XII HSC - BOARD - FEB - 2016

Date: 04.03.2016

BIOLOGY (56) - SOLUTIONS

SECTION - I

Q. 1

(i) (b) 1:2:1

Refer XII-GTB-Pg.No. 12 **1 Mark**

Topic:Genetic basis of Inheritance ; Sub-topic:Incomplete dominance _ L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(ii) (c) 68

Refer XII-GTB-Pg.No. 21 **1 Mark**

Topic:Gene: It's nature, expression and regulation ; Sub-topic:DNA structure of Eukaryotic DNA _ L-2 _Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(iii) (b) *Saccharomyces*

Refer XII-GTB-Pg.No. 87 **1 Mark**

Topic:Respiration ; Sub-topic:Fermentation_ L-1_Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(iv) (d) Anthocyanin

Refer XII-GTB-Pg.No. 64-65 **1 Mark**

Topic:Photosynthesis ; Sub-topic:Photosythetic pigment _ L-1_Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(v) (a) UAG

Refer XII-GTB-Pg.No. 28 **1 Mark**

Topic:Gene: It's nature, expression and regulation ; Sub-topic:Genetic code _ L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(vi) (d) Acetyl - Co - A

Refer XII-GTB-Pg.No. 82 **1 Mark**

Topic:Respiration ; Sub-topic:Aerobic Respiration_ L-1_Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(vii) (b) 5th June

Refer XII-GTB-Pg.No. 117 **1 Mark**

Topic:Organism and Environment - I ; Sub-topic:Deforestation_ L-1_Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

Q.2 (A)

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

Refer XII-GTB-Pg.No. 10 **1 Mark**

Topic:Genetic basis of Inheritance ; Sub-topic:Test cross _ L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(ii) Pathogenic fungi used to kill plant pests are mycoherbicides.

Refer XII-GTB-Pg.No. 59 **1 Mark**

Topic:Microbes in Human welfare; Sub-topic:Bio control agents_ L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(iii) **Anti codon:** It is triplet of nucleotides present on the loop of middle arm of t-RNA. It is complementary with the codon.

Refer XII-GTB-Pg.No. 26 **1 Mark**

Topic:Gene: It's nature, expression and regulation ; Sub-topic:RNA _ L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(iv) Humification is formation of humus which is a dark coloured amorphous substance which is a reservoir of nutrients.

Refer XII-GTB-Pg.No. 110 **1 Mark**

Topic:Organism and Environment -I ; Sub-topic:Decompostion _ L-1_ Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(v) The bubbles of CO_2 trapped in glutein make idlies puffy.

Refer XII-GTB-Pg.No. 55 **1 Mark**

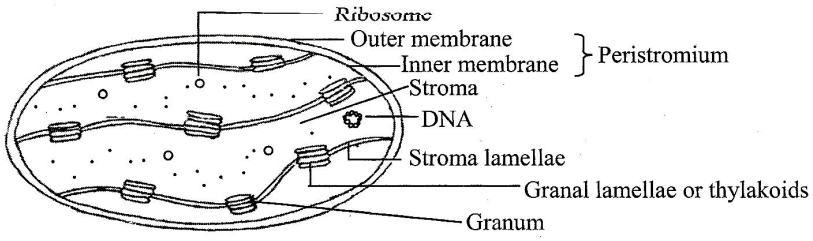
Topic:Microbes in Human welfare; Sub-topic:Food preparation_ L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(vi) The gradual (and predictable) change in the species composition of a given area is called ecological sucession. The ecological succession may replace one population of species by another, leading to change in physical environment.

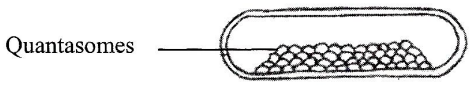
Refer XII-GTB-Pg.No. 113 **1 Mark**

Topic:Organism and Environment -I ; Sub-topic:Ecological succession _ L-1_ Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

Q.2 (B)



Chloroplast



Thylakoid

Scientifically correct diagram - **1 Mark**

Correct labels - **1 Mark**

Refer XII-GTB-Pg.No. 64 Fig. 6.1

Topic:Photosynthesis ; Sub-topic:Site of photosynthesis _ L-1_ Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

Q.2 (C)

(i) Induction of mutation and its utilization in developing desirable traits in an organism is called mutation breeding. It is a phenomenon in which alternation of base sequences in DNA is caused and it results in changes in the genotype and phenotype of an organism.

Mutations can be induced artifically through chemical or physical factors called Mutagens.

Selection of mutant organism is done for the desirable characters. By this method resistant varieties of moong beans to yellow mosaic virus and powdery mildew have been developed.

4 points of explanation **1/2 Mark each.**

Refer XII-GTB-Pg.No. 49

Topic:Enhancement in food production ; Sub-topic:Plant Breeding_ L-1_ Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(ii) (a) Biogas is a cheap, safe and renewable source of energy.

(b) Biogas can be burnt in gas stoves to provide heat.

(c) It can be used for cooking, domestic lighting, street lighting.

(d) It is not harmful to enviroment, so it helps in controlling pollution.

(e) It can be used for driving engines.

(f) It helps to improve sanitation of surrounding.

(g) It can be easily generated, stored and transported.

