



**WORK BOOK
CUM**

QUESTION BANK WITH ANSWERS

ZOOLOGY

CLASS - XII



**SCHEDULED CASTES & SCHEDULED TRIBES
RESEARCH & TRAINING INSTITUTE (SCSTRI)
ST & SC DEVELOPMENT DEPARTMENT
BHUBANESWAR**

**Work Book
cum
Question Bank with Answers**

ZOOLOGY

CLASS-XII

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RESEARCH & TRAINING INSTITUTE (SCSTRI)
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2020

FOREWORD



An innovative education program has been initiated by ST & SC Development Department, Govt. of Odisha for the students appearing in +2 Science and Commerce examination pursuing studies in the ST & SC Development Department Schools (EMRS & HSS) to ensure quality education at +2 level.

In this regard it is to mention that an Academic Performance Monitoring Cell (APMC) has been set up in SCSTRTI to monitor the Training and Capacity Building of Teachers of SSD Higher Secondary Schools and Ekalabya Model Residential Schools (EMRS) to enhance quality education for better performance of the students appearing +2 Science and Commerce examination. This effort by APMC will certainly help the students to equip themselves for appropriate answering the question in the examination in an efficient manner.

In order to materialize the effort, the best of subject experts of the state have been roped into formulate self-contained and self-explanatory "Work book cum Questions Bank with Answers" as per the syllabi of CHSE, Odisha. They have tried to make the material as far as activity based and solution based as possible. This novel effort is first of its kind at +2 level in Odisha.

I would like to extend my thanks to Prof.(Dr.) A.B. Ota, Advisor-Cum-Director and Special Secretary, SCSTRTI and the team of Subject experts for their sincere effort for bringing out the study materials in quick time.

Hope, these study materials will be extremely useful for the students appearing the +2 examination in Science and Commerce of our SSD Schools.

Ranjana Chopra
Principal Secretary
ST & SC Development Department
Govt. of Odisha

PREFACE



The ST and SC Development Department, Government of Odisha, has initiated an innovative effort by setting up an Academic Performance Monitoring Cell (APMC) in Scheduled Castes and Scheduled Tribes Research and Training Institute (SCSTRTI) to monitor the Training and Capacity Building of teachers of SSD Higher Secondary Schools and Ekalavya Model Residential Schools (EMRS) and to ensure quality education of students studying at +2 level under the administrative control of the ST & SC Development Department. This innovative programme is intended to ensure quality education in the Higher Secondary Level of the schools of the ST & SC Development Department.

Since the introduction of +2 Science and +2 Commerce stream by the Council of Higher Secondary Education, Odisha, there was a great demand to cater to the needs of the students appearing the +2 Examination. But no organisation or institute has taken the initiative to fulfil the needs of the students appearing the +2 examination. Realizing the necessities and requirements of students to perform better and secure better marks in the examination and proper pattern of answering the question in a scientific way, the APMC under the banner of SCSTRTI has taken the initiative for the first time in Odisha to prepare Questions Banks in Physics, Chemistry, Botany, Zoology, Mathematics, IT, English & Odia of the Science Stream and all the disciplines of the Commerce stream in line with the Syllabus of the Council of Higher Secondary Education (CHSE).

These questions banks are first of this kind in Odisha, as per syllabi of CHSE and are self contained and self explanatory. The subject expert, who are the best in their respective subjects in the state have been roped in for the exercise. They have given their precious time to make the question banks as activity based and solution based as possible.

I take this opportunity to thank all the subject experts of different subjects for rendering help and assistance to prepare the question banks within a record time. I hope, this material will be extremely useful for the students preparing for the +2 examination in different subjects of Science & Commerce streams.

Prof. (Dr.) A.B. Ota
Advisor cum Director & Special Secretary
SCSTRTI, Govt. of Odisha

ZOOLOGY (2nd Year) Syllabus**I. Reproduction**

- (b) **Human Reproduction** : Male and female reproductive systems : Microscopic anatomy of testis and ovary; Gametogenesis - spermatogenesis & oogenesis; Menstrual cycle; Fertilisation, embryo development upto blastocyst formation, implantation; Pregnancy and placenta formation (Elementary idea); Parturition (Elementary idea); Lactation (Elementary idea).

Reproductive Health : Need for reproductive health and prevention of sexually transmitted diseases (STD); Birth control - Need and Methods, Contraception and Medical Termination of Pregnancy (MTP); Amniocentesis; Infertility and assisted reproductive technologies - IVF, ZIFT, GIFT (Elementary idea for general awareness).

II. Genetics and Evolution

- (b) **Sex determination** : In humans, birds, honey bee; sex linked inheritance - Haemophilia, Colour blindness; Mendelian disorders in humans - Thalassaemia; Chromosomal disorders in humans Down's syndrome, Turner's and Klinefelter's syndromes.
- (d) **Evolution** : Origin of life; Biological evolution and evidences for biological evolution (Paleontological, comparative anatomy, embryology and molecular evidence); Darwinism, Modern Synthetic theory of Evolution; Mechanism of evolution - Variation (Mutation and Recombination) and Natural Selection with examples, types of natural selection; Gene flow and genetic drift; Hardy-Weinberg's principles; Adaptive Radiation; Human evolution (in brief).

