

Federal Board SSC-II Examination

Biology Model Question Paper(Curriculum 2006)

**SECTION – A (Marks 12)**

**Time allowed: 15 Minutes**

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

**Q.1 Encircle the correct option i.e. A / B / C / D. All parts carry equal marks.**

- (1) Inhaled and exhaled oxygen concentration differs with each other due to:  
A. Storage of Oxygen in lung tissue.  
B. Non-reactivity of Oxygen with blood.  
C. Liberation of Oxygen gas as a metabolic waste.  
D. Utilization of Oxygen during the aerobic respiration.
- (2) Which metabolic waste is deposited in the leaves of tomato plant?  
A. Ammonium phosphate      B. Calcium oxalate  
C. Magnesium phosphate      D. Calcium phosphate
- (3) In binary fission of Amoeba, the offspring lack genetic variation because they:  
A. Are limited in number      B. Are produced asexually  
C. Are unicellular organism      D. Contain a single chromosome
- (4) The single cell protein involves replication of all microorganisms EXCEPT:  
A. Virus      B. Bacteria  
C. Algae      D. Yeast
- (5) In chromatin, DNA wraps around a protein called:  
A. Actin      B. Fibrin  
C. Histone      D. Myosin
- (6) Apart from hearing, ear also performs the function of:  
A. Hormonal secretion      B. Memory  
C. Body balance      D. Osmoregulation
- (7) Hinge joint which allows movement in one plane only is present in:  
A. Neck      B. Hip  
C. Knee      D. Shoulder

- (8) Calcitonin and Parathormone work in collaboration with each other for the regulation of:
- A. Calcium in cell cytoplasm      B. Calcium in teeth  
 C. Calcium in bones                      D. Calcium in blood
- (9) Applying your knowledge of inheritance, pin point the correct genotype of round seeded true breeding pea plant:
- A. RR    B. Rr  
 C. rr    D. RR and Rr
- (10) Human immunodeficiency virus (HIV) causes acquired immunodeficiency syndrome (AIDS) in human beings by:
- A. Increasing the pH of blood  
 B. Decreasing the number of white blood cells  
 C. Increasing the division of red blood cells  
 D. Decreasing the oxygen carrying capacity of blood
- (11) The function of fungi in an ecosystem is to:
- A. Provide oxygen to producers  
 B. Return nutrients to the environment  
 C. Increase complexity of food chain  
 D. Decrease competition among consumers
- (12) If a patient has severe throat infection, which type of medicine is required?
- A. Sedative                                      B. Antibiotics  
 C. Vaccine                                        D. Narcotics

### Solution

|    |   |     |   |
|----|---|-----|---|
| 1. | D | 7.  | C |
| 2. | B | 8.  | D |
| 3. | B | 9.  | A |
| 4. | A | 10. | B |
| 5. | C | 11. | B |
| 6. | C | 12. | B |

Federal Board SSC-II Examination

Biology Model Question Paper(Curriculum 2006)

Time allowed: 2.45 hours

Total Marks: 53

Note: Answer any eleven parts from Section 'B' and attempt any two questions from Section 'C' on the separately provided answer book. Write your answers neatly and legibly.

**SECTION – B (Marks 33)**

**Q.2** Attempt any ELVEN parts from the following. All parts carry equal marks.(11 x 3 = 33)

i) What are the three main effects of air pollution on environment? Describe them brief.

**Ans. Effects of Air Pollution(Note: Write any three effects)**

**1. Global warming:**

Due to global warming, polar ice-caps and glaciers are melting faster. Sea water is also expanding causing sea levels to rise. Due to melting glaciers, rivers overflow and cause floods.

**2. Smog formation:**

Smog is a mixture of gases like hydrocarbons and nitrogen oxides. It forms a yellowish brown haze especially during winter and reduces visibility. It also causes many respiratory disorders and allergies as it contains polluting gases.

**3. Acid rains:**

Acid rain damages the stone structures. It harms the plants as it increase the soil acidity. It lowers the pH of water and aquatic organisms cannot survive at this pH.

