

1	(B)/ Divergent Evolution
2.	(C) /0.48
3.	(C) /anti-parallel and complementary
4.	(D)/ 3' end of the coding strand.
5.	(D) / $\square=\bigcirc$
6.	(A) /Female <i>Aedes</i> mosquito
7.	(C)/ <i>Monascus purpureus</i> – Citric Acid
8.	(A) /Restriction endonuclease
9.	(A)/ Biomass of fish exceeds that of phytoplankton
10.	(C)/ it is penetrated by the sperm cell.
11.	(C)/ 1-(iii), 2-(iv), 3-(i), 4-(ii)
12.	(A)/ Embryo sac.
13.	(B)/ Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
14.	(A)/ Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
15.	(C) /Assertion (A) is true, but Reason (R) is false
16.	(A)/ Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

SECTION – B

17.	• Detritus rich in lignin and chitin– slow decomposition, rich in nitrogen and water soluble substances like sugar - decomposition rate is faster, • Warm environment – favour decomposition, low temperature – inhibit decomposition.
18	In EcoRI First letter 'E' comes from the genus, the second two 'co' letters from the species, letter 'R' – is derived from the name of strain, Roman number 'I' - indicates the order in which the enzyme is isolated.
19.	(a) Copper releasing IUDS – CuT, Cu-7, Multiload – 375 (Any two) Cu^+ released from IUDs suppress sperm motility, reduces fertilising capacity of sperms, increase phagocytosis of sperms (Any two)

OR

SECTION - C

22.

- 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.

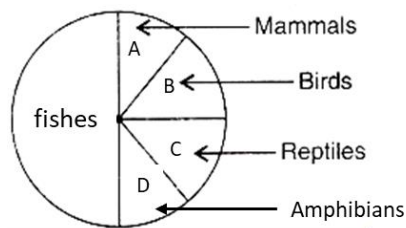
e.g. Cactus feeding predator (moth) control the spreading of the prickly pear cactus. **(or any other correct example)**

- 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 *Pisaster* (predator) **(or any other correct example)**

23.

(a)



(b) Dodo, Quagga, Thylacine, Steller's Sea Cow, 3 subspecies (Bali, Javan, Caspian) of tiger

(or any other correct example - any two)

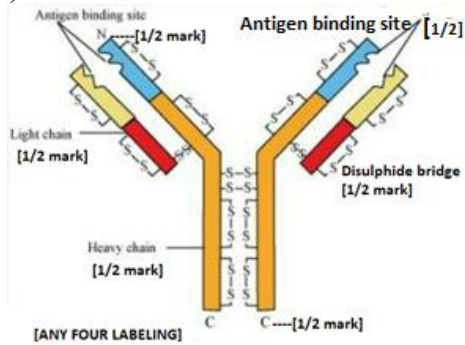
24.

(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 differences)

(b)

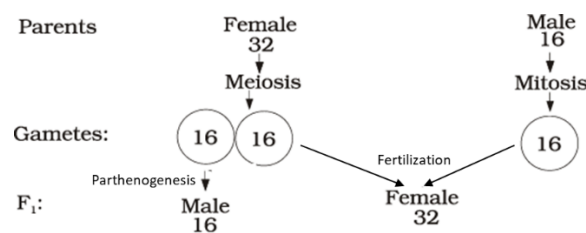


(any correct four labels)

25.

Honey bee shows mechanism of haplo-diploid pattern of sex-determination, female (queen or worker) develops from fertilized egg, so are diploid, males (drones) develop from unfertilized egg by parthenogenesis, so are haploid, Females are diploid having 32 chromosomes and the males are haploid having 16 chromosomes this is haplo-diploid sex determination

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OR

In a dihybrid cross the F₂ phenotypic ratio deviated very significantly from 9:3:3:1, the proportion of the parental gene combination was much higher than the non-parental type, the parental combinations were due to linkage of genes (physical association) and the non-parental types were due to distant genes (recombination/ crossing over)

(Explanation of the same if provided through cross should be considered)

26.

- Human blood group inheritance is regulated by the gene 'I' which is present in more than two allelic forms – I^A , I^B , i /Hence human blood group inheritance is controlled by more than two alleles that is called multiple allelism.

- When I^A and I^B are present together in blood group AB they both express their own types of sugars, because both the dominant alleles hence show co-dominance.

27.

(a)

- IVF – Fertilisation outside the human body in almost similar conditions as that of the body.

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 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.

SECTION - E

31.

(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.
32.	(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.
33.	(a) Law of independent assortment : It states that when two pairs of traits are combined in a hybrid segregation of one pair of characters is independent of the other pair of characters Parents phenotype - Axial violet flower X Axial violet flower Parents Genotype - AaVv X AaVv

♀ \ ♂	AV	Av	aV	av
AV	AAVV Axial Violet	AAVv Axial Violet	AaVV Axial Violet	AaVv Axial Violet
Av	AAVv Axial Violet	AAvv Axial white	AaVv Axial Violet	Aavv Axial White
aV	AaVV Axial Violet	AaVv Axial Violet	aaVV Terminal Violet	aaVv Terminal Violet
av	AaVv Axial Violet	Aavv Axial White	aaVv Terminal Violet	aaVV Terminal White

(Gametes and punnet square)

Axial violet – 9

Axial white – 3

Terminal violet – 3

Terminal white – 1

(Ratio and phenotypes)

Non-parental recombination in the F₂ progeny shows independent assortment of characters.

OR

- Griffith selected ‘S’ strain and ‘R’ strain bacteria *Streptococcus pneumoniae*, ‘S’ strain – Virulent causes pneumonia, ‘R’ strain – Non-virulent does not cause pneumonia

‘S’ strain $\xrightarrow{\text{Inject into mice}}$ mice die

‘R’ strain $\xrightarrow{\text{Inject into mice}}$ mice live.

‘S’ strain (heat-killed) $\xrightarrow{\text{Inject into mice}}$ → mice live

Heat killed ‘S’ strain + ‘R’ strain (live) $\xrightarrow{\text{Inject into mice}}$ → mice die.

Griffith concluded that the ‘R’ strain bacteria had somehow been transformed by the heat killed ‘S’ strain bacteria.

- They purified biochemicals (Proteins, DNA, RNA etc.) from the heat killed ‘S’ cells and the fractions were added individually to the culture of the live ‘R’ cells,



DNA was able to cause transformation of 'R' cells into 'S' cells/they found that protein digesting enzyme or RNA digesting enzymes did not affect transformation or digestion with DNase did inhibit transformation indicating that the transforming substance is not a protein or RNA,
This suggests that the DNA is the "genetic material".