III. Biology and Human Welfare

- (a) **Health and Diseases** : Pathogens; parasites causing human diseases (malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, common cold, amoebiasis, ring worm); Basic concepts of immunology vaccines; Cancer, HIV and AIDS; Adolescence, drug and alcohol abuse.
- (b) **Improvement in food production** : Apiculture and Animal husbandry.

IV. Biotechnology and its Applications

- (a) **Principles and process of Biotechnology** : Genetic engineering (Recombinant DNA technologies).
- (b) **Application of Biotechnology in health and agriculture** : Human insulin and vaccine production gene therapy; Genetically modified organisms Bt crops; Transgenic Animals; Biosafety issues - Biopiracy and patents.

N.B. : Long answer type questions are to be set only from the portions underlined in the Syllabus.

QUESTION PATTERN OF CHSE

Theory : 35 marks

Practical : 15 marks

Total : 50 marks

Group - A : Objective Type Compulsory

1. Multiple choice / One word answer [1 x 5 = 5 marks]
2. Correct the sentences / Fill up the blanks [1 x 5 = 5 marks]

Group - B : Short Answer Type

3. Answer within three sentences [2.5 x 3 = 7.5 marks]
(3 bits to be answered out of 5 bits)
4. Difference between (3 important differences) [3.5 x 1 = 3.5 marks]
(1 bit to be answered out of 3 bits)

Group - C : Long Answer Type

5. Answer two questions out of four [7 x 2 = 14 marks]

TOTAL

35 marks

CHSE QUESTION PAPERS WITH ANSWERS**2019 to 2017****2019 (A)****Time : 1½ hours****Full Marks : 35***The figures in the right-hand margin indicate marks.**Answer **all** questions serially and continuously from Group-A and Group-B as per the instructions and any **two** from Group-C**Illustrate your answers with labelled diagrams and examples wherever necessary***Group - A**

1. Choose the correct answer from the choices given under each bit / Give the answer in **one word only** : [1x5=5]
- (a) Graafian follicle is observed in the ovary of
(i) Rohu (ii) Amphioxus
(iii) Salamander (iv) Human
- (b) Which one is not a terminal birth control method ?
(i) Vasectomy (ii) Tubectomy
(iii) Hysterectomy (iv) Copper-T
- (c) What is the diploid chromosome number in a person suffering from Down's syndrome ?
(i) 45 (ii) 46
(iii) 47 (iv) 48
- (d) What is the name of the scientist who cloned a sheep named Dolly ?
- (e) Colostrum is rich in which type of antibody ?
2. Fill in the blanks with correct answer(s)/ Correct the underlined portion of the sentences : [1x5=5]
- (a) The full form of ELISA is _____.
- (b) Cancer of muscle is named as _____.
- (c) Recapitulation theory was postulated by _____.
- (d) In honebee, the process of development of male bee without fertilization is termed as swarming.
- (e) Plasmodium vivax causes cerebral malaria.

Group - B

3. Answer any **three** of the following (restrict each answer to 2 or 3 important sentences): [2½ x 3 = 7½]
- (a) What is tubectomy ?
- (b) What is fossil ?
- (c) What is antibody ?
- (d) Write a note on queen bee.
- (e) What is HIV ?
- (f) What is Humulin ?
4. Differentiate between any **one** of the following pairs (restrict the answer to 3 or 4 important differences) : [3½]
- (a) Homologous organ and Analogous organ
- (b) T lymphocyte and B lymphocyte
- (c) Amoebiasis and Filariasis

Group - C

- Answer any **two** questions (restrict each answer within 200 words) : [7x2=14]
5. Illustrate in detail the process of spermatogenesis in human.
6. What is sex-linked inheritance ? Discuss how sex-linked gene inheritance occurs in human giving two examples.
7. Describe briefly recombinant DNA technology.
8. Write notes on any **two** of the following: [3½x2=7]
- (a) Biochemical origin of life
- (b) Turner syndrome
- (c) Human male reproductive system
- (d) Spermiogenesis

ANSWERS 2019 (A)**Group - A**

1. (a) (iv) Human
(b) (iv) Copper - T
(c) (iii) 47
(d) Ian Wilmut
(e) Immunoglobulin A (IgA)
2. (a) Enzyme linked immunosorbent assay
(b) Sarcoma
(c) Ernst Haeckel
(d) Pathenogenesis
(e) *Plasmodium falciparum*

Group - B

3. (a) **Tubectomy** - It is the method of sterilization in females. The fallopian tubes of both sides are cut and tied. It prevents the movement of egg and cut end.
(b) **Fossil** - The remnant of an organisms preserved by the nature of those organisms, which lived once again a time in the past is known as a fossil.
(c) **Antibody** - Antibody constitutes a class of plasma proteins called Immunoglobulins. These have the
4. (a) **Homologous organ and Analogous organ**

Homologous organ

- (i) They differ phenotypically.
- (ii) Change in environment develops new needs and distress.
- (iii) They perform different functions.
- (iv) These organs show adaptive radiation.
- (v) They occur in related organisms.

ability to recognize and help to destroy specific antigens in the body. These are of IgA, IgM, IgG, IgD and IgE.

