XII HSC - BOARD - MARCH- 2017

Date: 10.03.2017

BIOLOGY (56) - SOLUTIONS

SECTION - I

Q. 1

(i) (b)

Correct answer 1M

Refer HSC - GTB - Page No. 13

Topic: Genetic basis of inheritance ; Sub-topic: multiple alleles _ L-2__ _Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

(ii) (a)

Correct answer 1M

Refer HSC - GTB - Page No. 110

Topic:Organism & Environment-I ; Sub-topic:Decomposition _ L-2___Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

(iii) (b)

Correct answer 1M

Refer HSC - GTB - Page No. 49

Topic:_Enhancenment in food production_ ; Sub-topic:_Plant Breeding for disease resistance _ L-2__ _Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

(iv) (d)

Correct answer 1M

Refer HSC - GTB - Page No. 57

Topic:_Microbes in human wekfare_ ; Sub-topic:_Antibiotic production _ L-2__ _Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

(v) (c)

Correct answer 1M

Refer HSC - GTB - Page No. 39

Topic:_Biotechnology ; Process & application_ ; Sub-topic:Restriction endonuclease_L-2__Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

(vi) (c)

Correct answer 1M

Refer HSC - GTB - Page No. 87

Topic:_Respiration_ ; Sub-topic:Respiratory Quotient_ L-2_Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

(vii) (c)

Correct answer 1M

Refer HSC - GTB - Page No. 116

Topic:Organism & Environment-I ; Sub-topic:_Environmental issues_ L-2__ _Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

Q.2 (A)

(i) The Taq polymerase is an example of the source of thermostable enzyme DNA polymerase.

Correct answer 1M

Topic:Biotechnology process & Applications ; Sub-topic: PCR_ L- 1_Target-2017_XII-HSC Board (56) Exam_Biology_JNb madam

(ii) Toad stool is the example of the non – edible or poisonous mushroom.

Correct answer 1M

Topic:_Microbes in human welfare_ ; Sub-topic:_Microbes in household production _ L-1__ _Target-2017_XII-HSC Board (56) Exam_Biology_JNb madam

(iii) Vincristin & Vinblastin are the secondary metabolites in *Catharanthus roseus*.

2 Correct secondary metabolites 1M

Topic:_Biotechnology ; Process & application_ ; Sub-topic:Secondary metabolises L-2__Target-2017_XII-HSC Board (56) Exam_Biology_JNb madam

(iv) Ecological succession. The gradual & predictable change in the species composition of a given area is called ecological succession.

Correct answer 1M

Topic:Organism & Environment - I ; Sub-topic:_Ecological succession_ L-1_Target-2017_XII-HSC Board (56) Exam_Biology_JNb madam

(v) Saccharomyces cerevisiae is the organism which produces invertase enzyme which bring about alcoholic fermentation of sucrose.

Organism name 1/2 mark

enzyme - 1/2 mark.

Topic:_Microbes in human wekfare_ ; Sub-topic:_Fermentation _ L-1_Target-2017_XII-HSC Board (56) Exam_Biology_JNb madam

(vi) Floral adaptations in *Salvia* are as follows : (Lever Mechanism)

(1) Pollination in *Salvia* is entomophilous.

(2) The flower in *Salvia* is bisexual & protandrous.

(3) There are two stamens in the flower having long bifurcated connective.

(4) The upper branch of the connective bears a fertile anther lobe while the lower branch of the connective bears a sterile anther lobe.

(5) When an insect enters the *Salvia* flower, it pushes the lower sterile lobe owing to which the upper fertile lobe bends & strikes the back of the insect & dust its pollen grains.

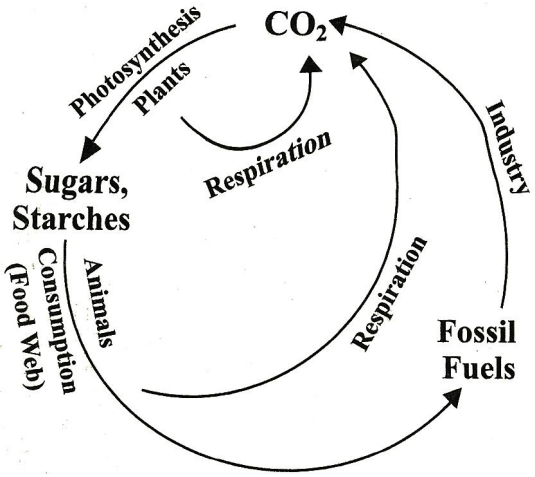
(6) When the same insect visits another flower, the pollen grains are picked up by the receptive stigma & the pollination is effected.

(Any 2 correct floral adaptations 1/2 mark each)

Topic:Organism & Environment ; Sub-topic:_Pollination_ L-1_Target-2017_XII-HSC Board (56) Exam_Biology_JNb madam

Q.2 (B)

Carbon cycle



Topic:Organism & Environment-I ; Sub-topic:_Nutrient cycles in ecosystems_ L-2_Target-2017_XII-HSC Board (56) Exam_Biology_TKb sir

Q.2 (C)

(i) The cross between F_1 hybrid and the recessive parent is called test cross.

Significance of test cross:

(i) It helps to determine whether individuals exhibiting dominant character are genotypically homozygous or heterozygous.

(ii) Purity of the parents can be determined.

(iii) It can determine the genotype of the individual.

(iv) It has wide application in plant breeding experiments.

