

# Inter (Part-II) 2018

Biology	Group-I	PAPER: II
Time: 2.40 Hours	(SUBJECTIVE TYPE)	Marks: 68

## SECTION-I

2. Write short answers to any EIGHT (8) questions: (16)

(i) What is lithotripsy?

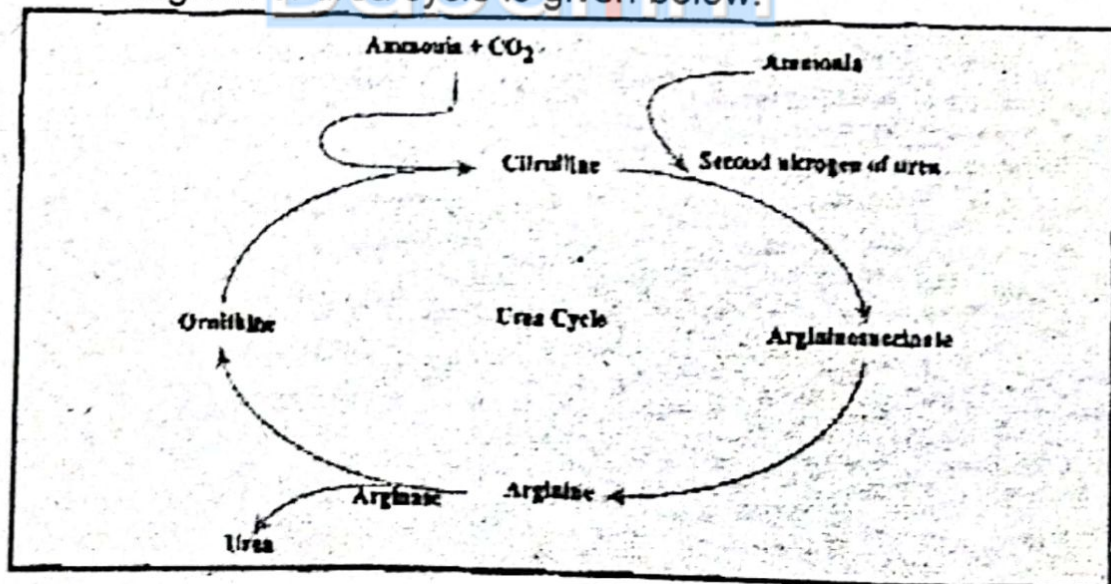
**Ans** The kidney stones have been removed by kidney surgery. Presently, lithotripsy is used for non-surgical removal of kidney stone. It is the technique used to break up stones that form in the kidney, ureter or gall bladder. There are several ways to do it, although the most common is extracorporeal shock wave lithotripsy.

(ii) What are xerophytes? Give two adaptations of xerophytes.

**Ans** Xerophytes have the adaptations for reduced rate of transpiration. Many xerophytes possess small, thick leaves to limit water loss by reducing surface area proportional to the volume. Their cuticle is thick, waxy and leathery. Stomata are on lower surface of leaves and located in depression.

(iii) Draw and label the urea cycle.

**Ans** Diagram of urea cycle is given below:





(iv) What is the difference between tetanus and muscle tetany?

**Ans**

#### **Tetany**

It is the disease caused by low calcium in the blood. It increases the excitability of neurons and results in loss of sensations. Muscle twitches and convulsion occur. If untreated the system progresses to spasm of larynx, respiratory paralysis, and ultimately death occurs.

#### **Tetanus**

It is an acute infectious disease caused by anaerobic bacterium, *Clostridium tetani*, resulting in persistent painful spasms of some skeletal muscles, which typically begins gradually with stiffness of jaws and neck muscles and progresses to fixed rigidity of jaws (lock jaw) and spasms of trunk and limb muscles, usually fatal due to respiratory failure. Though rare in developed countries, the tetanus is the major killer in developing countries where the mortality rate is 40 percent.