- (d) **Queen bee** - Each honey bee colony has one fertile female called queen. It has well developed ovaries. Its main function is to lay eggs at the rate of 1500 to 2000 in a day. A queen has 2 types eggs : fertilised and unfertilised. Queen and workers develop from the fertilised eggs while drones develop from the unfertilised eggs.
- (e) **HIV** - HIV represents Human Immunodeficiency Virus. It causes AIDS. HIV is a retrovirus. HIV transmission occurs when a person is exposed to body fluids infected with the virus. When it enters the body, it infects helper T-cells, WBC of the immune system.
- (f) **HUMULIN** - Genetically modified organisms (GMOs) are now utilised to produce human insulin (HUMULIN) in commercial basis. Recently insulin synthesizing gene has been transfereed from human cell to bacteria, which produces HUMULIN by recombinant DNA technology.

Analogous organ

- (i) They show superficial resemblance.
- (ii) Principle of appetency is discarded.
- (iii) They perform similar functions.
- (iv) These organs show convergent evolutions.
- (v) They are found in unrelated organisms.

4. (b) T lymphocyte and B lymphocyte

T-lymphocyte

- (i) These are processed in the thymus gland.
- (ii) It is developed into T-Lymphocyte (like cytotoxic, Helper, Suppressor or Killer etc.)
- (iii) These are responsible for cell-mediated immunity.
- (iv) These are killer cells and killed by the help of Lysoenzyme.

B-lymphocyte

- (i) These are processed in some unknown places of the body.
- (ii) It forms plasma cells which produced antibodies.
- (iii) These antibodies are responsible for humoral immunity.
- (iv) These antibodies cause agglutination and neutralisation of foreign antigens.

4. (c) Amoebiasis and Filariasis

Amoebiasis

- (i) It is the infection of the intestine, caused by *Entamoeba histolytica*.
- (ii) It results in chronic dysentery, consequent weakness and dehydrations.
- (iii) The parasite occurs in encysted form in tainted food and drink.

Filariasis

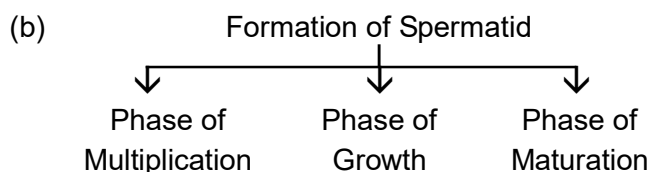
- (i) It is caused by a nematode, *Wuchereria bancrofti*.
- (ii) It's definite host is man and the intermediate host is female culex.
- (iii) The life cycle of mosquito has many larval stages including microfilariae.

Group - C

5. **Spermatogenesis**

(a) **What is spermatogenesis ?** Takes place in two steps, i.e.

1. Formation of Spermatid,
2. Spermatoleosis or Spermiogenesis



Detailed discussion on each phase.

- (c) Diagram
 - (d) Description of Spermatoleosis or Spermogenesis.
6. (a) What is sex-linked inheritance ?
- (b) x-linked inheritance and y-linked inheritance.

(c) Diagram of haemophilia and colourblindness.

(d) Detailed description of both phenomenon.

7. **Recombinant DNA Technology**

- (a) Steps involved in the production of r-DNA.
- (b) Preparation of desired gene.
- (c) Isolation of Plasmid vector.
- (d) Insertion of desired gene into vector.
- (e) Introduction of r-DNA into host cells.
- (f) Identification of cloned gene.
- (g) Diagrams
- (h) Applications

8. Each note within 4 to 5 sentences.

2018 (A)

Time : 1½ hours

Full Marks : 35

The figures in the right-hand margin indicate marks.

Answer **all** questions serially and continuously from Group-A and Group-B as per the instructions and any **two** from Group-C

Illustrate your answers with labelled diagrams and examples wherever necessary

Group - A

1. Choose the correct answer from the choices given under each bit / Give the answer in **one word only** : [1x5=5]

- (a) Which department of the Government of India is the nodal centre for Indian biosafety network ?
- (b) Which species of honeybees is commercially cultivated ?
 (i) *Apis dorsata* (ii) *Apis florea*
 (iii) *Apis mellifera* (iv) *Apis indica*
- (c) Human embryo is protected by which cavity ?
 (i) Amniotic cavity
 (ii) Pleural cavity
 (iii) Peritoneal cavity
 (iv) Peritoneal cavity
- (d) Which is an exotic breed of cattle ?
 (i) Jersey (ii) Sahiwal
 (iii) Gir (iv) Red Sindhi
- (e) What is called the protein pathogen that does not contain nucleic acid ?

