

# BIOZOOLOGY

## (BLUE PRINT)

UNIT	SUBJECT	MARKS				TOTAL
		1	3	5	10	
1	HUMAN PHYSIOLOGY	4	6	5	20	35
2	MICROBIOLOGY	3	3	5	-	11
3	IMMUNOLOGY	1	6	5	-	12
4	MODERN GENETICS	2	9	5	-	16
5	ENVIRONMENTAL SCIENCE	2	3	-	10	15
6	APPLIED BIOLOGY	3	6	-	10	19
7	THEORIES OF EVOLUTION	1	3	5	-	9
	TOTAL	16	36	25	40	117

## STAGE - I

### BIOZOOLOGY

To Score 20 Marks

UNIT	SUBJECT	1- MARK	3- MARK	5- MARK	10- MARK	TOTAL MARKS
2	MICROBIOLOGY	3	1	1	-	11
3	IMMUNOLOGY	1	2	1	-	12
4	MODERN GENETICS	2	3	1	-	16
	TOTAL	6				39

1. A study of modern Genetics with its **29** **Three marks** questions would fetch **9 marks**.
2. By learning 28 question in Immunology **2** **Three marks** questions could be answered.
3. A study of Microbiology fetch 15- five marks on the whole ( $1*3=3$ ,  $3*1=3$ ,  $5*1=5$ ) and 41 three mark questions.  
Five marks questions also figure or find place in 3 mark questions in which case one could score three marks by writing any valid three points.

**STAGE - II**  
**BIOZOOLOGY**

**To score 40 marks**

UNIT	SUBJECT	1 MARK	3 MARK	5 MARK	10 MARK	TOTAL
5	ENVIRONMENTAL SCIENCE	2	1	-	1	15
6	APPLIED BIOLOGY	3	2	-	1	19
	TOTAL					34
		39+34				73

1. The lesson on Environment with 31 pages carries 10 mark(1), three marks (1), and one mark (2). This being a topic of human interest students could easily score marks by their own study.
2. Applied Biology carries two 3 mark questions. The lesson Applied biology carries one 10 mark, two 3 marks and three 1 marks. Student have to learn thoroughly and Concentrate on milk production, lactation periods, and names of cattles , poultry breeds , fishes.

**STAGE III**  
**BIOZOOLOGY**

**To score 75 marks**

UNIT	SUBJECT	1 MARK	3 MARK	5 MARK	10 MARK	TOTAL
1	HUMAN PHYSIOLOGY	4	2	1	2	35
7	THEORIES OF EVOLUTION	1	1	1	-	9
	TOTAL					44

- Those willing to study Evolution instead of MicroBiology could do so. Those who aim to sure centum (75/75) should concentrate on Lessons from 2 to 6. However 1 mark questions in Lessons 1 and 2 do count.
- As per the blue print, from the first unit human physiology questions are take for 35 marks. So the students should concentrate more in this part. To learn human physiology in an easy way with cohesion and coherence knowledge of human anatomy is must. So recall the human anatomy studied in eleventh standard and then start to read human physiology in twelfth standard. This unit is biggest one with 92 pages. It is suggested to divide this into sub units 1. Nutrition and Digestion 2. Bones and Joints 3. Muscles 4. Respiration 5. Circulation 6. Nervous co-ordination 7. Chemical Co-ordination 8. Receptor organs 9. Excretion 10. Reproduction. In this module questions are given to practice. It will be very convenient to concentrate, recall and to reproduce.
- Students have to learn deeply similar questions with different answers. For eg. Diabetes mellitus occur in Endocrine system and in Excretion. Oestrogen, Progesterone and Testosterone in Endocrine gland and in reproductive system.

## STAGE – I

### 3 - Marks Questions and Answers

#### 2. MICROBIOLOGY

**1. Define Micro Biology.**

It is science that deals with the structure, shape, reproductive methods, culture technics of micro organisms and bacteria and virus.

**2. What is the use of pure culture?**

- 1.To separate out single cells of a strain of bacteria.
- 2.Used in fermentation of alcohol and fixation of N<sub>2</sub> in soil by bacteria.
- 3.It is bases of modern micro biology.

**3. What is diploid cell culture?**

Diploid cells are derived from lungs, kidney of embryonic cells. Used in the manufacture of vaccine as host cells.

**4. What is Amoebiosis ?**

- (i) An internal protozovan parasite of the class – sarcodina
- (ii) It is caused by Endomoeba histolitica
- (iii) It causes Amoebic dysentery.
- (iv) Prophoside is the infective stage.

**5. What is zoo- Anthroponoses?**

- (i) Infection from Animals to Human.
- (ii) Man is an important link in the life style.
- (iii) e.g. Taenia soliam

**6. Mention important Anti Biotics.**

- (i) Amphilicin (i) Erithromicin (iii) Detrocyclin (iv) Streptomycin

**7. Dignostic test of Aids?**

- (i) ELISA test and WESTERN BLOT test.
- (ii) Wester blot test confirms AIDS

**8. What is zoonoses?**

- (i) Parasetic infection from animals to human.
- (ii) E.g. Rabies

**9. What is pure culture?**

By serial dialution method a single cell separated out from a colony and cultured and isolated.

**10. What is Lytic, Lysogenic cycle?**

- (i) In Lytic cycle the bacterial cell walls is desolved
- (ii) In Lysogenic cycle viaral jeeno integrates with bacterial genome

**11. Mention the inventions of Louie Pasteur?**

1. Germ Theory of Disease
2. Vaccination for rabies, chicken pox cholera, Anthrax in Sheep
3. Pasteurization of milk
4. Attenuation of infective agents

**12. Mention the contribution of Koch**

- 1 Solidified media
- 2 Discovered the pathogens of Tuberculosis ,Diphtheria and Tetanus.
- 3 His finding also lead to immunization therapy.

**13. What is CHICKEN EMBRYO TECHNIQUE?**

1. Fertilized eggs of 5-12 days are chosen
- 2 .Virus is inoculated in to the egg under aseptic conditions and incubated at a temperature of 36<sup>o</sup> Celsius
3. The whole is sealed by paraffin

**14. Why virus is called an obligate parasite ?**

1. virus could not be cultured in artificial media
2. It could be cultured only in live plant or animal cells and hence are called obligate parasites

**15. What is an Oncogenic virus?**

Virus that causes cancer is called Oncogenic virus. E.g. Adeno virus, poliyoma virus, Epstein barr virus. RNA virus – roves sarcoma .

**16. How Rabbis spreads ?**

Rabbis infected animals like dogs, bats when they bite normal healthy domestic and wild animals it spreads .

**17. What are the symptoms of Rabbis?**

- (i) High fever and headache.
- (i) Hydrophobia
- (iii) Nervoursness
- (iv) Confused state of mind
- (v) Trembling of throat and chest muscels

**18. Write short notes on Variola virus**

- (i) It is a smallpox virus .
- (i) Its spread through dropleds .
- (iii) Vaccination by Vaccinia virus.

**19. What are the Various shapes of Bacteria?**

- (i) Coccus – Round shaped and its kinds.
- (ii) Baccillas – Rod shaped and its kinds.
- (iii) Comma – Comma shape
- (iv) Vibrio - Spiral shaped

## 20. What is a synthetic media?

- (i) Synthetic media is a chemical media made of carbohydrates, protein, vitamins, nucleic acid etc.
- (ii) It supports the nutritional requirements of microorganisms.

## 21. What is bacterial transformation?

- Bacterial transformation is a process in which cell-free or naked DNA containing the genetic information is transferred from one bacterial cell to another.
- It was discovered by an English health officer, Griffith in 1928.

## 22. What is Transduction?

In Transduction, bacteriophages act as a vector to transfer a portion of DNA from one bacterium (donor) to another (recipient).

## 23. What is generalized Transduction and specialized Transduction?

- If all fragments of bacterial DNA have a chance to enter a transducing phage, the process is called **Generalized transduction**.
- On the contrary, if a few restricted genes of the bacterial chromosomes are transduced by bacteriophage, it is called **specialized transduction**.

## 24. What are the symptoms of cholera?

Symptoms of cholera are vomiting, profuse diarrhoeal stool (rice water stool). Which results in severe dehydration, loss of minerals, increased blood acidity and haemoconcentration.

## 25. What are the two types of plague?

- Plague is caused by the bacterial species *Yersinia pestis*, a non-motile gram-negative bacilli.
- There are two types of plagues. They are **bubonic plague** and **pneumonic plague**.
- Bubonic plague is characterized by enlarged and inflamed lymph glands (Bubos). The symptoms are shivering, fever, nausea, vomiting and general weakness. In untreated cases, the bubonic plague can cause 58% mortality.
- Pneumonic plague is a pneumonia characterized by a thin watery sputum with bright red streaks of blood. The mortality is 100% in untreated cases.

## 26. Write short notes on Syphilis?

- The disease syphilis is a well-known and dreadful sexually transmitted disease (STD). It is caused by *Treponema pallidum*.
- Syphilis occurs only in humans and is transmitted by direct sexual contact (Venereal syphilis) or through placenta from an infected mother to the foetus (Congenital syphilis). Venereal syphilis progresses in three stages viz., primary, secondary and tertiary stage.
- The symptoms are very prominent in the tertiary stage. It will lead to blindness, loss of hearing, brain damage, insomnia, headache and delusions and spinal cord damage.

**27. Write short notes on Gonorrhoea?**

- Gonorrhoea is another sexually transmitted disease caused by *Neisseria gonorrhoea*.
- In the males the primary site of infection is the urethra.
- In the female it is the cervix. It causes pain during urination and a yellowish discharge from the urethra of males.
- In females also it causes painful urination and vaginal discharge.
- Other symptoms are fever, abdominal pain, arthritis, meningitis etc.

**28. Give particulars about other protozoan disease? Other pathogenic protozoans**

1. *Trypanosoma gambiens* - causes African sleeping sickness
2. *Leishmania donovani* - causes kala azar
3. *Leishmania tropica* - skin leishmaniasis

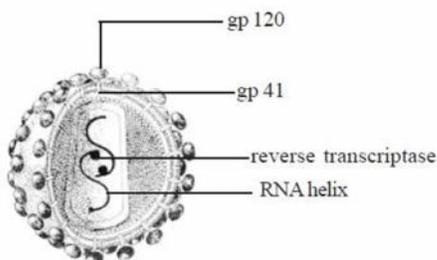
**29. Mention the types of Malaria .**

- (ii) vivax malaria by plasmodium vivax
- (iii) Quardan malaria by plasmodium malaria
- (iv) Ovale malaria by plasmodium ovale
- (v) Malignant malaria by plasmodium falciparum

**30. What is Chemotheraphy?**

The control and treatment of infectious diseases with a chemical compound or drug is called **chemotherapy**.

**31. Draw HIV and Label the parts.**



**32. What is Anti Biotic?**

The word antibiotic refers to a metabolic product of one microorganism that in very small amounts is detrimental or inhibitory to other microorganisms.

**33. What are the two types of Anti Biotics?**

- Bacteriostatic – It controls bacteria. .
- Bacteriocidal – It kills bacteria.

**34. Write short notes on Pox virus?**

- Pox viruses are the largest of all viruses and are brick shaped.
- They contain double stranded DNA, protein and lipid.
- They have a dumb bell shaped nucleoid surrounded by two membrane layers.

**35. What is primary culture?**

- ❖ Primary cell culture are derived from normal tissue of an animal such as mouse, hamster, chicken and monkey or a human being.
- ❖ When cells from these tissues are processed and cultured the first monolayer is referred to as the primary culture.
- ❖ A monolayer is a confluent layer of cells covering the surface of a culture vessel.

**36. Mention the types of Genetic recombination in bacteria?**

Bacterial conjugation, transformation and transduction.

**37 .Define – Medical MicroBiology?**

The Medical microbiology deals with aspects of infection,causative agents of infection and the diseases due to infection.

**38. What is black water fever?**

The plasmodium falciparum infection is black water fever.It is characterized by the whole some destruction of patients erythrocytes and the excretion of liberated haemoglobin in the urine.

**39. Write short note on Anthroponoses?**

Infections with parasites species that are maintained in man alone. Eg ., Malaria and Filaria.

**40. Uses of medical Microbiology ?**

Innumerable infections diseases that haunt the human population where discovered. Drugs and Vaccines have been found.

### **3. IMMUNOLOGY**

**1.What are interferon?**

Certain cells, like WBC, when infected with a virus, respond by releasing anti viral proteins, called **interferons**.

**2. What is Phagocytosis?**

- 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**. Macrophages are large irregular-shaped cells that engulf microbes, viruses and cellular debris.

- In response to an infection, monocytes are liberated at the site of infection.

### **3. What are the functions of free antibodies?**

The free **antibodies have three main functions** viz.,

1. Agglutination of particulate matter, including bacteria and viruses,
2. Opsonisation or coating over bacteria to facilitate recognition and phagocytosis by the phagocytes and
3. Neutralization of toxins released by bacteria.

### **4. What are the functions of spleen?**

1. The spleen serves as the graveyard for effete(aged) red blood cells,
  2. It acts as a reserve tank and setting bed for blood and
  3. It acts as a systemic filter for trapping circulating blood borne foreign particles.
- (The immunological function of the spleen is primarily directed against blood borne antigens).

### **5. What are the functions of Thymus?**

- (i) Produces T cells.
- (ii) Cell mediated immunity.

### **6. What is antigen?**

- ❖ A molecule that provokes an immune response(immunogenicity) and hence is called an immunogen.
- ❖ The other describes a molecule which reacts with the antibody produced, or with the activated cellular constituents of cell mediated immunity(antigenicity), and is referred to as an antigen.

### **7. What are Haptens?**

- Haptens are small well defined chemical groups such as dinitrophenol (DNP).
- which are not immunogenic on their own but will react with preformed antibodies.
- To make a hapten immunogenic, it must be linked to a carrier molecule which is itself immunogenic.

### **8. What are the various types of antibodies?**

IgG, IgA, IgM, IgE, IgD.

### **9. Mention the names of immunosuppressive drugs?**

Cyclosporine and steroids.

### **10. What are primary lymphoidal organs?**

- Thymus and bone marrow.
- Thymus produces T cells.
- Bone marrow produces B cells.
- Bursa of fabricius in Birds.

**11. What are secondary lymphoidal organs?**

Spleen, lymph nodes and MALT.

**12. Expand MALT, GALT, BALT.**

- Mucous Associated Lymphoid Tissue - MALT
- Gut Associated Lymphoid Tissue. - GALT
- Bronchial Associated Lymphoid Tissue - BALT

**13. What is Allergy?**

Allergies result from an inappropriate and excessive immune response to common antigens. Eg., dust, moulds, pollen.,

**14. What is anaphylaxis?**

Sometimes an allergen may cause a sudden, violent and fatal reaction in a sensitivity individual ; this is called anaphylaxis.

**15. What are Autoimmune diseases?**

- Autoimmune diseases result when the immune system attacks and destroys “self” cells and molecules.
- This condition can cause chronic and serious diseases.
- Examples of autoimmune diseases are insulin-dependent diabetes, multiple sclerosis, rheumatoid arthritis, etc.
- Multiple sclerosis is caused by antibodies that attack the myelin sheath of nerve cells.

**16. What are the special features of acquired immunity?**

- (i) Specificity : It is the ability to distinguish differences among various foreign molecules.
- (ii) Diversity : It can recognize a vast variety of foreign molecules.
- (iii) Discrimination between Self and Non-self : It is able to recognize and respond to molecules that are foreign (non-self) to the body. At the same time, it can avoid response to those molecules that are present within the body (self antigens) of the given animal.