(v) Differentiate the compact bone and spongy bone. Give only two differences.

**Ans**

#### **Compact Bone**

1. Compact bone is dense and strong and provides an attachment site for muscle.
2. There is no bone marrow in the cavity of compact bone.

#### **Spongy Bone**

1. Spongy bone is light, rich in blood vessels, and highly porous.
2. The cavity of spongy bone contain bone marrow where blood cells are formed.

(vi) Give the name of hormones which are involved in epinasty and hyponasty.

**Ans**

#### **Epinasty:**

It is shown by leaves, petals, etc. The upper surface of leaf in bud condition shows more growth as compared with the lower surface. This leads to opening of buds.



### **Hyponasty:**

If growth in the lower surface of the leaf in bud condition is more than that of the upper surface, then the bud will remain closed.

**(vii) Differentiate the internal and external fertilizations.**

**Ans** Internal fertilization is when the male deposits his sperm directly into the female's body. External fertilization is when male and female's gametes unite outside the female's body.

**(viii) What is meant by apomixes?**

**Ans** Apomixis is an asexual mode of seed formation that produces clonal progeny with a maternal genotype. It primarily influences reproductive events in the ovule of flower.

**(ix) What is profundal zone? Give its one character.**

**Ans** In profundal zone, light is insufficient to support photosynthesis. The organisms of this zone are mainly nourished by detritus that falls from the littoral and limnetic zone and by incoming sediment. Decomposers and detritus feeders, such as, snails and certain insect larvae, bacteria, fungi and fishes, inhabit it.

**(x) What are alpine and boreal?**

**Ans** Coniferous forests located at high altitude are called alpine while coniferous forests located at high latitude are called boreal.

**(xi) What is soil? Give its basic constituents.**

**Ans** Soil can be defined as:  
"The upper layer of earth's crust."

The basic constituents of soil are soil particles, soil water, soil air and inorganic matter and soil organisms.

**(xii) What is wild life? Give its important role.**

**Ans** In general, wild life refers to all non-cultivated plants and non-domesticated animals. Animals and plants have been major source of food for humans. All living organisms are interdependent. There is a delicate balance between living organisms and environment. Man has been disturbing this balance since very long. Man's decisions regarding the usefulness or harmfulness of the wild life have led to severe disturbances in natural habitats. As a result, many animals and plants have either become extinct or else in their number as to



be on the verge of extinction. These are known as the endangered species.

**3. Write short answers to any EIGHT (8) questions: (16)**

**(i) Write two commercial applications of Gibberellins.**

**Ans** Following are the two commercial applications of Gibberellins:

1. GA promote fruit setting e.g., in tangerines and pears and are used for growing seedless grapes (parthenocarpy) and also increase the berry size.
2.  $GA_3$  is used in the brewing industry to stimulate  $\alpha$ -amylase production in barley and this promotes malting.

**(ii) Differentiate between reflex action and reflex arc.**

**Ans** Reflex action is a type of involuntary action. While Reflex arc is the pathway of passage of impulse during a reflex action.

**(iii) Define feed back mechanism.**

**Ans** It is a type of interaction in which a controlling mechanism is itself controlled by the products of reactions, it is controlling.

**(iv) Define law of segregation.**

**Ans** According to the law of segregation, the two coexisting alleles, for each trait in an individual segregates from each other at meiosis, so that each gamete receives only one of the two alleles. Alleles unite again at random fertilization of gametes when zygote is formed.

**(v) What is epistasis? How it differs from dominance?**

**Ans** When an effect caused by gene or gene pair at one locus, such a phenomenon of gene interaction is called epistasis.

Epistasis must not be confused with dominance. Dominance is the relationship between alleles of the same gene occupying the same locus, but epistasis is the interaction between different genes occupying different loci.