2. Fill in the blanks with correct answer(s)/ Correct the underlined portion of the sentences : [1x5=5]

- (a) HIV is treated using a combination of medicines called antibacterial therapy.
- (b) Genetically engineered rice rich in vitamin A known as _____.
- (c) The infective stage of malarial parasite is _____.
- (d) The transgenic mouse is called _____.
- (e) The 'Father of Modern Paleontology' is Leonardo da Vinci.

Group - B

3. Answer any **three** of the following (restrict each answer to 2 or 3 important sentences): [2½ x 3 = 7½]

- (a) What is patent ?
- (b) What are gestation and parturition ?
- (c) What is innate immunity ?
- (d) What is Hardy-Weinberg principle ?
- (e) What is gene flow ?
- (f) What is recombinant vaccine ?

4. Differentiate between any **one** of the following pairs (restrict the answer to 3 or 4 important differences) : [3½]

- (a) Ex vivo gene therapy and In vivo gene therapy.
- (b) Corpus luteum and Corpus albicans.
- (c) Broilers and Layers.

Group - C

Answer any **two** questions (restrict each answer with 200 words) : [7x2=14]

5. Write notes on any two of the following :

- (a) Seminiferous tubule
- (b) Down's syndrome
- (c) Thalassemia
- (d) Genetically modified organism

6. Give an account of the human female reproductive system.

7. Describe Darwin's theory of natural selection.

8. Describe the chromosomal basis of sex determination in human, honeybee and birds.

ANSWERS - 2018 (A)**GROUP - A**

1. (a) Department of Biotechnology
(b) (i) *Apis dorsata*
(c) (i) Amniotic fluid
(d) (i) Jersey
(e) Prions
2. (a) Antiretrovirus
(b) Golden rice
(c) Sporozoite
(d) Super mouse
(e) Georges Cuvier

GROUP - B

3. (a) Patent is an open letter. It is a set of legal right, privilege and authority granted by a sovereign state to a person or an institution for a limited period of time for an invention using scientific and technical knowledge. India enacted the patent Act in 1970. The act has undergone amendments in 1999, 2002, 2005 and 2006, Patents are granted for inventions not for discovery.
- (b) The average duration of human pregnancy is about nine months and 10 days, which is called the gestation period. Vigorous contraction of the uterus at the end of pregnancy causes expulsion of the foetus. This process of delivery of foetus is called parturition.
- (c) All living organisms are naturally gifted with the resistance to certain infections from birth and this natural defense mechanism is known as innate immunity or native immunity or natural

immunity. It includes the general protective reactions of organisms against any invasion.

- (d) Hardy-weinberg principle stated that evolution was a population character and not an individual one. The population remains in a state of genetic equilibrium as long as no external force acts on its gene pool. Evolutionary changes over successive generations occur by changes in gene frequency of the population.
- (e) The sum total of all genes in a population of a species at a given time is called its gene pool. When individuals migrate from one population to another some alleles of genes move with them. If the migrating individual of one population is reproductively fit and reproduces with another individual of the other population, there is a transfer of alleles from one to the other. This process of allele transfer from one population to another is called gene flow.
- (f) A vaccine is defined as an antigenic agent, which, when administered into the animal, generates an active immune response. The antigenic agent varies from vaccine to vaccine. It is generally of three classes : attenuated (inactivated) whole organisms, isolated antigenic proteins and inactivated toxins. The latter two fall under subunit vaccine class. The vaccine produced due to application of recombinant DNA has been termed as recombinant vaccines.

4. (a) Ex vivo gene therapy and In vivo gene therapy**Ex vivo gene therapy**

- (i) The use of the patient's own cells for culture and genetic correction and then their return back to the patient.
- (ii) This is achieved by vectors such as viruses, bone marrow cells and human artificial gene.
- (iii) More time consuming and not so easy.

In vivo gene therapy

- (i) The direct delivery of the therapeutic gene into target cells of a particular tissue in a patient.
- (ii) Gene delivery carried by viral or non-viral vector systems.
- (iii) It is less time consuming and easy to perform.

(b) Corpus luteum and Corpus albicans.**Corpus luteum**

- (i) The glandular yellow body developed from the graafian follicle after the release of ovum is called corpus luteum.
- (ii) It acts as a temporary endocrine gland and secretes more progesterone and small estrogen.
- (iii) These hormones maintain pregnancy and remain active till placenta forms these hormones.

Corpus albicans

- (i) If the ovum is not fertilised, the corpus luteum reaches the maximum development. Then it becomes gradually smaller, involuted and transformed into whitish scar, corpus albicans.
- (ii) It also secretes both hormones like corpus luteum.
- (iii) As there is no pregnancy, so question of hormones does not arise.

(c) Broilers and Layers**Broilers**

- (i) Poultry birds exclusively grown for meat are called broilers.
- (ii) These are quick growing birds, which are generally males but can also be females.
- (iii) Example - White plymouth rock and white cornish etc.

Layers

- (i) These are female fowls raised for egg production.
- (ii) These are exclusively females, which have a high rate of egg production.
- (iii) Example - White leghorn, Andalusian.