4 points of explanation - 1/2 Mark each

Refer XII-GTB-Pg.No. 58

Topic:Microbes in Human welfare; Sub-topic:Bio gas production_ L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

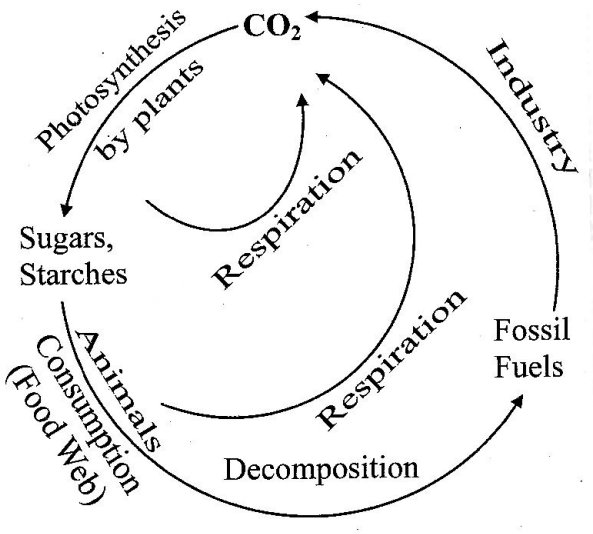
(iii) **Reservoir of carbon :**

Carbon constitutes about 49% of the dry weight of organisms.

It is estimated that 71% of the global carbon is found in the dissolved form in oceans.

Reservoir of carbon is found in hydrosphere (oceans), lithosphere (as deposits of fossil fuels) and in atmosphere (as carbon dioxide).

In ocean, it remains stored as bicarbonates as limestone and marble rocks.



Carbon Cycle

Cyclic pathway of carbon :

(a) The carbon enters the biotic components of an ecosystem through green plants, photosynthetic bacteria and cyanobacteria in terrestrial ecosystem and through phytoplanktons and hydrophytes in the aquatic ecosystems.
These are called producers and carry out photosynthesis by taking in the atmospheric CO_2 and make carbohydrates and oxygen.

(b) Carbohydrates are used as source of food by animals. Thus, carbon fixed by producer enters the food chain and keep moving through different living organisms. This carbon returned to the soil in the form of detritus.

4 points of explanation - **1/2 mark each.**

Refer XII-GTB-Pg.No. 111-112

Topic:Organism and Environment -I ; Sub-topic:Nutrient cycles in ecosystems _ L-1_Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(iv) **Floral adaptations for Chiropterophily**

(a) Pollination takes place with the help of bats.
(b) Flowers are large stout enough so that bats can hold on to the flowers.
(c) Chiropterophilous plants are nocturnal i.e. open their flowers during night time.
(d) Flowers emit rotten fruit like fermenting fruity odour.
(e) Flowers have large number of staments to produce a considerably large quantity of pollengrains.
E.g. *Anthocephallus* (Kadamb), *Adansonia (*Baobab tree), *Bauhinia* (Banana).

4 points of explanation - **1/2 mark each.**

Refer XII-GTB-Pg.No. 100

Topic:Reproduction in plants; Sub-topic:Pollination _ L-1_Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

Q.3 (A)

(i) **Pleiotropy :**

(a) When a single gene controls two (or more) different traits, it is called pleiotropy gene and this phenomenon is called pleiotropy or pleiotropism.
The ratio is 2 : 1 instead of 3 :1.

(b) According to Mendel's principle of unit character, one gene (factor) controls one character (trait), but sometimes single gene produces two related or unrelated phenotypic expressions.

(c) For example, the disease, sickle cell anaemia is caused by a gene Hb^s. Normal or healthy gene is Hb^A and is dominant.

(d) The carrier (heterozygotes - Hb^A/Hb^s) show signs of mild anaemia as their RBCs become sickle shaped (half - moon - shaped) in oxygen deficiency. They are said to have sickle-cell trait and are normal in normal conditions.

(e) The homozygotes with recessive gene Hb^s however, die of fatal anaemia.

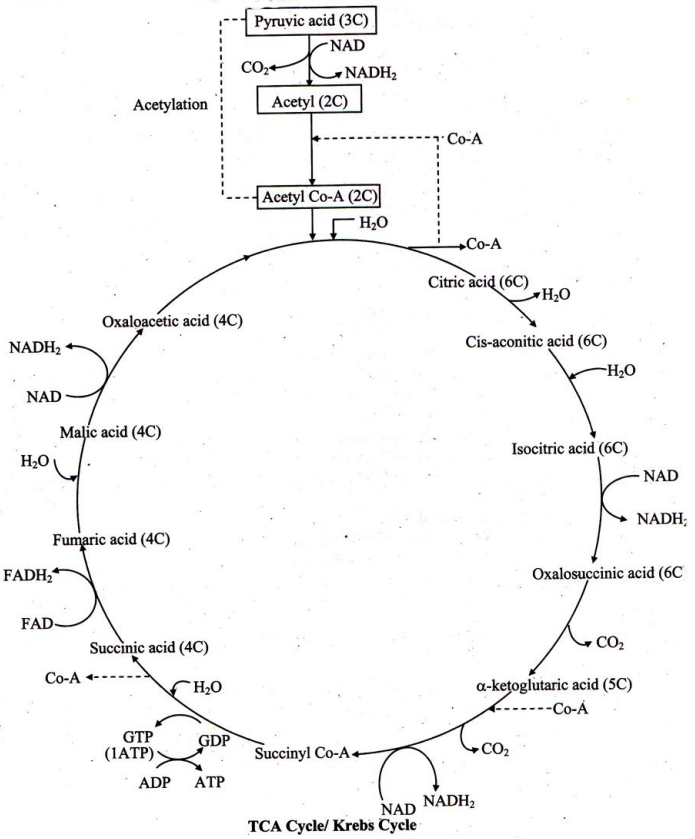
(f) Thus the gene for sickle-cell anaemia is lethal in homozygous condition and produces sickle cell trait in heterozygous carrier.