**17. Differentiate between CMI and Humoral Immunity?**

CMI	Humoral Immunity
By T cells	By B Cells
Infected cells are killed	Infected cells are impaired by antibodies

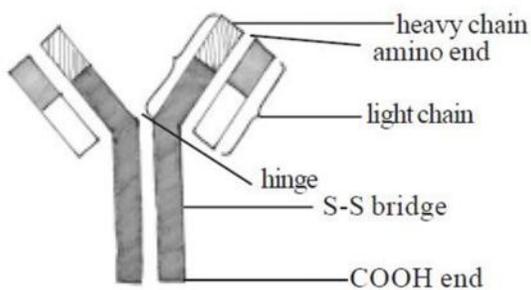
### 18. Difference between active and passive immunity

Active Immunity	Passive Immunity
Obtained by infections and vaccination	Transfer of antibodies from healthy individual to the infected.

### 19. Differentiate between paratope and epitopes

The part of the antibody molecule which makes contact with the antigen is termed the **paratope**. Consequently, the part of the antigen molecule that makes contact with the paratope is called the **epitope**.

### 20. Draw Immunoglobulin and label the parts



### 21. What is immunology ?

The system of animal body, which protects it from various infectious agents and cancer, is called **Immune system**. A study of the immune system is known as **Immunology**.

### 22. what are the four types of agents?

(i) Bacteria (ii) Viruses (iii) fungi (iv) parasites

### 23. Define : Immunity?

- Innate immunity comprises all those natural defense mechanisms with which an organism is protected from infection.
- ❖ As a strategy innate immunity consists of various types of barriers.

### 24. What are the infection agents?

(i) Bacteria (ii) viruses (iii) fungi (iv) parasites.

### 25. Define: Innate Immunity

- Innate immunity comprises all those natural defense mechanisms with which an organism is protected from infection.
- As a strategy, innate immunity consists of various types of barriers that
- prevent entry of foreign agents into the body.

**26. What is Acquired immunity?(Specific Immunity)**

Specific defence mechanisms require several days to be activated, following the failure of non-specific defence mechanisms.

**27. Define: Immunoglobulins**

- (i) Immunoglobulins (Igs) are **glycoproteins**.
- (ii) Each molecule of Ig consists of two pairs of polypeptide chains of different sizes.
- (iii) The smaller chains are called '**light**' (L) chains and the larger ones are called '**heavy**' (H) chains.

**28. Difference between the Autograft and Allograft(Homograft)?**

<b>Autograft</b>	<b>Allograft(Homograft)</b>
The tissue of the original donor is grafted back into the same donor. <b>example</b> , skin graft from thigh to face in severely deformed case of burnt individuals (plastic surgery).	Graft between allogenic individuals (ie., members of the same species but of different genetic constitution. <b>example</b> , kidney transplanted from one human to another.

**29. Difference between Isograft and Xenograft (Heterograft)?**

<b>Isograft</b>	<b>Xenograft (Heterograft)</b>
Graft between syngeneic individuals <b>Ex:</b> clones or identical twins.	Graft between Xenogenic individuals <b>Ex:</b> organ transplanted from pig to human, baboon to human

**30. Define the Inflammatory Barriers**

Tissue injury results in redness and swelling, along with pain and production of heat that may result in fever. This response occurs due to release of chemical alarm signals, notably **histamine**, **serotonin** and **prostaglandins**, by the **damaged mast cells**.

**31. Define Immunogen?**

The term Immunogen is introduced to denote antigenic substances which elicit both humoral and cell mediated immune response or either humoral or cell mediated response.

**4. MODERN GENETICS**

**1. What is Karyogram ?**

Karyotyping is a technique through which the complete set of chromosomes are separated from a cell and the chromosomes are lined up in a **karyogram**.

## 2. What are the uses of Karyotyping

1. Karyotyping helps to identify the sex of individuals through amniocentesis.
2. Genetic diseases in human beings can be detected by this technique. If a disease is detected, the medical counselling for termination of pregnancy and abortion of such foetus can be done.
3. By characterizing the normal karyotype, the chromosomal abnormalities such as deletion, duplication, translocation, non-disjunctions and the consequent aneuploids could be detected.

## 3. What is Recombinant DNA

- The foreign DNA fragment isolated is made to recombine with the plasmid DNA which is cleaved by the same restriction endonuclease.
- The recombination of the two DNAs is effected by the DNA ligase enzyme.
- The product formed is called recombinant plasmid or recombinant DNA. product formed is called recombinant plasmid or recombinant DNA.

## 4. Name the bacteria associated with genetic engineering ?

E. coli , Bacillus subtilis, Strptomyces sp., Saccharomyces cerevisiae

## 5. What is superbugs ?

- Genetically engineered bacteria are called **superbugs**.
- Superbugs can degrade several aromatic hydrocarbons, at the same time.
- They are employed in clearing oil spills in the ocean. Thus these are used in pollution abatement.
- The super bug was produced first by an Indian researcher Anand Chakravarthy in USA.
- He developed a strain of Pseudomonas bacterium to clear up oil spills.
- The above superbug can destroy octanes, xylenes camphors and toluenes.

## 6. What are cloning Vectors?

Vectors or vehicle DNA are those DNA that can carry a foreign DNA fragment when inserted in to it.

## 7. What are Albinism?

Disorder of melanin metabolism characterized by the absence of melanin in the skin hairs and eyes.

## 8. Symptoms of Huntington's chorea?

- (i)Deterioration of intellectual facility
- (ii)Depression.
- (iii)occasional hallucination and delusions
- (iv)psychological problems

**9.what are cDNA library (complementary 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.

**10.What are Humangene bank (or) genome database?**

- (i)collection of sequenced genes
- (ii)cataloging of them for future use
- (ii)They represent the fundamental data.

**11.what is modern genetics/Human genetics?**

- (i)Identification of human chromosomes
- (ii)Genetic engineering prospects genetic diseases and gene therapy, cloning devices, transgenic (or) modified organisms etc.
- (iii)Human genome project, Bio-informatics/biological data base and proteomics.

**12.what are called ‘Bubble Boy’ syndrome and symptoms? (SCID)**

SCID disease (Severe Combined Immunodeficiency’)

- (i) Inherited disease are affecting children.
- (ii) the gene for the disease (called ADA Adenosine Deaminase) is located on chromosome 20.
- (iii) Infection due to rapid death of all white blood cells.

**13.What is transgenic organisms?**

In genetic engineering the methods of gene transfer lead to the production of transgenic animals and plants.

**14.what is mean by “Glowing Coal”?**

- (i)One of the computer graphic models of protein.
- (ii)properties of amino acids in a protein but also help to understand the protein function.
- (iii)Computer modeling of protein began as early as in 1970.

**15.What is palindrome sequences?**

Palindrome refers to a base sequence that reads the same on the two strands but in opposite directions.

Eg:The base sequence on one strand in GAATTC read in “5-3”direction , the sequence on the opposite strand is CTTAAG read in “3-5 “ direction.

**16.What is pedigree analysis ?**

- Unlike animals, controlled crosses cannot be made in human beings.
- Hence human geneticists, resort to a scrutiny of established mating.
- The scrutiny of established matings to obtain information about the genetic characters / traits is called **pedigree analysis**

**17.Name some hereditary diseases?**

- 1.Sickle cell anaemia
2. Thalassemia
3. Agammaglobulinemia
4. Albinism
5. Huntington's chorea
6. Severe Combined Immune Deficiency (SCID)

**18.What is meant by Proteomics?**

- Human genome analysis involves the analysis of proteins.
- Analysing different proteins and locating them in cells and identifying their respective genes, which encode them in the cells, represent the science of Proteomics.
  - For identifying the proteins, the cells, mRNAs are probed.
  - Researchers have identified about 60000 (Sixty thousand) different m-RNAs in human beings.
- From the mRNAs the respective genes/DNA are traced.
- The above said DNA is known as cDNA (Complementary DNA).

**19.What is cloning?**

- Cloning is an experimental technique wherein, a group of genetically identical organisms is produced.
- Cloning of various animals has become possible due to knowledge gained in the field of developmental biology and developmental genetics.

**20.What is transfer of genes?**

The transfection of fertilized egg involves either the transfer of whole nuclei or whole chromosomes; or their fragments or the DNA segments.

**21. Define Gene therapy?**

- ❖ The fact that genes can be cloned to several thousand copies through genetic engineering has given rise to an entirely novel model of therapeutic device viz., Gene therapy.
- ❖ Gene therapy involves the replacement of corrective genes in place of defective genes in human.

There are two types of gene therapy.

- 1). Somatic cell gene therapy and
- 2). Germ line cell gene therapy.

**22. What is Bio-informatics?**

- Bioinformatics deals with the creation and maintenance of databases of biological information such as the nucleic acid, gene sequences and protein sequences.
- It has its own applications in gene therapy, diagnostics, drug designing, crop improvement, biochemical processes etc.
- It involves the data analysis or creation of electronic databases on genomes and protein molecules.

**23. What is the definition of database?**

- 'Creating' database means a coherent collection of data with inherent meaning, used for future application.
- Database is a general repository of voluminous information or records to be processed by a programme.

**24. What are the uses of Bio informatic?**

1. It helps to understand gene structure and protein synthesis.
2. It helps to know more about the diseases.
3. It helps to understand more about the fundamental biology and the thread of life, - the DNA.
- 4.. It paves the way for the medical and bio engineering applications.
5. It helps to apply the biophysical and biotechnological principles to biological studies. In turn, it will help to design new drugs and new chemical compounds to be used in health and environmental management respectively.

**25. Give the languages of Bio informatics?**

The languages, which help in bioinformatics, are  
C, C++, JAVA, FORTRAN, LINUX, UNIX etc.

**26. What is DNA library?**

A DNA library is a collection of DNA fragments, which contains all the sequences of a single organism.

**27. What is DNA fragmentation?**

- DNA segmenting in genetic engineering refers to fragmenting of DNA by Restriction Endonuclease and sequencing or mapping the DNA in terms of its nucleotide sequences.
- Chemical and enzymatic methods are available for the above. As a result the genic and non-compartments of DNA can be identified.

**28. What are the clinical manifestations of thalassemia?**

The clinical manifestations of thalassemia include

- I) decrease in the bone marrow activity,
- II) peripheral haemolysis,

- III) splenomegaly (enlarged spleen) and hepatomegaly, (enlarged liver) etc.
- IV) The thalassemic children die at the age of seventeen.

### 29. Define protein Data bank?

The information regarding three-dimensional structure of protein is stored in another computerized database called **Protein Data Bank**.

### 30. What is Differentiation?

- ❖ In the development of multi cellular animals the zygote represent the progenitor cell the future embryo.
- ❖ Multitudes of cells arise from mitotic divisions of the fertilized egg cells.
- ❖ These cells later become distinct cell types differing in form and function.

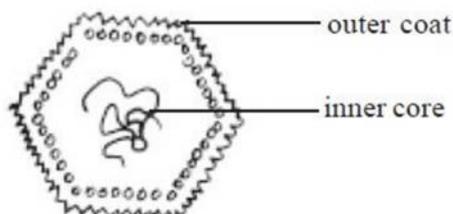
## 5 MARKS QUESTIONS AND ANSWERS

### 2 MICROBIOLOGY

#### 1. Briefly describe the structure of virus ?

##### Structure of Viruses:

- Animal and plant viruses are composed of a central core of nucleic acids surrounded by a protein covering called capsid.
- The capsid is made up of units called capsomeres.
- Viruses exhibit a characteristic symmetry, 1. Spherical viruses are isohedral, 2. Rod shaped viruses are helical in symmetry.
- Certain group of viruses are complex in symmetry.
  - Some animal viruses, in addition to the nucleocapsid structure contain an outer membrane like structure called the envelope. The envelope is made up of lipoproteins. The envelope conceals the symmetry of viruses.
  - Virions with envelopes are sensitive to lipid solvents such as ether and chloroform. On the other hand, the naked virions are not affected by the lipid solvents.
  - Isohedral viruses such as adeno viruses, SV15, polio viruses and blue tongued viruses are spherical in shape and their surface is a lattice with identical triangular units.
  - Helical surface symmetry and structure are characteristic of tobacco mosaic virus(TMV) and animal viruses that cause diseases such as measles, mumps, influenza and rabies.
  - In these, the nucleo capsid is a flexible structure packed within a fringed lipoprotein envelope. The fringes are made of glycoproteins.
  - In TMV the nucleic acid core is covered by a capsid consisting of closely packed capsomeres arranged in a helix. Complex or uncertain symmetry is seen in Pox viruses, T-bacteriophages, These have different proteins and lipoproteins.



## 2. Write short notes on Virus diseases in man?

### A. Cancer and Viruses:

- Viruses have been identified as one of the causative agents for cancer or tumour. Such tumour inducing viruses are called oncogenic viruses.
- Adenoviruses, polioma virus, simian virus 40 (SV 40), Epstein-Barr virus (EBV) (a herpes virus) are oncogenic DNA viruses.
- The RNA sarcoma viruses are oncogenic RNA viruses (eg., Rous sarcoma).

### B. Rabies Virus and Rabies disease:

- Rabies virus belongs to the rhabdovirus family. It is a parasite of domestic and wild mammals.
- The transmission to humans occurs through the bite of an infected animal. Dogs, cats, bats, are the mammalian animal sources for the rabies virus.
- In humans, the symptoms of rabies are severe headache, high fever, alternating excitement and depression, muscular spasms in throat and chest, hydrophobia etc.
- The incubation time in humans is usually about 3 to 8 weeks but it may also vary. If untreated the mortality rate from rabies is 100 percent.
- The new rabies vaccine was discovered in 1980.
- It is an inactivated vaccine prepared from the virus propagated in cultures of diploid human cells. This vaccine is both safe and highly immunogenic.

### C. Pox virus:

- Pox viruses are the largest of all viruses and are brick shaped. They contain double stranded DNA, protein and lipid.
- They have a dum bell shaped nucleoid surrounded by two membrane layers.
- Variola virus is called the small pox virus. It is transmitted by droplet infection either directly from the infected person or by handling articles infected by the patient.
- Small pox is completely eradicated. The small pox vaccine consists of vaccinia, closely related to variola.
- It gives protection both by humoral and cell mediated immunity. Other pox viruses are chicken pox and measles viruses.

### D. Hepatitis-B:

- Hepatitis B virus (HBV) is an enveloped virus with a double stranded DNA. This causes jaundice and hepatic carcinoma.
- This disease is deadly and more infective than AIDS.
- HBV vaccine consists of purified HBV Ag (Australian antigen) obtained from the blood serum of apparently healthy carriers.

### **3.Enumerate the adaptation of pathogenic microbes?**

- 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.
6. Yet another group, may grow extracellularly and bring damage to the body tissues by elaborating substances called toxins.

### **4. Write the symptoms of AIDS defined by WHO?**

1. Weight loss at least 10% body weight
2. Chronic diarrhoea for more than a month
3. Prolonged fever for more than one month
4. Night sweats and persistent coughs
5. Opportunistic infections such as tuberculosis, oropharyngeal candidiasis (fungal infection in mouth and throat)
6. recurrent herpes zoster (viral) infection
7. Meningitis and nerve damage
8. Loss of memory and intelligence
9. An unusual cancer, kaposi sarcoma which produces scattered purplish lesions over the chest and abdomen.

### **5. write short note on control of Aids?**

1. Screening of blood and blood products.
2. Education to people about do's and don'ts in AIDS contraction and bringing more awareness among the public.
3. Education about protected sexual behaviour and practices
4. Participation of voluntary agencies, teachers, NGOs, paramedical workers, several other voluntary health organizations, in AIDS awareness programmes
5. Making the antiretroviral drugs such as AZTs (Azidothymidine/Zidovudin) and saquinovir etc., available to patients.