Definition 1 Mark

Any 1 correct significance 1 Mark

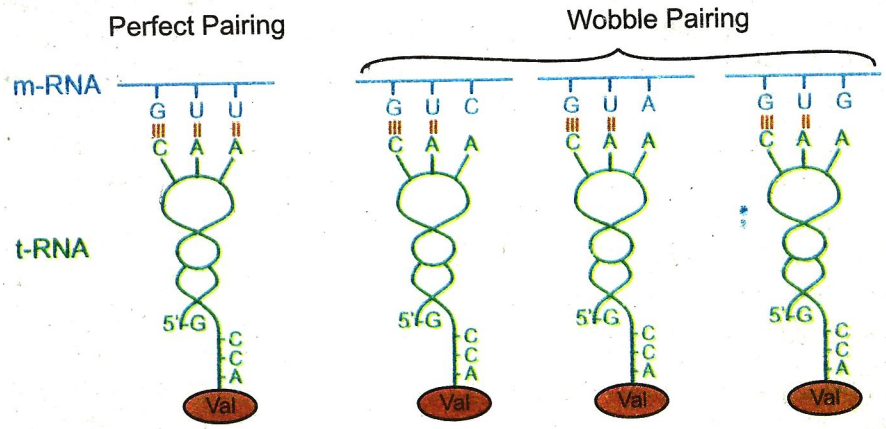
GTB - XII - P.No. 10,11

Topic_Genetic Basis of Inheritance_Subtopic_Test cross_L1

(ii) Wobble hypothesis

(1) This hypothesis suggests that, in codon-anticodon pairing, the third base may not be complementary. The third base of the codon is called wobble base and this position is called wobble position.

(2) The actual base pairing occurs at first two positions only.



In the above example through the codon & anticodon do not match perfectly then also the required amino acid is brought perfectly. This enables the economy of tRNA. GUU, GUC, GUA & GUG – codons. CCA – anticodon for all 4 codons.

Diagram 1M
Correct explanation - 1M

Topic: Genes : Its nature & expression ; Sub-topic:Genetic code L-3 _Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

(iii) Biopatent - A biopatent is a patent granted by the government to the inventor for biological entities, processes & products.

Basmati rice, known for its unique aroma and falvour has been grown in India for centuries. There are about 27 documented varieties of **Basmati** grown in **India**. A texas based company got patent rights on Basmati rice through the US patent and Trademark office. This allowed the company to sell a new of Basmati – **Texmati**, in the US and aborad. Actually this new variety is derived by crossing Indian Basmati with semi dwarf variety and claimed as an invention or a new variety. Thus, it is a case of bio - piracy and unfair bio-patenting.

Correct defenition - 1M
Correct example - 1M

Topic:Biotechnology: Process & Applications ; Sub-topic: Bio safety issues L- 3_Target-2017_XII-HSC Board (56) Exam_Biology_TKb sir

(iv) In given diagram,
W – Suspensor
X – Plumule
Y – Radicle
Z – Cotyledon
Each correct label 1/2 M.

Topic: Reproduction in plants ; Sub-topic: Development of embryo L- 2_Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

Q.3 (A)

(i) **Replication of bacteriophages** (lytic cycle) inside the specific host bacterial cell takes place in following steps:

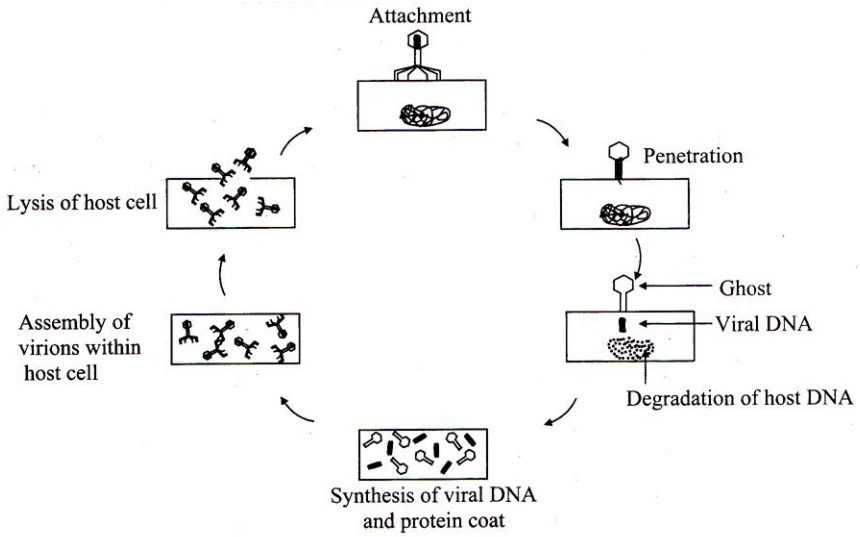
(i) **Attachment :**
Bacteriophages attach to specific receptors on the surface of bacteria. As phage do not move independently, they rely on random encounters with the right receptors.

(ii) **Penetration :**
After the contact, the tail fibres bring the base plate closer to the surface of the cell.
Once attached completely, the tail contracts, injecting material (DNA) through the bacterial membrane. (Capsid- protein coat remains outside and is called 'ghost')

(iii) **Synthesis of proteins and nucleic acid :**
The host's normal synthesis of proteins and nucleic acids is disrupted, and it is forced to manufacture viral DNA and proteins instead. These products are the parts of new virions within the cell.

(iv) **Virion assembly :**
The base plates are assembled with the tails first. The heads- capsids are constructed separately and then are joined with the tails. The DNA is packed efficiently within the heads. The whole process takes about 15 minutes.

(v) **Release of virions:**
Phages are released via lysis of cell. It is achieved by an enzyme called endolysin,which breaks down the cell wall. Released virions are capable of infecting a new bacterium.



Lytic cycle

Any Four correct steps 1/2 Mark each

Correct Diagram 1 Mark

Topic_Biotechnology:Process and Application_Subtopic:Phage lambda as vector_L2_Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

(ii) **Biofertilizers :** The biofertilizers are nitrogen fixing microbes or fungi which enrich the soil with nutrients. There are 3 major types of biofertilizers i.e. bacterial biofertilizers, cyanobacterial biofertilizers and fungal biofertilizers.

(a) Nitrogen fixing symbiotic bacterial biofertilizer - *Rhizobium* in root nodule of leguminous plants.

(b) Nitrogen fixing symbiotic cyanobacterial biofertilizers - *Anabaena azollae* in *Azolla*.

(c) Nitrogen fixing non - symbiotic cyanobacterial biofertilizers - *Nostoc, Anabaena*.