Group - C

- 5. (a) Seminiferous tubule Refer to page 71 of zoology text book.
 - (b) Down's syndrome - Refer to page 163 of zoology text book.
 - (c) Thalassaemia - Refer to page 162 of zoology text book.
 - (d) Genetically modified organism (GMOs) - Refer to page 362 of zoology text book.
- 6. Human female reproductive system - Refer to page 75 of zoology text book.
 - 7. Darwin's theory of natural selection - Refer to page 229 of zoology text book.
 - 8. Chromosomal basis of sex determination in human, honeybee and birds - Refer to page 55 of zoology text book.

2017 (A)

Time : 1½ hours

Full Marks : 35

The figures in the right-hand margin indicate marks.

Answer **all** questions serially and continuously from Group-A and Group-B as per the instructions and any **two** from Group-C

Illustrate your answers with labelled diagrams and examples wherever necessary

Group - A

1. Choose the correct answer from the choices given under each bit / Give the answer in one word only : [1x5=5]

- (a) Which parasite causes amoebic dysentery ?
 (i) *E. histolytica* (ii) *P. vivax*
 (iii) *E. coli* (iv) *A. proteus*
- (b) Which antibody initiates allergic reactions ?
 (i) Ig A(ii) Ig E
 (iii) Ig G (iv) Ig D
- (c) Which hormone is secreted during emotional states such as fear, anger and pain ?
 (i) Adrenaline (ii) Oxytocin
 (iii) Insulin (iv) Thyroxin
- (d) What is conservation of biodiversity outside the natural habitat called as ?
 (i) In-Vivo (ii) Ex-Situ
 (iii) In-Situ (iv) In-Vitro
- (e) Which enzyme is used to join fragments of DNA ?
 (i) Endonuclease (ii) Transferase
 (iii) Ligase (iv) Polymerase

2. Fill in the blanks with correct answer(s)/ Correct the underlined portion of the sentences : [1x4=4]

- (a) Cerebral Malaria is caused by Plasmodium vivax.
- (b) The preservation of semen at very low temperature is called remediation.
- (c) The confirmative test for AIDS is _____ blotting.
- (d) Red data book is published in _____.

Group - B

3. Answer any **three** of the following (restrict each answer to 2 or 3 important sentences): [4x2=8]

- (a) What is Arbor Vitae ?
 (b) What is Linkage ? Mention its significance.
 (c) Write the forensic applications of DNA fingerprinting.
 (d) What is National Park ?
 (e) What are the causes of female infertility?
 (f) Mention the causes of drug addiction.
 (g) What is 'Algal bloom' ?
 (h) Write the functions of placenta.
4. Differentiate between any **one** of the following pairs (restrict the answer to 3 or 4 important differences) : [3x2=6]
- (a) Spermatogenesis and Oogenesis.
 (b) Down's Syndrome and Turner's Syndrome.
 (c) Active immunity and passive immunity.
 (d) Vasectomy and Tubercotomy.

Group - C

Answer any **two** questions (restrict each answer withi 200 words) : [6x2=12]

5. Describe the structure and functins of human forebrain.
6. What is sex-linked inheritance ? Explain the inheritance colourblindness in man.
7. Discuss the mechanism of conduction of nerve impulses along a nerve fibre.
8. Write notes on any two of the following :
- (a) AIDS
 (b) Acid rain
 (c) Radioactive wate
 (d) Budding in Hydra

ANSWERS - 2017(A)**Group - A**

1. (a) (i) *E. histolytica*
 (b) (ii) IgE
 (c) (i) Out of syllabus
 (d) (ii) Out of syllabus
 (e) (iii) Ligase
2. (a) *Plasmodium falciparum*
 (b) Cryopreservation
 (c) Western
 (d) Out of syllabus

Group - B

3. (a) The phenomenon of inheritance of genes together and to retain their parental combination even in the offspring is known as linkage.
- (b) **Significance of linkage :**
 - Linkage plays an important role in improvement of plants, in determining the nature and scope of hybridization and selection programme.
 - It helps to hold the parental characteristics together.
- (c) Out of syllabus
- (d) Out of syllabus
- (e) Causes are damaged or non-functional fallopian tubes, non-functional or absence of ovaries, non-functional or absence of uterus, idiopathic infertility etc.

- (f) Causes are out of curiosity or under pressure from friends, in order to experience excitement and adventure to overcome depression, frustration and pain.
- (g) Out of syllabus
- (h) (1) **Nutrition** : Food material passes from mother's blood into the foetal blood through placenta.
- (2) **Digestion** : The Trophoblast of the placenta digest protein before passing them from foetal blood.
- (3) **Respiration** : Through the placenta O_2 passes from maternal blood into foetal blood and CO_2 passes from foetal blood to maternal blood.
- (4) **Excretion** : Nitrogen waste like urea pass from foetal blood to maternal blood by placenta and is filtered out by the kidney's of mother.
- (5) **Storage** : The placenta store glycogen, fat etc. for the foetus before liver is formed.
- (6) **Barrier** : It is very efficient barrier allow useful material to pass into the foetal blood. Drugs, virus and bacteria also pass through the placenta.
- (7) **Endocrine function** : It secrete hormones such as oestrogen, progesterone, human chronic gonodotropin hormone.