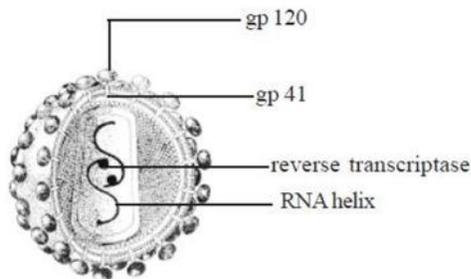
The management of HIV infection involves the above general measures, treatment of opportunistic infections and cancer,

antiretroviral drugs, immunomodulators and supportive treatment and counselling.

#### 6. Write a notes on the contribution of Louis Pasteur?

- a. The contribution of **Louis Pasteur** (1822 - 1895) in France in the field of microbiology led to a greater understanding of human ailments and animal diseases.
- b. Much of Pasteur's work involved the growth of bacteria and yeasts in liquid cultures.
- c. He developed methods of sterilization and of pasteurization.
- d. Pasteur (1857) observed different kinds of microbes associated with different kinds of fermentation. e.g. Spheres of variable size (yeast cells) within alcohol fermentation and smaller rods (Lactobacilli) with lactic acid fermentation.
- e. This finding led Pasteur to state that specific microbes may cause specific diseases in man.
- f. He developed vaccines, for the control of "cholera" "anthrax" and "rabies" in man.

#### 7. Describe the structure of HIV and how it was discovered? Structure of HIV:



- HIV is spherical in shape. Its size is about 100-140 nm.
- Like any other virus, it is made up of a central icosahedral capsid core containing the genetic material surrounded by a protein envelope.
- The protein envelope is attached several spikes of glycoprotein. Like other retroviruses the glycoprotein sticks out on both sides (inside and outside) of its protein coat.
  
- The outer position of glycoprotein called gp120 is attached to the gp 41 situated on the inner side of the viral coat. gp 41 is an unusually long protein with over 100 amino acids. gp 120 appears like a knob.
- Electron microscopic studies have revealed that the distribution of proteins of the viral surface is very much like a soccer ball made of 12 pentagons and 20 hexagons, stitched together to make a sphere.
- The envelope of HIV also contains other proteins including some HLA antigens (Human Leucocyte Antigen).

- The genome of HIV contains two helix of RNA molecules in folded form. The enzyme reverse transcriptase is attached to RNA.
- The disease Acquired Immuno Deficiency Syndrome (AIDS) was identified in the year 1981 (December).
- Early epidemiological studies have established that it is a communicable disease transmitted through sexual contact or through blood and blood products.
- In 1983 **Luc Montagnier** at Pasteur Institute, Paris and **Gallo** at National Institute of Health (NIH) USA isolated the virus that caused AIDS. In 1986, the committee on taxonomy of virus coined the term HIV or Human Immunodeficiency Virus to avoid confusion due to different names being given by different researchers.
- HIV is new member of the Lentivirinae subfamily of human retroviruses.
- Retroviruses are RNA viruses, which have the capacity to convert their RNA into DNA with the help of an enzyme called reverse transcriptase.

### **8. What are the characteristics of a good Chemotherapy?**

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.
4. It exhibits selective toxicity, that is it kills or inhibits the pathogenic microbes without having harmful effect or having least harm to the host.

### **9. Describe the cultural techniques of virus.**

- Viruses can grow only in living cells.
- However the culture of viruses is possible nowadays.
- The most economical and convenient method of cultivating a wide variety of animal viruses is the 'chicken embryo technique'.
- In this technique, fertile chicken eggs incubated for 5 to 12 days are inoculated with the virus particles through the shell, aseptically.
- The opening may be sealed with paraffin wax. The eggs incubated at 36 C are ideal sources for the growth of viruses.
- Chick embryos contain several different types of cells in which various viruses will undergo replication. The yolk sac is a general ideal medium for the growth of viruses.
- Viral cultures are of three types viz., Primary cell cultures, diploid cell strains and continuous cell lines.

### **1. Primary culture:**

Primary cell culture are derived from normal tissue of an animal such as mouse, hamster, chicken and monkey or a human being. When cells from these tissues are processed and cultured the first monolayer is referred to as the primary culture. A monolayer is a confluent layer of cells covering the surface of a culture vessel.

### **2. Diploid cell strain:**

Diploid cell strains are derived by primary cell cultures from a specific tissues like lung or kidney which is of embryonic origin. These diploid cells are the most employed host of choice for the production of human vaccine virus.

### **3. Continuous cell lines:**

Continuous cell lines are capable of an infinite number of doublings. Such cell lines may arise with the mutation of a cell strain or more commonly from the established cell cultures from malignant tissue. Many viruses, which are difficult or impossible to grow have been cultured in continuous cell lines.

## **10. State the stages of for the preparation of bacterial cultural media.**

The preparation of bacteriological media involves the following steps.

1. Each ingredient or the complete dehydrated medium is dissolved in the appropriate volume of distilled water.
2. The pH of medium is determined.
3. Agar is added and the medium (solid medium) is boiled to dissolve agar.
4. The medium is dispersed in flasks or tubes.
5. The medium is sterilized by autoclaving.

## **11. Write notes on bacterial diseases. (Any five diseases)**

### **A. Salmonella and Human Diseases:**

- Salmonella are pathogenic bacilli which cause three kinds of infection to humans viz., enteric fever (Typhoid or Paratyphoid), Gastroenteritis and Septicemia.
- Typhoid fever is caused by *S.typhi*. It is transmitted via Pathogen contained food and water.
- The disease is characterized by a continued fever, inflammation of the intestine, formation of intestinal ulcers and enlargement of the spleen.
- Gastroenteritis is caused by Salmonella, but most commonly by *S.choleraesuis*.
- The bacteria reach the blood stream from the intestinal tract, where it multiplies.
- It causes recurring high fever, chills, loss of appetite and weight loss. When the bacteria infect the organs from blood they can cause meningitis, pneumonia, abscesses, nephritis, osteomyelitis, or endocarditis, etc.

## B. Cholera :

- Cholera is caused by *Vibrio cholere*. It is a disease of antiquity and has been the cause of untold sufferings and death.
  - Cholera is transmitted in water and food contaminated with this bacteria.
  - In the small intestine, the bacteria adhere to epithelium, multiply and produce the enterotoxin.
  - The symptoms of cholera are vomiting, profuse diarrhoeal stool (rice water stool)
- ❖ Which results in severe dehydration, loss of minerals, increased blood acidity and haemoconcentration.

## C. Plague :

- Plague is caused by the bacterial species *Yersinia pestis*, a non motile gram negative bacilli.
- There are two types of plagues. They are **bubonic plague** and **pneumonic plague**.
- Bubonic plague is characterized by enlarged and inflamed lymph glands (Bubos). The symptoms are shivering, fever, nausea, vomiting and general weakness. In untreated cases the bubonic plague can cause 58% mortality.
- Pneumonic plague is a pneumonia characterized by a thin watery sputum with bright red streaks of blood. The mortality is 100% in untreated cases.

## D. Syphilis :

- The disease syphilis is a well known and dreadful sexually transmitted disease (STD). It is caused by *Treponema pallidum*.
- Syphilis occurs only in humans and is transmitted by direct sexual contact (Venereal syphilis) or through placenta from an infected mother to the foetus (Congenital syphilis).
- Venereal syphilis progresses in three stages viz., primary, secondary and tertiary stage.
- The symptoms are very prominent in the tertiary stage. It will lead to blindness, loss of hearing, brain damage, insomnia, headache and delusions and spinal cord damage.

## E. Gonorrhoea :

- Gonorrhoea is another sexually transmitted disease caused by *Neisseria gonorrhoea*.
- In the males the primary site of infection is the urethra.
- In the female it is the cervix. It causes pain during urination and a yellowish discharge from the urethra of males. In females also it causes painful urination and vaginal discharge. Other symptoms are fever, abdominal pain, arthritis, meningitis etc.

12. Write short notes on Viral genetics.

13. Write short notes on **acterial genetics**.

14. Write short notes on Protozoan diseases

### 3. IMMUNOLOGY

#### 1. Explain physical and physiological barriers associated with innate immunity.

##### Innate Immunity (Non-specific)

- a. Innate immunity comprises all those natural defense mechanisms with which an organism is protected from infection.
- b. As a strategy, innate immunity consists of various types of barriers that prevent entry of foreign agents into the body.
- c. The pathogens that enter into the body, are quickly killed by some components of the immune system.
- d. This is the **first line of defence** in most animals. Innate immunity consists of the following four types of barriers.

##### 1. Anatomical Barriers

- These barriers block the entry of organisms into the body. The **skin** and the **mucous membrane** lining the respiratory and intestinal as well as the reproductive passages constitute the **barriers**.
- Mucous material entraps foreign microorganisms. The ciliary movements produced by the epithelial lining cells expel out micro-organisms from the body.

##### 2. Inflammatory Barriers

- ❖ Usually an infection or tissue injury results in redness and swelling, along with pain and production of heat that may result in fever. The above phenomenon is known as **inflammatory response**.
- ❖ This response occurs due to release of chemical alarm signals, notably **histamine, serotonin** and **prostaglandins**, by the **damaged mast cells**.
- ❖ At the site of inflammation there may be leakage of vascular fluid, which contains serum proteins with antibacterial activity.
- ❖ Further, there is an **influx of phagocytic cells into the affected area**. These responses inhibit and destroy the invading microorganisms.
- ❖ Besides the phagocytes, **natural killer cells** (NK cells) (T Lymphocytes) kill virus-infected cells and some tumour cells of the body by creating perforin-lined pores in the plasma membrane of the target cells.
- ❖ These pores allow entry of water into the target cell, which then swells and bursts.

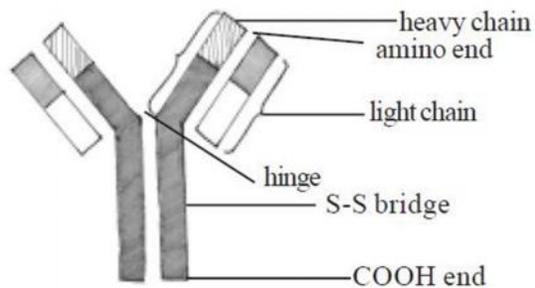
#### 2. Describe the special features of acquired immunity.

- (i) **Specificity** : It is the ability to distinguish differences among various foreign molecules.
- (ii) **Diversity** : It can recognize a vast variety of foreign molecules.

(iii) **Discrimination between Self and Non-self** : It is able to recognize and respond to molecules that are foreign (non-self) to the body. At the same time, it can avoid response to those molecules that are present within the body (self antigens) of the given animal.

(iv) **Memory** : When the immune system encounters a specific foreign agent, e.g., microbe, for the first time, it generates an immune response and eliminates the invader. The immune system retains the memory of this encounter for a prolonged interval. As a result, a second encounter with the same microbe evokes a heightened immune response.

### 3. Describe the structure of Immunoglobulins. (Antibodies)



- Immunoglobulins (Igs) are **glycoproteins**. Each molecule of Ig consists of two pairs of polypeptide chains of different sizes.
- The smaller chains are called '**light**' (L) chains and the larger ones are called '**heavy**' (H) chains.
- The L chain has a molecular weight of approximately 25,000 and the H chains is of 50,000.
- The L chain is attached to the H chain by a **disulphide bond**. The two H chains are also joined together by **S-S bonds**, depending on the class of immunoglobulins.
- The H chains are structurally and antigenically distinct for each class and are designated by the Greek letter corresponding to the immunoglobulin class, as follows :
  - ✓ IgG (Gamma) IgA (alpha) IgM(mu) IgD (delta) and IgE (epsilon).
  - ✓ The L chains are similar in all classes of immunoglobulins. They occur in two varieties, **kappa** (k) and **lambda** ( $\lambda$ ).
  - ✓ A molecule of immunoglobulin may have either kappa or lambda chains, but never both.

#### Region of polypeptide chains

Each heavy and light chains consists of two regions viz.,

##### 1. The variable (V) region or Fab region:

- The V region shows a wide variation in amino acid sequences in the amino or N-terminal portion of the molecule. These areas of high variability in the variable region of H and L chains are called '**hotspots**' or hypervariable regions. These hotspots are most intimately involved in the information of the antigen-binding site.

- In both VH and VL regions of the chain atleast three hypervariable regions/ hotspots are present. The infinite range of the antibody specificity of immunoglobins depends on the variability of the amino acid sequences at the ‘variable regions’ of the H and L chains, which form the antigen combining sites (Paratope).

## 2. Constant (c) region (or) Fc region (Fc = fragment of constant region) :

The C region denotes constant region with unvarying amino acid sequence in the C or COOH terminal portion of the molecule.

(Fab – Fragment of antigen binding site  
Fc – Fragment of constant region)

## 4. Writ short notes on antibody mediated immune response or humoral immune response.

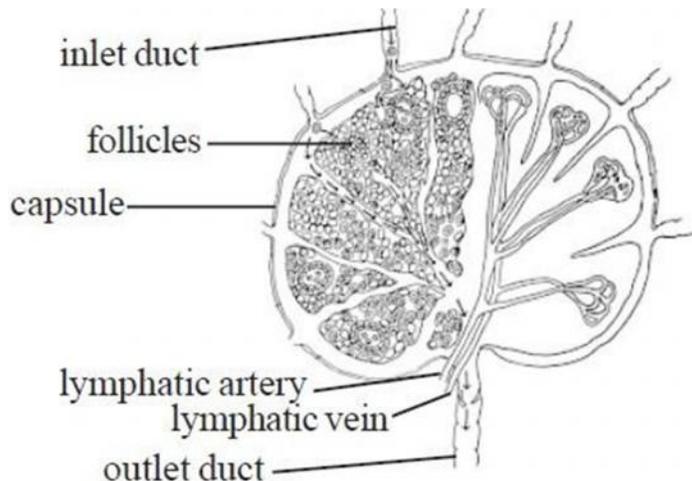
- I. Antibody mediated or humoral immunity involves the synthesis of specific antibody molecules called immunoglobulins by the B-lymphocytes.
- II. Each antigen has many different **antigenic determinants**, each of which matches a specific antibody and binds to it.
- III. The B cells, direct the antibody-mediated immunity.
- IV. The antibody molecules (Igs) may be bound to a cell membrane in the form of receptors or they may remain free.
- V. The free **antibodies have three main functions** viz.,
  1. Agglutination of particulate matter, including bacteria and viruses,
  2. Opsonisation or coating over bacteria to facilitate recognition and phagocytosis by the phagocytes and
  3. Neutralization of toxins released by bacteria

## 5. How adoptive immunity is activated?

- Every antigen is processed by **antigen presenting cells(APC)**, like macrophages, B lymphocytes and dendritic cells.
- The processed antigen is presented on the surface of these cells.
- A subgroup of T cells called **T helper cells**, specifically interacts with the presented antigen and becomes activated.
- The activated T helper cells then activate B cells, and a subgroup of T cells called cytotoxic lymphocytes (CTLs), in a specific manner.
- The activated B and cytotoxic lymphocytes proliferate to produce clones.
- All the cells of a clone can recognize the same antigen and eliminate it.