(d) Mycorhiza - Fungal biofertilizer - Ectotrophic mycorhiza and Endotrophic mycorhiza - VAM

Topic:Microbes in Human Welfare ; Sub-topic:Biofertilizers_L-2 _Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

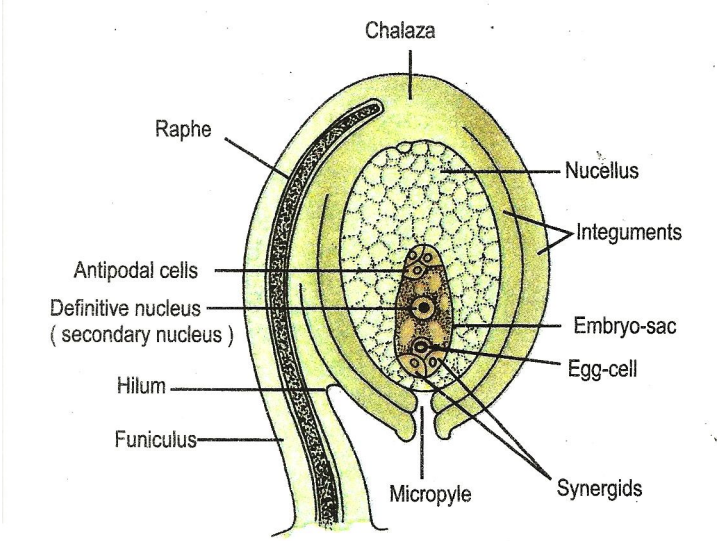
(iii)

Sr. No	Anemophily	Entomophily
1	Pollination which takes place by wind is called anemophily.	Pollination which takes place by insects, is called as entomophily.
2	Pollinating agent is abiotic (wind).	Pollinating agent is biotic (insect)
3	Flowers are non – conspicuous, colourless or white.	Flowers are conspicuous, attractive, brightly, coloured.
4	No nectar & honey are produced by flowers.	Nectar & honey are produced by flowers.
5	Pollen grains are dry, smaller in size, powdery.	Pollen grains are sticky, larger.
6	e.g. Maize	e.g. *Salvia*

Any 3 correct points of differences 1M each.

Topic: Reproduction in Plants; Sub-topic:Pollination_ L-2_Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

Q.3 (B) V.S. of mature anatropous ovule.



V.S. of mature anatropous ovule

Scientifically correct, proportionate diagram 1M
any 4 correct labels - 1/2 M each.

Topic_Reproduction in Plants_Subtopic:Ovule_L2_Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

Q.4

Photophosphorylation : The process in which energy rich ATP molecules are synthesized using solar energy is called photophosphorylation.

Non cyclic photophosphorylation involves the following steps :

Photoexcitation of PS- II :

PS- II absorb light and gets excited, which results in ionisation of chlorophyll-a and a high energy electron is emitted from PS-II.

(ii) **Electron Acceptors :**

The expelled energy rich electron is first accepted by Co-Q (co- enzyme quinone).
Electron from Co-Q moves down through various electron carriers and releases energy.
From Co-Q, electrons are transferred to plastoquinone (PQ) (it is an iron containing protein).
From PQ, electrons are transferred to cytochrome complex (cytochrome -b and cytochrome -f).
From cytochrome complex, the electrons are finally accepted by chlorophyll of PS-I.

(iii) **Synthesis of ATP :**

One ATP is synthesized when electron passes from cytochrome b_6 to cytochrome f.

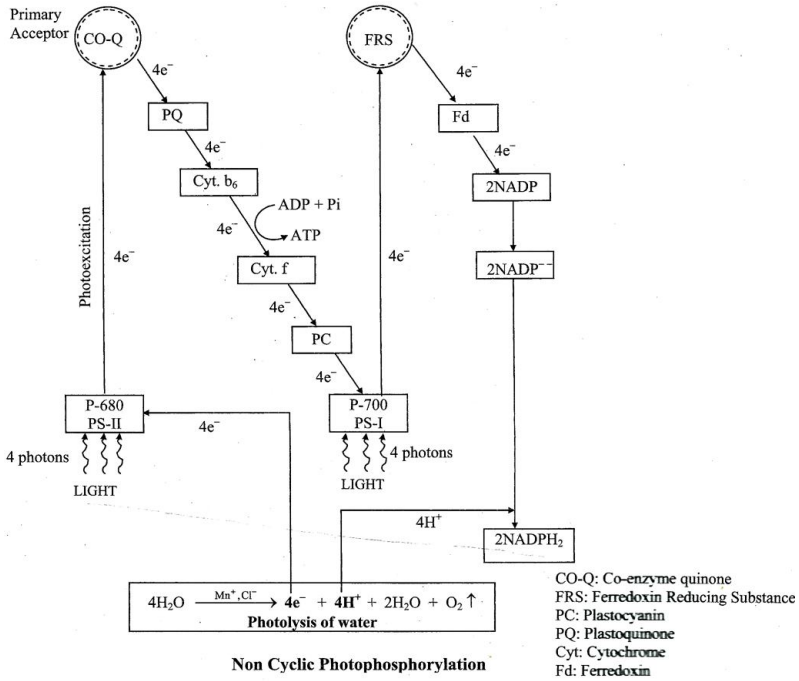
(iv) **Photoexcitation of PS -I :**

The light energy absorbed by PS– I is transferred to reaction centre P_{700} and get excited. The expelled energy rich electron is first accepted by unknown electron acceptor called FRS (Ferredoxin Reducing Substance).
Electron from FRS moves down through various electron carries and release energy.
From FRS, electrons are transferred to ferredoxin (it is an iron containing protein).
The reduced ferredoxin transfers electron to NADP to form $NADP^-$ in the presence of enzyme Fd-NADP -reductase.

(v) **Photolysis of water :**

Splitting of water into H^+ and OH^- in presence of light and chlorophyll is called photolysis of water. Manganese, calcium and chloride ions present in PS- II play an important role in photolysis of water. Photolysis of water occurs in order to satisfy the electron need of PS-II and proton need of $NADP^-$

(vi) ATP and $NADPH_2$ together called as assimilatory powers by Calvin, as it is required for assimilation of CO_2.