**(vi) What is the sex limited trait? Give an example.**

**Ans** A sex limited trait is limited to only one sex due to anatomical differences. Such trait affects a structure or function of the body present in only males or only females. These traits may be controlled by sex-linked or autosomal genes.



(vii) What are restriction enzymes? Give an example.

**Ans** An enzyme that cleaves a DNA duplex molecule at a particular base sequence, usually within or near a palindromic sequence, also called restriction enzyme.

(viii) Define genomic library.

**Ans** A genomic library is a collection of bacterial or bacteriophage clones, each clone containing a particular segment of DNA from the source cell. For making a genomic library, an organism's DNA is simply sliced up into pieces, and pieces are put into vectors (*i.e.*, plasmids or viruses) that are taken up by host bacteria.

(ix) What are two goals of human genome project?

**Ans** Following are the two goals of human genome project:

1. The first goal is to construct a genetic map of the human genome. The aim is to show the sequence of genes along the length of each type of chromosomes, such as depicted for the X chromosome.
2. The second goal is to construct a base sequence map. There are three billion base pairs in the human genome and it is estimated that it could take an encyclopaedia of 200 volumes, each with 1,000 pages, to list all of these. Yet this goal has been reached and all the chromosomes have been sequenced.

(x) Define biosphere and ecosystem.

**Ans** **Biosphere:**

Biosphere is a thin layer of earth in which all living organisms exist. Organisms within the biosphere not only adapt themselves to the environment but also interact to modify and control chemical and physical conditions of the biosphere.

**Ecosystem:**

The eco part of the word is related to the environment; and the system part means a collection of related parts that function as a unit. So,

"The environment and a collection of its related parts that function as a unit is called ecosystem."

(xi) Differentiate between primary and secondary succession.

**Ans** During primary succession, an ecosystem is forged from bare rock, sand or clear glacial pool where there is no trace of



previous life. While, during secondary succession, a new ecosystem develops after an existing ecosystem is disturbed as in case of forced fire or an abandoned farm field.

(xii) **Define commensalisms. Give one example.**

**Ans** In this type of relationship, only one organism benefits from the relationship. The other is not affected at all.

**Example:**

Shark may have small fish called remoras attached to them. As the shark feeds, the remoras pick up the scraps. The remoras benefit from this relationship, the shark is not affected at all.

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**4. Write short answers to any SIX (6) questions: (12)**

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(i) **Differentiate between primary and secondary growth.**

**Ans** Primary tissue is added by the apical meristems in the plants. While Secondary tissue is added by the intercalary or vascular cambium leading to increase in thickness of stems in plants.

(ii) **Define growth correlations.**

**Ans** The development of a plant is usually correlated with its growth and different organs growing at different rates in different directions and the development of different parts takes place. Such reciprocal relationship is known as correlation.

(iii) **Differentiate between heterochromatin and euchromatin.**

**Ans** Highly condensed portions of the chromatin are called heterochromatin. Some of these portions remain permanently condensed, so that their DNA is never expressed. On the other hand, the remainder of the chromosome called euchromatin condensed only during cell division, when compact packaging facilitates the movement of the chromosomes.

(iv) **What is central dogma?**

**Ans** All organisms use the same basic mechanism of reading and expressing genes, which is often referred to as central dogma.

(v) **What are mutagens? Give one example.**

**Ans** Agents that induce change in DNA; include physical agents that damage DNA and chemicals that alter DNA bases are called mutagens.



(vi) What is mitotic apparatus? Give its function.

**Ans** The specialized microtubule structure including aster and spindle is called mitotic apparatus.

It is designed to attach and capture chromosomes, aligning them and finally separating them so that equal distribution of chromosomes is ensured.

(vii) Write symptoms of Down's syndrome.

**Ans** The affected individuals have flat, broad face, squint eyes with the skin fold in the inner corner, and protruding tongue, mental retardation, and defective development of central nervous system.

(viii) What are vestigial organs? Give one example.