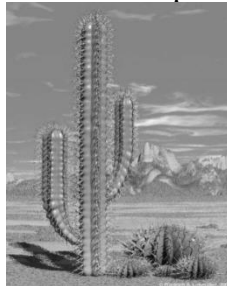
**4. Ozone depletion:**

Ozoneholes permit UV rays to reach the Earth's surface. The UV rays cause skin cancers, inflame the cornea and damage the all life forms including animals, plants, fungi and bacteria.

ii)a. Plants can be categorized on the basis of availability of water and salt.

Identify the group and habitat to which this plant belongs.

(1)



b. Which characteristics make its survival possible?

(2)

**Ans. a.** This plant belongs to **Xerophytes** that lives in dry environment.

**b. 1. Thick, waxy cuticle:** They possess thick, waxy cuticle over their epidermis to reduce water loss from internal tissues.

**2. Less number of stomata:** They have less number of stomata to reduce threat of transpiration.

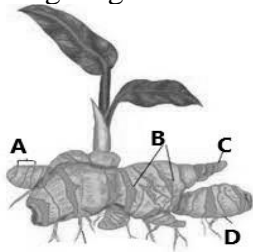
**3. Deep roots:** They have deep roots to absorb maximum water from soil.  
**4. Succulent organs:** Some xerophytes have special parenchyma cells in stems or roots in which they store large quantities of water. This makes their stems or roots wet and juicy, called succulent organs.

iii) Complete the table to associate the adaptations with the relevant flowers.

Ans.

|                   | <b>Insect pollinated flower</b>          | <b>Wind pollinated flower</b>                     |
|-------------------|--|---|
| Colour            | Brightly coloured                        | Dull coloured                                     |
| Stamen and stigma | Enclosed inside petals                   | Hang out of petals                                |
| Pollen grain      | Small number produced / Heavy and sticky | Large number produced / light with smooth surface |

iv) Following diagram shows the way of natural vegetative propagation.



- Label the parts A, B, C and D (1)
- Name this type of vegetative propagation and give example. (1)
- From which part shoot and root of new plant arise. (1)

Ans. a. A. Nodes B. Scale leaves  
 C. Bud D. Adventitious root

b. Type of vegetative propagation is Rhizomes. **Example:** Ginger, Ferns, water lilies

c. The buds present on the upper surface of rhizome give rise to shoot.

The lower surface of rhizome produces adventitious roots.

v) State the harmful effects of cigarette smoke on lungs and circulatory system.

Ans. Smoking is harmful due to the chemicals in cigarettes and smoke. Tobacco smoke contains over 4,000 -7,000 different chemicals, out of which more than 50 are carcinogens.

**Effects of smoking on lungs:**

- Smoking is the main cause of lung cancer. This risk of lung cancer is significantly lower in non smokers.
- Smokers are at greater risk of developing lung infections. For example, smoking increases the risk of tuberculosis and of pneumonia by many times.

**Effects of smoking on circulatory system:**

Smoking also has effects on the circulatory system.

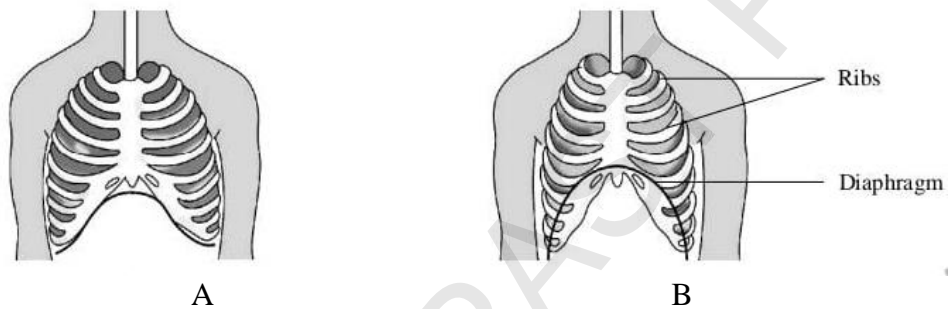
- The carbon monoxide present in tobacco smoke lessens the oxygen-carrying capacity of haemoglobin.
- Many other chemicals in smoke increase the production of blood platelets. When platelets are more than the normal numbers, they can make thrombus.
- It causes narrowing of arteries that can lead to arteriosclerosis and high blood pressure.