Non Cyclic Photophosphorylation

Significance of Non cyclic photophosphorylation

1) It yields ATP
2) It yields $NADPH_2$
3) It yields metabolic H_2O

Marking Scheme:

Definition - 1 Mark

Schematic presantation 1 Mark

Any 4 correct points 1 Mark each.

Any 2 correct significance 1/2 Mark each.

Topic*_Photosynthesis_*Subtopic:*Non cyclic photophosphorylation_*L2_Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

(OR)

RNA (Ribo Nucleic Acid) is a type of nucleic acid found in the nucleus as well as in the cytoplasm.

Non -genetic RNA : It is mainly involved in protein synthesis. There are three different types of non genetic RNA as follows :

(a) Messenger RNA (m-RNA).

(b) Ribosomal RNA (r- RNA)

(c) Transfer RNA (t- RNA) or soluble RNA (s-RNA).

a. Messenger RNA (m-RNA) or Informational RNA :

(i) It is called messenger RNA because it carries message for protein synthesis from DNA to the ribosomes (site for protein synthesis) in the form of codons.

(ii) It is produced on the DNA strand inside nucleus by a process called transcription and then transferred to cytoplasm.

(iii) It constitutes about 3 – 5% of the total RNA content of the cell.

(iv) It is long RNA and the molecular weight of an average sized m-RNA is about 5,00,000.

(v) It is always single stranded, linear and straight (unfolded).

(vi) It has two ends as 5′ end and 3′ end. At 5′ end it bears a cap of methylated guanine. This cap is followed by initiation codon and at 3′ end are present many adenine type nucleotides (poly A tail).

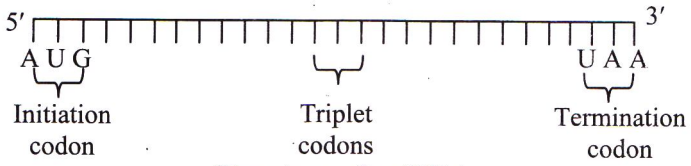
(vii) A triplet of nucleotides on m-RNA is called codon.

(viii) Each codon on m-RNA specifies one amino acid. This is called m- RNA language or genetic code or cryptogram.

(ix) The codon present at 5′ end of mRNA **is called initiation codon or start codon.** The common initiation codon is AUG or in some cases GUG.

(x) The codon present at 3′ end is called **termination codon or stop codon or non-sense codon (as they do not specify any amino acid).** The termination codon may be UAA (Ochre) or UAG (Amber) or UGA (Opal).

(xi) m-RNA is short lived and is degraded soon after protein synthesis.



Structure of m-RNA

Functions of m-RNA :

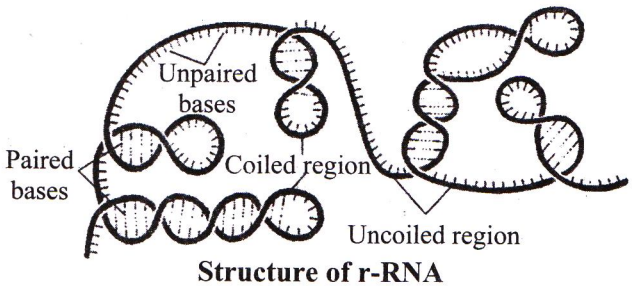
(i) It carries genetic information from DNA to ribosomes during proteins synthesis.

(ii) The genetic code of m-RNA gets translated into the sequences of amino acids to form proteins.

(b) **Ribosomal RNA (r-RNA) :**

(i) It is present in ribosomes, hence the name ribosomal RNA.

(ii) It consists of a single strand. The single strand is folded upon itself in certain regions.



Structure of r-RNA

(iii) In folded regions, complementary base pairing occurs while in unfolded regions it is absent. Hence, r-RNA does not show puring -pyrimidine equality.

(iv) It constitutes about 80% of the RNA content of the cell.

(v) The molecular weight ranges from 40,000 to 1,00,000.

Function of r-RNA

(i) It provides proper binding site for m-RNA on the ribosome.

(ii) It orients m-RNA molecule in such a way that all the codons are properly read.

(iii) It releases t-RNA molecule after transfer of activated amino acid to polypeptide chain.

(iv) It also protects the proteins molecule under construction.

(v) It also protects m-RNA from RNAse enzyme.

(c) **Transfer RNA (t-RNA) or soluble RNA (s-RNA) or supernatant RNA or adapter RNA.**

(i) It is the smallest of the three types of non-genetic RNA.

(ii) It transfer activated amino acids to the site of protein synthesis. Hence, it is called transfer RNA.
(iii) It is also called soluble RNA as these molecules cannot be separated from cytoplasm even by ultra centrifuge technique.
(vi) The t-RNA molecule consists of a single strand folded upon itself.
(v) It is about 10-20% of the total RNA content of the cell.
(vi) It is made up of 73-93 nucleotides with molecular weight of about 25,000 -30,000.
(vii) Structure of t-RNA can be explained by two model as:

1. Hairpin model :

In hair pin model of t-RNA, by folding there is formation of one loop having a triplet of unpaired base called anticodon.

The 5′ end has G-nucleotide while at 3′ end there is sequence of CCA nucleotides.

