

HIGHER SECONDARY SECOND YEAR  
HALF YEARLY EXAMINATION 2014-2015  
BIOLOGY- ZOOLOGY KEY ANSWER

-----Part II

[Zoology] Section A

Choose and write the correct answer

1. Superior colliculi
2. Vitamin B12
3. Glycogen
4. Chemical messenger
5. Development of pure culture technique
6. African sleeping sickness
7. 3-4 genes
8. Multiple sclerosis
9. Protein
10. Hydrogen
11. 4<sup>th</sup>
12. Orchid Bees
13. Jersey
14. Tilapia[Oreochromis mossambius]
15. Desi
16. Jean Baptiste Lamarck

Section B

17. Name three concentric zone of adrenal cortex in adult

In adults three concentric zones are discernible within the cortex. 1. A thin outer most layer, the Zona glomerulosa, 2. A thick middle region, Zona fasciculata and 3. A relatively thick inner layer, the Zona reticularis.

Tilapia[Oreochromis mossambius]

19. A good chemotherapeutic agent posses the following characteristics:

1. It destroys or prevents the activity of a disease causing pathogen, without injuring the host tissues
2. It is able to penetrate the cells and tissues of the host and can encounter the pathogens in effective but safe concentrations or dosage.
3. It leaves the hosts natural defense or immune mechanisms such as phagocytosis or antibody production, unaffected.

20. Immune suppressive drugs

immunosuppressive drugs like cyclosporin and steroids etc to the host,

21. Phagocytic barrier

Phagocytosis is an important mechanism of innate immunity. It is performed by leucocytes. In response to pathogenic infections, the total count of leucocytes will increase sharply. Humans contain wandering phagocytes that circulate throughout the body. The most important phagocytes are the macrophages and the neutrophils.

22.c DNA

In cDNA copies of messenger RNA are made by using reverse transcriptase enzymes. The cDNA libraries are smaller than genomic libraries and contain only DNA molecules for genes.

23. Pedegree chart

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24. Reverse osmosis

Reverse osmosis (forcing water underpressure through a semipermeable membrane whose tiny pores allow water to pass but exclude most salts and minerals.

## 25. Bubble Boy Syndrome

The children suffering from the syndrome completely lack the immune defense mechanism against infection due to rapid death of all white blood cells. SCID is also called Bubble Boy Syndrome.

## 26. cattle classification

Cattles are classified under three groups based on the purpose they serve to man. They are Dairy breeds, Dual purpose breeds and Draught breeds.

## 27. Sphygmomanometer

Uses:

1. Sphygmomanometer helps to estimate the state of blood circulation and the working of heart.
2. Sphygmomanometer helps to diagnose pathological conditions such as hypertension (increased BP) and hypotension (reduction in BP).

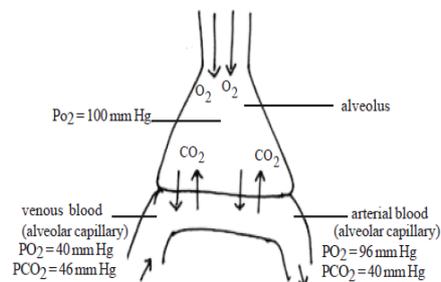
## 28. bottleneck effect

Hence interbreeding between members of small and larger populations may not be possible. The small population might have evolved into a new species. This type of genetic drift is referred to as bottleneck effect.

### SECTION C

## 29. Gaseous exchange in the alveoli Once the air is within the lungs the process of gaseous exchange

begins. Capillaries of the pulmonary artery remains close to the wall of the alveoli. This enhances the exchange of gases. Oxygen carbon-di-oxide water vapour Inhaled % 21.00 0.04 variable Exhaled % 15.7 3.6 saturated



Oxygen and carbon-di-oxide are exchanged across the alveolar membrane by diffusion from the site of higher to low partial pressure until the partial pressure of the two regions are equal. This process is a simple physical one which does not involve any secretory or active transport mechanism. In the atmospheric air there is a high concentration of oxygen 20-95% (PO<sub>2</sub> 140mm Hg) while the proportion of carbon dioxide is low (0.04%). The alveolar PO<sub>2</sub> is about 100mm Hg and the PO<sub>2</sub> of venous blood is about 40mm Hg. This pressure gradient is sufficient for the transfer of O<sub>2</sub>. The PCO<sub>2</sub> of venous blood is 46mm.Hg and that of alveolar air is only 6mm.Hg (1/10th of O<sub>2</sub>), it is adequate for CO<sub>2</sub> transfer by diffusion. CO<sub>2</sub> diffuses 20 times faster than O<sub>2</sub>

## 30. The Pathogenic adaptations

The Pathogenicity of the microbes is due to several phenomena or adaptations.