vi) Differentiate between the cross sectional views of brain and spinal cord, with reference to white and grey matter. (3)

Ans.

| Brain   | Spinal cord  |
|---|--|
| The <b>outer region</b> of brain is made of <b>grey matter</b> containing cell bodies and non-myelinated axons. | The <b>outer region</b> of spinal cord is made of <b>white matter</b> containing myelinated axons. |
| Beneath grey matter is present the white matter consisting of myelinated axons.                                 | The central region is made of grey matter, consisting of neuron cell bodies.                       |
| Grey matter is of irregular shape.  | Grey matter is butterfly shaped.   |

vii) Following diagram shows the two steps of breathing.



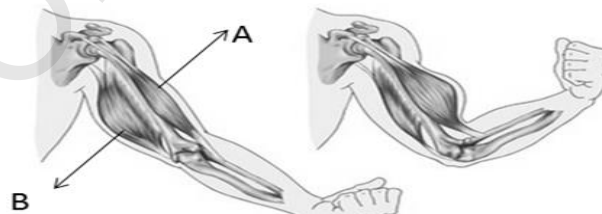
Which diagram (A or B) shows the process of inhalation? Support your answer with reasons. (3)

Ans. Diagram A shows the process of inhalation.

Reasons:

1. The ribs are raised because rib muscles are contracted.
2. The dome-shaped diaphragm is lowered because it is also contracted.
3. The area of the thoracic cavity is increased, which reduces the pressure on lungs.
4. As a result, the lungs expand and the air pressure within them decreases.
5. The air from outside rushes into the lungs to equalize the pressure on both sides.

viii)a. Mention the name of muscles at A and B. (1)



b. Elaborate the antagonistic movement of arm muscles. How do they cause the movement of elbow joint? (2)

Ans. a. A is biceps muscle and B is triceps muscle

b. **Antagonism:**

In an antagonistic pair, both muscles do opposite jobs. When one muscle contracts the other relaxes and this phenomenon is known as antagonism.

**Flexion:**

When a muscle contracts and bends the joint, it is known as flexor muscle and the movement is called flexion.

**Extension:**

When a muscle contracts and straightens the joint, it is known as extensor muscle and the movement is called extension.

**Biceps and triceps**

Biceps is a **flexor** muscle on the front of the upper arm bone while Triceps is an **extensor** muscle on the back of arm.

**Flexion of elbow**

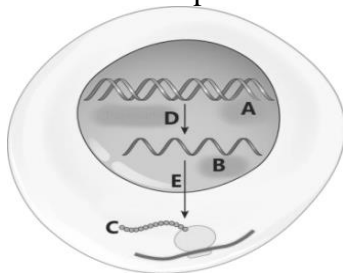
When biceps contracts, the forearm (insertion end) is pulled upward. It is the **flexion of elbow joint**. During this flexion, triceps muscle relaxes.

**Extension of elbow**

When triceps muscle contracts, forearm is pulled down. It is the **extension at elbow joint**. During it, biceps muscle relaxes. In this way, biceps and triceps make up an antagonistic pair of muscles.

ix) DNA is a genetic material that has instructions to direct all functions of cells.

- Identify the labeled parts A, B and C in the diagram. (1.5)
- Name the processes D and E. Describe them briefly. (1.5)



Ans.

a. A. DNA of chromosome                      B. mRNA                      C. protein

b. At **D**, The specific sequence of DNA nucleotides is copied in the form of messenger RNA (mRNA) nucleotides. This process is called **transcription**.