## 6. Describe the structure of a Lymph node.

### A. Lymph nodes :



- ❖ The lymph nodes are small, round or ovoid bodies placed along the course of lymphatic vessels.
- ❖ They are surrounded by a fibrous capsule from which trabeculae penetrate into the nodes. The node can be differentiated into an **outer cortex** and an **inner medulla**.
- ❖ In the cortex are accumulations of lymphocytes (primary follicles) within which germinal centers (secondary follicles) develop during antigenic stimulation. The follicles contain, besides proliferating lymphocytes, dendritic macrophages which capture and process the antigen.
- ❖ In the medulla, the lymphocytes are arranged as elongated branching bands (medullary cords).
- ❖ The cortical follicles and medullary cords contain B lymphocytes and constitute the bursa or bone marrow dependent areas.
- ❖ Between the cortical follicles and medullary cords, there is a broad, intermediate zone called paracortical area which contains T lymphocytes and constitutes the thymus dependent area.
- ❖ Lymph nodes act as a filter for the lymph. Each group of nodes drain a specific part of the body.
- ❖ They phagocytose foreign materials including microorganisms.
- ❖ They help the proliferation and circulation of T and B cells.
- ❖ They enlarge following local antigenic stimulation.
- ❖ In the human body, totally about 600 lymph nodes are distributed.

## 7. What is the genetic basis for organ transplantation?

- Success of organ transplants (ie., Cornea, Kidney, Heart, Liver, Bone marrow) and skin grafts depends on a proper matching of histocompatibility antigens that occur in all cells of the body.
- Chromosome 6 of mouse contains a cluster of genes known as the **major histocompatibility complex** (MHC).
- Which in humans is called **human leukocyte antigen** (HLA) complex.
- ❖ The alleles of HLA genes determine the histocompatibility ie., the compatibility between donor and recipient tissues in transplants.

## 8. What is transplantation? Describe the various types of transplantation.

The replacement of a diseased organ by a transplant (healthy tissue or organ) is called **transplantation**.

**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.

## 9. What are the symptoms of graft rejection?

1. Skin rashes, 2. Fluid accumulation in spleen and enlargement (Splénomegaly), 3. Emaciation (becoming thin), 4. Diarrhoea, 5. hepatomegaly, 6. Anaemia and general immune suppression, 7. Damage in bile ducts, 8. Increased bilirubin synthesis etc.

## 10. What are the measures taken to prevent graft rejection?

In clinical fields, graft rejection is prevented by :

1. Blood groups estimation (ABO and Rh) in the host,
2. Testing the presence of cytotoxic antibodies in the host serum,
3. Cross matching of tissues (Host Vs graft) prior to transplantation,
4. Giving immunosuppressive drugs like cyclosporine and steroids etc to the host,
5. Total lymphoid tissue irradiation etc.

## 11. Write notes on immuno deficiency disorders.

- Immunodeficiency Diseases result from a defect in one or more components of the innate or adaptive immunity.
- Affected individuals are susceptible to diseases that normally would not bother most people

- Immunodeficiency may result from gene mutations, infections, malnutrition or accidents.
- a. Severe combined immunodeficiency (SCID).**
  - **SCID** results from one of many genetic defects; one such genetic defect leads to adenosine deaminase deficiency.
  - SCID is characterized by a very low number of circulating thymocytes.
  - Affected individuals usually die at an early age.
- b. AIDS (Acquired Immuno Deficiency Syndrome)**
  - **AIDS** is another example for immunodeficiency disease.
  - It is caused by a retrovirus, known as human immunodeficiency virus (HIV).
  - Retroviruses have RNA genomes that are replicated via DNA copies.
  - HIV, selectively infects and kills T-helper cells. The depletion of T-helper cells weakens the acquired immune response and may even abolish it completely.
  - The viral RNA genome is converted into DNA copy by the viral enzyme reverse transcriptase.
  - The DNA copy of HIV becomes inserted into the human chromosome and replicates with the cell DNA.
  - It may be transcribed to produce RNA copies of the viral genome.
  - The RNA copies are packaged and liberated as virus particles.
  - The infected cell is lysed in this process, and the released virus particles infect new T helper cells.

## 12. Explain the process of graft rejection.

- Both cell mediated and humoral immune responses follow in rejection.
- Sensitized T cells (lymphocytes), macrophages, plasma cells are all involved in the primary or first set rejection.
- In the secondary or second set reaction, B cells (B lymphocytes) and their antibodies are involved.
- In the cell mediated reaction substances such as interleukin 1 (IL-1), Interleukin – 2 (IL-2) etc take part.
- The final lysis of the graft is achieved by lymphotoxins or TNF (Tumour necrosis factors) or proteolytic enzymes.

## 4. MODERN GENETICS

### 1. What are the uses of Bio-informatics?

- (i) To know the genes structure and protein synthesis.
- (ii) Useful in genetic engineering.
- (iii) Useful in the study of DNA and genetic disorders.

## 2. Mention the uses of genetic engineering.

- (i) Life saving drugs like insulin are produced in large scale.
- (ii) To produce disease resistant crop varieties.
- (iii) In the production of GMOs (genetically modified organisms )
- (iv) Helps in bio remediation e.g. pseudomonas putida in the degradation of petro products.

## 3. Write notes on genetic diseases.

### 1. Sickle cell anaemia :

- Sickle cell anaemia is a genetic syndrome caused by an autosomal mutant allele Hbs.
- In homozygous condition (Hbs Hbs), it causes the production of an abnormal haemoglobin called haemoglobin s.
- The normal haemolobin is designated as HbA (HbAHbA).
- Sickle cell persons with the genotype HbsHbs suffer from a fatal haemolytic anaemia.
- The patient dies due to damaged heart, kidney, spleen and brain as a result of clogged blood vessels or vascular obstruction. Persons with heterozygous genotype HbA Hbs are said to be carriers and they survive.

### 2. Thalassemia :

- ❖ Thalassemia is an erythroblastic anaemia due to homozygous recessive gene expression in children.
- ❖ Two types of this disease viz., thalassemia major and thalassemia minor exist.
- ❖ The former is the severe form while the latter is its milder form.
- ❖ The homozygotes suffer from severe thalassemia while all heterozygotes suffer from milder thalassemia.
- ❖ The clinical manifestations of thalassemia include I) decrease in the bone marrow activity, ii) peripheral haemolysis, iii) splenomegaly (enlarged spleen) and hepatomegaly, (enlarged liver) etc. The thalassemic children die at the age of seventeen.

### 3. Agammaglobulinemi

### 4. Albinism

### 5. Huntington's chorea

### 6. Severe Combined Immunodeficiency (SCID)

4. Explain Karyotyping techniques.
5. Describe seven groups of Human chromosomes.
6. Describe application and uses of Recombinant DNA technology. (rDNA technology).
7. Write note on significance and benefits of Human Genome Project. (HGP).
8. Explain the mechanism of Cloning of Sheep.
9. Describe the Ethical issues , Merits and Demerits of Cloning.
10. Explain the transfer of genes to fertilized egg or embryos.
11. Describe the application of Transgenic animals.
12. Explain the techniques Germ line cell therapy.

13. Describe the scope of Bioinformatics.
14. Define Database and Explain its types.
15. What is Protein model? Explain its uses.
16. Describe Protein structure.
17. Explain detail account on Totipotent and Pleuripotent.
18. What is gene therapy? Explain its types.

## **STAGE - II**

### **10 MARKS**

## **ENVIRONMENTAL SCIENCE**

### **1. State reasons for population explosion and its consequences?**

- The rapid and dramatic rise in world population has occurred over the last few hundred years.
- The world's population increased from 1.65 billion in 1900 to 3.02 billion in 1960 and reached 6.1 billion in 2000.
- Thus the size of the population nearly quadrupled in the span of 100 years, a historically unprecedented rate of increase.
- This sudden increase in population is called as Population Explosion or Population Bomb or Population Trap

#### **Reasons for the Explosion**

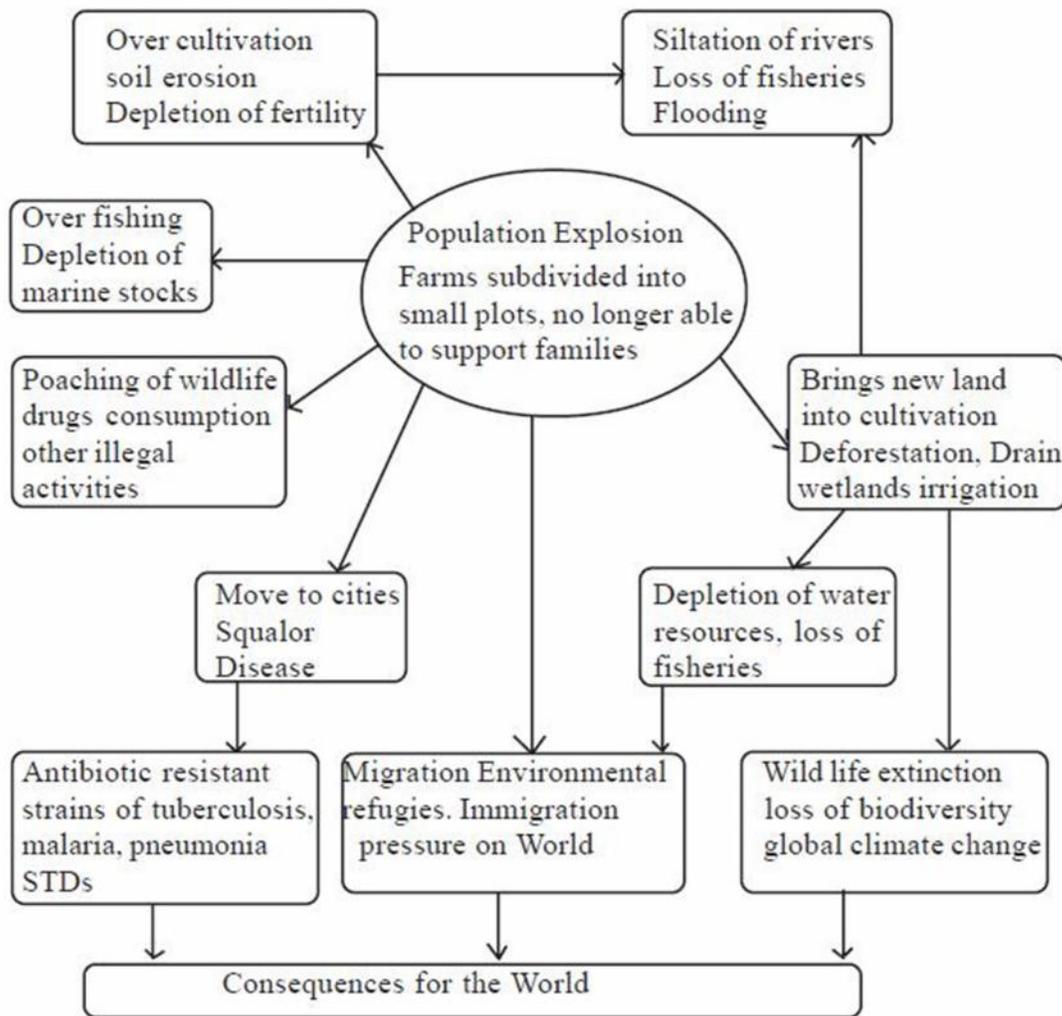
- The main reason for slow and fluctuating population growth prior to early 1800's was the prevalence of diseases such as small pox, diphtheria, measles and scarlet fever.
- In addition, epidemics of diseases such as typhoid fever, cholera and plague eliminated large number of adults.
- Famines also were not unusual. Biologically speaking, prior to 1800s the population was essentially in a dynamic balance with natural enemies and other aspects of environmental resistance.
- High reproductive rates were largely balanced by high mortality.
- Since the 19th century discovery of vaccination provides protections to many of the infectious agents.
- Discovery of antibiotics is a major breakthrough in the medical history, Improvement in agricultural techniques,
- Improvement in the nutrition and Better sanitation and personal hygiene brought about spectacular reductions in mortality, especially among infants and children.
- The birth rate has remained high. So the human population entered into exponential growth, as they were freed from natural enemies and other environmental restraints.

#### **Growing Population and Environmental impacts**

- ❖ Increasing numbers of people put increasing demands on the environment, both through demands for resources and through production of wastes.

- ❖ Most of the human population survived through subsistence agriculture to meet their needs.
- ❖ After the modern medicines and industrial revolution, the death rate plummeted and population growth increased.
- ❖ What are the impacts of rapid growth on a population that is largely engaged in subsistence agriculture?
- ❖ Five basic alternatives are being played out to various degrees,
  1. people can subdivide farms among the children or intensify cultivation of existing land to increase production per unit area.
  2. open up new land to farm.
  3. move to cities and seek employment.
  4. engage in illicit activities for income.
  5. emigrate to other countries legally.

The rapid population growth especially affects women and children. Increasing the average wealth of a population affects the environment both positively and negatively..



**19. Write an essay on green house effect , what are green house gases?**

**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.
- Normally all life on earth depends on this green house effect. If it does not exist, earth would be cooled, and ice would cover earth from pole to pole. But if the

greenhouse effect becomes strong it could make the earth warmer than usual. Even a little extra warming may cause problems for humans, plants and animals.

### **Types of Greenhouse Gases :-**

#### **Carbon dioxide**

- ❖ In the environment, greenhouse gases occur (i) naturally or (ii) from human activities.
- ❖ The most abundant greenhouse gas is **carbon dioxide**.
- ❖ It reaches the atmosphere due to volcanic eruptions, respiration of animals, burning and decay of organic matter such as plants.
- ❖ Normally carbon-dioxide is **removed** by the plants by photosynthesis.
- ❖ Carbon-dioxide is also absorbed into ocean water. But humans by their activities increase the release of carbon dioxide into the atmosphere .
- ❖ Such activities include burning of fossil fuels, solid wastes, wood and wood products to drive vehicles, generate electricity etc.
- ❖ At the same time due to deforestation, the number of trees available to absorb carbon-dioxide through photosynthesis has been greatly reduced.
- ❖ Human activities have caused carbon-dioxide to be released to the atmosphere at rates much faster than that at which earth's natural processes can recycle this gas.
- ❖ There were about 281 molecules of carbon-dioxide per million molecules of air (i.e., parts per million or ppm) in 1750.
- ❖ Today atmospheric carbon-dioxide concentrations are 368 ppm, a 31% increase.

#### **Methane**

- ❖ Methane traps 20 times more heat than carbon-dioxide.
- ❖ It is emitted during the production and transport of coal, natural gas and oil. It is also emitted from rotting organic waste in landfills, by the cows as a by product of digestion.
- ❖ Since 1750, the amount of methane in the atmosphere has more than doubled.

#### **Nitrous Oxide**

Nitrous Oxide traps 300 times more heat than carbon-dioxide. burning fossil fuels and ploughing farm soils releases nitrous oxide.

Since 1750 its level increased by 17%. **Hydrocarbons** formed from the manufacture of foams, coolants such as **chlorofluorocarbons** used in refrigerators are the other gases responsible for global warming.

### **3. What are the effects of global warming? and efforts to control 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 21<sup>st</sup> 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. Some types of forests may disappear.
10. More people will get sick or die from heat stress.
11. Tropical diseases such as malaria, dengue fever, yellow fever and encephalitis will spread to other parts of the world.

#### **Efforts to control Global warming:-**

Two major ways are there to control global warming:

- 1). to keep the carbon-dioxide out of the atmosphere by storing the gas or its carbon component somewhere else, a strategy called **carbon sequestration**.
- 2). to reduce the production of green house gases.

#### **Carbon sequestration :-**

The simple technique is to preserve trees and plants more. Trees, take up carbon-dioxide, break it down in photosynthesis, and store carbon in new wood. It needs massive reforestation. Carbon-dioxide can also be sequestered directly into deep ocean water or into oil wells or some aquifer form which it cannot escape.

Usage of alternate fuels such as nuclear energy, solar power, wind power and hydrogen fuel cells which emit no greenhouse gases are being considered.

#### **Ozone layer depletion**

Ozone is a form of oxygen (O<sub>3</sub>). In the stratosphere (ozonosphere), ozone blocks out the sun's ultraviolet rays and is a lifesaver.