1. Pathogens are able to selectively attach to the external surfaces such as the skin and conjunctiva or the internal surfaces such as the mucus membranes of the respiratory, gastrointestinal or urinogenital tracts.
2. They also penetrate the above body surfaces and gain access to the internal tissues.
3. In some infections, the pathogen may remain localized, growing near its point of entry into the body.
4. Some pathogens become widely distributed in different tissues or organs. This is called generalized infections.
5. Some other pathogens can grow within the cells of host, causing severe disturbances to normal physiological processes.

## 31. Classification of grafts : The graft can be classified into four major types.

1. Autograft : The tissue of the original donor is grafted back into the same donor. For example, skin graft from thigh to face in severely deformed case of burnt individuals (plastic surgery).
2. Isograft : Graft between syngeneic individuals (ie., identical genetic constitution). For example, clones or identical twins.

3. Allograft : (Homograft). Graft between allogenic individuals (ie., members of the same species but of different genetic constitution. For example, kidney transplanted from one human to another.

4. Xenograft : (Heterograft). Graft between xenogenic individuals (ie., different genetic lineage). For example organ transplanted from pig to human, baboon to human.

### **32. Albinism :**

It is an inherited disorder of melanin metabolism characterized by the absence of melanin in the skin, hairs and eyes. The clinical characteristics of this disease are the milk-white coloured skin and marked photophobia. Albinism is an inborn error metabolic disease, In this, the genes by undergoing mutation do not produce particular enzymes, which take part in the metabolic pathways. The metabolism of one amino acid phenylalanine proceeds in chains of enzyme-mediated reactions. The change or absence of enzyme due to defective genes, results in physiological abnormalities. In albinism, complete lack of melanin pigment (a dark brown pigment) causes the albino to suffer. The incidence of albinism in human has been reported to be from 1:5000 to 1:25000. The albinism may be generalized albinism, localized albinism of the eye (ocular albinism) or partial albinism (skin and hair). The recessive genes 'aa' do not produce the tyrosinase enzyme, which converts DOPA (3,4 – dihydroxy phenyl alanine) into melanin in the melanocytes

### **33. Gene mutation in evolution**

Since proteins perform several functions, they determine many of the characteristics of organisms. The role played by a protein is largely determined by its primary structure. The primary structure is due to the sequence of amino acids in its molecule. This structure in turn determines the three dimensional protein molecule. The conformation determines the protein function. The basic sequence of amino acids in proteins is precisely regulated by the genetic code. Any change in the code due to gene mutation will result in the production of abnormal proteins. The abnormal proteins thus formed may be either beneficial or harmful. A gene producing a beneficial protein confers an advantage on its possessor. Gradually its frequency increases in a population. Individuals having harmful mutations may not survive to reproductive age. So, such mutated genes are not passed to the next generation. The mutations are considered as the 'raw materials' for evolution. They help to create and provide variations in a population along with genetic recombinations. The collection of genes in a population is referred to as the 'gene pool'. Mutations enrich the gene pool with new modified genes. A large scale accumulation of such genes will lead to evolutionary modifications.

### **Section - D**

### **34. Define bone fracture**

Fracture is defined as a break or crack in the bone. Trauma or injury to the bones of human body is getting increased with the development of industry and transportation. Trauma is the biggest killer and maimer of human beings all over the world. Hippocrates in the 4th century B.C. described the treatment of fractures and injuries to limbs.

#### **Mechanism of fracture :**

A fracture can be caused either by direct violence or indirect violence. Direct violence causes a fracture at the site of impact of the force. Indirect violence fracture is one that is transmitted to a bone away from the site of impact and producing the fracture there. Torsion produces spiral or oblique fracture. It is important to understand the mechanism of fracture as it helps in deciding the manoeuvres for reducing further damages. When a man falls down from a building or from a coconut tree he sustains a fracture on bones and the spine. The fracture of bone is caused by direct violence and the fracture spine is caused by indirect violence.