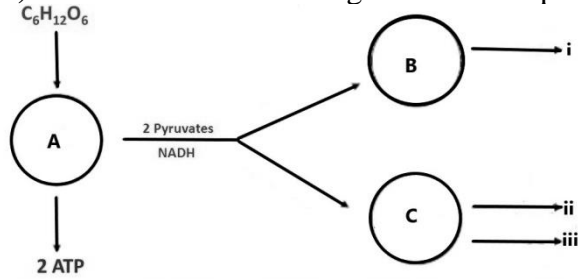
At **E**, The mRNA carries the sequence of its nucleotides to ribosome. The ribosome reads this sequence and joins specific amino acids, according to it, to form protein. This step is known as **translation**.

x) Complete the given table.

Ans.

| Blood group | Possible Genotypes         | Antigen Produced        | Relationship between alleles            |
|-------------|----------------------------|-------------------------|---|
| A           | $I^A I^A$<br>or<br>$I^A i$ | Antigen A               | Allele $I^A$ is dominant over $i$       |
| B           | $I^B I^B$<br>or<br>$I^B i$ | Antigen B               | Allele $I^B$ is dominant over $i$       |
| AB          | $I^A I^B$                  | Antigen A and Antigen B | Alleles $I^A$ and $I^B$ are co-dominant |
| O           | $ii$                       | No Antigen              | Allele $i$ is recessive                 |

xi) The flow chart is showing anaerobic respiration.



- Identify the processes A, B and C. (1.5)
- Mention the products (i), (ii) and (iii) produced by these processes. (1.5)

Ans. a. A. is glycolysis B. is lactic acid fermentation C. Alcoholic fermentation

b. i. Lactic acid ii. Ethanol iii. CO<sub>2</sub>

xii) Relate the given diagrams A and B with the specific disorder of eye. (1)



- Recognize the cause of the eye sight problem of the grandmother if she is unable to read the newspaper. (1.5)
- Suggest the lens to rectify this problem. (0.5)

Ans.

A. is Myopia B. is Hypermetropia

b. The cause of eye sight problem of grandmother is **Hypermetropia (Long sightedness)**. It happens when eyeball shortens. Such persons are unable to see near objects clearly. The image is formed behind retina.

c. Convex lens is used to rectify this problem.

xiii) Which type of symbiosis exists between lice and human being? Justify your answer with reasons and two relevant examples. (3)

Ans.

**Parasitism:** It is a type of symbiosis that exists between human being and head lice. In parasitism smaller partner (parasite) derives food and shelter from the body of larger partner (host) and, in turn, harms it.

Lice get food and shelter from the scalp of the human host. They feed on human blood and damage the scalp.

**Examples:** Ascaris and Entamoeba in the intestine, plasmodium in the blood.

- Visualize what would happen if there is no nitrogen fixing bacteria present in an ecosystem. How it will disturb the nitrogen cycle? (2)
- Which natural process would be stopped if denitrifying bacteria become extinct? (1)

Ans.a. Nitrogen is an important component of many biomolecules, like proteins and nucleic acids (DNA and RNA) so it is required for all life to exist. Living organisms cannot pick up the gaseous nitrogen directly from atmosphere. It has to be converted into nitrates to be utilised by plants. Some bacteria i.e. nitrogen fixing bacteria have the ability to transform

gaseous nitrogen into nitrates and ammonia, which is taken up by plants and transformed into nitrogenous molecules.

If there is no nitrogen fixing bacteria present in an ecosystem, normal flow of nitrogen cycle will be disturbed. Plants cannot get nitrogen and will be unable to grow properly. Consumers would not survive since they would have no way to obtain the nitrogen they need for their structural and functional growth.

**b.** The process of denitrification would be stopped if denitrifying bacteria become extinct. Denitrification is a biological process in which nitrates and nitrites are reduced to nitrogen gas by denitrifying bacteria. By this process, nitrogen is returned to atmosphere.

**xv)** Keeping in view the working of vaccine, summarize how does corona vaccine produce immunity in human body. (3)

**Ans.** A vaccine is a material containing weakened or killed pathogens and is used to produce immunity to a disease by stimulating the production of antibodies.

**The Mode of Action of corona Vaccines:**

1. When corona vaccine is injected, the pathogens having special proteins called **antigens** enter the body of host.
2. These antigens stimulate the immune response in host i.e. **B-lymphocytes** start producing **antibodies** against them.
3. Antibodies bind to pathogens and destroy them.
4. In addition, **memory cells** are produced, which remain in blood and provide protection against future infections with the same pathogen.