**Ans** The oldest homologous structures are vestigial organs, rudimentary structures of marginal, if any, use to the organism. Vestigial organs are historical remnants of structures that had important functions in ancestors but are no longer essential presently. For instance, the skeletons of whales and some snakes retain vestiges of the pelvis and leg bones of walking ancestors, vermiform appendix in carnivores, ear muscles in man, etc.

(ix) Differentiate between endangered and threatened species.

**Ans** **Endangered Species:**

A specie that is in imminent danger of extinction throughout its range.

**Threatened Species:**

Threatened species are any species which are vulnerable to endangerment in the near future.

## SECTION-II

**NOTE: Attempt any Three (3) questions.**

**Q.5.(a) Describe in detail excretion in plants.**

**(4)**

**Ans** **Definition:**

The elimination of wasteful, metabolites, mainly of the nitrogenous nature is called excretion.

**Excretion in Plants:**

All living things must undergo excretion. It is one of the essential properties of life. In plants, oxygen could be looked



upon as a waste product of photosynthesis, carbon dioxide a waste product of respiration and water as the waste product of both. The mechanisms of elimination of these gases are described in the respective chapter. Water is lost through transpiration or just used for maintaining the turgor in the cells. Plant cells have large vacuoles. These can be used for either storage of useful compounds, or the storage of waste substances. These may accumulate at the concentration that lead to crystal formation in the vacuoles. Plants produce certain wastes of inorganic and organic nature which are stored in certain organs. The leaves are the prominent organs for this purpose. These leaves are destined to fall off, as is the case of autumn leaves in plants or die off as happens in the leaves and stalk of certain bulbs. e.g., blue bell, leaving the bulb undergrounds.

This is the reason gardeners find rotted autumn leaves a good source of minerals. The falling of yellow leaves in autumn is the seasonal time for the plants to get rid of the accumulated wastes and because of this reason, leaves are said to be excretophore. According to an explanation, the change in colour in leaves is not due to the removal of chlorophyll as the microscopic examination of autumn leaves show that leaves are loaded with pigmented compounds prior to falling of many toxic material like heavy metals increase sharply as the yellowing proceeds.

Some trees deposit strange chemicals in their branches and trunks, especially in old xylem which is no longer used for water transport. This takes place in ebony which produce very black wood in the center. These are considered to be waste material by plant physiologists.

Some plants will actively secrete waste compound into the soil, occasionally using them as chemical weapons against other competing plants e.g., conifers.

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**(b) Discuss the flow of energy in food chain of an ecosystem. (4)**

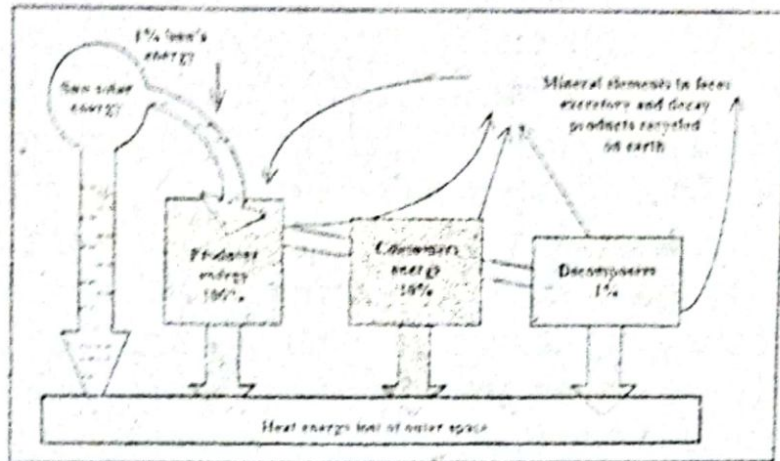
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**Ans** The flow of energy in food chain of an ecosystem:

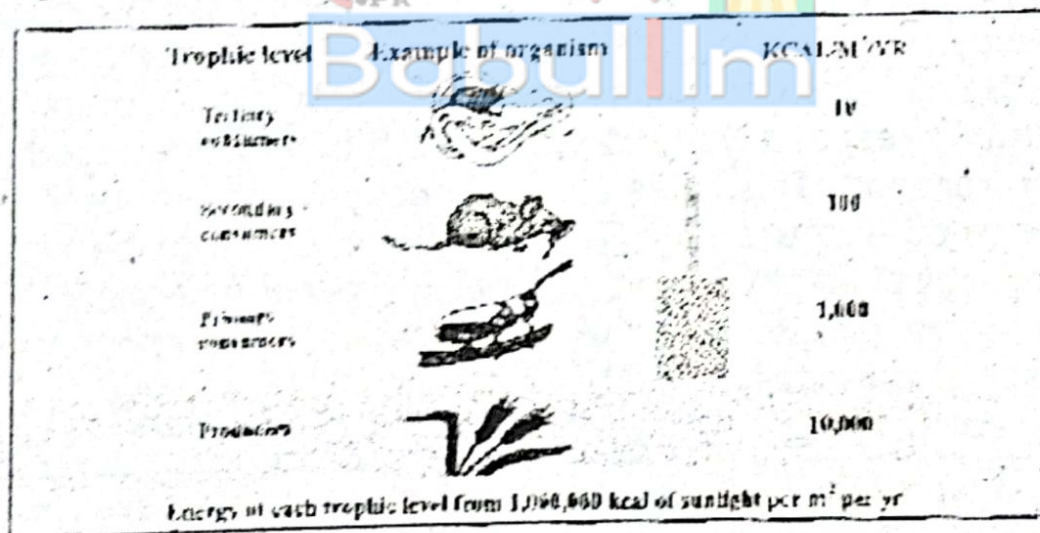
Energy in the form of radiant heat and light from the sun flows through an ecosystem passing through the different trophic levels (links) and radiates again back into outer space. The total amount of energy fixed by plants is gross primary



productions. The amount of energy left after plants have met their respiratory needs is net primary production, which shows up as plant biomass.



About 1% of the total energy from the sun is trapped by the producers in an ecosystem. The remaining 99% of solar energy is used to evaporate water, heat up soil and is then lost to the outer space. As energy is transferred from one trophic level to the next, from producer to primary consumer, between 80 to 90% of the original energy is heat as a byproduct of respiration. However, a continuous flux of energy from the sun prevents ecosystem from running down. A pyramid of energy can be constructed showing energy transfer in a community of organisms.



A short food chain of two or three links supports a community more efficiently than a long chain of five links where much of the original energy from the producers would never reach those organisms at higher trophic levels. Decomposers are able to obtain energy by converting plant and animal tissues and waste into inorganic mineral ions.



**Q.6.(a) Discuss arrangement of vertebrate in vertebral column. Also describe rib cage. (4)**

**Ans** **Vertebral Column:**

Vertebral column extends from the skull to the pelvis to form backbone, which protects the spinal cord. Normally, the vertebral column has 4 curvatures, which provide more strength than does the straight column. The vertebral column consists of 33 vertebrae. The vertebrae are named according to their location in the body, viz, cervical, thoracic, lumbar and pelvic.

The cervical vertebrae include seven vertebrae which lie in the neck region. The first two cervical vertebrae are atlas vertebra and axis vertebra. There are twelve thoracic vertebrae located in the thoracic region, five in lumbar region and nine in pelvic region which form two sets, sacrum and coccyx. Sacrum is formed by the fusion of anterior five vertebrae, whereas coccyx is formed by the fusion of four posterior vertebrae.

**Rib cage:**

It is composed of twelve pairs of ribs that articulate with the thoracic vertebrae. Ten of them connect anteriorly with sternum, either directly or through the costal arch. The lower two pairs of ribs are called "floating ribs" because they do not attach to the sternum. The rib cage provides support to a semi-vacuum chamber called the "chest cavity".