## Healing of Bones in fracture :

It involves three phases, viz.,

1. Inflammatory phase
2. Reparative phase
3. Remodelling phase.

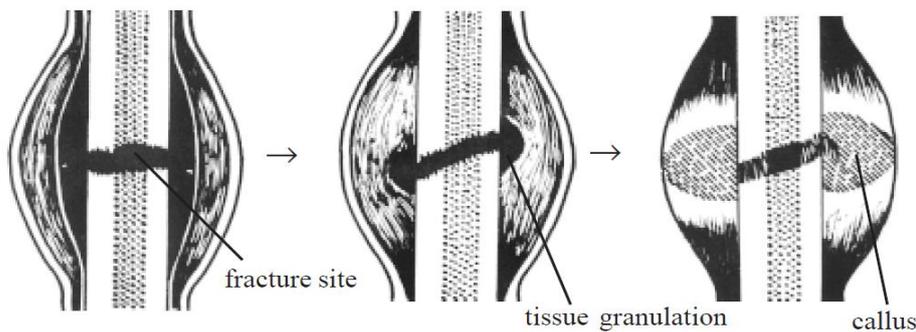


Fig.1.7. Healing of bone in fracture

**1. Inflammatory Phase** : - When a fracture occurs, at the site of fracture the blood vessels get broken and the blood fills up the gap of the bone. This blood clots to form a haematoma. This process takes place in one to two days. The soft tissue of this region undergoes inflammation.

**2. Reparative Phase** : - A stage of callus is formed. It bridges the gap and establishes contact between the ends of fractured bone. The callus is nothing but granulation of tissues around the site of fracture. This phase takes place about eight to twelve weeks.(Fig. 1.7)

**3. Remodelling phase** : - Once the fracture is bridged by the callus tissue, the site of fracture undergoes remodelling by muscular and weight bearing stresses and slight deformity gets corrected by moulding. This remodeling takes up to one year. Physiotherapy and rehabilitation

**Physiotherapy is the therapeutic exercise to make the limbs work**

Normally. Therapeutic exercise is carried out by physiotherapists under the supervision of orthopaedic surgeon. The common problem at the end of fracture treatment is the wasting of muscles and stiffness of joints. These two problems can be rectified by physiotherapy, by gradual exercises.

### 35. Parathyroid gland

In man the parathyroid glands are small oval yellow-brown bodies found attached to the posterior surface of the thyroid gland. The parathyroid glands secrete two hormones namely, 1.

Parathormone and 2. Calcitonin.

#### Parathormone:

Purified parathormone is a simple polypeptide chain. It has short duration of biological activity. The half-life of the hormone is of about 20-30 minutes only.

#### Physiological effects of Parathormone:

Parathormone manifests its regulatory effects at three different loci in the body namely the skeleton, kidneys and the gastro intestinal tract. In skeleton, the hormone directly acts upon the bone tissue to stimulate the activity of osteoclast cells (bone destroying cells). Under the influence of this hormone calcium is released from the bone matrix into the circulation. As a result plasma calcium level increases. Thus it helps in the skeletal remodeling In kidney, parathormone induces a marked increase in phosphate excretion. In the gastro intestinal tract, parathormone stimulates the absorption of calcium and phosphate from the gut by enhancing the vitamin D synthesis. As a result, more phosphate and calcium are transported into the blood stream. Its other physiological effects include its inhibitory action over the osteoblasts or bone forming cells, bicarbonate reabsorption and reduction of urine pH, etc.

#### Calcitonin:

It is a calcium-lowering hormone secreted by the parafollicular cells of the parathyroid gland. It is a protein. Its physiological effects are antagonistic to that of parathormone. It inhibits bone resorption. In kidney, it inhibits the reabsorption of calcium, phosphorus, sodium, potassium, magnesium and other ions. It decreases gastric HCl secretion. It also decreases the insulin and glucagon secretion.

#### Hyperparathyroidism

It is a condition where there is an increased amount of parathyroid hormone in circulation. Excess secretion of parathormone brings about demineralization of the bones. The protein matrix of the

bone is also absorbed. These changes result in bone cyst and the elevation of the calcium level in the blood. The latter causes calcification of kidneys, arteries, stomach and lungs.

#### **Hypoparathyroidism**

Removal of parathyroids causes the blood calcium levels to fall and results in tetany. Tetany is characterized by low serum calcium (Hypocalcemia), reduced urinary excretion of calcium and phosphate, neuromuscular hyperexcitability, spasms of muscles and cramps etc.

