosquito is the vector and it belongs to the phylum Arthropoda. [1]
- (c) Chronic inflammation of lymphatic vessels. [1]  
Swelling of the legs, scrotum and other parts of the body. [1]

#### OR

- (i) Reverse transcriptase [1]
- (ii) Transmission of HIV infection generally occurs by [1]
- (a) Sexual contact with infected person.
- (b) By transfusion of contaminated blood and blood products.
- (c) By sharing infected needles as in the case of intravenous drugs abusers.
- (d) From infected mother to her child through placenta.
- (iii) Due to decrease in the number of helper T-lymphocytes, the person suffers from several infections [1]
- (iv) Enzyme linked Immuno-Sorbent Assay (ELISA) [1]

### SECTION-E

- A31.** When a host is exposed to antigens, which may be in the form of living or dead microbes or other proteins, antibodies are produced in the host body. This type of immunity is called active immunity. Active immunity is slow and takes time to give its full effective response. Injecting the microbes deliberately during immunisation or infectious organisms gaining access into body during natural infection induce active immunity. When ready-made antibodies are directly given to protect the body against foreign agents, it is called passive immunity. The yellowish fluid colostrum secreted by mother during the initial days of lactation has abundant antibodies (IgA) to protect the infant. The foetus also receives some antibodies from their mother, through the placenta during pregnancy. These are some examples of passive immunity. [5]

OR

(a)

[1 × 3]

	Parasitism	Predation
(i)	The species that gets named is host and the one that get benefitted is parasite	The species that gets harmed is prey and the one that gets benefitted is predator
(ii)	Parasite take nutrition by host without killing	Predation take nutrition by killing the prey
(iii)	Requires specific cost to complete its life cycle	Does not require the specific prey to complete true life cycle.

(b) Importance of predation in ecological context.

[½ × 2 = 1]

- Predation is important in ecosystem to transfer the energy across trophic levels.
- Keep prey population under control.
- Maintain species diversity in a community.
- Act as conduct of energy transfer.

There are different type of parasitism which are as follows:

[½ × 2 = 1]

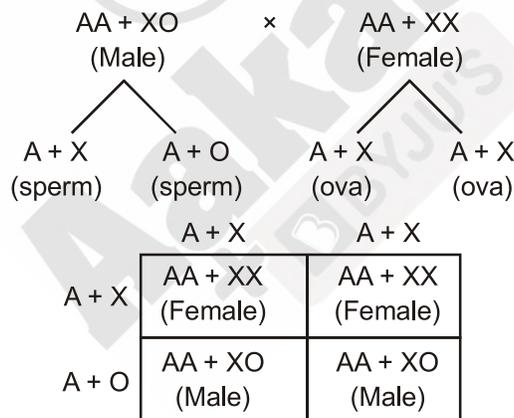
- (1) Ectoparasitism
- (2) Endoparasitism
- (3) Brood parasitism

(Any Two)

A32. (a) The term 'X body' was given by Henking.

He traced a specific nuclear structure all through spermatogenesis in a few insects. He observed that only 50% of the sperm received this structure which was termed 'X body' by him. [2]

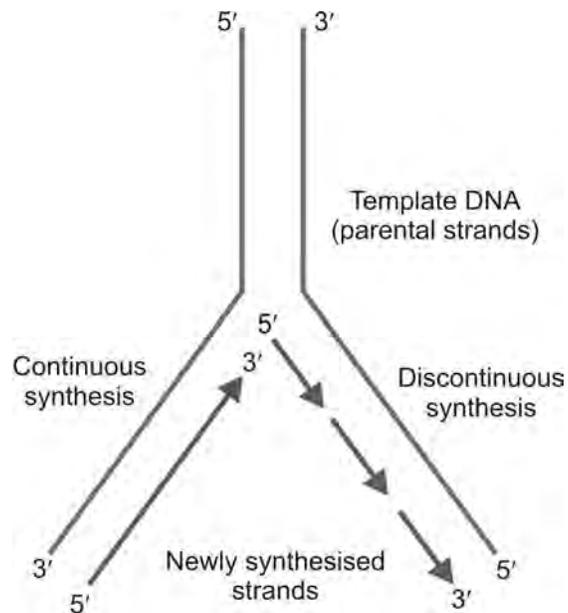
(b) In grasshoppers, XX – XO type of sex determination is observed. Number of chromosomes are different in male and female individuals.



All eggs (ova) bear an additional X-chromosome besides the autosomes while only 50% of the sperms bear X-chromosomes. In grasshopper, eggs fertilised by (A + X) type sperm become females while those fertilised by (A + O) type sperm become males. Therefore, sperm determines the sex of the offspring. Due to the involvement of the X-chromosome in sex determination, it was designated to be the sex chromosome. [3]

OR

For long DNA molecules, since the two strands of DNA cannot be separated in its entire length (due to very high energy requirement), the replication occur within a small opening of the DNA helix, referred to as replication fork. The DNA-dependent DNA polymerases catalyse polymerisation only in one direction, that is 5' → 3'. This creates some additional complications at the replicating fork. Consequently, on one strand (the template with polarity 5' → 3'), the replication is continuous, while on the other (the template with polarity 5' → 3'), it is discontinuous. The discontinuously synthesised fragments are later joined by the enzyme DNA ligase. The DNA polymerases on their own cannot initiate the process of replication. Also the replication does not initiate randomly at any place in DNA. There is a definite region in *E. coli* DNA where the replication originates. Such regions are termed as origin of replication. [3 + 2]



**A33.** Events during menstrual cycle and parturition.

- (i) Menstrual cycle is completed in 3 phases [½]
- Menstruation phase
  - Follicular phase
  - Luteal phase
- (a) **Menstruation phase:** Cycle starts with menstruation due to decrease in level of hormone progesterone. [½]
- (b) **Follicular phase:** Endometrium of uterus grows in size. Graafian follicle develops under effect of hormone FSH and ovulation occurs in mid-cycle due to LH surge. [½]
- (c) **Luteal phase:** Ruptured Graafian follicle is converted into corpus luteum under the effect of hormone LH. [½]
- (ii) Corpus luteum secretes large amounts of progesterone hormone that is essential for the maintenance of the endometrium required for implantation of blastocyst leading to pregnancy. [1]
- (iii) Placenta produces several hormones such as hCG, hPL and relaxin. Relaxin is produced during later phase of pregnancy. Levels of other hormones like estrogen, cortisol, prolactin, progesterone and thyroxine also increase which is essential for supporting foetal growth, metabolic changes in mother and maintenance of pregnancy. [1]
- (iv) Parturition signal originate from fully developed foetus and the placenta that induce mild uterine contractions which triggers release of oxytocin from maternal pituitary. Oxytocin acts on the uterine muscle causing stronger uterine contractions to induce labour pain and expulsion of foetus called parturition. [1]

**OR**

- (i) DNA fragments are negatively charged molecules that can be separated by forcing them to move towards the anode under an electric field through a matrix. The DNA fragment separate according to their size through sieving effect provided by the agarose gel.  
Hence, the smaller the fragment size, the farther it moves. [2]
- (ii) Agarose is a natural polymer extracted from sea weeds. [½+½]
- (iii) Cathode (a) → (b) → (c) Anode [1]
- (iv) The separated band of DNA are cut out from gel piece. This step is known as elution. [1]