**(b) Explain the process of DNA replication with the help of a diagram. (4)**

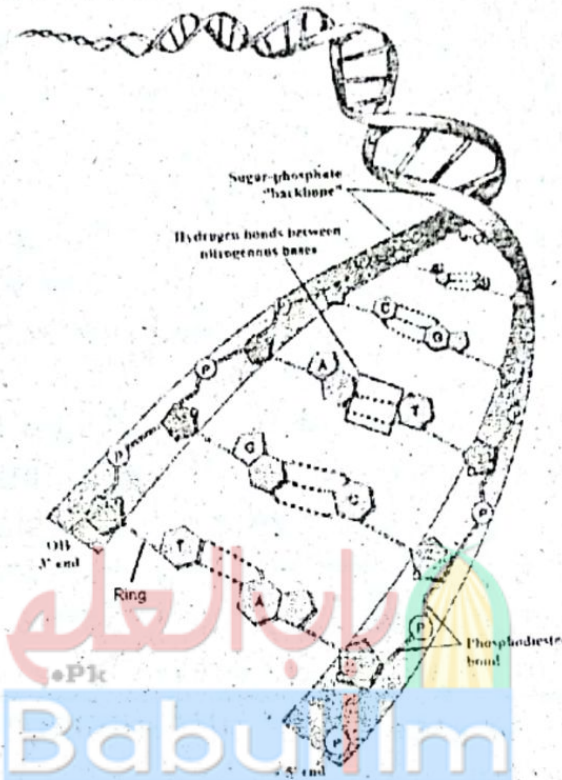
**Ans** **DNA Replication:**

The Watson-Crick model immediately suggested that the basis for copying the genetic information is complementarily. If one were to unzip the molecule, one could need only to assemble the appropriate complementary nucleotides on the exposed single strand to form two daughter complexes with the same sequences. This form of DNA replication is called semi-conservative, because while the sequence of the original duplex is conserved after one round of replication the duplex itself is not. Instead each strand of the duplex becomes part of another duplex. In semi-conservative replication, the two strands of the duplex separate out each acting as a model or mold, along which new nucleotides are arranged thus giving rise to two new duplexes. In this process by separation of two strands, primary



structure has been conserved, whereas the secondary structure has been disrupted.

The other hypothesis of DNA replication were also proposed. The conservative model stated that the parental double helix would remain intact and generate DNA copies consisting of entirely new molecules. The dispersive model predicted that parental DNA would become completely dispersed and that each strand of all the daughter molecules would be a mixture of old and new DNA.



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**Q.7.(a) Discuss peripheral nervous system of man. (4)**

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**Ans** **Peripheral Nervous System (PNS):**

It comprises of sensory neurons and motor neurons, which may form ganglia and the nerves. Ganglia are the concentrations of cell bodies of neurons. The nerves are the bundles of axons or dendrites, bounded by connective tissue. They may be sensory motor or mixed nerves depending upon the direction of impulse they conduct. In humans, there are 12 pairs of nerves, which arise from the brain, or lead to the brain. These nerves are called cerebral or cranial nerves. Some of these nerves are sensory, some motor, and some are mixed. From the spinal cord, 31 pairs of spinal nerves arise or lead to spinal cord. All these nerves are mixed having fibres of both sensory and motor neurons.



Motor neurons form somatic nervous system, which controls voluntary movements, which are under the conscious control of the body, involving skeletal muscles. Motor neurons also form autonomic nervous system, which controls involuntary responses by influencing organs, glands and smooth muscles. The autonomic nervous system is further divided into sympathetic nervous system and para sympathetic nervous system.

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(b) Describe deforestation.

(4)

**Ans** Deforestation and Afforestation:

"Clearance of vast areas of forest for procuring lumber, planting, subsistence crops or grazing cattle is called deforestation."