#### **36. Green house gases and Green house effect :-**

The trapping of energy from the sun by certain gases in the atmosphere leading to the rise in earth's temperature is known as Green house effect. Hence these gases are known as green house gases. Some gases such as water vapour, carbon dioxide, nitrous oxide and methane act as the trap. These gases absorb and reflect infra-red waves radiated by earth. By doing so, these gases conserve heat as the glass in a green house does.

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#### **Effects of Global warming :-**

1. Due to the warming of oceans, sea level will rise. Glacier ice will also melt, causing further rise in sea level. As a result in the 21st century sea level will rise from 9 to 88 cm. Such a rise will submerge many parts of countries.
2. Seasons will be longer in some areas.
3. The warmed world will be generally more humid and greater humidity will increase the rainfall.
4. Storms are expected to be more frequent and intense.
5. Some regions of the world would become dry.
6. Wind blows will be harder and in different patterns. Hurricane would be more severe.
7. Weather patterns would be less predictable and more extreme.
8. Crops and forests may be affected by more insects and plant diseases.
9. Animals and plants will find it difficult to adjust to the changed environment. Animals will tend to migrate toward the poles and toward higher elevations.
10. Some types of forests may disappear.
11. More people will get sick or die from heat stress.
12. Tropical diseases such as malaria, dengue fever, yellow fever and encephalitis will spread to other parts of the world.

#### **37. Common diseases and control :**

Cattle are subjected to a large number of diseases. Cattle in normal health appear bright, alert and active in their movements with a shiny coat. They also enjoy normal appetite and sleep. Cattle in ill health appear dull, restless and change posture frequently with a drop in milk yield. **Contagious diseases** : The diseases which spread easily by various modes are called contagious diseases. These diseases are of bacterial or viral origin. The bacterial diseases are **anthrax, haemorrhagic septicemia, mastitis and tuberculosis**. The viral diseases are **cow pox, foot and mouth disease and rinderpest**. **1. Anthrax** : Anthrax, a bacterial disease is due to  $\beta$  anthracis which causes sudden death in cattle.

**Symptoms** : High temperature (41-41.5°C), swelling of the neck, thorax, flanks and lumbar regions which are neither hot nor painful. Blood discharges from natural openings, the affected animal dies in 10 to 36 hrs. **Control** : Vaccination with spore vaccine at the age of 6 months and then annually. Affected animals are to be segregated, contaminated place to be disinfected and the carcasses to be buried deep. **2. Cow pox** is a contagious viral disease attacking cows and buffaloes.

**Symptoms** : Retarded rumination, swelling of udder and teats, rise in temperature, eruptions on skin and udder and teats developing into vesicles, pustules and scabs by stages ultimately leading to mastitis and loss of milk. **Prevention** : Segregation of affected animal, giving sloppy food for swallowing and digestion,

fomenting udder with warm disinfectant solution, giving saline laxative and diuretics, treating lesions with mild antiseptic ointment. Cow shed should be kept clean. 3. External parasitic diseases : Common ectoparasites are flies, ticks, mites, fleas and lice. They are directly involved by sucking the blood from cattle and become an irritant. They are also indirectly involved in transmitting

**bacterial, viral and protozoan diseases.**

Internal parasitic diseases : Hook worm, round worm, tape worm and flukes are some of the intestinal parasites causing diarrhoea, dysentery and some other complications. Non-contagious diseases : The diseases which does not spread by external modes but are caused by physiological or genetical means is known as non contagious diseases.

**1. Milk fever** : Milk fever is common in high milk producing cows and buffaloes during the early part of the lactation. It is due to inability of the animal to assimilate calcium from the feed, leading to demineralization in the bone. The serum Ca and P levels become low and the sugar level gets increased.

**Symptoms** : Staggering, loss of appetite, temperature becoming below normal, pulse rate becoming high, restlessness and become inactive. **Precaution and first aid** : Feeding jaggery along with lime water, few days prior to calving and giving soft nutritious and easily digestible food for a few days after calving prevents milk fever. Cleaning the udder with warm cloth and preventing infection from the floor. Pumping clean air into the udder and massaging are other measures to be adopted.

**2. Constipation** : Constipation is severe due to over eating of coarse fibrous roughages, inadequate intake of water and lack of exercise. Which leads to lack of appetite, lack of rumination or chewing and dull appearance.

**Precaution and first aid** : The affected animals can be given wheat bran meal or rice gruel and succulent fodder. Plenty of drinking water with jiggery or salt, evacuating the rectum by giving warm soap water enema and massaging the abdomen are the other measures of treatment.

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