### SECTION – C

Note: Attempt any **TWO** questions from the following. All questions carry equal marks. (2 × 10 = 20)

**Q.3 a.** How are seeds produced from male and female gametophyte in angiosperms?

Explain the process with the help of diagram. (4+2)

Sporophyte generation produce spores by meiosis. The haploid spores develop into gametophyte. It produces gametes by mitosis.

**Male gametophyte:**

**1. Formation of microspore**

The anther contains sacs called **pollen sacs**. When the anther is developing, mitotic division produces **microspore mother cells**. A diploid mother cell by meiosis produces four haploid **microspores**.

**2. Formation of pollen grain**

A nucleus of microspore divides mitotically into two nuclei i.e. a tube nucleus and a generative nucleus. This two celled structure is called **pollen grain**.

**3. Formation of pollen tube**

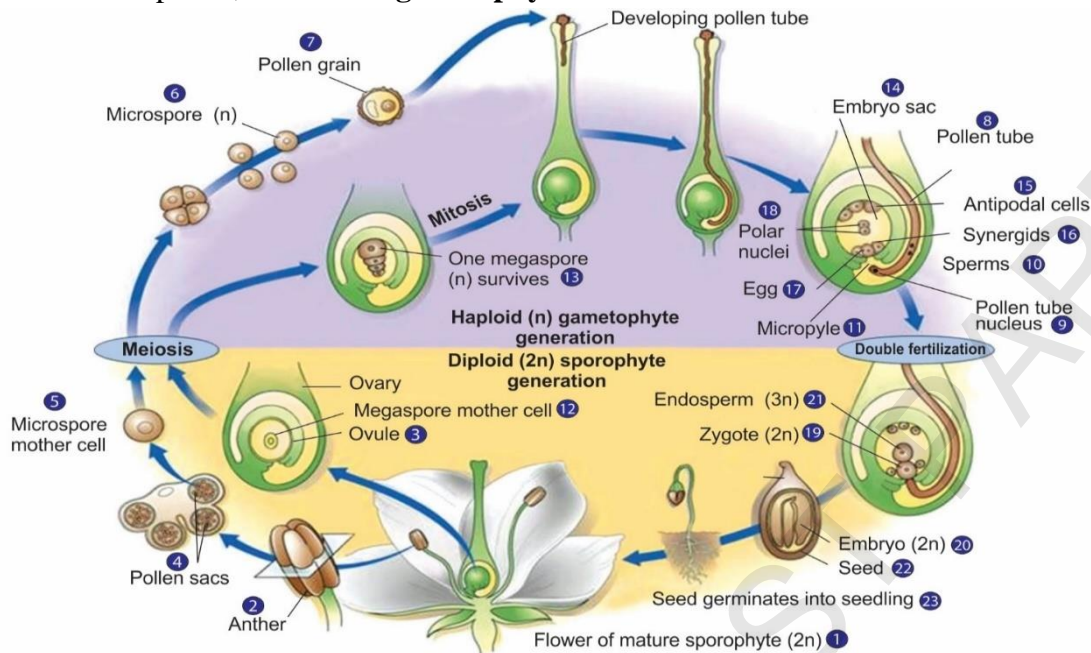
After pollination the pollen grains germinate on the stigma. Each pollen grain produces a **pollen tube**.

**4. Structure of male gametophyte**

The pollen tube grows down, through the tissues of the stigma, style and ovary until it reaches the **ovule**. As the pollen tube develops, the two nuclei of the pollen grain move into it. The two nuclei are **generative nucleus** and the **tube nucleus**. Generative nucleus divides to form two



**sperms** which are male gametes. The pollen grain with pollen tube, containing tube nucleus and the two sperms, is the **male gametophyte**.



**Life cycle of a flowering plant showing Gametophyte formation**

### Female gametophyte:

#### 1. Formation of macrospore

The **ovule** is an egg shaped structure attached by a stalk, to the inside of the ovary. It has an opening called **micropyle**. Certain cells of the ovule called **macrospore mother cell**, undergo meiosis to produce four haploid cells. Only one of these cells survives. The surviving cell is called **megaspore**.