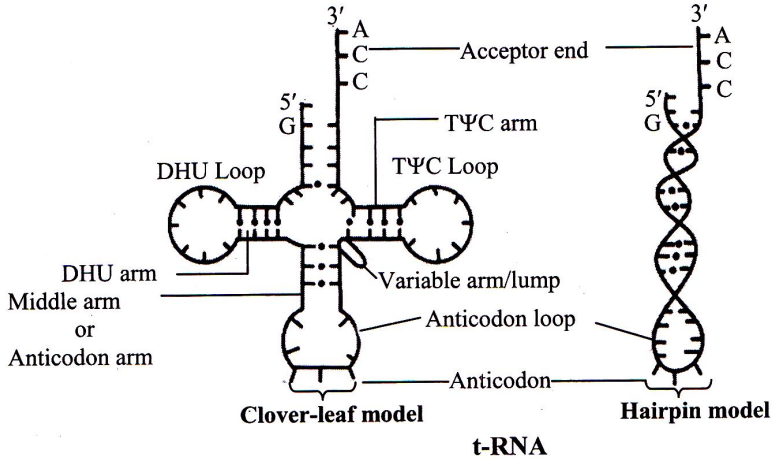
2. Clover leaf model (trifoliate leaf model) :

(i) The clover leaf model of r-RNA shows presence of three arms namely DHU arm, middle arm and T ψ C arm.
(ii) These arms have loops at their ends such as amino acyl binding loop, anticodon loop and ribosomal binding loop respectively.
(iii) The anticodon loop has anticodon which is a triplet of unpaired nucleotides.
(iv) The anticodon present on t-RNA are complementary to codons present on the m-RNA (anticodons are also referred to as nodoc).
(v) In addition it also shows a small lump and called variable arm or variable lump.
(vi) Like the hair -pin t-RNA, it has G nucleotide at 5′ end and CCA nucleotides at 3′ end.

Function of t-RNA:

It carries specific type of amino acid at CCA end to the ribosomes during protein synthesis.

It place the required amino acid properly in the sequence. (This becomes possible because of complementary nature of codons and anticodons).



t-RNA

Marking Scheme:
Correct defination of RNA 1 Mark
Correct digram of mRNA, rRNA, tRNA 1 Mark each
Functions of mRNA, rRNA, tRNA 1 Mark each

*Topic*_**Photosynthesis**_*Subtopic:***Non cyclic photophosphorylation**_*L-2_Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir*

SECTION - II

Q. 5

(i) (c)

XCXc = Carrier for colur Blindness and has normal vision.

Refer XII HSC- GTB Pg.No.145

Correct answer 1 Mark

Topic:Chromosomal Basis of Inheritance ; Sub-topic:Sex Linked Inheritance_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

(ii) (b)

Y-Chromosome

Refer XII HSC- GTB Pg.No.152

Correct answer 1 Mark

Topic:Genetic Engineering and Genomics; Sub-topic:DNA Fingerprinting_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

(iii) (d)

Abortion in the first trimester of pregnancy may occur due to lack of progesterone.

Refer XII HSC- GTB Pg.No.233

Correct answer 1 Mark

Topic:Human Reproduction; Sub-topic:Menstrual Cycle_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

(iv) (c)

Seminal vesicles contribute about 60% of the total volume of the semen.

Refer XII HSC- GTB Pg.No.228

Correct answer 1 Mark

Topic:Human Reproduction; Sub-topic:Male Reproductive System_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

(v) (b)

Lowering of blood pressure is related with the production of ANF-A trial Natriuretic Factor.

Refer XII HSC- GTB Pg.No.198

Correct answer 1 Mark

Topic:Excretion and Osmoregulation; Sub-topic:Osmoregulation_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

(vi) (b)

Diabetes milletus

Refer XII HSC- GTB Pg.No. 154

Correct answer 1 Mark

Topic:Genetic Engineering and Genomics; Sub-topic:Gene Therapy_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

(vii) (b)

DNA Fingerprinting

Refer XII HSC- GTB Pg.No. 151

Correct answer 1 Mark

Topic:Genetic Engineering and Genomics; Sub-topic:DNA Fingerprinting_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

Q.6 (A)

(i) Blood, semen, hair root and tissue samples are used for isolation of DNA in DNA fingerprinting technique.

Refer XII HSC- GTB Pg.No. 151

Any one correct example 1 mark

Topic:Genetic Engineering and Genomics; Sub-topic:DNA Fingerprinting_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

(ii) Podocytes have specialized filteration slits whose permeability is same as the permeability of glomerular capillaries, thus ultrafilterate moves from glomerulus easily to urinary space.

Refer XII HSC- GTB Pg.No. 195

Topic:Excretion and Osmoregulation; Sub-topic:Osmoregulation_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

(iii) Commensalism : It is a class of relationship between two organisms where one organism benifits but other is neutral. (There is no harm or benefit)

Refer XII HSC- GTB Pg.No. 248

Topic:Organism and Environment-II; Sub-topic:Population Interactions_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

(iv) Acrosome secretes hydrolytic enzymes like hyaluronic acid which helps in penetration of egg during fertilization.

Refer XII HSC- GTB Pg.No. 234

Topic:Human Reproduction; Sub-topic:Gametes_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

(v)

	X Chromosome	Y Chromosome
(i)	X Chromosome is longer than Y chromosome	Y chromosome is shorter than X chromosome
(ii)	X Chromosome contains large amount of euchromation and small amount of heterochromatin	Y chromosome contains large amount of heterochromatin and less amount of euchromatin.
(iii)	Non homologous region of X chromosome contains more genes comparatively.	Non homologous region of Y chromosome contains less genes comparatively.
(iv)	X linked genes are present on non-homologous region of chromosome.	Holandric genes or Y linked genes are present on non homologous region of chromosome.
(v)	X linked diseases are hemophilia, colour blindness, night blindness, muscular dystrophy etc.	Y linked diseases are Hyportrichosis of pinna or Testicular Atrophy etc.

Any 2 points = 1/2 mark each.

Refer XII HSC- GTB Pg.No. 234

Topic:Chromosomal Basis of Inheritance ; Sub-topic:Structure of Chromosomes_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

(vi) Endangered species (1) Asiatic wild ass (2) *Osmunda regalis* (3) *Psilotum nudum*

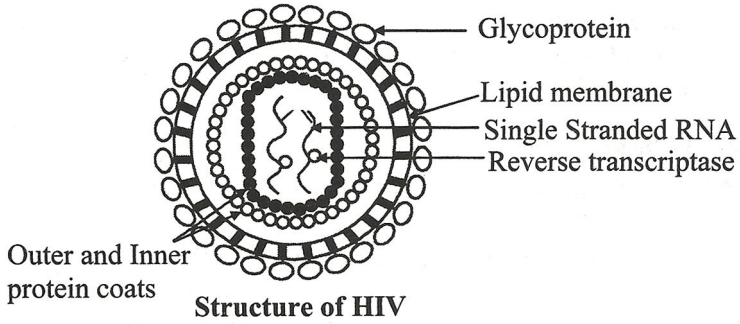
Refer XII HSC- GTB Pg.No. 252

Any two correct examples 1/2 each.