4. (a) Spermatogenesis and Oogenesis**Spermatogenesis**

- (i) It occurs in seminiferous tubules of testes.
- (ii) Finally 4 functional sperms are formed from each spermatogonium.
- (iii) Sperms are minute, yolkless and motile.
- (iv) Polar bodies are not formed.
- (v) Nucleus becomes condensed by the loss of superfluous materials.
- (vi) Process is completed in testis.

Oogenesis

- (i) It occurs in the ovaries.
- (ii) Finally one functional ovum is formed from each oogonium.
- (iii) Ova are much larger often with yolk and non-motile.
- (iv) Polar bodies are formed.
- (v) Nucleus is bloated due to increase in nucleoplasm and called as "germinal vesicle".
- (vi) Process stops at secondary oocyte stage until fertilization.

(b) Down's Syndrome and Turner's Syndrome.**Down's Syndrome**

- (i) It is an autosomal disorder.
- (ii) It is due to trisomy of chromosome 21.
- (iii) Broad forehead, short and broad, neck, permanently open mouth, gonads and genitivation under developed etc.

Turner's Syndrome.

- (i) It is a sex chromosome disorder.
- (ii) It is due to chromosome complement 45 (44+XO).
- (iii) Sterile females with poorly development ovary, under developed breasts, ... uterus etc.

(c) Active immunity and passive immunity.**Active immunity**

- (i) It is developed when the person's own cells produce antibodies in response to infection or vaccine.
- (ii) It provides relief only after a long period.
- (iii) It has no side effects.
- (iv) It is long lasting.

Passive immunity

- (i) It is developed when antibodies produced in other organisms are injected into a person to counter antigen such as snake venom.
- (ii) It provides immediate relief.
- (iii) It may cause reaction.
- (iv) It is not long lasting.

(d) Vasectomy and Tubercotomy**Vasectomy**

- (i) It is a surgical method of sterilisation of males.
- (ii) Vasa differentia are blocked by cutting or occluding so that sperms are unable to pass down.
- (iii) There may be scalpel surgery or non-scalpel surgery.

Tubercotomy

- (i) It is a surgical method of sterilisation of females.
- (ii) A part of both the fallopian tubes are excised or ligated to block the passage of ova.
- (iii) It is performed by conventional laparoscopy abdominal surgery, conventional laparoscopy, or milaparotomy.

Group - C

5. Out of Syllabus
6. (i) "Sex linked inheritance" or "Sex linkage" is the transmission of characters and sex determining genes along with sex determining genes which are borne on the sex chromosomes and, therefore, are inherited together from one generation to the next generation was discovered by "Morgan".
- (ii) **Example of Y. linked inheritance** : It is the inheritance of TDF (Testis determine factor) and trait of having hair on ear pinna through y. linked (holandric) gene in males only.
- (iii) **Example of x-linked inheritance** : Haemophilia (Bleeder's disease) is carried by x-linked recessive gene where male individuals suffer from the disease but in female act as carriers only.
- Colour blindness
(Red Green Colour Blindness)
- Many persons have the inability to distinguish red from green. This condition is also called partial colour blindness. The normal gene and its recessive allele are present on the X chromosome. In females, colour blindness appears only when both the sex chromosomes carry the recessive gene (X^cX^c). The females which carry single gene for colour blindness (XX^c) have normal vision but function as carrier. However, in males the defect appears in the presence of a single recessive gene (X^cY), because Y chromosome of males does not carry any gene for colour vision. Thus, this defect is much more common in men than woman. Colour blindness like any other sexlinked trait shows criss-cross inheritance.
7. Out of Syllabus
8. (a) **AIDS**
- (1) Caused by virus - HIV.
 - (2) Symptoms - Fever, lethargy, weight loss, nausea, headache, rashes etc.
 - (3) Diagnosed by ELISA test.
 - (4) Confirmative test is Western blotting.
- (b) **Acid Rain** : Out of Syllabus.
- (c) **Radioactive waste**
- Radioactive wastes are usually byproducts of nuclear powerplant or radioactive materials used in research laboratories and medicals. These are of three types - low level waste, intermediate level waste and high level waste. The effects are instantaneous, prolonged and delayed type.
- (d) **Budding in Hydra**
- Budding** : It is a special method of asexual reproduction which is performed by animals like sponge, hydra in favourable conditions.
- Budding in hydra** :
- Hydra reproduce through external budding.
 - When hydra become fully grown, then outgrowth develops from its basal part.
 - Gradually, the outgrowth grows in size, develops many small tentacles and becomes a bud.
 - When the bud enlarges, it gradually detaches from its base and grows into a new free living hydra.