#### **4. Describe Ozone as a natural sun block?**

- ❖ The electromagnetic radiation emitted from the sun includes ultraviolet radiation, which is potentially harmful to most living things since it can damage DNA.
- ❖ The ozone layer screens out the sun's harmful ultraviolet radiation.
- ❖ Even 1% reduction in the amount of ozone in the upper stratosphere causes a measurable increase in the ultraviolet radiation that reaches the earth surface. If there was no ozone at all, the amount of ultraviolet radiation reaching us would be catastrophically high.
- ❖ All living things would suffer radiation burns, unless they were underground,
- ❖ or in the sea.
- ❖ In the stratosphere, small amount of ozone are constantly being made by the action of sunlight on oxygen.
- ❖ At the sametime, ozone is being broken down by natural processes.
- ❖ The total amount of ozone usually stays constant because its formation and destruction occur at about the same rate.
- ❖ But unfortunately human activity has recently changed that natural balance. Some manufactured substances such as chlorofluorocarbons and Hydro chlorofluoro carbons can destroy stratosphere ozone much faster than it is formed.

## **Ozone hole:**

Ozone loss was first detected in the stratosphere over the Antarctic. The part of the atmosphere where ozone is most depleted is referred as “**Ozone hole**” but it is not a real hole just a vast region of the upper atmosphere where there is less ozone than elsewhere. Ozone-poor air can spread out from the Polar regions and move above other areas. In addition, direct ozone depleted are is also slowly increasing.

### **Reasons for the Antarctic Ozone hole:**

- ❖ Scientific observations prove that the ozone hole formed over Antarctic is due to compounds of chlorine and bromine formed in the atmosphere.
- ❖ Nearly all of the chlorine and half of the bromine in the stratosphere comes from human activities, the chlorofluocarbons released due to human activities transported up into the upper stratosphere. The most common Ozone depleting substances (ODS) are chlorofluocarbons (CFC) or freon gases, bromine compounds on halons, nitrogen oxides and methyl bromide. These compounds are liberally released from air-conditioners, freezers, foam insulations, aerosol products, industrial solvents, fire extinguishers and pesticides.

### **Effect of Ozone depletions:**

If the ozone is depleted more ultraviolet radiations (especially ultraviolet B (UVB) will reach the earth's surface.

**Effect on plants:-** will affect crop yield and forest productivity.

**Effect on animals:-** will cause damage to fish larvae and other small animals

**Effect on human health:-** Results in non-melanoma skin cancer and melanoma, acute erythema (sun burn), ocular abnormalities, cataract, affect immune responses. The general effect of ozone depletion is summed up in the following chart

## **5. Describe the types of wastage, explain waste water management?**

- Human activities related to livelihood and welfare generate waste.
  - All wastes are pollutants and they create pollution in one way or other.
  - Fundamentally air, land and water pollution results mostly due to improper disposal of wastes.

### **Classification of wastes**

#### **1. Bio – degradable waste**

These are wastes capable of being removed or degraded by biological or microbial action. Waste from agricultural products, animal wastes and waste from food processing, leather, fibre, paper and wood etc. come under this group.

#### **2. Non bio-degradable waste**

The substances which are normally not acted upon and decomposed by microbes are non-bio degradable wastes. It includes mineral waste, mining waste and industrial waste and non-degradable metallic and plastics substance.

### 3. Mixture of biodegradable and non-biodegraded wastes

It includes municipal waste and industrial waste. Municipal waste contains household garbage, piles of food scrapes, old newspaper, discarded and throw away materials, glass, cans, old appliances, broken materials, leather shoes, fibres, plastics and others. Construction waste materials, packaging materials, sewage, hospital waste, junk and vehicles are varied types of urban wastes. All these wastes are found in the form of semisolid, solid, semiliquid, sludge and in fly ash form.

#### Waste water treatment and management

- For the treatment of sewage, **primary treatment** consists of mechanical filtration, screening, and settling, followed by chlorination.
- It removes 50 to 65% of the suspended solids.
- In **secondary treatment** the organic wastes are transformed by bacteria in the treatment plant, where oxygen is provided by aeration, instead of depleting dissolved oxygen in the receiving waters. The sludge from this process, consisting largely of bacterial masses, is concentrated and processed further in an anaerobic digester.

### 6. How will you manage hazardous waste?

#### Management of hazardous wastes

- Hazardous wastes may remain dangerous for thousands of years.
- The hazardous waste include radioactive refuse, metallic compounds, organic solvents, acid asbestos, organic cyanides, pathological hospital wastes, disposable medical equipments and tools.

#### The following methods are adopted for the disposal of hazardous wastes.

**1. Land fills** : There are permanent storage facilities for military related liquid and radioactive waste materials in secured lands. High level radio active wastes are stored in deep underground storage. Wastes are carefully contained to prevent cross – mixing of reactive substances. The land fill is capped with impervious clay to prevent infiltration and percolation of water through the fill. Fill bottom is lined and provided with drainage system to contain and remove any leakage that occurs. Monitoring the wells provides a final check.

**2. Deep – well injection** : It involves drilling a well into dry, porous material below groundwater. Hazardous waste liquids are pumped into the well. They are soaked into the porous material and made to remain isolated indefinitely. However fractures in the impermeable layer may permit the injected wastes to escape and contaminate ground water.

**3. Surface impoundments** : This method is used to dispose large amounts of water carrying relatively small amounts of chemical wastes. Surface impoundments are simple excavated depressions (ponds) into which liquid wastes are drained. Solid wastes

settle and accumulate while water evaporates. If the pond bottom is well sealed and if evaporation equals input, wastes may be stored in the impoundment indefinitely.

**4. Incineration** : The hazardous biomedical wastes are usually disposed off by

means of incineration. Human anatomical wastes, discarded medicines, toxic drugs, blood, pus, animal wastes, microbiological and biotechnological wastes etc are called

### **Bio-medical wastes.**

**5. Bioremediation** : This is another rapidly developing clean up technology. Cleaning the environment with biological options such as microbes and plants is called bioremediation. Some naturally occurring bacteria and other microorganisms have the capability to degrade or absorb or detoxify the wastes such as heavy metals. Many plant materials are successfully used as adsorbents for xenobiotics (phytoremediation). Genetically Engineered Microorganisms (GEMS) are currently produced in large scale to remove the hazardous radionuclides and heavy metals such as mercury, chromium, cadmium etc. Certain plants such as *Gibberella fusarium* were able to breakdown cyanide and reduce it to a non-toxic form. The bacteria *Pseudomonas*, nicknamed as 'super – bug' are capable of degrading variety of toxic compounds and also degrade oil.

## **7. How will you manage non Hazardous waste?**

### **Management of non-hazardous wastes- Solid Waste Management**

**1.Sanitary land fills** : The refuse is spread in a hollow land or in a trench and compacted with a layer of clear sand fill. The sanitary land fills are far more desirable than open dumps but the ground water contamination is always a potential problem. Once a land fill operation has been completed the site must be inspected periodically. This land fill is suitable for recreational activities such as parks and play ground.

**2.Incineration** : Municipal incinerators burn combustible solid waste and melt certain non-combustible materials. Since the high temperature destroys pathogens and their vectors, it is a good method of disposal from health point of view. The incineration can reduce the volume of solid waste by 80 to 90 percent.

### **3.Reuse and recycling techniques :**

- Resource recovery is a broad term that is used for the retrieval of valuable materials or energy from a waste.
- The separating out of materials such as rubber, glass, paper and scrap metal from refuse and reprocessing them for reuse is named as reclamation of waste or recycling.
- Paper (54% recovery) can be repulped and reprocessed into recycled paper, cardboard, and other paper products; finally ground and sold as cellulose insulators or shredded and composted.
- Glass (20% recovery) can be crushed, remelted and made into new containers or crushes used as a substitute for gravel or sand in construction materials such as concrete and asphalt.
- Some forms of plastics (2.2 % recovery) can be remelted and fabricated into carpet fibre, fill for insulated apparel, irrigation drainage, tiles and sheet plastics.
- Metals can be melted and refabricated (39% recovery).

Food wastes and yard wastes (leaves, grass etc.) can be composted to produce humus soil conditioner.

- Textiles can be shredded and used to strengthen recycled paper products.
- Old tyres can be remelted or shredded and incorporated into highway asphalt.

### **Waste water treatment and management**

- The main steps in typical water – treatment plants are coagulation, settling and filtration to remove suspended particles, aeration to remove the volatile substances most responsible for taste and odour, and chlorination to kill pathogenic organisms.
- For the treatment of sewage, **primary treatment** consists of mechanical filtration, screening, and settling, followed by chlorination.
- It removes 50 to 65% of the suspended solids.
- In **secondary treatment** the organic wastes are transformed by bacteria in the treatment plant, where oxygen is provided by aeration, instead of depleting dissolved oxygen in the receiving waters.
- The sludge from this process, consisting largely of bacterial masses, is concentrated and processed further in an anaerobic digester.

**8. Mention a few hot spot in india, and what are the organization to preserve and safe guard biodiversity in india?**

**Bioreserves in India**

Tamilnadu has the distinction of having a marine biosphere reserve viz., the **Gulf of Mannar Biosphere Reserve** and also a hill Biosphere Reserve, the **Nilgiri biosphere**

**Reserve. *Nilgiri Biosphere Reserve:***

- The total area is 5,520 sq. km. It is rich in plant diversity.
- It was established to conserve *in situ* genetic diversity of species and restore degraded ecosystem to its natural conditions.

***The Gulf of Mannar Biosphere Reserve:***

- This reserve was one of six areas chosen on the basis of its threatened status and richness of biological wealth for inclusion into an action programme to save India's protected areas for future generations.
- It encompasses 21 small islands along the coast.
- It is considered as a 'biologists aradise' with 3600 species of plants and animals.

**Organizations functioning to preserve and safeguard biodiversity in India :**

1. National Bureau of Plant Genetic Resources in New Delhi.
2. National Bureau of Animal Genetic Resources at Kamal.
3. National Bureau of Fish Genetic Resources in Allahabad.
4. The Union Ministry of Environment and Forests.
5. The Foundation for the Revitalisation of Local Health Traditions (FRLHT) in Bangalore.

## 9. What is energy crisis and how it could be remedied?

### **Energy crisis**

Energy crisis is due to the increase in population accompanied by rapid urbanization and industrialization.

### **Steps to be taken to resolve energy crisis**

#### **1.Reduce the consumption of fuels**

The consumption of fuel in these areas can be reduced by (a) proper insulation of existing buildings and design changes in new constructions (eg. using less plate glass), (it saves about 33% of energy) (b)improving the fuel economy of automobiles, (c) using more efficient means of transportation.

**2. Develop new sources of energy:** The energy crisis has prompted the development of alternate energy sources (alternatives to fossil fuels) other than the heat available from the combustion of fossil fuels.

#### ***(a)Wind Energy***

In India, the wind power is of great significance as there are large coastal, hill and desert areas where wind energy can be usefully exploited for generation of electricity and water pumping.

#### ***(b) Geothermal Energy***

Geothermal energy is fast emerging as a significant source of electricity in several island nations, mainly in the Indian oceans and the Pacific regions. Geothermal plants make use of naturally heated steam drawn to the surface through a series of boreholes.

#### **Hot Rocks for energy generation**

The Hot Dry Rock (HDR) technology is especially suitable for countries like India, where the geological pattern favours easy exploitation of this source. Tapping of energy involves drilling of holes several km deep into the earth where the temperature of rocks ranges from 200 – 250°C. Water is pumped into these bore holes and allowed to circulate through the source rock's fracture net work, which may have fissures barely a few millimeter wide. This water is then ejected under pressure from a second hole in the form of steam. The steam is used to power turbines for electricity generation, after which it is condensed back to water that can be used again.

#### ***(c) Mini hydel generation***

Energy generation from small water source is probably the most cheapest and reliable of all renewable energy sources. It can be harnessed conveniently from nearby canal or stream in a most environmentally benign manner. Nature has been very generous and bounteous in providing a vast hydro electric potential to the Indian subcontinent.

#### ***(d) Ocean energy***

**The various methods of extracting energy from oceans are as follows.**

1.Ocean winds, 2.Ocean waves, 3.Ocean tides, 4.Ocean currents, 5.Ocean geothermal, 6.Ocean Thermal Energy Conversion (OTEC), 7.Salinity gradient and

8. Bioconversion of sea weeds. India's first power plant generating electricity from ocean energy is commissioned at Vizhinjam fishing harbour in Kerala to provide energy of 150 MW in a year.

**(e) Solar energy:**

Solar energy is another energy source. Each year the earth receives from the sun an enormous total of  $5 \times 10^{20}$  k.cals of energy. Solar energy, which is the primary source of all energy forms on the earth, is the renewable form of energy.

**Advantages of solar energy:**

(a) Solar energy is a kind of universal, decentralized and non-polluting energy (b) it helps considerably in maintaining the ecological balance through the process of photosynthesis and green house effect. (c) it has none of the disadvantages found in the combustion of fossil fuels such as coal, oil or gas.

**(f) Nuclear energy :**

Nuclear energy is the only energy source, known to be economically feasible in the present and for the near future. It can replace fossil fuels. In nuclear fission, a heavy atom splits under neutron bombardment into smaller fragments, with the evolution of huge amount of energy. In spite of this advantage the problem of disposal of nuclear wastes remains. **Nuclear fusion** is expected to be an ideal energy source for the future. In nuclear fusion, light nuclei such as deuterium ( ${}^2_1\text{H}$ ) and tritium ( ${}^3_1\text{H}$ ) combine to form heavier stable nuclei.

**(g) Bio gas or Gobar gas:**

Gobar gas plants are based on anaerobic fermentation of organic wastes in the absence of air. Through gaseous stage the heating efficiency of the cattle dung increased production by about 20%. There is a production of an organic manure which is about 43% better than dry cattle dung itself. This manure can also reduce pressure on naphtha-based fertilizers. It has been estimated that  $10\text{m}^3$  of biogas has energy equivalent of  $6.0\text{m}^3$  of natural gas, 3.6 litres of butane, 7.0 litres of gasoline or 6.1 litres of diesel fuel.

**(h) Hydrogen – Source of power for future**

The hydrogen has been found to be a good choice among all the alternative fuel options.

**10. Write notes on fresh water management?**

**Freshwater Management**

On a human time scale, the amount of water on the earth is fixed. There is little we can do to make more water. However, there are several ways to increase local supplies.

**a) Seeding clouds**

Seeding clouds with dry ice or potassium iodide particles sometimes can initiate rain if water laden clouds and conditions that favour precipitation are present.

## **b) Desalination**

Desalination of ocean water is a technology that has great potential for increasing fresh water. The common methods of desalination are distillation (evaporation and recondensation) or reverse osmosis (forcing water under pressure through a semipermeable membrane whose tiny pores allow water to pass but exclude most salts and minerals).

## **c) Dams, Reservoirs, Canals and Aqueducts**

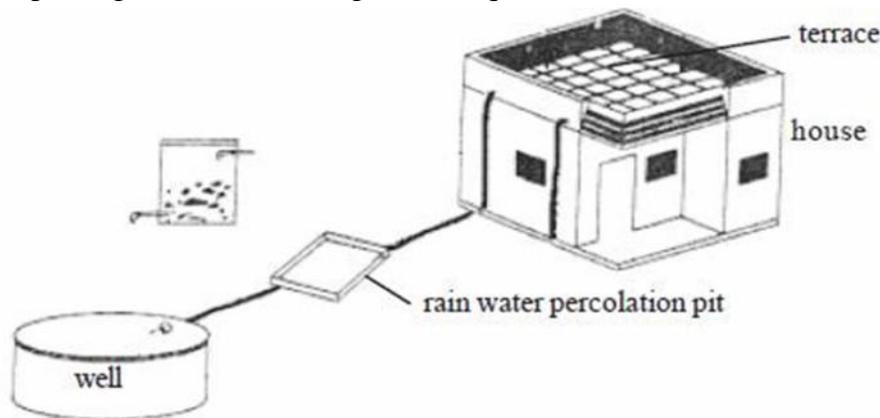
It is common to trap run off with dams and storage reservoirs and transfer water from areas of excess to areas of deficit using canals, tunnels and underground pipes.