Topic:Organism and Environment-II; Sub-topic:Endangered Species_ L-2_Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

Q.6 (B)

Human Immuno deficiency Virus



Structure of HIV

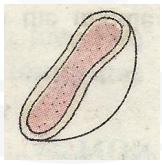
Diagram 1/2 mark , Any 2 labels = 1/2 mark each.

Refer XII HSC- GTB Pg.No. 234

Topic:Human Health and Diseases ; Sub-topic:HIV_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

Q.6 (C)

(i) **RBC (Red Blood Corpuscles) or Erythrocytes**



Erythrocytes are circular, biconcave and non-nucleated blood cells.

Their diameter is 7 μ and are 2.5 μ thick.

In adult male, RBC count is 5.1 to 5.8 million per cubic millimeter while in female it is 4.3 to 5.2 million per cubic millimeter. Normal life span of a single RBC is about 120 days. Formation of RBC's is called erythropoiesis.

Erythropoiesis in foetus, takes place in yolk sac, kidney, spleen and liver while in adults, it takes place in red bone marrow. Old and worn out RBCs are destroyed in spleen and liver.

The cytoplasm of RBCs contains respiratory pigment called haemoglobin which helps in transport of oxygen and carbons dioxide. The normal haemoglobin content in adult male is 13-18 gm/100 ml of blood and 11.5-16.5 gm/100 ml of blood in adult female. Less amount of haemoglobin leads anaemia.

Functions:

RBCs transport oxygen from lungs to tissues and carbon dioxide from tissues to lungs.

They maintain blood pH as haemoglobin acts as a buffer.

They also maintain the viscosity of blood.

Any 4 points = 1/2 mark each.

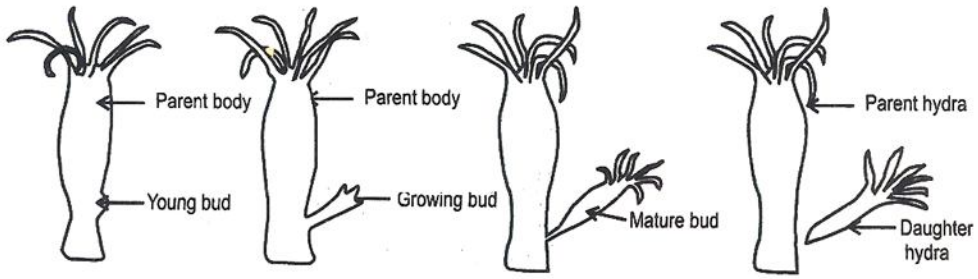
Refer XII HSC- GTB Pg.No. 181

Topic:Body Fluids and Circulation; Sub-topic:Blood Composition_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

(ii) Vaccines are produced by biotechnology & are used for curing diseases.
Eg : Rabies vaccine – to cure Rabies
Hepatitis B vaccine – to cure Hepatitis B
Polio vaccine – to cure Polio
Small pox vaccine – to cure Small pox

Topic: Genetic Engineering & Genomics ; Sub-topic: Vaccine L-2 _Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

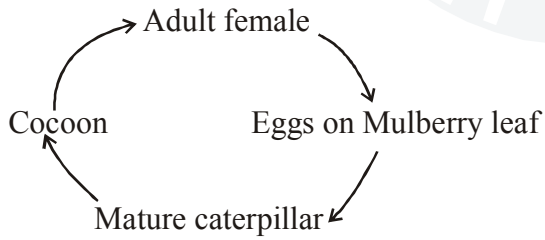
(iii)



Budding in hydra is type of asexual reproduction.
Hydra reproduces small buds which grow gradually.
The bud grows into a small hydra, which detaches from the parent and becomes an independent new organism
Any 3 points = 1/2 mark each. Diagram 1/2 Mark
Refer XII HSC- GTB Pg.No. 225

Topic:Human Reproduction; Sub-topic:Introduction - Asexual Reproduction_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

(iv) Species used in sericulture is Bombyx Mori - it produces mulberry silk.
Various stages in life cycle of silk moth in cyclic form are



Species Name = 1 mark
Stages of life cycle = 1 mark
Refer XII HSC- GTB Pg.No. 117

Topic:Animal Husbandry; Sub-topic:Sericulture_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

Q.7 (A)

(i) **ABO blood group :** This system was given by Karl Landsteiner.

(a) **Antigen :** These groups are based on two antigens present on the membranes of 'RBC's namely antigen A and antigen B. Person may have neither of them or one of them or both of them.

(b) **Antibody :** It is γ -globulin protein present in blood plasma, so is called plasma factor. There are two types of antibodies a and b. A person may have neither of them, one of them or both of them.

Antigen A and antibody a and antigen B & antibody b are incompatible to each other. And cause self

clumping. On the basis of this four blood groups are recognised.

Blood Group	Genotype	Antigen	Antibody	Can give blood to	Can receive blood from
A	I^AI^A or I^AI^O	A	b	A, AB	A, O
B	I^BI^B or I^BI^O	B	a	B, AB	B,O
AB	I^AI^B	A,B(Both)	None	AB	All (Universal recipient)
O	I^OI^O	None	a,b (Both)	All (Universal donor)	O

Person with blood group O is called universal donor as it has no antigen and can donate blood to any person.

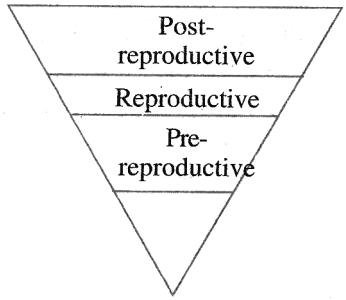
Person with blood group AB is called universal recipient as it has no antibody in their plasma so can receive blood from any blood group.

