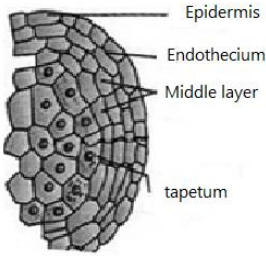


	- Hormonal regulation: Acts as an endocrine gland and produces hCG /Human Chorionic Gonadotropin, hPL / Human Placental Lactogen, estrogen, progestogens. (Any two hormones) OR (b) (i) Fertilisation can only occur if the ovum and sperms are transported simultaneously to the ampullary region / use of contraceptive devices / low sperm count or poor sperm quality / absence of ovulation / lactational amenorrhea / coitus interruptus / periodic abstinence (Any other correct reason) (ii) <table><tr><td>Meiosis I in Spermatogenesis</td><td>Meiosis I in Oogenesis</td></tr><tr><td>Starts at puberty</td><td>Starts during embryonic stage</td></tr><tr><td>Results in production of two equal haploid secondary spermatocyte</td><td>Results in production of unequal haploid secondary oocyte and first polar body</td></tr></table> (Any One correct difference)	Meiosis I in Spermatogenesis	Meiosis I in Oogenesis	Starts at puberty	Starts during embryonic stage	Results in production of two equal haploid secondary spermatocyte	Results in production of unequal haploid secondary oocyte and first polar body	$\frac{1}{2}+\frac{1}{2}$ 1 1	2
Meiosis I in Spermatogenesis	Meiosis I in Oogenesis								
Starts at puberty	Starts during embryonic stage								
Results in production of two equal haploid secondary spermatocyte	Results in production of unequal haploid secondary oocyte and first polar body								
18.	(a) Using recombinant DNA technology a company Eli Lily, prepared human insulin in <i>E.coli</i> bacteria, in large quantity / By recombinant DNA technology a company Eli Lily prepared two DNA sequences corresponding to A and B chains of human insulin, introduced them in plasmids of <i>E.coli</i>, A and B chains produced separately are extracted and combined by creating disulfide bonds. (b) Animal derived insulin may cause allergy or any other types of reactions whereas insulin produced by r DNA technology does not / Insulin produced by rDNA technology is produced in large quantity in comparison to animal derived insulin	$1\frac{1}{2}$ $\frac{1}{2}$	2						
19.	(a) A- Mycorrhiza, B- Free living nitrogen fixing bacteria, C- Symbiotic nitrogen fixing bacteria. (b) <i>Azotobacter</i> (Any other correct example)	$\frac{1}{2} \times 3$ $\frac{1}{2}$	2						

20.	(a) (i) Commensalism , Egret is benefitted and cattle neither benefitted nor harmed / as the cattle move they stir up and flush out insects from vegetation which might be difficult for egrets to find and catch. (ii) Brood Parasitism, The Cuckoo lays its eggs in the nest of the crow as the eggs resemble the eggs of crow the crow (host) incubates the eggs. OR (b) - Genetic level: A single species might show high diversity at the genetic level over its distributional range like Medicinal plant <i>Rauwolfia vomitoria</i> shows genetic diversity in terms of potency of concentration of active chemical reserpine / India has more than 50,000 genetically different strains of rice / India has more than 1000 varieties of mango. - Ecological level: At ecosystem level India has deserts /rain forests / mangroves / coral reefs / wetlands /estuaries / Alpine meadows that shows a greater ecosystem diversity than Scandinavian countries like Norway	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ 1 1	2
21.	(a) (i) Substitution of Glutamic acid by Valine at the sixth position of beta globin chain of haemoglobin molecule / Polymerisation of haemoglobin molecule under low oxygen tension (ii) - Sickle cell anaemia - Change in shape of the RBC from biconcave to elongated sickle like structure / Oxygen carrying capacity of haemoglobin reduces. OR (b) - DNA is double stranded and the two strands being complimentary make it more stable than RNA - The presence of thymine at the place of uracil confers additional stability to DNA. - 2'-OH group in RNA is reactive group and makes it labile and easily degradable therefore DNA chemically is less reactive - DNA being more stable mutate at slower rate than RNA (Any Two)	1 $\frac{1}{2}$ $\frac{1}{2}$ 1+1	2
	SECTION C		
22.	(a) Due to immune response shown by the body / due to ability of the body to fight against foreign agents (pathogens) (b) Physical barrier, Skin on our body prevents entry of pathogens / Mucus coating (of respiratory, gastrointestinal, urinogenital tract) help in trapping microbes entering our body. - Physiological barrier, Acid from stomach / saliva in the mouth / tears from eyes – all prevent microbial growth. - Cellular barrier, Neutrophils and monocytes in the blood as well as macrophages in tissues can phagocytose and destroy microbes. Cytokine barrier, Virus infected cell secrete proteins interferons that protect non-infected cells from further viral infection (Any Two)	1 $\frac{1}{2} \times 4$	3