6 points of explanation - **1/2 mark each.**

Refer XII-GTB-Pg.No. 13

Topic:Genetic basis of Inheritance ; Sub-topic:Pleiotropy _ L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(ii)



Correct sequence of steps. **3 Marks**

Refer XII-GTB-Pg.No. 83 Fig. 7.6

Topic:Respiration ; Sub-topic:TCA Cycle_ L-1_Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

(iii)

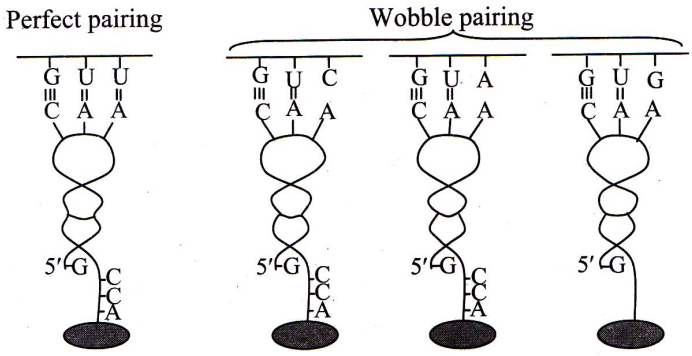
No	Cyclic Photophosphorylation	Non- cyclic Photophosphorylation
i.	Electrons emitted by chlorophyll return back to the same chlorophyll.	The electrons emitted by chlorophyll do not return back to the same chlorophyll.
ii.	$NADPH_2$ is not formed.	$NADPH_2$ is formed
iii.	Does not involve photolysis of H_2O	Involves photolysis of H_2O.
iv.	No evolution of O_2.	There is evolution of O_2.
v.	Less efficient and less significant.	More efficient and significant process.
vi.	Only photosystem-I (P_{700}) is involved in this cycle.	Both photosystem-I (P_{700}) as well as PS II (P_{680}) are involved.
vii.	It operates under low light intensity, anaerobic conditions, poor available of CO_2	It takes place under optimum light, aerobic conditions and in the presence of sufficient CO_2.

4 points of distinction - **1/2 mark each.**

Refer XII-GTB-Pg.No. 67-68

Topic:Photosynthesis ; Sub-topic:Light reactions _ L-1_Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

Q.3 (B)



Wobble Hypothesis

Correct sequence of steps. **3 Marks**

Refer XII-GTB-Pg.No. 28 Fig. 2.12

Topic:Gene: It's nature, expression and regulation ; Sub-topic:Genetic code _ L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

Q.4 Definition :

The fusion of one male gamete with egg and that of another male gamete with secondary nucleus is called as double fertilization.

It is the characteristic feature of angiosperms. It was discovered by Nawaschin (1879) in *Lilium martagon* plant.

It consists of two processes.

(a) **Syngamy :**

It is a fusion of first male gamete with egg. It result in diploid zygote which develops to form embryo. It is also called generative fertilization.

(b) **Triple Fusion :**

It is a fusion of second male gamete with secondary nucleus. It result in formation of triploid PEN (Primary Endosperm Nucleus) which develops to form endosperm.

Since both male gametes participate in fertilization, it is called double fertilization.

Process of double fertilization described as follows :

(i) After pollination, the intine of the pollen grain forms pollen tube and passes through the germ pore.

(ii) The growth of pollen tube is stimulated by the sugary substance produced on the stigma.

(iii) The pollen tube with two male gametes and tube nucleus runs through the style and finally turns towards the micropylar end of the ovule in the cavity of the ovary.

(iv) The length of the pollen tube depends on the length of style.

(v) When the pollen tube enters through the micropylar end of the ovule for fertilization, it is called **Porogany** (sometimes it may enter through integuments and called as **mesogamy** or sometimes through chalaza and called as **chalazogamy**).

(vi) Filiform apparatus of synergids attract the pollen tube towards egg apparatus.

(vii) As the pollen tube elongates, it carries with it two haploid, non- motile male gametes and hence, it is also called **siphonogamy** (siphon = tube).

(viii) On piercing the nucellus, the pollen tube penetrates the embryo sac. Its tip penetrates the embryo sac and reaches the egg apparatus passing either between the egg and synergids or between one synergid and wall of embryo sac.