#### 2. Formation of Embryo sac

The megaspore nucleus divides by mitosis three more times to produce a total of eight nuclei. At the centre of the ovule is the microscopic structure called **embryo sac**, having all the eight nuclei. Wall formation takes place and these nuclei are converted into cells. This eight celled structure is the **female gametophyte** or embryo sac.

#### 3. Structure of female gametophyte

There are three **antipodal cells** at the opposite end of the micropyle. They have no function. There are two cells called **synergids** at the end of micropyle. They help in fertilization by guiding the pollen tube. The **egg** is present between the two synergids. There are two **polar nuclei** placed in the centre. By the time egg is fertilized, the two polar nuclei combine to form a single **fusion nucleus**.

#### Fertilization and Seed formation

Soon after the tip of the pollen tube enters the embryo sac, the end of the tube ruptures and releases the two sperms into the embryo sac. One of the two sperms fuses with the egg to form a **zygote**. The second sperm moves to the centre and unites with the fusion nucleus. Union of one sperm with the egg and second sperm with the fusion nucleus is called **double fertilization**. It only occurs in the flowering plants. The zygote develops into an **embryo**. Within the ovule, the fusion nucleus develops into an **endosperm**. The embryo consists of

**radicle, plumule and cotyledon.** The ovule matures into a **seed**. The seed germinates into seedling to form a new flowering plant.

**b.** Antibiotics are very essential medicinal drugs. How does antibiotic resistance develop? Analyze serious effects caused by antibiotic resistance. **(3+1)**

**Resistance to antibiotics**

When bacteria are exposed to the same antibiotic for a long time, they acquire resistance against that antibiotic. Antibiotic resistance is accelerated by the misuse and overuse of antibiotics. Bacteria may acquire resistance in one of two ways: (a) Mutation (b) Transfer of resistance from one bacterium to another through transfer of plasmid during conjugation. As a result, the germs are not killed and continue to grow. Infections caused by antibiotic resistant bacteria are difficult, and sometimes impossible, to treat e.g., drug resistant TB and drug resistant Typhoid.

**Q.4 a.** Genetic engineering offers enormous benefits by producing the GMO. Apply the knowledge to identify the different steps of production of GMO. Illustrate it with the help of labelled diagram. **(3+3)**

**GENETIC ENGINEERING**

Genetic engineering or recombinant DNA technology is a set of techniques for combining in a test tube, genes from different sources even different species and transferring the recombinant DNA into cells, where it can be replicated and expressed. Genetic engineering can produce cells that contain recombinant DNA and are capable of producing new and different proteins. Genetic engineering is the altering the genetic constitution of an organism by modifying its own genes or introducing genes from a different species.

How Gene is transplanted?