## **d) Watershed management**

A series of small dams or tributary streams can hold back water before it becomes a great flood.

## **e) Rain water harvesting**

The activity of collecting rainwater directly or recharging it into ground to improve ground water storage in the aquifer is called rain water harvesting.



## **f) Better agricultural practices**

Sound farming and foresting practices can reduce runoff. Retaining crop residues on fields reduces flooding. Minimizing ploughing and forest cutting on steep slopes protects watersheds.

## **g) Domestic conservation**

We could save as much as half of the water we now use for domestic purposes without great sacrifice or serious changes in our lifestyles. The use of washing machines, dish washers and low volume shower heads can reduce water loss.

## **h) Industrial conservation**

Nearly half of all industrial water use is for cooling of electric power plants and other industrial facilities. By installing dry cooling systems, this could be avoided.

## **i) Saving water -an individual's role**

As an individual you can conserve water by the following methods.

- Take shorter showers.
- Don't wash car and two wheelers often
- Don't allow tap run while washing hands, dishes, food or brushing your teeth unnecessarily.
- In your lawn consider planting native plants, a rock garden or some xerophytic landscaping.
- Use water conserving appliances : low – flow showers and low –flush toilets.
- Use recycled water for lawns, house plants and car washing
- Check taps for leaks

## 11. Describe poverty.

### Poverty and environment

- Poverty is a condition of having insufficient resources or income. the effects of poverty may include poor nutrition, mental illness, drug dependence and crime.
- Extreme poverty, which threatens people's health or lives, is known as **destitution** or **absolute poverty**.
- A condition of having fewer resources or less income than others within a society or country when compared to worldwide averages is known as the **relative poverty**.

### Poverty and Environmental issues

- The increase in population and poverty has made an impact on natural resources and the environment in many regions.
- In many parts of the world, environmental degradation – the deterioration of the natural environment, including the atmosphere, bodies of water, soil and forests – is an important cause of poverty.
- Environmental problems have led to shortages of food, clean water, materials for shelter, and other essential resources. global environmental degradation may result from a variety of factors, including over population and the resulting over use of land and other resources. Drastic environmental degradations may result in poverty.

### Various measures to eradicate poverty in human society include the following:

- a) Achieving self sufficiency by intensifying agriculture, augmenting green revolution, increasing crop productivity through modern genetic and bio technological approaches.
- b) Increasing land and water resources. Expanding the area of able cultivable lands, transforming dry lands into productive lands through irrigation water sheds development.
- c) Prevention of land and water pollution by minimizing the usage of chemical pesticides and adopting biological control strategies for pest eradication.
- d) Establishment of industries and technologies and creating more avenues for employment and man power utilization.
- e) Anti- poverty programmes and social security scheme by the Governments.
- f. Establishing more primary health centres, hospitals and orphanages for destitutes and diseased.

## 7. APPLIED BIOLOGY

### 1. How to find out healthy livestock?

- (i) They are active with a lustrous skin .
- (ii) Have good appetite and sound sleep.

### 2. What are the symptoms of cow pox?

**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.

### 3. State the preventive measures of cow pox.

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.

### 4. Name viral diseases afflicting livestock.

The **viral diseases** are **cow pox, foot and mouth disease** and **rinderpest**.

### 5. Name bacterial diseases afflicting livestock.

The bacterial diseases are **anthrax, haemorrhagic septicemia, mastitis** and **tuberculosis**.

### 6. What is out breeding ?

Out breeding is mating of less closely related or unrelated animals. The individuals involved do not have a common ancestor in the preceding 4-6 generations.

### 7. What is cross breeding ?

Cross breeding is mating of animals of different breeds. It is valuable as a means of introducing desirable characters into new breed in which they have not existed formerly. The cross breeds exhibit increased growth and vigour by the blend of desirable dominant genes from two breeds in the first generation.

### 8. What are the benefits of artificial insemination ?

It helps to eliminate the need for maintenance of herd sire, permits long distance transport of semen by air, avoids spreading of genital diseases, and increase the rate of conception. Further this method helps better recording, permits use of semen from injured and old bulls and provides a chance of detecting any genital abnormalities or pathological infection and inflammation in cows.

### 9. Why Leg horn hens are economically more important?

They attain maturity at five or six months and start laying eggs.

### 10. State the characteristic features of American type of hens with examples?

These breeds are characterized by yellow feathers, red ear lobes and many of them lay brown-shelled eggs. **Rhode island reds, Plymouth rock, New hampshire** and **Wyandotte** are some of the important breeds of American class.

### **11. How exotic breeds of fowls are classified on the basis of their origin?**

They are American breeds, Asiatic breeds, English breeds and Mediterranean breeds. In addition to the above many of the indigenous breeds are also reared.

### **12. What are the factors to be observed in the choice of eggs for incubation?**

The egg should be fertile (2) Over-sized and small sized eggs should not be selected instead medium sized should be preferred (3) Dark-brown shelled eggs hatch earlier than light-brown shelled eggs (4) Freshly laid eggs are preferred for rearing.

### **13. What are the two types of incubation?**

- The incubation is of two types namely **natural incubation** and **artificial incubation**.
- In the natural incubation method, the eggs are subjected to the care of mother. Only a limited number of eggs can be incubated by a mother hen.
- In artificial incubation the eggs are maintained in a chamber(incubator) which stimulates the optimum environmental condition. In artificial incubation more number of eggs can be incubated than natural incubation.

### **14. What is brooding and its kinds?**

Brooding is the care and management of young chickens for four to six weeks immediately after hatching. Like incubation, brooding also has the natural and artificial methods. In the former, day-old chickens are left to the care of mother and in the latter temperature controlled artificial brooder is used.

### **15. What are the uses of Stethoscope?**

1. Stethoscope helps to find normal (lub-dub) versus abnormal heart sounds (heart murmurs) and also to diagnose valve functions.
2. Stethoscopes can indicate fluid in lungs in case of pneumonia and pulmonary edema. It can diagnose airway diseases like bronchitis and pleuritis.
3. Stethoscopes are also used to compare the movements in the normal versus overactive or underactive intestinal tract.

### **16. What are the uses of Sphygmomanometer?**

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).

### **17. What are the uses of CT scan? (any three)**

1. CT is an invaluable tool in the cancer diagnosis process and is often the preferred method for diagnosing lung, liver and pancreas cancer.
2. CT imaging and CT angiography are finding a greater role in the detection, diagnosis and treatment of heart disease, acute stroke and vascular diseases, which can lead to stroke, gangrene or kidney failure.
3. CT can be used to measure bone mineral density for the detection of osteoporosis.
4. CT has excellent application in trauma cases and other internal bleeding in patients.

5. CT is used extensively for diagnosing problems of the inner ears and sinuses. The anatomy of the inner ear and sinuses is made up of delicate soft tissue structures and very fine bones. CT is excellent for imaging tumors or polyps in the sinuses and disease that cause degeneration of the small bones in the inner ear.

6. CT has been the basis for interventional work like CT guided biopsy and minimally invasive therapy. CT images are also used as basis for planning radiotherapy cancer treatment. CT is also often used to follow the course of cancer treatment to determine how the tumor is responding to treatment.

**18. What is CT scan?**

Computed Tomography (CT) or “CAT scanning” combines the use of a digital computer together with a rotating X-ray device to create detailed cross sectional images or “slices” of the different organs.

**19. What are the uses of Haemocytometer?**

1. Decrease in the number of circulating erythrocytes indicates anaemia.
2. An increased number of erythrocytes indicates the possibility of polycythemia.
3. An increase in WBC count for a transient period indicates bacterial infection.
4. Progressive increase in abnormal WBC count indicates the possibility of leukemia.

**20. What is Endoscopy?**

Endoscopy is a method of examining the interior of a body cavity or hollow organ (e.g., oesophagus, stomach) using an endoscope, a narrow, flexible fiber optic instrument that conducts light.

**21. What are the uses of Haemo cytometer?**

1. Decrease in the number of circulating erythrocytes indicates anaemia.
2. An increased number of erythrocytes indicates the possibility of polycythemia.
3. An increase in WBC count for a transient period indicates bacterial infection.
4. Progressive increase in abnormal WBC count indicates the possibility of leukemia.

**22. What is Endoscopy?**

Endoscopy is a method of examining the interior of a body cavity or hollow organ (e.g., oesophagus, stomach) using an endoscope, a narrow, flexible fiber optic instrument that conducts light.

**23. What are the advantages of auto autoanalyser? Advantages of an autoanalyser :**

1. Accuracy is more when compared with manual method.
2. Large number of samples may be processed in minimal time.
3. Two or more assays may be performed simultaneously.
4. Calculations are not required.

**24. What are disadvantages of autoanalyser? Disadvantages of an autoanalyser :**

1. It is impractical for small number of specimens.
2. Instruments may fail occasionally.
3. Additional training of the staff about the working, maintenance and potential problems of the machine is needed.
4. They are expensive.

**10 Mark Questions**

**6.APPLIED BIOLOGY**

1. Explain the origin distribution characters and milk production of mulching cows.
2. Describe the diseases of livestock.
3. Explain modern technology adopted in livestock breeding.
4. Describe important cattle breeds and their characteristics.
5. What are the important stages of poultry farming and explain the stages?
6. Classify exotic breeds of fowls .
7. Explain poultry farming.
8. Describe the indigenous (Desi variety) breeds of fowls.
9. What are the factors required for brooding .
10. Describe the types of fish ponds.
11. What is pisciculture? and Mention the characters of cultivable fish.
12. Describe pisciculture management and edible fishes of Tamilnadu.
13. Explain pisciculture as a profession.
14. What is ECG?. Explain P, Q, R, S, T waves.
15. What is CT scan?. What are its uses.
16. Explain Stethoscope and Sphygmomanometer?
17. Explain Endoscopy and Artificial pace maker.
18. Describe an account on Haemocytometer.
19. Explain the process of Urine – Sugar analysis.

## STAGE – III

### ONE MARKS

#### **1.HUMAN PHYSIOLOGY** **NUTRITION and DIGESTION**

1. The ratio of CHO in carbohydrates \_\_\_\_\_ (**1:2:1**)
2. Most important monosaccharide in RNA and DNA is \_\_\_\_\_ (**Pentose**)
3. The calorie obtained from 1g of carbohydrate is \_\_\_\_\_ (**4.1 C**)
4. Polysaccharide present in the liver and muscle of animal \_\_\_\_\_ (**glycogen**) Lactose is composed of \_\_\_\_\_ (**glucose and galactose**)
5. The shape of starch in food particle \_\_\_\_\_ (**pectin**)
6. Name the protein functioning as enzymes \_\_\_\_\_ (**functional proteins**)
7. The name of essential amino acid among the 20 amino acid \_\_\_\_\_ (**10**)
8. Lipid is stored in animals \_\_\_\_\_ (**adipose tissue**)
9. Oil recommended hypertension patients \_\_\_\_\_ (**PUFA**)
10. 1gram of lipid as energy value \_\_\_\_\_ (**9.3 calories**)
11. Vitamin that helps in the maturation of RBC is \_\_\_\_\_ ( **vitamin B12**)
12. Vitamin D deficiency causes \_\_\_\_\_ (**Osteomalacia**) in the aged
13. Pellagra is caused by the deficiency of Vitamin \_\_\_\_\_ (**Niacin**)
14. Isometric exercises enhance storage of \_\_\_\_\_ (**glycogen**)
15. The important function of Vitamin \_\_\_\_\_ (**A**) is concerned with \_\_\_\_\_ (**eye sight**)
16. \_\_\_\_\_ (**multiple sclerosis**) is an autoimmune disorder
17. Percentage of water in the body of man \_\_\_\_\_ (**71 to 78 %**)
18. Vitamin E is an \_\_\_\_\_ (**Antioxidant**)
19. Tissues are rejuvenated by Vitamin \_\_\_\_\_ (**E**)

#### **DIGESTIVE SYSTEM**

1. The Fasting sugar range from \_\_\_\_\_ (**70-110 mg/DL**)
1. First step in digestion \_\_\_\_\_ (**tasting**)
2. Saliva secreted per day \_\_\_\_\_ (**1500 ml**)
3. Secretion of saliva is an example for \_\_\_\_\_ (**reflex action**)
4. Chief cells secrete \_\_\_\_\_ (**enzymes – Pepsin and Renin**)
5. \_\_\_\_\_ (**mucous**) prevent crop from Hcl
6. Hcl is secreted by \_\_\_\_\_ (**Oxyntic cells**)
7. The Bile stones are made of \_\_\_\_\_ (**cholesterol**)
8. PH value of pancreatic juice is \_\_\_\_\_ (**7 – 8**)
9. BMI of adult is \_\_\_\_\_ (**19-25**)
10. Absorbed food is directed to liver by \_\_\_\_\_ (**hepatoportal vein**)
11. The first sign of Dental caries is \_\_\_\_\_ (**tooth pain**)
12. Bacteria that causes duodenal ulcer is \_\_\_\_\_ (**helicobacter pylori**)

13. Hernia develops in babies is \_\_\_\_\_ (**umbilical hernia**)
14. Appendicitis causes \_\_\_\_\_ (**severe pain and swelling**)
15. The severe damage cause to liver is \_\_\_\_\_ (**cirrhosis**)
16. Magnesium ion is responsible for \_\_\_\_\_ formation (**Bones and teeth**)
17. During fasting blood glucose level \_\_\_\_\_ (**70-110mg/DL**)
18. First phase of digestion \_\_\_\_\_ (**swallowing**)
19. Saliva secrete during daily \_\_\_\_\_ (**1000-1500ml**)
20. Swallowing and saliva secretion \_\_\_\_\_ (**Involuntary action**)
21. Chief cells secrete \_\_\_\_\_ (**Enzymes**)
22. HCl Acid action inhibited by \_\_\_\_\_ (**mucous**)
23. **HCl** secrete \_\_\_\_\_ (**Oxyntic cells**)
24. Bile salts converts the lipid molecules in to \_\_\_\_\_ (**lipid droplets**)
25. Bile stone formed by \_\_\_\_\_ (**cholesterol**)
26. P<sup>H</sup> of Pancreatic juice \_\_\_\_\_ ( **p<sup>h</sup> 7-8**)
27. Ecto peptidase is \_\_\_\_\_ (**carboxy peptidase**)
28. Body mass index at adult \_\_\_\_\_ (**19-25**)
29. Digestive food materials send through liver by \_\_\_\_\_ (**Hepatic portal vein**)
30. Tooth decay first symptom \_\_\_\_\_ (**tooth ache**)
31. "Ulcer" causative agent \_\_\_\_\_ (**Helicobacter pylori**)
32. Hernia cause to childs \_\_\_\_\_ ( **umbilical hernia**)
33. Swallowing happen in intestinal valve is \_\_\_\_\_ (**Appendix**)

### **BONES AND JOINTS**

34. The total number of bones in adult \_\_\_\_\_ (**206**)
35. The total number of muscle fibre \_\_\_\_\_ (**700**)
36. \_\_\_\_\_ (**Hippocrates**) explained bone fractures and treatment in the 14<sup>th</sup> century
37. \_\_\_\_\_ (**Callus**) tissue integrates the broken bone tissue.
38. Pathological fracture is caused by \_\_\_\_\_ (**hyperparathyroidism**)
39. The fine filament of muscle fiber are called \_\_\_\_\_ (**myofibrils**)
40. Sliding filament hypothesis was explained by \_\_\_\_\_ (**Hanson**) and Huxley.