Any 6 points = 1/2 mark each

Refer XII HSC- GTB Pg.No. 160,161

Topic:Human Health and Diseases ; Sub-topic:Blood Group_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

(ii) Age structure showing declining population



In declining population - Large number of post reproductive and smaller number of pre reproductive make population decline.

Correct Explanation - 1 $^1/_2$ Mark

Diagram - 1 $^1/_2$ Mark

Refer XII HSC- GTB Pg.No. 251

Topic:Organism and Environment - II; Sub-topic:Population attributes_ L-2 _Target-2017_XII-HSC Board (56) Exam_Biology_TKb Sir

(iii) **Reflex arc :** The pathway of nerve fibres along which the reflex impulse travels is known as **reflex arc.** It is always unidirectional from receptor organs to the effector organ via CNS - Spinal cord.

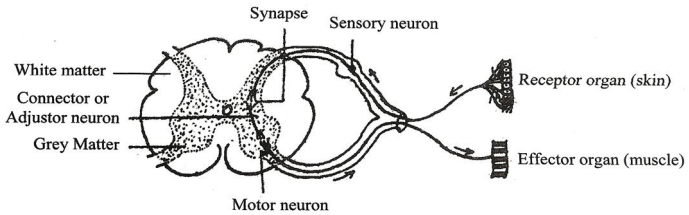
Reflex arc is structural and functional unit of reflex action.

Component of simple reflex arc

Simple reflex arc is formed of five components as given below

(i) **Receptor organ**

It is a specialized part of body called sense organ that receives the stimulus and converts it into the impulse. **e.g.** skin, eye, tongue, nose and ears.



Path of Reflex Action

(ii) **Sensory or Afferent neuron**

It carries sensory nerve impulse from receptor organ to CNS. Its cyton is located in dorsal root ganglion.

Its dendron is long and connected to receptor while the axon enters in the grey matter of spinal cord to form a synapse.

(iii) **Associated or Intermediate neuron**

It is present in the grey matter of spinal cord. It receives sensory impulse, interprets it and generates motor impulse.

(iv) **Motor of effector neuron**

Its cyton is present in the ventral horn of grey matter and axon travels through ventral root. It conducts motor impulse from spinal cord to effector organ.

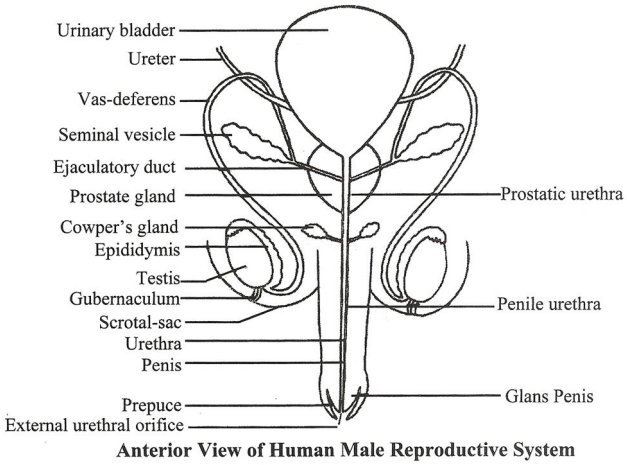
(v) **Effector organ**

It is a specialized part of the body which is excited by receiving the motor impulse. It gives proper response to the stimulus. **e.g.** Muscles and glands.

Diagram = 1 Mark with labels
Any 4-6 points = 1/2 mark each = 2 marks
Refer XII HSC- GTB Pg.No. 208 Diagram = 17.8

Topic:Control and Coordination ; Sub-topic:Refex Action_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

Q.7 (B)



Anterior View of Human Male Reproductive System

Diagram = 1 Mark with 4 labels 1/2 mark each
Refer XII HSC- GTB Pg.No. 227

Topic:Human Reproduction ; Sub-topic:Male Reproductive System_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

Q.8

Glands and Hormones of human endocrine system are

(a) **Pituitary Gland**

Hormones :

Anterior Lobe

- Growth Hormone (GH)
- Thyroid stimulating Hormone (TSH)
- Adrenocorticotropic Hormone (ACTH)
- Prolactin (PL)
- Gonadotropic Hormone (GnRH)

FSH - Follicle Stimulating Hormone

LH - Leutinizing Hormone

Posterior Lobe

- Anti Diuretic Hormone (ADH)
- Oxytocin (Birth Hormone)
- Coherin

(b) Thyroid Gland :

Hormones : T_3 - Triiodothyronine

T_4 - Tetraiodothyronine / thyroxine

(c) Parathyroid gland:

Hormones : Parathormone

(d) Thymus:

Hormones : Thymosins

(e) Adrenal gland:

Adrenal Cortex

Hormone : Glucocorticoids, Gonadocorticoids, Mineralocorticoids

Adrenal Medulla :

Hormone : Adrenaline, Nor adrenaline

(f) Pancreas :

Hormone :

Alpha cells of Islets of Langerhans - Glucagon

Beta cells of Islets of Langerhans - Insulin

Delta cells of Islets of Langerhans - Somatostatin

(g) Testis :

Hormone : Testosterone

(h) Ovary :

Hormone : Oestrogen and Progesterone

(i) Heart :

Hormone : Atrial Natriuretic Factor (ANF)

(j) **Kidneys :**

Hormone : Erythropoetin

(k) **Hypothalamus:**

Hormones: ACTH - RF , TSH-RF , FSH-RF, LH-RF, GH-RF, GHRIF, PRIF, MSHRF, MSHRIF (RF - releasing factor, IF-inhibitting factor)

T.S. of Thyroid Gland

Histological structure of thyroid gland

Thyroid gland is externally covered by connective tissue **sheath** or **capsule.**