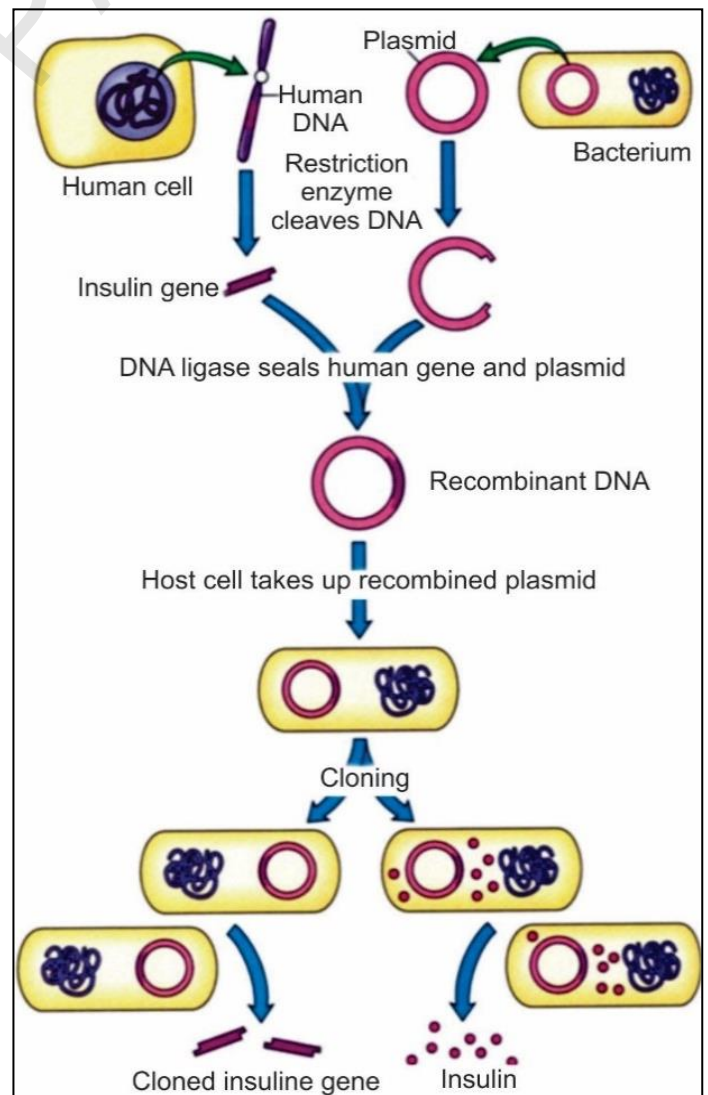
Following are the basic steps in genetic engineering for gene transplantation.

**1. Gene of interest**

A gene is identified that controls a trait in which scientists are interested. DNA containing that gene is collected from the donor organism that naturally has this gene.

**2. Vector selection**

Scientists isolate plasmid DNA (extra-chromosomal ring of DNA) from bacteria. This ring of DNA will carry the gene to the new organism. The plasmids or bacteriophage viruses can serve as a vector.



**Steps of genetic engineering**

### 3. Restriction endonuclease

The donor DNA and the plasmid DNA are mixed with restriction endonuclease enzyme (cutting enzyme). This enzyme cuts both kinds of DNA into pieces at special sequence.

### 4. Formation of recombinant DNA

The pieces of DNA which have complementary sequences join together to make a complete plasmid. This plasmid is now a ring of DNA that has a new gene in it so it is called recombinant DNA. DNA ligase (joining enzyme) is used to make bond between two types of DNA.

### 5. Transfer of recombinant DNA into host

The recombinant DNA is mixed with other bacterial cells. Some of these bacteria will take the plasmids into their cells by a process called **transformation**. The cells containing the gene are identified and separated. These are genetically modified organism (GMO).

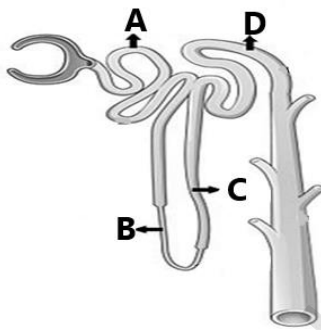
### 6. Growth of the GMO

Colonies of GMO are provided suitable growth conditions, as in fermenter.

### 7. Expression of the gene

The GMO contains the gene of interest and produces the desired product, which is separated from culture medium.

b. Nephron is the structural and functional unit of kidney. Explain the re-absorption of glomerular filtrate at A, B, C and D. Which processes are involved in it? (4)



**Selective reabsorption:** During reabsorption, about 99% of the water and the most of the solutes that enter the nephron are returned to the bloodstream, as the filtrate flows along the nephron. This reabsorption occurs through osmosis, diffusion and active transport. The substances needed by the body, particularly glucose and amino acids, are completely reabsorbed.

**A** is Proximal convoluted tubule. Some water and most of the solutes are reabsorbed from the proximal convoluted tubule.

**B** is descending limb of loop of Henle. It allows the reabsorption of water.

**C** is the ascending limb of loop of Henle. It allows the reabsorption of salts.

**D** is distal convoluted tubule. It allows more reabsorption of water in the blood.

Q.5 a. Draw and label the structure of eye. Give detail of each layer of eye. (3+3)

### Internal Structure of the Eye

Eye ball is made of three layers.