23.	(a) Genetic Code: It is the sequence of three nitrogenous bases (codon) on mRNA that directs the sequence of amino acids during synthesis of proteins. (b) To provide complementarity between nucleotides and amino acids / to support the notion that change in nucleic acids was responsible for change in amino acids in proteins / to establish the correlation between genetic information and protein synthesis / to constitute a combination of four bases to code twenty amino acids. (c) As a codon from bacteria to human code for the same amino acid.	1 1 1	3								
24.	(a) Propagation of large number of plants in short duration, new plants are genetically identical to the original plants from which they have grown, production of disease free plants. (Any two) (b) Tomato, Banana, Apple (Any other two correct examples)	1+1 $\frac{1}{2}+\frac{1}{2}$	3								
25.	(a) <i>Drosophila melanogaster</i> (b) - They could be grown on simple synthetic medium in the laboratory. - Complete their life cycle in about two weeks. - Single mating produces large number of progeny flies. - Clear differentiation of sexes – male and female flies are easily distinguishable. Has many types of hereditary variations that can be seen under low power microscopes. / (Any other correct reason) (Any four)	1 $\frac{1}{2} \times 4$	3								
26.	(a) <table><tr><th>Homologous organs</th><th>Analogous organs</th></tr><tr><td>Organs having the same basic anatomical structure but modified to perform different functions.</td><td>Organs not similar in structure but perform similar function.</td></tr><tr><td>Have common ancestry</td><td>Do not have common ancestry</td></tr><tr><td>Show divergent Evolution</td><td>Show Convergent Evolution</td></tr></table> (Any one difference) (b) • Homologous Organs show divergent Evolution, Analogous organs show Convergent Evolution. • Homologous Organs – Plants example - Thorns and tendrils of Bougainvillea and Cucurbita Animals example- pattern of bones of forelimbs of Whales, bats, Cheetah and humans/ vertebrate hearts/ vertebrate brains. Analogous Organs – Plants example – Sweet potato (root modification) and Potato (Stem modification) Animals example- wings of butterfly and birds / eye of Octopus and mammals / flippers of Penguin and Dolphin. (Any other related example)	Homologous organs	Analogous organs	Organs having the same basic anatomical structure but modified to perform different functions.	Organs not similar in structure but perform similar function.	Have common ancestry	Do not have common ancestry	Show divergent Evolution	Show Convergent Evolution	1 $\frac{1}{2}+\frac{1}{2}$ $\frac{1}{2}+\frac{1}{2}$	3
Homologous organs	Analogous organs										
Organs having the same basic anatomical structure but modified to perform different functions.	Organs not similar in structure but perform similar function.										
Have common ancestry	Do not have common ancestry										
Show divergent Evolution	Show Convergent Evolution										
27.	-										

	 (Award ½ marks for each correct labelling) - Outermost layer: Epidermis helps in protection / in dehiscence of anther to release the pollens. - Innermost layer: Tapetum provides nourishment to the developing pollen grains	$\frac{1}{2} \times 4$ $\frac{1}{2}$ $\frac{1}{2}$	3
28.	(a) - Amniocentesis - Some of the amniotic fluid of the developing foetus is taken to analyse the fetal cells and dissolved substances. - Advantage: It tests the presence of certain genetic disorders / down syndrome / haemophilia / sickle cell anaemia / determine the survivability of the foetus - Disadvantage: to determine the sex of unborn child and if found female may lead to female foeticide. (b) Saheli is different from other pills in term of: - Composition: It is non-steroidal. - Advantage: Once a week pill / low side effects / high contraceptive value	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3
SECTION D			
29.	(a) Genetic Engineering / Recombinant DNA Technology (b) • Plasmid is an autonomously replicating circular extra chromosomal DNA. • It is used as a vector to transfer foreign genes into host cells. (c) Antibiotic resistant gene, <i>Salmonella typhimurium</i> OR (c) - Exonuclease: Remove the nucleotides from the ends of DNA strand. - Endonuclease: Make cuts at specific positions within DNA strand.	1 1 1 $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	4
30.	(a) Water, Soil, sunlight, temperature, organic substances, inorganic substances (Any two) (b)	$\frac{1}{2} + \frac{1}{2}$	