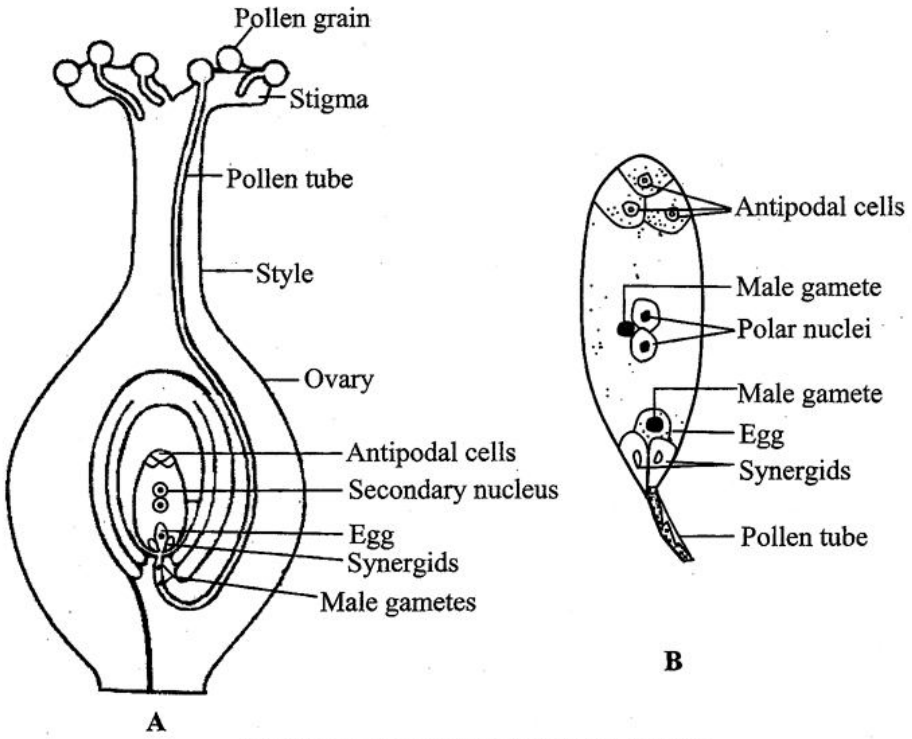
(ix) Ultimately, the tip of the pollen tube bursts and two male gametes are discharged.

(x) The tube nucleus disorganises before bursting of pollen tube.

(xi) One of these male gametes fuses with the egg cell or oosphere causing fertilization, as a result of which diploid oospore or zygote is formed. This is called **first fertilization or syngamy.**

(xii) The other male gamete fuses with the secondary nucleus forming the diploid endosperm nucleus which later on gives rise to endosperm. This is called as **triple fusion or second fertilization.**

(xiii) Thus, this process of fertilization which occurs twice in the same embryo sac at a time by two male gametes (syngamy and triple fusion) is called **double fertilization.**



Double fertilization in angiosperms

Explanation - **5 marks**

Diagram - **2 marks**

Refer XII-GTB-Pg.No. 101-102 Fig. 8.16 (A & B)

Topic:Reproduction in Plants ; Sub-topic:Fertilization _ L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

OR

Definition of rDNA Technology:

Recombinant DNA (rDNA) technology is the technique of manipulating the genome of a cell or organism so as to change the phenotype desirably.

Basic steps of rDNA Technology:

(a) **Isolation of desired gene:**

The donor individual having desired gene is selected.

From the DNA of this donor, desired gene is selected and isolated with the help of restriction endonuclease enzyme.

The donor DNA containing the desired gene is called passenger DNA.

(b) **Selection of vector :**

A vector DNA (usually plasmid DNA or phage DNA) is selected.

(c) **Formation of recombinant DNA:**

The vector DNA is cleaved at specific point using restriction endonuclease enzyme. The cut ends of vector DNA are sticky i.e. cohesive.

The desired gene is now ligated with the vector DNA using ligase enzyme.

The vector DNA containing a new introduced gene is called recombinant DNA (r-DNA) or chimeric DNA(Chimeric vector or chimeric plasmid).

Therapeutic products produced by rDNA Technology

(a) Blood proteins : Erythroprotein; Factors VII,VIII, IX, Tissue plasminogen activator, Urokinase

(b) Human Hormones: Epidermal growth factor, Follicle stimulating hormone, Insulin,Nerve growth factor, Relaxin, Somatotripsin

(c) Immune modulators: α – Interferon, β – interferon, Colony stimulating factor, Lysozyme, Tumor necrosis factor

Definition of rDNA Technology - **1 Mark**

3 Basic Steps in rDNA Technology - **3 Marks**

3 examples of Therapeutic proudcts - **3 Marks**

Refer XII-GTB-Pg.No. 35 to 37

Topic:Biotechnology: Process and Application ; Sub-topic:Recombinant DNA technology _ L-1 _ Target-2016_XII-HSC Board (56) Exam_Biology_HSb Sir

SECTION - II

Q. 5

(i) (a)

Metacentric

Refer XII – GTB Pg. No. 142 **1 Mark**

Topic: Chromosomal basis of inheritance ; Sub-topic:Chromosomes_L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(ii) (b)

Tissue growth facator

Refer XII – GTB Pg. No. 154 **1 Mark**

Topic:Genetic engineering and genomics; Sub-topic:Gene therapy_L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(iii) (c)

Rh^{-ve}

Refer XII – GTB Pg. No. 161 **1 Mark**

Topic:Circulation/Human health & disease ; Sub-topic:Blood groups_L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(iv) (b)

Atherosclerosis

Refer XII – GTB Pg. No. 186-187 **1 Mark**

Topic:Circulation; Sub-topic:Blood related disorders_ L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(v) (d)