In developing countries like Pakistan, there is a population explosion. These rapid increase in population growth increase requirements for food and shelter. To overcome the basis need of more food, we are cutting trees to make way for agriculture and wood for houses. If the forest are cut down in the rate, leaf canopy, which protect the soil from the beating effect, of rain, will no longer exist. Consequently, some of the soil will be wasted by surface run off reaching streams and rivers.

The destruction of forest leaves the soil barren and this is called deforestation.

Nowadays, we are facing the problem of environmental pollution. Tree plantation is the only solution to make our environment more heat and clean. Numerous human activities have determinial effect on natural carbon silk.

The great forest of temperature and tropic biomass have been greatly reduced through harvesting parasite that exceeded rates of replacement. This reduction has decreased the number that through photosynthesis removed carbon as  $\text{CO}_2$  from the atmosphere and through their growth stored it as wood for a long period of life.

It is, therefore, necessary to replace the deforestation with reforestation i.e., tree may be replanted. Reforestation is especially important for many of the conifers species, which often require the bare soil to establish. In clear-cut areas, where



all of the trees have been removed, responding from stumps or seed germination may be protected for reforestation.

Afforestation is establishment of new forest where no forest existed previously.

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**Q.8.(a) Write a note on birth.**

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**(4)**

**Ans** Birth:

The total gestation period (pregnancy) is usually about 280 days.

Once the placenta is established, it starts secreting the progesterone hormone which maintains the pregnancy. Any disturbance in its secretion may lead to premature birth or miscarriage. Human embryo remains enclosed in amniotic sac filled with amniotic fluid which is protective and shock absorptive.

During this period, pituitary gland produces luteotropic hormone (LTH). Placenta also secretes human placental lactogen. Both these hormones stimulate mammary development in preparation for lactation.

From beginning of the 3<sup>rd</sup> month of pregnancy, the human embryo is referred to as the fetus. Most of the major organs are formed by the 12<sup>th</sup> week of pregnancy and the remainder of the gestation period is taken up by growth.

It was thought that hormonal activities within the mother *i.e.*, decrease in progesterone level onset the birth. But recent evidence suggest that there is a high degree of fetal involvement in the timing of birth. The initial stage of birth is the result of the stimuli from the fetal pituitary. The ACTH released from fetal pituitary stimulates the fetal adrenal gland to release corticosteroids, which cross the placental barrier and enter the maternal blood circulation causing a decrease in progesterone production. The reduction of progesterone level, stimulates the pituitary gland to produce oxytocin hormone. This induces labour pains, *i.e.*, contraction of the uterus wall. The release of oxytocin occurs in "waves" during labour and provides the force to expel the fetus from the uterus.

The cervix dilates and the uterine contractions spread down over the uterus and are strongest from top to bottom. Thus, pushing the baby downward leading to the delivery of the



baby. The umbilical cord is ligated and baby is released from the mother.

Within 10-45 minutes after birth, the uterus contracts and separate the placenta from the wall of the uterus and placenta then passes out through the vagina. This is called after birth. Bleeding, throughout this period, is controlled by the contraction of smooth muscle fibers which completely surround all uterine blood vessels supplying the placenta. Average loss of blood is about  $350 \text{ cm}^3$ .

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(b) Explain the ABO blood group system.

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**Ans** **Work of Landsteiner:**

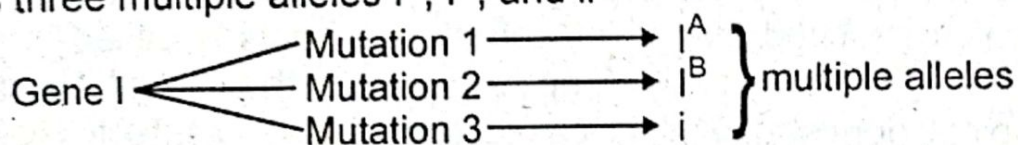
ABO blood group system (the first multiple allelic system) was discovered by Karl Landsteiner in 1901.