### Outer layer:

**Sclera** is the first and the outer most tough, white fibrous layer. It forms the white portion of the eye.

**Cornea** is the transparent bulging disc in the front part of the sclera.

### Middle layer:

**Choroid** is the second layer of the eye, lining the inside of the sclera. This contains a network of blood capillaries. The choroid is black pigmented layer which prevents internal reflection of light. The anterior end of the choroid is modified to form the **ciliary muscles** and the **iris**.

**Iris** is a circular, disc-shaped structure with a round hole called **pupil** in the centre. The pupil allows light to pass into the eye. The colour of the iris may vary, usually between blue to grey and green to brown.

**Biconvex lens** is present behind the pupil. The lens is held in position by **suspensory ligaments**, and ciliary muscles. The shape of the lens can be altered by contraction and relaxation of the ciliary muscles.

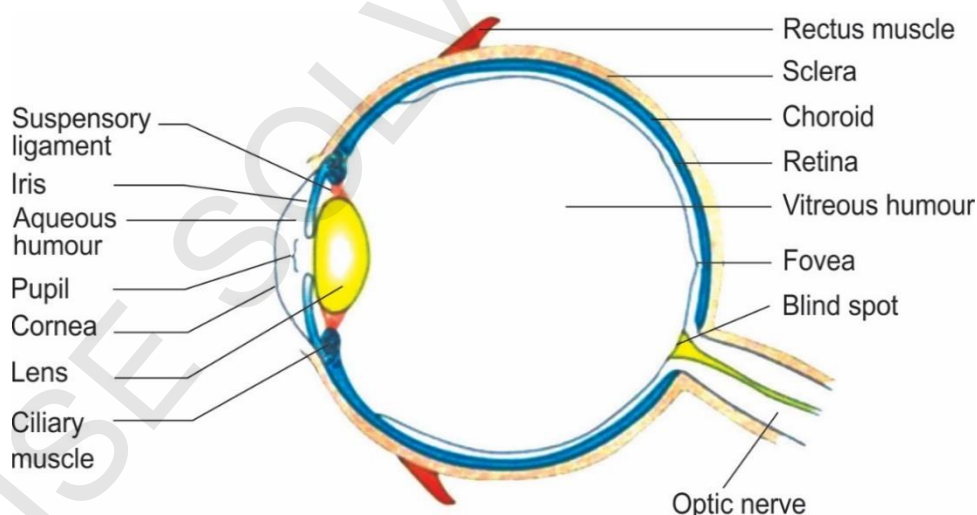
### Inner layer:

**Retina** is the third and inner most layer of the eye ball. The cells of retina are sensitive to light. There are two types of light sensitive cells, according to their shapes called **rods** and **cones**. The cones are sensitive to high intensity coloured light and rods are sensitive to light of low intensity.

**Blind spot** is found over the optic nerve where it enters the eye. It has no photoreceptors, so it is not sensitive to light.

**Fovea** is a small depression in the centre of the retina. It contains mostly cones so it produces sharp images. It is a yellowish area so it is also known as **yellow spot**.

The lens divides the eye balls into two **chambers**. The small chamber in front of the iris and the lens is filled with a watery fluid known as **aqueous humour**. The larger chamber behind the lens is filled with a transparent jelly fluid, is known as **vitreous humour**. Both the chambers keep the eyeball firm and refract light.



**Fig:** Internal structure of human eye

**b.** Skeleton provides protection and support for animal body. Describe the bones of the axial skeleton in human. (4)

**Answer:** There are 206 bones in the human skeleton. The skeleton is divided into axial and

appendicular skeleton.

**Axial Skeleton**

The axial skeleton forms central axis of the body and consists of 80 bones.

The **skull** is formed by 8 cranial and 14 facial bones. There are 6 middle ear ossicles, three in each ear.

A **Hyoid bone** is present in the neck region. It is the only bone of the body that does not articulate with any other bone.

**Vertebral column** consists of 26 bones called vertebrae.

**Rib cage** is composed of 12 pairs of ribs and the sternum.

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