Intra-specific struggle

Refer XII – GTB Pg. No. 248 **1 Mark**

Topic:Organisms and environment - II; Sub-topic: Population interacations_L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(vi) (b)
Volant adaptation
Refer XII – GTB Pg. No. 248 **1 Mark**
Topic:Organisms and environment - II; Sub-topic: Adaptations_L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(vii) (a)
In-breeding
Refer XII – GTB Pg. No. 174 **1 Mark**
Topic:Animal hubandary; Sub-topic:Animal breeding_L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

Q.6 (A)

(i) Visit of veterinary doctor to dairy farm is mandatory for identification of health problems, disease and rectification of disease.
Refer XII – GTB Pg. No. 173 **1 Mark**
Topic:Animal Husbandary; Sub-topic:Management of farms and farm animals_L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(ii) Ammonotelic animals excrete ammonia as their nitrogenous waste. ammonia is highly soluble in water and highly toxic to the body; to eliminate ammonia large quantity of water is required, hence aquatic animals can afford to be ammonotelic.
Refer XII – GTB Pg. No. 191 **1 Mark**
Topic:Excretion and Osmoregulation; Sub-topic:Modes of excretion_L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

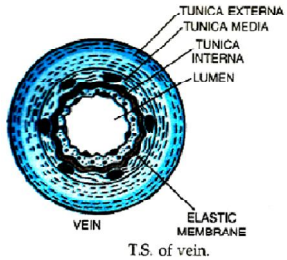
(iii) Pollution Under Control (PUC) is mandatory for all vehicles to check air pollution and thereby reduce hazards due to it.
Refer XII – GTB Pg. No. 255 **1 Mark**
Topic:Organisms and environment - II; Sub-topic: Air pollution_L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(iv) Organic evolution is defined as "slow, gradual, continuous and irreversible changes through which the present day complex forms have descended from their simple pre-existing forms of the past ."
Refer XII – GTB Pg. No. 123 **1 Mark**
Topic:Origin and evolution of life; Sub-topic:Organic evolution_L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(v) The genotype of Turner's syndrome is 44 + XO. It is also referred as X monosomy.
Refer XII – GTB Pg. No. 148 **1 Mark**
Topic: Chromosomal basis of inheritance ; Sub-topic: Sex chromosomal abnormalities_L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(vi) The full form of R.F.L.P. is Restriction fragment length polymorphism.
Refer XII – GTB Pg. No. 151 **1 Mark**
Topic:Genetic engineering and genomics; Sub-topic:DNA fingerprinting_L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

Q.6 (B)



T.S. of vein.

(Scientifically correct diagram – 1/2 mark, 3 labels – 1 1/2 marks)
Refer XII – GTB Pg. No. 185 **2 Marks**

Topic:Circulation; Sub-topic:Blood vessels_ L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

Q.6 (C)

(i) The change in gene and gene frequencies is called genetic variation.

Factors responsible for genetic variation are :

(i) **Gene Mutation :** Changes in the chemical make up of a gene is called gene mutation or point mutation. These mutations are the cause for new alleles that introduce variations in the gene pool and it accounts for the change in gene frequency.

(ii) **Gene Flow :** Transfer of gene between populations that differ genetically from one another is called gene flow. **e.g.** when animal migrate from an area to another they contribute their genes to the gene pool of that area and hence a change in gene frequency.

(iii) **Genetic Recombination :** In sexually reproducing organisms, during gametogenesis, the homologous chromosomes exchange genetic material by the process of crossing over. This produces new combination and the phenomenon is called genetic recombination. It adds variability to individuals.

(iv) **Genetic Drift :** Any alternation in allele frequency, in the natural population by pure chance is called genetic drift. **e.g.** elimination of a particular allele from a population due to events like accidental death prior to mating of an organism that is the sole possessor of particular allele. Smaller populations have greater chances for genetic drift. It is also called Sewall Wright effect.

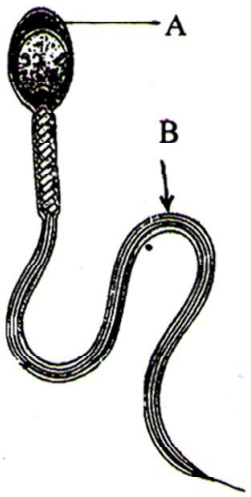
(v) **Chromosomal aberrations :** It refers to the structural alterations in a chromosome causing changes in the gene arrangement. **e.g.,** detetion, duplication, translocation and inversion. They also cause variations in the Mendelian population.

(Any four points – 1/2 mark each.)

Refer XII – GTB Pg. No. 125 **2 Marks**

Topic:Origin and evolution of life; Sub-topic:Organic evolution_L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(ii)



(A) – Acrosome : It is present in the head of the sperm and secretes hydrolytic enzymes like hyaluronidase which helps in penetration of the egg during fertilization.

(B) – Tail : It provides motility to the sperm.

Refer XII – GTB Pg. No. 234-235 **2 Marks**

Topic:Human reproduction; Sub-topic:Structure of sperm_ L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(iii) **Artificial acquired active immunity :** It is the immunity which is acquired artificially by vaccination. Vaccines consists of dead or alive but attenuated (artificially weakened) pathogens or toxoids. They are introduced into the body to stimulate the formation of antibodies by the immune system.

e.g. Polio vaccine, BCG vaccine, etc.

Refer XII – GTB Pg. No. 158 **2 Marks**

Topic:Human health & disease; Sub-topic:Immunity_L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(iv) **Economic importance of fisheries :**

(i) It is a source of employment for many people.