### **MUSCLES**

1. Muscle contraction is activated by the chemical \_\_\_\_ (**acetyl choline**)
2. Taratalogic disorder is \_\_\_\_\_ (**congenital**)
3. Heart muscles are benefited by \_\_\_\_\_ (**isometric exercises**)
4. Blood purification in the patient of Myasthinia gravis is called \_\_\_\_\_ (**plasmapheresis**)
5. Positive waves of ECG are **PRT** and -ve waves ECG are \_\_\_\_ (**QS**)
6. The five types of waves of ECG are \_\_\_\_\_ (**PQRST**)
7. Duration of p wave \_\_\_\_\_ (**1sec**)
8. Gout is caused by \_\_\_\_\_ (**metabolic disorder**)
9. Auto immune disorder against an unknown antigen \_\_\_\_\_ (**Rheumatic diseases**)

10. Human adult have \_\_\_\_\_ no of bone & muscle fibres \_\_\_\_\_ (206, 700)
11. In BC 14 years who first explained the bone fracture \_\_\_\_\_ (Hippocrates)
12. Young and tender tissues of bones is \_\_\_\_\_ (callus tissues)
13. Pathological bone fracture happens by \_\_\_\_\_ (Hyperthyroidism)

### RESPIRATORY SYSTEM

51. Flooding elevation for \_\_\_\_\_ (Brooding is 5-7.5)
52. \_\_\_\_\_ (Chitakong) is found in West Bengal.
53. The fusion of Diploid gamete with haploid gamete results in \_\_\_\_\_ (polyploidy)
54. The advocate of new Darwinism is \_\_\_\_\_ (TH. Huxley)
55. TB easily catches \_\_\_\_\_ (HIV) patients.
56. \_\_\_\_\_ (inspiration) is an active process.
57. Respiration is controlled by \_\_\_\_\_ (medulla oblongata) of Brain.
58. Pneumonia is caused \_\_\_\_\_ (Pneumococcal pneumonia)
59. Inflammation of the plural membranes called \_\_\_\_\_ (pleurase)
60. Calcium ions required for \_\_\_\_\_ (Muscle contraction)
61. TB is caused by \_\_\_\_\_ (Microbacterium tuberculosis)

### CIRCULATORY SYSTEM

62. Mitral valve is called \_\_\_\_\_ (Bicuspid valve)
63. SA node produces \_\_\_\_\_ (electrical impulses)
64. Heartbeats \_\_\_\_\_ (72 to 80 times per minute)
65. Lub sounds are caused by the closure of \_\_\_\_\_ (arterio – ventricular valve)
66. Tub sounds are caused by the closure of \_\_\_\_\_ (semi lunar valve).
67. Myocardial infarction is called \_\_\_\_\_ (coronary artery)
68. The unbearable in chest is called \_\_\_\_\_ (Angina)
69. The internal structure of heart is revealed by \_\_\_\_\_ (Echocardiograph)
70. Shrinkage of valves is called \_\_\_\_\_ (stenosis)
71. Normal BP of man \_\_\_\_\_ (120/80 mmHg.)
72. The \_\_\_\_\_ is capable of generating action potential (SA node)
73. The rate of heart beat is \_\_\_\_\_ per minute (72-80)
74. The first louder sound of heart is due to \_\_\_\_\_ (closure of the atrioventricular valves)
75. The second sound is of shorter duration was due to \_\_\_\_\_ (closure of semilunar valve)
76. \_\_\_\_\_ is due to sudden death of heart muscles. (Myocardial infarction)
77. Due to \_\_\_\_\_ the pain ranges from a high ache to intense crushing agony (Angina pectoris)
78. \_\_\_\_\_ is a technique that uses ultra sound waves to image the interior of heart (Echo cardiography)
79. Narrowing of heart valves is called \_\_\_\_\_ (stenosis)
80. \_\_\_\_\_ may cause severe unremitting chest pain (myocardial infarction)
81. Men are affected earlier than women because women are protected by \_\_\_\_\_ hormone (oestrogen)

82. Osteosclerosis is less common in women due to \_\_\_\_\_ (**Oestrogen**)
83. Heart transplantation was performed first time by \_\_\_\_\_ (**Christian Bernard**)
84. The blood volume of man and women \_\_\_\_\_ (**5-6, 4-5 litter**)
85. The life span of RBC of male and female \_\_\_\_\_ (**120 – 110 days**)
86. RBCs have their origin in \_\_\_\_\_ (**Bone marrow**)
87. Thrombosis in coronary artery is called \_\_\_\_\_ (**coronary thrombosis**)
88. \_\_\_\_\_ (**Embolus**) is part of the **thrombosis**)
89. The first human heart transplant was performed by \_\_\_\_\_ (**prof christian Bernard-south Africa**)
90. The total blood volume in human female is litters \_\_\_\_\_ (**4-5lts**) and \_\_\_\_\_ males (**5-6**)
91. Erythrocytes stay in circulation for about \_\_\_\_\_ (**120 days**) in males and \_\_\_\_\_ (**110**) days in females.
92. The number of erythrocytes in male and female \_\_\_\_\_ per cubice mm (**4.2-5.8, 3.6-5.2**)
93. RBC are manufactured in the \_\_\_\_\_ (**bone marrow of bones such as ribs and vertebrae**)
94. Which WBC contain heparin which inhibits blood clotting (**Basophils**)
95. A thrombus formed in the artery suppling heart muscle is known as \_\_\_\_\_ (**coronary thrombosis**)
96. When a portion of a thrombus clot becomes fragmented and enters the circulating blood, it is called \_\_\_\_\_ (**embolus**)
97. fibrinogen \_\_\_\_\_ fibrin (**thrombin**)
80. The ability of the body is maintained and internal mileu irrespective of external environment called \_\_\_\_\_ (**homeostasis**)
81. While matter of CNS is called \_\_\_\_\_ (**axons**)
82. The cortex region of cerebrum has \_\_\_\_\_ (**ten**) number of nerves junction.
83. The larger part diencephalons is \_\_\_\_\_ (**thalamus**)
84. Sleep, wake cycle is controlled by \_\_\_\_\_ (**hypothalamus**)
85. The mass of cerebrum in male and female \_\_\_\_\_ (**1400gm, 1200gm**)
86. The four nuclei of midbrain are called \_\_\_\_\_ (**corporaquadrigemina**)
87. Information from cerebrum to cerebellum is via \_\_\_\_\_ (**pons**)
88. The vital organs like heart, lungs are controlled by \_\_\_\_\_ (**medulla oblongata**)
89. Loss of memory is called \_\_\_\_\_ (**amnesia**)
90. Non REM sleep is good for \_\_\_\_\_ (**health**)
91. Conditional reflex was experimentally proved by \_\_\_\_\_ (**Pavlov**)
92. REM sleep lost for \_\_\_\_\_ (**5 – 30**) minutes.
93. The volume of cerebro spinal fluid is \_\_\_\_\_ (**150 ml**)
94. The gall stones are formed of \_\_\_\_\_ (**cholesterol**)
95. During the contraction of muscle the ATP molecules bind with the active site of Of \_\_\_\_\_ (**actin filaments**)
96. . Excessive exposure to U V-rays can cause \_\_\_\_\_ (**skin cancer**)
- EXCRETION**
97. Urea biosynthesis takes place in \_\_\_\_\_ (**liver**)
98. Area responsible for reabsorption of water, glucose, sodium phosphate and

- bicarbonates is \_\_\_\_\_ (**proximal convoluted tubules**)
99. Number of ATP molecules spent to convert ammonia to urea is \_\_\_\_\_ (**three**)
100. Which of the following is called artificial kidney \_\_\_\_\_ (**dialyzer**)
101. Intermediate between bacterium and virus is called \_\_\_\_\_ (**Mycoplasma**)

#### **CIRCULATION**

102. The largest leucocytes \_\_\_\_\_ (**Monocytes**)
103. The smallest leucocytes \_\_\_\_\_ (**Lymphocytes**)
104. \_\_\_\_\_ influence mood and general body movements due to strong emotions such as fear or anger. (**Thalamus**)
105. The major mineralocorticoid hormone is \_\_\_\_\_ (**Aldosterone**)
106. The sperms are stored in \_\_\_\_\_ (**Epididymis**)
107. Myasthenia Gravis important symptom is \_\_\_\_\_ (**Drooping eyelids**)

#### **NERVOUS SYSTEM**

1. Within brain the collections of grey matter form centers called \_\_\_\_\_ (**Nuclei**)
2. The \_\_\_\_\_ make up the white matter of the CNS (**axons**)
3. The number of synapses in the cerebral cortex alone is \_\_\_\_\_ ( **$10^{2783000}$** )
4. Major part of diencephalon is \_\_\_\_\_ (**thalamus**)
5. \_\_\_\_\_ co-ordinates responses to the sleep-wake cycle (**Hypothalamus**)
6. The weight of male and female brain is \_\_\_\_\_ (**1400gms, 1200gms**)
7. The four mounds in the mid brain \_\_\_\_\_ (**Corpora quadrigemina**)
8. \_\_\_\_\_ means memory loss (**Amnesia**)
9. The \_\_\_\_\_ relays information from the cerebrum to the cerebellum (**Pons**)
10. The \_\_\_\_\_ function as centers of several reflexes involved in the regulation of heart rate breathing (**pons**)
11. \_\_\_\_\_ is the state of inability to recall memories (**Amnesia**)
12. During this \_\_\_\_\_ sleep the dreams in memory does not occur (Slow wave sleep)
13. REM sleep lasting \_\_\_\_\_ minutes (**5-30 mts**)
14. The physiologist who first demonstrated the conditioned reflex was \_\_\_\_\_ (**Ivan Pavlov**)
15. In Human the volume of CSF is \_\_\_\_\_ ml (**150**)
16. \_\_\_\_\_ are involved in visual reflexes (**Superior colliculi**)
17. The rate of secretion of CSF in a day is \_\_\_\_\_ (**550ml**)
18. \_\_\_\_\_ acts as a mechanical buffer for CNS (**Cerebrospinal fluid**)
19. The phenomenon of maintaining a constant inner state irrespective of changes happening in the environment (**Homeostasis**)

#### **CHEMICAL CO-ORDINATION**

1. The pituitary is controlled by \_\_\_\_\_ (**Hypothalamus**)
2. Pituitary weighs about \_\_\_\_\_ (**500 mg**)
3. \_\_\_\_\_ is originated from the floor of diencephalon as a downward growth (**Neurohypophysis**)
4. Deficiency of growth hormone or hyposecretion in children results in \_\_\_\_\_ (**Dwarfism**)
5. Excessive secretion of GH results in over growth and reach a height of 7 to 9 feet is \_\_\_\_\_ (**Gigantism**)
6. The excessive GH in adults also results \_\_\_\_\_ (**Acromegaly**)
7. TSH is a glycoprotein with a molecular weight of \_\_\_\_\_ (**28,000 daltons**)

8. The \_\_\_\_\_ stimulates the adrenal cortex (**ACTH-Adreno cortico trophic hormone**)
9. TSH, FSH and LH are \_\_\_\_\_ (**glycoprotein**)
10. The term oxytocin refers to \_\_\_\_\_ (Quick birth)
11. The \_\_\_\_\_ stimulates the smooth muscles of uterus and causes the contraction, and helps in the delivery of foetus (**Oxytocin**)
12. The most important function of the adrenal cortex is its role in \_\_\_\_\_ (**stress tolerance**)
13. \_\_\_\_\_ deficiency leads to Diabetes insipidus (**ADH OR Vassopressin**)
14. Amino acid residue in thyroxine is \_\_\_\_\_ (**Tyrosine**)
15. The amount of Iodine in thyroxine is \_\_\_\_\_ (**65%**)
16. Which Hormone is very essential for the development of nervous system particularly at the time of birth and during the first year (**Thyroxine**)
17. \_\_\_\_\_ is caused due to lack of Iodine in the soils (**Endemic goiter**)
18. \_\_\_\_\_ is found in children who are deficient of thyroxine hormone from the time of birth (**Cretinism**)
19. Thyroxine deficiency in adults leads to \_\_\_\_\_ (**Myxoedema**)
20. The hyper function of thyroid gland results in \_\_\_\_\_ (**Grave's disease**)
21. Grave's disease is called \_\_\_\_\_ (**thyrotoxicosis or exophthalmic goiter**)
22. The half-life of the parathormone is \_\_\_\_\_ (**20-30 minutes**)
23. \_\_\_\_\_ is a calcium-lowering hormone (**Calcitonin**)
24. The alpha cells secrete \_\_\_\_\_ (**glucagon**) and the beta cells secrete (**Insulin**)
25. Synthesis of glucose from non-carbohydrates is \_\_\_\_\_ (**Gluconeogenesis**)
26. \_\_\_\_\_ is the hyperglycemic hormone (**Glucagon**)
27. All the chemical hormones are \_\_\_\_\_ (**Steroids**)
28. \_\_\_\_\_ increases the rate, amplitude and frequency of the heart beat (**Adrenalin or epinephrine**)
29. \_\_\_\_\_ also acts as an anti-inflammatory agent (**Cortisone**)
30. \_\_\_\_\_ is one of the androgenic hormone (**Testosterone**)
31. The corpus luteum of the pregnant woman secretes another hormone \_\_\_\_\_ (**Relaxin**)

## RECEPTOR ORGANS

1. Refraction occurs through which surfaces of eye before it reaches retina \_\_\_\_\_ (**cornea, front surface of lens, rear surface of lens**)
2. The vitreous humour is made of \_\_\_\_\_ (**gelatinous mucoprotein**)
3. \_\_\_\_\_ is a purple red photosensitive pigment present in the outer segment of the rods (**Rhodopsin or visual purple**)
4. \_\_\_\_\_ cells of eyes perceive colors (**cone**)
5. The ideal refractive state is called \_\_\_\_\_ (**Emmetropia**)
6. \_\_\_\_\_ is short sightedness (**Myopia**)
7. \_\_\_\_\_ is long sightedness (**Hypermetropia**)
8. \_\_\_\_\_ results if the lens curvature is too great or the entire eye ball becomes elongated. (**Myopia**)
9. When the curvature of lens is not great enough it results in \_\_\_\_\_ (**Hypermetropia or long sightedness**)
10. If the light is focused in front of the retina is corrected using \_\_\_\_\_ (**concave lens**)
11. \_\_\_\_\_ occurs if either the cornea or lens is distorted (**Astigmatism**)
12. \_\_\_\_\_ the result of a reduction in the amplitude of accommodation

with age due to hardening and loss of plasticity of the lens(**Presbiopia**)

13. \_\_\_\_\_ is the opacity in the lens of the eye(**Cataract**)

14. Vitamin \_\_\_\_\_ and \_\_\_\_\_ are necessary for the retinal functions(**A,B**)

15. In \_\_\_\_\_ conjunctiva causes redness, discomfort and a discharge from the affected eye(**Conjunctivitis**)

16. The Industrial noise survey of India recognized noise levels from \_\_\_\_\_ as permissible levels(**81db- 120db**)

17. loud noises is \_\_\_\_\_ (**above 130 db**)

18. The skin of the body forms \_\_\_\_\_ of the total mass(**8%**)

19. The surface area of skin \_\_\_\_\_ (**1.1-2.2m<sup>2</sup>**)

20. \_\_\_\_\_ secretes an oily substance(**Sebaceous glands**)

21. \_\_\_\_\_ glands are found through the body opening on the surface and secreting a clear watery fluid(**merocrine**)