**Phenotypes of ABO system:** ABO system has four different phenotypes which are distinct from each other on the basis of specific antigens on the surface of RBC. A person having antigen A has blood group A, a person having antigen B has blood group B; a person having both the antigens A and B has blood group AB; but a person having neither antigen A nor B would have blood group O.

**Work of Bernstein**

Bernstein explained the genetic basis of ABO system in 1925.

**Genetic basis of ABO system:** This blood group system is encoded by a single polymorphic gene I on chromosome 9. It has three multiple alleles  $I^A$ ,  $I^B$ , and  $i$ .



Allele  $I^A$  specifies production of antigen A, and allele  $I^B$  specifies production of antigen B, but allele  $i$  does not specify any antigen. Their dominant relations are interesting too. Alleles  $I^A$  and  $I^B$  are codominant to each other; because each expresses equally in  $I^A I^B$  heterozygote to produce AB phenotype. But allele  $i$  is recessive to both  $I^A$  and  $I^B$ . Therefore  $I^A I^A$  or  $I^A i$  genotypes will produce phenotype A. Similarly,  $I^B I^B$  or  $I^B i$  produces phenotype B. The homozygous  $ii$  will produce phenotype O.



Blood types	Genotypes	Antigen on RBC	Phenotypes	Antibody in plasma
Blood Group A	$I^A I^A$ $I^A i$	A A	A Homozygous A Heterozygous	B B
Blood Group B	$I^B I^B$ $I^B i$	B B	B Homozygous B Heterozygous	A A
Blood Group AB	$I^A I^B$	A & B	AB	none
Blood Group O	ii	no antigen	O	AB

**Q.9.(a) Describe the phenomenon of growth correlation. (4)**

**Ans** **Growth Correlation:**

The development of a plant is usually correlated with its growth and different organs growing at different rates in different directions. Such reciprocal relationship is known as 'co-relation'.

One of the most important correlative effect in plants is apical dominance. In many plants, only apical bud grows while growth is suppressed in lower axillary buds. In an experiment, when apical bud was removed, the growth in the lower buds was inhibited. So active shoot apex controls the development of lateral buds. Thus, the auxin of the terminal bud is responsible for inhibiting the growth of lateral buds by a phenomenon known as apical dominance. Later Thimann and Skoog, in 1934, performed experiments and showed that apical dominance was caused by auxin diffusing from the apical bud which inhibited the growth of lateral shoots is called inhibitory effect. The removal of apex releases the lateral buds from apical dominance. It is called compensatory effect. Research has also indicated that not only auxin causes apical dominance, cytokinins also play important role in apical dominance and in many cases if cytokinins are applied directly on the inhibited bud, it allows lateral buds to be released from apical dominance. It is also seen that those plants that have dense growth of lateral branches, have very little apical dominance. As far as practical application of apical dominance is concerned, it plays an important role in tap root development, and the inhibition of sprouting of lateral buds (eyes) in potato tuber by applying synthetic auxin. In the later case, the sprouting of eyes



is prevented and storing period is increased from one to three years.

(b) How comparative embryology support the process of evolution? (4)

**Ans** **Comparative Embryology:**

Closely related organisms go through similar stages in their embryonic development. For example, all vertebrate embryos go through a stage in which they have gill pouches on the sides of their throats. At embryonic stage of development, similarities between fishes, frogs, snakes, birds, humans and all other vertebrates are much more apparent than differences. As development progresses, the various vertebrates diverge more and more, taking on the distinctive characteristics of their classes. In fish, for example, the gill pouches develop into gills; in terrestrial vertebrates, these embryonic structures become modified for other functions, such as the eustachian tubes that connect the middle ear with the throat in humans.

Comparative embryology can often establish homology among structures, such as gill pouches, that become so altered in later development that their common origin would not be apparent by comparing their fully developed forms.