(ii) It provides nutrient food, as fishes are rich in proteins, vitamins (A, D & E), carbohydrates, fats and minerals.

(iii) It is flourishing as agro-base business as well as an industry.

(iv) It promotes allied business like manufacturing of crafts and gears and also provides raw material to other industries.

(v) It helps in biological control as fishes feed on insect larvae and micro-organisms.

(vi) Oil extracted from the body of fishes has medicinal as well as commercial value. e.g. Shark liver oil, cod liver oil (medicinal value) and oil extracted from sardine and mackerel (commercial value).

(vii) The waste parts of fishes are used to prepare the fertilizers and fish manure.

(viii) Fishes yield number of byproducts such as fish meal, Isinglass, fish glue, fish flour, etc.

(ix) Fishery is a good source of foreign exchange.

(Any four points – 1/2 mark each.)

Refer XII – GTB Pg. No. 176 **2 Marks**

Topic:Animal Husbandary; Sub-topic:Fisheries_L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

Q.7 (A)

(i) Sex Determination in human :

Human diploid cell has 46 chromosomes i.e. 23 pairs in each cell.

Out of these, 22 pairs of chromosomes are called autosomes.

Autosomes determine all body character like colour of hair, skin, colour of eyes, height etc.

Out of 23 pairs, one pair of chromosomes is called sex chromosomes.

They are X and Y chromosomes.

Every individual gets one set of chromosomes from his mother and one from his father.

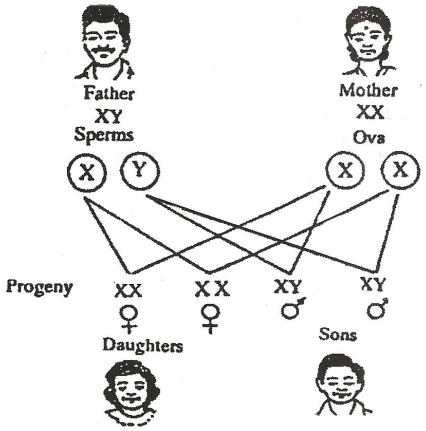
A human **male thus has 44 + XY** chromosomes whereas a **female has 44 + XX** chromosomes.

During gamete formation; meiosis or reduction division takes place and a gamete gets only one set of chromosomes and thus it is haploid.

e.g. Female gamete (ovum) 22 + X

Male gamete (sperm) 22 + X or 22 + Y.

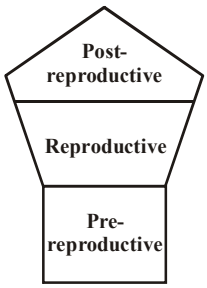
When the male and female gametes unite to form a zygote the chromosomes again become diploid. Thus the offspring gets the same number of chromosomes as his parent. Since which sperm (X or Y) fertilizes. Sex of baby is determined by the nature of sperm (X or Y) that fertilizes ovum. Thus in human, male determines sex of the baby.



Refer XII – GTB Pg. No. 146-147 **3 Marks**

Topic: Chromosomal basis of inheritance ; Sub-topic: Sex determination_L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(ii) **Steady population :** When the pre-reproductive and post reproductive age group is same then the population remains steady.



Refer XII – GTB Pg. No. 251 **3 Marks**

Topic:Organisms and environment - II; Sub-topic: Population attributes_L-1 _Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

(iii) Genes which can be used in gene therapy are :

(i) Bovine growth hormone to increase cattle and dairy yields.

(ii) Tissue growth factor - Beta (TGF - B) promotes new blood vessels and epidermal growth. Useful in wound healing and burns.

(iii) Human blood clotting factor VIII to treat haemophilia.

(iv) Human insulin (HUMULIN) to treat insulin dependent diabetes.

(v) Tissue plasminogen activator (TPA) used to prevent or reverse blood clots.

(vi) Human Growth Hormone producer gene to treat pituitary dwarfism.

(vii) Dnase to treat cystic fibrosis.

(viii) Recombinant Vaccines for prophylaxis of human and animal viral diseases (hepatitis B)

(ix) Genetically Engineered Bacteria and other microorganisms for improved production of industrial enzymes, citric acid and ethanol.

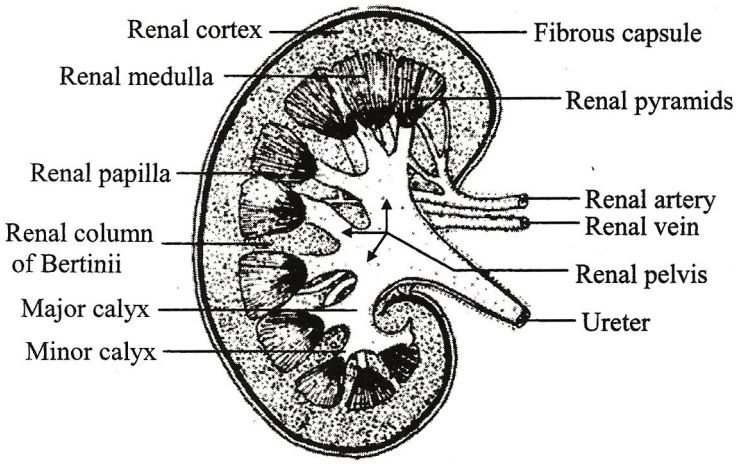
(x) Genetically Engineered Bacteria can accelerate the degradation of oil pollutants or certain chemicals in toxic wastes.