	<table><tr><th>Role of producers</th><th>Role of decomposers</th></tr><tr><td>Conversion of inorganic molecules into organic material with the help of sunlight through the process of photosynthesis</td><td>Break down of dead and decayed organic material into simpler inorganic substances through the process of decomposition</td></tr></table> (c) Food Chain : Phytoplanktons → zooplanktons → Fish Trophic Levels : producers/ 1st trophic level Primary consumer/ 2nd trophic level Secondary consumer/ 3rd trophic level OR (c) Some energy is dissipated and lost as heat to the environment / only 10% of energy being transferred to the next trophic level.	Role of producers	Role of decomposers	Conversion of inorganic molecules into organic material with the help of sunlight through the process of photosynthesis	Break down of dead and decayed organic material into simpler inorganic substances through the process of decomposition	2	
Role of producers	Role of decomposers						
Conversion of inorganic molecules into organic material with the help of sunlight through the process of photosynthesis	Break down of dead and decayed organic material into simpler inorganic substances through the process of decomposition						
		1					
		1	4				
	SECTION E						
31.	(a) (i) (1) A- Morula, B- Blastocyst, C-Inner Cell Mass, D-Trophoblast (2) Inner cell mass get differentiated into an embryo. (3) Stem cells, they have the potency to give rise to all tissues and organs. (ii) It acts on uterine muscles and causes strong uterine contractions, Oxytocin is released from maternal Pituitary. OR (i) - Avoid sex with unknown partners / multiple partners. - Use condoms during coitus. - In case of doubt, one should go to a qualified doctor for early detection and get complete treatment if diagnosed with infection (ii) - Discourage children from believing in myths and having misconception about sex related problems. - Proper information of reproductive organs. - Safe and hygienic sexual practices - Proper information of sexually transmitted diseases/STDs	½ x4 1 ½+½ ½+½ 1x3 ½ x4'					

	- Information about AIDS would help those in adolescent age group to lead a reproductively healthy life. (or any other correct point) (Any Four)		5
32.	(a) (i) • Disease : Acquired Immuno Deficiency Syndrome /AIDS • Causative Agent : Human Immuno deficiency Virus / HIV (ii) - After getting the entry into the body of the person virus enters macrophages - RNA genome of the virus replicates to form viral DNA with the help of enzyme reverse transcriptase - The viral DNA gets incorporated into the host cell's DNA and directs the infected cells to produce virus particles. - Simultaneously HIV enters into helper T-lymphocytes (T_H) and produce progeny viruses which attack other T-lymphocytes leading to weakened immune system. // The diagram illustrates the life cycle of a retrovirus within a macrophage. It starts with a retrovirus (consisting of a viral RNA core and a viral protein coat) entering the macrophage. The viral RNA is introduced into the cytoplasm. Reverse transcriptase enzyme is used to produce viral DNA. This viral DNA then incorporates into the host genome within the nucleus. New viral RNA is produced by the infected cell, and new viruses are produced and released to infect other cells. The diagram is divided into sections for the macrophage, animal cell, and cytoplasm, with labels for the plasma membrane, nucleus, and DNA. (iii) - By Sexual contact with infected person. - Transfusion of contaminated blood and blood products. - Sharing of infected needles by intravenous drug abusers. - Infected mother to her child through placenta. (Any Two) OR (b) (i) They reduce our dependence on toxic chemicals and pesticides / They create a system where insects called pests are not eradicated but kept at manageable level by complex system of checks and balances / No negative impact on plants mammals birds fish or non – target insects (Any other correct reason)	1+1 $\frac{1}{2} \times 4$ $\frac{1}{2} + \frac{1}{2}$ 1	

F₁ generation — Rr
(All with red coat)

↓
Rr X Rr
R r

F ₂ generation	R	RR Red coat	Rr Red coat
	r	Rr Red coat	rr White coat

F₂ phenotypic ratio: 3 Red Coat : 1 White Coat

(2) Red is incompletely dominant

Gametes RR (Red coat) X rr (White coat)
 ↓ ↓ ↓ ↓
 R R r r

F₁ generation — Rr
(All with Pink coat)
 ↓
 Rr X Rr

	R	r
R	RR Red coat	Rr Pink coat
r	Rr Pink coat	rr White coat

F₂ phenotypic ratio: 1 Red : 2 Pink : 1 White

1/2

1/2

1/2

1/2

1/2

1/2

1/2

5