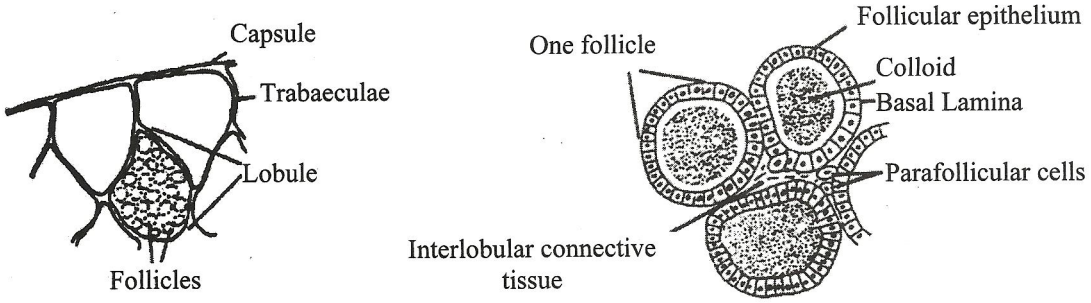
From the capsule, number of septa arise called **trabeculae** which divide the thyroid gland into several **lobules.**

The lobules contain about 3 million thyroid follicles.

There are about 3 million follicles in thyroid gland.

Each thyroid follicle is oval in shape and varies in size.

Larger follicles are present towards periphery whereas smaller ones are interiorly present.



T.S. of Thyroid Gland

The follicles are surrounded by a connective tissue called interfollicular tissue which contains blood vessels and nerve fibres.

Each follicle is lined by single layer of cuboidal glandular epithelium which rest on very thin basement membrane.

The follicular cavity or acinus is filled by dense amorphous semisolid substance called colloid, which is thyroglobulin, a precursor of thyroid hormone, thyroxine.

Other cells bigger than follicular cells are also present singly or in groups in connective tissue. These are called parafollicular or 'C' cells.

They secrete hormone thyrocalcitonin.

Deficiency of thyroxine causes:

Hypothyroidism

(a) **Cretinism**

In childhood, deficiency of the thyroxine causes cretinism.

It leads to retardation of physical and mental growth of the child.

Patient has low I.Q. (mentally retarded), delayed puberty, dwarfism and sterility.

(b) **Myxoedema (Gull's disease)**

In adults, deficiency of thyroxine causes myxoedema.

It causes thickening and puffiness of the skin and subcutaneous tissue.

Patient has low BMR, low body temperature, reduced heart rate, low pulse rate and BP, low blood sugar and iodine level, increased body weight.

It also causes mental dullness (loss of memory), falling of hairs, dry skin and intolerance of cold.

(c) **Simple goiter (Iodine deficiency goiter or endemic goiter)**

Deficiency of iodine in diet or drinking water causes simple goiter.

It causes enlargement of thyroid gland (15 time or more) for synthesis of thyroxine hormone.

It is commonly found in hilly regions.

Glands of Human Endocrine System - 1 Mark

TS of Thyroid Gland - 3 Marks

Deficiency - 3 Marks

Refer XII HSC- GTB Pg.No. 215,216

Topic:Control and Coordination ; Sub-topic:Human Endocrine System_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam

OR

Evolution: A slow gradual, continuous and irreversible changes through which the present day complex forms have descended from their simple pre-existing forms of the past.

Principles of Darwin's Theory of Natural Selection:

Charles R. Darwin was a British biologist. He postulated the "Theory of origin of species by natural selection".

Principles of Darwinism:

(i) **Over production or prodigality of production :**

All organisms have a natural tendency to over produce.

If this tendency is not checked, then even a single species of a plant or animal will occupy the entire space available on the earth.

(ii) **Struggle for existence:** Organisms multiply in geometric ratio but space and food remain constant leading to competition for survival. Increase in number of species leads to a competition called struggle for existence. The struggle for existence may be intra - specific, inter- specific or environmental.

(a) Intra specific struggle: it is the competition among the individuals of the same species. This type of struggle is very severe, because of the need and approach of all competing organisms is precisely same. e..g. struggle between cow and cow, horse and horse, deer and deer, etc. for getting grass.

(b) Inter specific struggle: it is the struggle between the organisms of hte different species livign togehter. individuals of one species compete with other species for food, shelter and breeding places. e..g struggle between cow, horse nad deer fo rgetting grass.

(c) Environmental struggle: it is struggle of all livign forms against adverse environmental conditions i.e. against natural calamities like extreeme cold, heat, drought, stroms, earhtquakes etc.

(iii) **Variations and Heredity:**

The differences which occur between the closely related organisms are called variations.

It is universal law of nature. Variations may be favourable or unfavourable. Accoirding to Darwin the useful variations are preserved and passed on to their offsprings. They play an important role in evolution.

(iv) **Survival of the fittest or natural selection:**

According to Darwin, in the struggle for existence the fittest individuals survive and reproduce while the unfit individual die out without reproducing. The nature selects the organisms which are provided

with favourable variatiosn and these are fittest to survive, hence, the theory is knonw as natural selection.

(v) **Orgin of new species:**

as a result of struggle for existence, variability and inheritance, the organisms tend become better adapted to their environment. Nature selects organisms with favourable variations and allows them to survive. The favourable characters are transmitted to the next generation. In the sacceeding generation, also natural selection operates. hence in each and every generation, there is slight batterment of the already developed characters. These different forms of organisms are identified as new species. Thus, according ot Darwin, a new species orginates by the gradual accumulation of favourable variations for a number of generations.

Objections to Darwin's natural selection theory:

(i) Natural selection theory explained "survival of the fittest" but not "arrival of the fittest".

(ii) He was not clearly aware of hereditary principles

(iii) Certain useless characters like vestigeal organs are also inherited. He cannot explain the inheritance of useless variations.

(iv) He was unable to differentiate variation as hereditary and environmental variations.

Evolution Definition : 1 Mark

Principles of Darwins Theory : 6 Marks

Objection (Any one)- 1 Mark

Refer XII HSC- GTB Pg.No.123 to 126

Topic:Origin and Evolution; Sub-topic:Organic Evolution_ L-1 _Target-2017_XII-HSC Board (56) Exam_Biology_ABz Mam