(Any six points – 1/2 mark each.)

Refer XII – GTB Pg. No. 154-155 **3 Marks**

Topic:Genetic engineering and genomics; Sub-topic:Gene therapy_L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

Q.7 (B)



V.S. of human kidnev

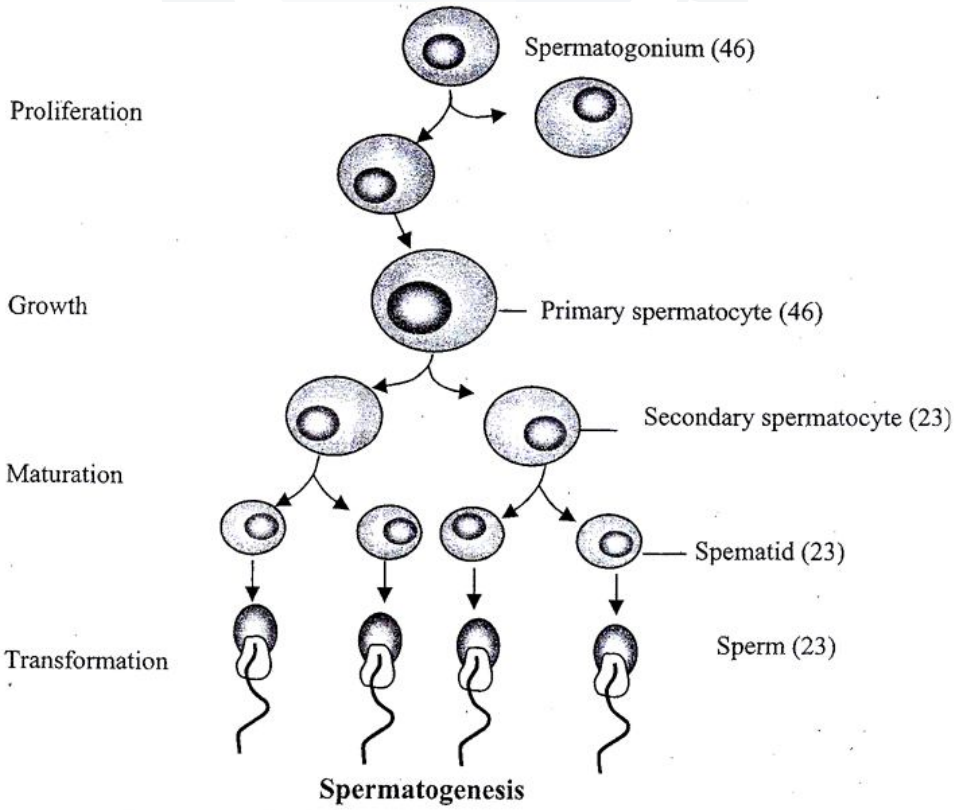
(Scientifically correct diagram – 1/2 mark, 5 labels – 2 1/2 marks)

Refer XII – GTB Pg. No. 193 **3 Marks**

Topic:Excretion and Osmoregulation; Sub-topic:Human excretory system_L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

Q.8 The gametogensis is the process of formation of gametes in sexually reproducing animals. These animals show presence of somatic cells and germinal cells. Somatic cells form organs of the body and multiply mitotically. The germinal cells form the gamete cells by mitosis and meiosis.

(i) Spermatogenesis is process of formation of haploid, microscopic and motile male gametes, called spermatozoa, from the diploid spermatogonia of the testis of male organism.



Spermatogenesis

Each testis has seminiferous tubules which are lined by cuboidal epithelium called germinal epithelium. Germinal cells is testes are known as primary germinal cells. Primordial cells passes through three phases namely.

(ii) **Multiplication Phase :**
Primordial cells undergo repeated mitotic divisions to produce large number of spermatogonia. Each spermatogonium is diploid (2n).

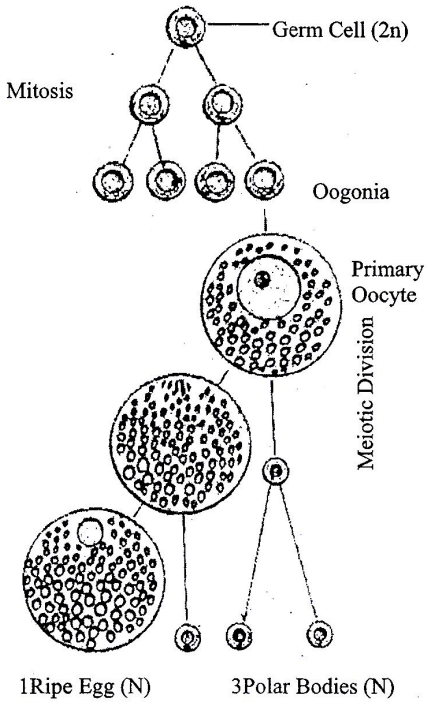
(ii) **The growth phase :** Spermatogonium cell accumulates food and grows in size. Now it is called primary spermatocyte.