21. melanin is stored in \_\_\_\_\_ (**melanopore**)

22. The synthesis of melanin is from the amino acid called \_\_\_\_\_ (**tyrosine**)

23. Hyper pigmentation of skin face nipples and genitalia during pregnancy under the influence of \_\_\_\_\_ (**oestrogen**)

24. Intermediate wave length ultraviolet light UVB lies in between \_\_\_\_\_ (**UVA,UVC**)

25. The taste buds \_\_\_\_\_ are near the tip(**Sensitive to sweet**)

26. The taste bud in the palate respond to \_\_\_\_\_ (**Sour and bitter**)

27. Excessive exposure to UV rays can cause \_\_\_\_\_ (**various forms as skin cancer**)

## **EXCRETION**

1. Ultra filtration of blood takes place in the malpighian body which acts as a \_\_\_\_\_ (**Biological filter**)

2. A \_\_\_\_\_ comprises Bowman's capsule and glomeruli(**Malpighian body**)

3. The kidneys normally receive an about \_\_\_\_\_% of the cardiac output(**20-25%**)

4. In 24hrs the total volume of glomerular filtrate is \_\_\_\_\_ (**170-180lts**)

5. In man \_\_\_\_\_ ml of glomerular filtrate is produced. (**125ml**)

6. In collecting tubule the osmotic reabsorption of water under the influence of (**Vaso pressin**)

7. In collecting tubule reabsorption of water takes place under the influence of \_\_\_\_\_ (**ADH/vasopressin**)

8. Amount of urea filtered in 24hrs through glomerular filtrate is \_\_\_\_\_ (**53g**)

9. People with GOUT have stones formed \_\_\_\_\_ (**Uric acid**)

10. Urea was formed in the \_\_\_\_\_ (**liver**)

11. Stones in the bladder and lower ureter can be crushed and removed by \_\_\_\_\_ (**cystoscopy or ureterorenoscopy**)

12. The first line of treatment in treating kidney stones is \_\_\_\_\_ (**Lithotripsy**)

13. \_\_\_\_\_ is called Artificial kidney (**Dializer**)

14. \_\_\_\_\_ is excretion of increased quantity of urine (**Polyurea**)

15. \_\_\_\_\_ is excessive appetite leads to increased in take of food(**polyphagia**)

## **REPRODUCTION**

1. \_\_\_\_\_ hormone secreted by leydig cells(**Testosterone**)

2. Optimal temperature for sperm production is \_\_\_\_\_ (**32°C**)

3. Sperm production for day is \_\_\_\_\_(125 billion)
4. \_\_\_\_\_is the age of puberty for women (12-15)
5. A ejaculation having \_\_\_\_\_ number of sperms (15 billions)
6. "Semen" means \_\_\_\_\_ (Dense Sperm with fluid)
7. \_\_\_\_\_ inhibits testosterone production (Inhibitin)
8. \_\_\_\_\_ hormone produced by corpus lustrum (progesterone)
9. \_\_\_\_\_ restrict the reflex action of uterus during pregnancy (progesterone)
10. \_\_\_\_\_ type of egg produced in human (Alecithal)
11. \_\_\_\_\_ measurement of Ovum (100  $\mu$ micron)
12. \_\_\_\_\_ layer beyond the zona pellucida (corona radiate)
13. Ovum is otherwise called as \_\_\_\_\_ (Graafian follicle)
14. Unfertilized ovum is dead within \_\_\_\_\_ period. (12-24 hrs)
15. Follicular phase between \_\_\_\_\_ days ( 5 – 14 days)
16. 15 – 28 days \_\_\_\_\_ phase in menstrual cycle (luteal phase)
17. Corpus luteum changed into \_\_\_\_\_ tissue (Corpus albicans)
18. \_\_\_\_\_ % for test tube achieved (20)
19. \_\_\_\_\_ produce follicular cells (corpus luteum)
20. First test tube baby formed by \_\_\_\_\_ (Steptoe and Edwards)
21. At present India population \_\_\_\_\_ (100 cores)
22. Copper 'T' remains for a period \_\_\_\_\_ ( 3 years)
23. Permanent family planning method in male is \_\_\_\_\_ (Vasectomy)
24. Permanent family planning method in female is \_\_\_\_\_ (Tubectomy)
25. Fertilization take place in female \_\_\_\_\_ (Fallopian tube)
26. In vitro fertilization take place in \_\_\_\_\_ stage ( 8 cell stage)

### **Three Mark Questions – Nutrition**

5. Define carbohydrates and mention their compositions.
6. Classify monosaccharide's?
7. What is meant by Trioses?
8. What is Pentoses?
9. What is meant by Disaccharides? Give eg.
10. What is structural proteins?
11. What is Kwashiorkar? Write its symptoms.
12. Function of lipids?
13. What is Obesity?
14. Write the symptoms of scurvy.

### **Digestion**

1. Name the types of Salivary glands.
2. Name the types of protease?
3. Give an account of "Peptic ulcer".
4. Given an account of root-canal therapy.
5. Which chemical material involved in "Bile stone".
6. What are the symptom of appendicitis?
7. What is Hepatitis?

8. Define Hernia and write its types.
9. Define : Rigor Mortis.
10. What are chylomicrons?

### **Bones and Joints**

2. What is physiotherapy?
3. Brief account of Bone treatment.
4. What is “Gout”?
5. What are the symptoms of Rickets?
6. What are the symptoms of Osteomalacia?
7. What are the types of fracture?
8. Write short notes on Rheumatic arthritis.

### **Muscles**

1. What are the neuro muscular function.
2. Name the four major proteins in machinery of muscle fibre.
3. What are the types of muscle contractions?

### **Respiration**

1. Name the muscles involved in respiration.
2. Define Herring – Breuer reflex.

### **Excretion**

1. How can kidney stone formed?
2. What is lithotripsy treatment?
3. What are the reasons for Kidney failure?
4. Draw : Ornithine Cycle
5. Define : Polyurea.

### **Reproduction**

1. What is meant by Menstrual cycle?
2. What is Corpus albicans?
3. What is meant by in vitro fertilization?
4. What is Vasectomy?
5. What is Tubectomy?
6. Define : Corpus luteum.

## **10 Mark Questions**

1. Explain about vitamin deficiency?
2. Give an account about minerals.
3. Explain - Digestion take place in mouth & stomach
4. Describe the digestion take place in small intestine.
5. Describe the mechanism of fracture and healing.
6. Explain the mechanism of muscle contraction.
7. Explain the "Pulmonary respiration".
8. Describe the mechanism of respiration in human.
9. Give an account 1. myocardial infarction. 2. Angina pectoris
10. Explain the blood composition.
11. Explain the structure and function of Human brain.
12. Explain the concept of left and right brain concept.
13. Describe "Pituitary gland".
14. Explain the function of thyroxine.
15. Explain the function of epinephrine.
16. Describe the Gonad glands.
17. Explain the defects of human eye.
18. Explain the function of human eye.
19. Write an essay on hearing loss and the correcting measures adopted.
20. Describe the mechanism of urine formation in human
21. Give an account about "Diabetes mellitus".
22. Describe the mechanism of "menstrual cycle".
23. Comment on various schemes suggested by the National Family Welfare programmes and their importances.(birth control)
24. Explain the structure of skeletal muscles.
25. Write note on Carbohydrates and Proteins.
26. Give an account on Peptic ulcer and Hernia.
27. What is Arthritis? Explain the types of arthritis.
28. Define memory? Explain the types of Memory and physiology of memory.
29. Define Sleep? Explain its types and Physiological effects of sleep.

## **7. THEORIES OF EVOLUTION**

1. Zoological philosophique was authored by \_\_\_\_\_ (**Lamarck**)
2. Lamarckian theory was based on \_\_\_\_\_ (**inheritance of acquired characters**)
3. Germ plasm was proposed by \_\_\_\_\_ (**August weise man**)
4. Lamarckian first law was evidenced by \_\_\_\_\_ (**evolution of horses**)
5. The third law of Lamark is concerned with Law of \_\_\_\_\_(**uses and disuse.**)
6. The contemporary of Darwin who endorsed with his theory is \_\_\_\_\_(**Alfred Wallace**)
7. \_\_\_\_\_(**Sewal Wright**) proposed genetic drift theory.
8. \_\_\_\_\_(**G.L.Stebbins**) proposed process of organic evolution.
9. \_\_\_\_\_(**Dobzhansky**) proposed synthetic theory of evolution.
10. \_\_\_\_\_ (**Mc Dougall** ) proved learned and behavior could be inherited.

11. \_\_\_\_\_ (**Darwinism**) is considered equivalent to Newton's law of gravitation.
12. \_\_\_\_\_ (**Darwin**) wrote the book origin of species.
13. Darwin travelled by the ship by name \_\_\_\_\_ (**H.M.Beagle**)
14. \_\_\_\_\_ (**Natural selection**) is the key element of Darwinism.
15. \_\_\_\_\_ (**Pangenesis**) is doctrine Darwin had his faith.
16. Bottle neck effect is otherwise called \_\_\_\_\_ (**sewal wright effect**)
17. \_\_\_\_\_ (**Hardy weighnberg law**) explained the frequency of allele in the absence of mutation.
18. A population comprising of sexually interbreeding organisms is termed as the \_\_\_\_\_ (**Genetic population or Mendelian population**)
19. \_\_\_\_\_ (**Allopatric speciation**) is an example for frogs of Gulf of Mannar.
20. \_\_\_\_\_ (**Sickle cell anemia**) is an example for polymorphism.
21. \_\_\_\_\_ (**Sickle cell anemia**) is prevalent among negroes.
22. \_\_\_\_\_ (**Mutation**) is the basis for evolution.
23. Modified form of Darwinism is \_\_\_\_\_ (**Neo Darwinism**)
24. Temperature related changes in the body of mice was noted by \_\_\_\_\_ (**F.B. Sumner**)
25. Lamarck is popularly known for \_\_\_\_\_ (**theory of inheritance**) of acquired characters.

## 7. THERIES OF EVOLUTION

### 5 MARKS

1. Describe the lamark law with suitable exambles.
2. Describe about NeoLamarckism experiments
3. Describe about theory of natural selection.
4. What are the objections to Darwininsm.
5. Describe detail account on Neo-Darwinism.
6. Describe detail account Gene mutation.
7. Describe detail account Chromosomal aberrations.
8. Describe detail account Recombination.
9. Describe detail account Hardy Weinberg equilibrium (population genetics).
10. Write note on Genetic drift or sewel wright effect.
11. Describe detail account Natural selection.
12. Write note on Polymorphism.
13. Describe detail account Isolating mechanism.
14. Write note on Speciation.

### **ADDITIONAL QUESTIONS**

1. Sperm cells are stored in \_\_\_\_\_ (**Epididymis**)
2. Smallest cell of WBC \_\_\_\_\_ (**Lymphocytes**).
3. \_\_\_\_\_ (**Aldosterone**) is an important Mineralo corticoid.
4. Important glucocorticoid \_\_\_\_\_ (**cartizone**)

5. Immunity is boosted by \_\_\_\_\_ (**Vitamin C**)
6. Partial pressure of O<sub>2</sub> in lungs is \_\_\_\_\_ (**100mmHg**)
7. Cerebral cortex is associated with \_\_\_\_\_ (**Alzheimer**)
8. Insulin has \_\_\_\_\_ (**51**) amino acids.
9. \_\_\_\_\_ (**Vitamin A**) deficiency causes white spots in the iris of eyes.
10. Open type of fracture causes \_\_\_\_\_ (**Infection.**)
12. Protein in muscles are destroyed by \_\_\_\_\_ (**Enzymes and Lysosomes.**)
13. Rheumatic heart disease is caused by \_\_\_\_\_ (**streptococcus**)
14. Haematoma is caused by \_\_\_\_\_ (**bone fracture**)
15. \_\_\_\_\_ (**Leprosy**) is an example for acquired deficiency of pigments.
16. Sexual cycle of plasmodium takes place in \_\_\_\_\_ (**female Anopheles mosquitoes**)
17. Leishmania Donovanii causes \_\_\_\_\_ (**Kala-azar of Leishmaniasis.**)
18. \_\_\_\_\_ (**Vibrio cholerae**) produces enterotoxin.
19. The shape of HIV is \_\_\_\_\_ (**spherical**)
20. An example for Primary Lymphoid organ is \_\_\_\_\_ (**Bone marrow**).
21. Decrease in Adenosine Aminase causes \_\_\_\_\_ (**SCID**)
22. Immuno globulin is a \_\_\_\_\_ (**Glycoprotein**)
23. The series of amino acid is read by \_\_\_\_\_ (**sequenator**)
24. Thalassemia is otherwise called \_\_\_\_\_ (**Erythroblastic anemia**)
25. 19<sup>th</sup>, 20<sup>th</sup> chromosome are found in \_\_\_\_\_ (**F**) group.
26. DNA is a \_\_\_\_\_ (**Negative molecule**)
27. Geothermal energy is obtained by \_\_\_\_\_ (**Evaporation of water**)
28. \_\_\_\_\_ (**Thilapia**) reproduces 8 times a year.
29. Abnormal increase in WBC causes \_\_\_\_\_ (**Leukemia**)
30. Intake of less amount of protein leads to the deficiency disease called \_\_\_\_\_ (**Kwashiorkor, Marasmus**)
31. Each gram of lipid is capable of yielding \_\_\_\_\_ (**9.3 calories**)
32. Deficiency of vitamin D causes \_\_\_\_\_ (**Rickets, Osteomalacia**)
33. During root canal treatment, the cavity of the tooth is filled with a sealing paste made of \_\_\_\_\_ (**gutta-percha resin**)
34. The gall stones are formed of \_\_\_\_\_ (**cholesterol**)
35. During the contraction of muscle the ATP molecules bind with the active site of \_\_\_\_\_ (**actin filaments**)
36. Excessive exposure to U V-rays can cause \_\_\_\_\_ (**skin cancer**)
37. Urea biosynthesis takes place in \_\_\_\_\_ (**liver**)
38. Area responsible for reabsorption of water, glucose, sodium phosphate and bicarbonates is \_\_\_\_\_ (**proximal convoluted tubules**)
39. Number of ATP molecules spent to convert ammonia to urea is \_\_\_\_\_ (**three**)
40. Which of the following is called artificial kidney \_\_\_\_\_ (**dialyzer**)

## Points to Remember

1. Compulsory question figure from the chapter Immunology which has hardly 17 pages, Students have to learn 16 five mark questions in this lesson.
  2. Regarding five mark questions in Immunology consider the following questions can be asked like
    - i. Central (Primary) lymphoid organs – thymus.
    - ii. Peripheral (Secondary) lymphoid organs – Lymph nodes, Spleen.
    - iii. MALT (Mucosa Associated lymphoid Tissues).
  3. Students clearly learn about learn about similar questions but different area or lesson.  
Interferon – Microbiology and Immunology  
SCID – Immunology and Modern genetics  
cDNA – Modern genetics – Human genome Project and Bioinformatics.
  4. In Microbiology Bacterial diseases in five mark questions can be asked like
    1. Common bacterial diseases .
    2. Sexually transmitted diseases – Bacteria – Syphilis and Gonorrhoea.
  - \* In Microbiology five mark questions , Cultivation of animal virus or Chicken embryo techniques. Students must answer with out missing any points.
  5. Similar answer but different way of questions. Eg., Birth control or Family planning or Contraception devices.
  4. Different answer but similar types of questions
    - a) Gonads – Endocrine function confused with Functioning of male and Female reproductive system.
    - b) Several processes in Respiration (Pulmonary respiration) confused with Mechanism of Breathing or Respiration.
    - c) Energy crisis differ with Environmental impacts in Energy production – Lesson Environmental Biology.
-