GROUP - A

OBJECTIVE TYPE QUESTIONS

1. **Choose the correct answer from the choices given under each bit/give the answer in one words only.**

HUMAN REPRODUCTION

- Human embryo is protected by :
(a) Allantois (b) Amniotic cavity
(c) Pleural cavity (d) Peritoneal cavity
- Human eggs are :
(a) Alecithal (b) Microlecithal
(c) Mesolecithal (d) Macrolecithal
- Embryo at 16-celled stage is called :
(a) Morula (b) Blastula
(c) Blastocyst (d) Gastrula
- Generally, the site of fertilization in a mammal is :
(a) Ovary (b) Uterus
(c) Vagina (d) Fallopian tube
- Which is a primary sex organ ?
(a) Scrotum (b) Penis
(c) Testis (d) Prostrate
- Gestation period in humans is :
(a) 10 weeks (b) 25 weeks
(c) 7 months (d) 9 months
- Part of sperm involved in penetrating egg membrane is :
(a) Tail (b) Acrosome
(c) Allosome (d) Autosome
- Villi of human placenta develop from :
(a) Chorion (b) Allantois
(c) Yolk sac
(d) Both chorion and allantois
- Corpus luteum is formed by :
(a) Stroma cells (b) Theca cells
(c) Follicle cells (d) Germinal cells
- Cleavage is largely influenced by :
(a) Cytoplasm (b) Yolk
(c) Nucleus (d) Chromosome
- Which cell organelle is responsible for the formation of acrosome ?
(a) Mitochondria (b) Nucleus
(c) Golgi complex (d) Lysosome
- In man, the developing embryo remains in :
(a) Ovary (b) Uterus
(c) Fallopian tube (d) Vagina
- Which is the middle piece of mammalian sperm ?
(a) Acrosome (b) Nucleus
(c) Centriole (d) Mitochondria
- How many spermatozoa are produced by a secondary spermatocyte ?
(a) Four (b) Eight
(c) One (d) Two
- Development of an egg without fertilization is called :
(a) Gametogenesis (b) Metagenesis
(c) Oogenesis (d) Parthenogenesis
- Abdominal testes are found in :
(a) Elephant (b) Cat
(c) Monkey (d) Horse
- Implantation of blastocyst occurs on :
(a) 4th day (b) 5th day
(c) 6th day (d) 7th day
- The placenta in humans is :
(a) Haemochorial (b) Endothelial
(c) Epitheliochorial (d) Syndesmochorial
- Which does protect the vaginal and urethral openings ?
(a) Labia majora (b) Labia majora
(c) Clitoris (d) Urethra
- Fallopian tube is a part of :
(a) Ureter (b) Uterus
(c) Oviduct (d) Vas deferens

21. The skin covering the glans of penis is called :
(a) Corpus spongiosum
(b) Epididymis
(c) Corpus cavernosa
(d) Prepuce
22. What is the main function of corpus luteum?
(a) Secretion of Progesterone
(b) Facilitate ovulation
(c) Facilitate fertilization
(d) Facilitate passage of Ova to oviduct
23. Where are Leydig's cells found and what is their secretion ?
(a) Pancreas and glycogen
(b) Liver and Cholesterol
(c) Testes and Testosterone
(d) Ovary and Oestrogen
24. Eggs are liberated from ovary in :
(a) Secondary Oocyte stage
(b) Primary Oocyte stage
(c) Oogonial stage
(d) Mature Ovum stage
25. Human females reach menopause around the age of :
(a) 25 years (b) 35 years
(c) 50 years (d) 70 years
26. Which membrane holds the ovary with uterus?
27. What are egg-laying mammals called ?
28. What is the other name of Ovarian follicle ?
29. What is called the secretion of milk by the mammary gland ?
30. Which is called the birth hormone ?
31. The process of giving birth to child is called?
32. Which is the term used for human male or female attaining sexual maturity ?
33. The implantation of Ovum after fertilization in any place other than uterus of females in pregnancy is called :
34. Which is the common passage in human males through which both sperm and urine are discharged ?
35. Which term is used for attachment of embryo to the walls of the uterus ?
36. Which gland helps in making the semen medium alkaline ?
37. Where are sperms temporarily stored ?
38. In which group of mammals, oestrous cycle is found ?
39. Which type of cells form the vitelline membrane?
40. Which enzyme is released by the acrosomal cap of the sperm in human beings ?

REPRODUCTIVE HEALTH

41. The highly sophisticated procedure of directly injecting a sperm into an egg is called :
(a) ICSI (b) ZIFT
(c) GIFT (d) AID
42. After tubectomy, which part of the female reproductive system remains blocked ?
(a) Cervix (b) Uterine
(c) Ovary (d) Fallopian tube
43. The MTP stands for :
(a) Medical Termination of Parturition
(b) Mechanical Transfer of Pollen
(c) Medical Termination of Pregnancy
(d) Maternally Transmitted Pathogens
44. Which is the correct surgical method for preventing pregnancy in which the vas deferens is cut ?
(a) Ovariectomy (b) Hysterectomy
(c) Vasectomy (d) Castration
45. What is the term used for surgical removal of uterus ?
(a) Tubectomy (b) Hysterectomy
(c) Sterilization (d) Vasectomy
46. Amniocentesis is the withdrawal of amniotic fluid during :
(a) Lactation (b) Pregnancy
(c) Gestation (d) Menopause