(iii) **The maturation phase :** The primary spermatocyte undergoes first meiotic or maturation division. The homologoes chromosomes start pairing.
Each homologous chromosome splits longitudinally. Chisma formation results in exchange of genetic material.
At the end of I meiotic division, two haploid, secondary spermatocytes are formed. Each secondary spermatocyte undergoes II meiotic division and produces spermatids. So at the end of maturation phase each spermatogonium produces four haploid spermatids.
Spermatid is non motile so it has to undergo spermiogenesis to become functional, motile male gamete i.e. spermatozoan.
Significance : It produces haploid sperms. Crossing over during meiosis I may produce variation. It proves evolutionary relationship.

Oogenesis :

Oogenesis is the process of formation of haploid female gametes, called ova, from the diploid oogonia of the ovary of female organism. It is completed in three stages :

(a) Multiplication phase
(b) Phase of Growth
(c) Maturation Phase



Oogenesis

(a) Multiplication phase: Germinal cells undergo mitosis to form large number of oogonia. Oogonia of the ovary of female organism. Oogonia in human beings are formed in ovary of female baby even before her birth.

(b) Phase of Growth : Just before puberty, under the influence of follicle stimulating hormone, one of the oogonium grows in size. Growth in size of oogonium is larger than that seen in spermatogenesis. This grown up cell is called primary oocyte.

(c) Maturation Phase : Primary oocyte undergoes maturation or meiotic division. Meiotic I division of primary oocyte shows equal nuclear division but unequal cytoplasmic division:

(Explaination – 5 marks
Diagram – 2 marks)

Refer XII – GTB Pg. No. 233-234 **7 Marks**

Topic:Human reproduction; Sub-topic:Gametogenesis_L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam

OR

Cerebrum :

Cerebrum is also known as **Telencephalon.**

It is **largest** part of the brain accounting for **80-85%** of its weight.

It is divided into cerebral hemispheres (right and left) by a **median longitudinal cerebral fissure.**

Two cerebral hemispheres are connected by a single thick bundle of nerve fibres called **corpus callosum.**

It is the largest commissure in human brain. It connects both the hemispheres and helps in co-ordination.

The **outer part** of cerebrum is called **cortex** while the **inner part** is called **medulla.**

Cerebral cortex is formed by neurons cell bodies which appear grey and hence are called **grey matter.**

Cerebral medulla is mainly formed of **white matter** (axons of nerve cells).

Deep within the white matter, certain masses of grey matter are located which are called basal nuclei. Thick dorsal wall (roof) of cerebrum is called **pallium** and the ventrolateral wall is known as **corpora striata.**

Cerebral cortex shows number of ridges called **gyri** and depressions called **sulci.** The gyri increase the surface area of cerebral cortex. There are three deep sulci on the cerebrum namely **central sulcus, lateral sulcus and parieto-occipital sulcus.**

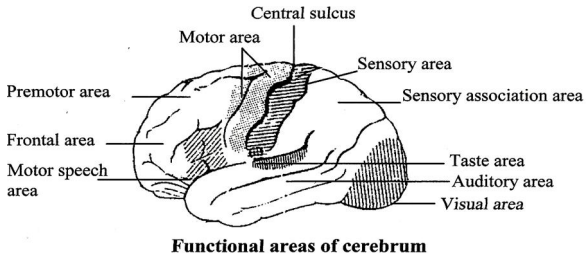
These sulci divide each cerebral hemisphere into four lobes viz., **anterior frontal lobe, middle parietal lobe, posterior occipital lobe, lateral temporal lobe.**

The frontal and parietal lobes are separated by central sulcus, the parietal and temporal lobes are separated by lateral sulcus while the parieto-occipital sulcus separates parietal lobe from occipital lobe.

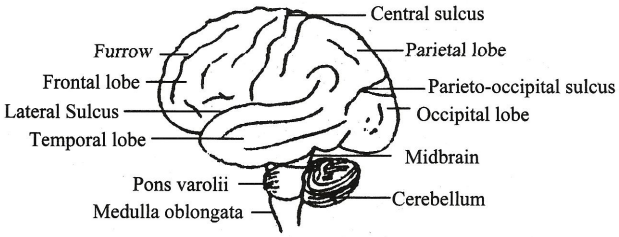
Functional areas of cerebral cortex : There are three functional areas as given below.

(a) **Sensory areas :** They receive impulses from sensory receptors and are concerned with analysis of sensation of temperature, pressure, touch and pain. They are located on the post central gyrus of parietal lobe. Sensory speech area **(Wernicke's area)** is present in parietal lobe while temporal lobe shows olfactory, auditory and gustatory areas. The visual areas lies in the occipital lobe.

(b) **Association areas :** They form major portion of the cortex and are present in each lobe. They are involved in input processing, analysis and storage of information. They are also concerned with power of reasoning, will understanding and memory.



Functional areas of cerebrum



Brain Lateral view

(c) **Mortor area :**It is mostly present in frontal lobe and concerns with origin of motor impulses. Motor area lies in the frontal lobe immediately anterior to the central sulcus. It controls involuntary movements and ANS.

Immediately anterior to motor area lies pre motor area. It controls voluntary movement.

In the lower part of motor area, just above the lateral sulcus, is present **motor speech area or Broca's area** which controls the movements for speech. It is dominant in the left hemisphere in right handed people and vice versa.

(Explaination – 5 marks

Diagram – 2 marks)

Refer XII – GTB Pg. No. 202-203 **7 Marks**

Topic:Control and Co-ordination; Sub-topic:Structure and functions of brain_ L-1_Target-2016_XII-HSC Board (56) Exam_Biology_ABz Mam