47. At present, which is the most widely accepted method of contraception in India ?
(a) Cervical cap (b) Tubectomy
(c) Diaphragm (d) IUDs
48. What is the function of copper T ?
(a) Prevents implantation
(b) Prevents fertilization
(c) Prevents zygote formation
(d) Prevents fertilization and zygote formation
49. Fertilized ovum is transplanted in uterus after :
(a) 1 day (b) 7 days
(c) 8 days (d) 10 days
50. Progesterone level falls during :
(a) Gestation (b) Menopause
(c) Lactation (d) Menstruation
51. Name the oral contraceptive developed by CDRI, Lucknow.
52. Name the fluid from which foetal cells are extracted for chromosomal analysis.
53. Mention the technical name of female/mother used to bring up in vitro fertilized egg to maturity.
54. Which is the term for prenatal diagnostic technique aimed to know the sex of developing foetus and to detect congenital disorders ?
55. Write the term for the termination of pregnancy before the foetus becomes viable.
56. What is the other technical term used for birth control ?
57. What is called the method of sex determination of foetus ?
58. What is the term used for newly born infants?
59. Which is the term used for non-occurrence of menses ?
60. What is the sterilisation procedure for males called ?
61. What is the sterilisation procedure for female called ?
62. The agents which cause malfunction of foetus are called as ?

GENETICS & EVOLUTION

63. A colourblind person cannot distinguish :
(a) All colours (b) Green
(c) Red (d) Red & Green
64. As per Genic balance theory, which ratio refers to super female ?
(a) 1.5 (b) 1.0
(c) 0.66 (d) 0.5
65. Sex-linked characters are :
(a) Dominant (b) Recessive
(c) Lethal (d) Non-herited
66. Nos. of autosomes in human sperm is :
(a) 11 (b) 22
(c) 44 (d) 45
67. A haemophilic man marries a normal homozygous woman. what is the probability that their son will be haemophilic ?
(a) 100% (b) 50%
(c) 75% (d) 0%
68. A fruitfly exhibiting both male and female trait is :
(a) Heterozygous (b) Gynandromorph
(c) Hemizygous (d) Gynander
69. The no. of barr bodies present in Turner's Syndrome is :
(a) 0 (b) 2
(c) 1 (d) 1 or 2
70. The genotype representation of Down's Syndrome will be :
(a) 45 + xx (b) 44 + xy
(c) 44 + xxy (d) 22 + xy
71. Translocation of a portion of chromosome 21 results into a condition known as :
(a) Down's Syndrome
(b) Cri-du-chat Syndrome
(c) Philadelphia Syndrome
(d) Klinefelter's Syndrome
72. Red-Green colour blindness in man is :
(a) Sex-linked character
(b) Sex-limited character
(c) Sex-influenced character
(d) Primary sexual character

73. What are the gene pair signifying a trait is called :
(a) Hybrid (b) Phenotype
(c) Pure line (d) Alleles
74. Who studied sex linked inheritance for the first time ?
(a) Morgan (b) Khorana
(c) Pasteur (d) Von Helmont
75. Free-martin is due to :
(a) Sex reversal by gene
(b) Environmental control of sex
(c) Hormonal control of sex
(d) Sex determination by chromosomes
76. Give an example of Y-linked inheritance.
77. Which type of inheritance is seen in Haemophilia/Colour blindness ?
78. Which type of trait is generally found in sex-linked inheritance ?
79. In which chromosome, is the gene for haemophilia located ?
80. In which syndrome a barr body is absent ?
81. Which amino acid replaces glutamic acid in sickle cell anaemia ?
82. In which group of animals, ZW-ZZ type of sex determinations is found ?
83. Which is the unit of inheritance ?
84. Addition or deletion of one or more chromosome to a set of chromosom is called?
85. Who proposed the 'Genic balance theory' ?
86. Who coined the word 'chromosome' ?
90. Which of the following was not found in free from during origin of life ?
(a) Ammonia (b) Methane
(c) Oxygen (d) Hydrogen
91. Who rejected the theory of spontaneous generation ?
(a) Lavosier (b) Pasteur
(c) Kulin (d) Lister
92. What was synthesized by Stanley Miller in his experiment ?
(a) Virus (b) Protein
(c) Amino acid (d) Cell
93. Sum total of genes in a population is called:
(a) Genotype (b) Genomics
(c) Gene pool (d) Karyotype
94. Genetic drift operates in :
(a) Small population
(b) Large population
(c) Island population
(d) Mendalian population
95. Stanley Miller's experiment supports :
(a) Chemical theory
(b) Theory of Abiogenesis
(c) Theory of Biogenesis
(d) Theory of Pangenesis
96. Which one provides most efficient proof of evolutions ?
(a) Fossils (b) Vestigeal organs
(c) Embryo (d) Morphology
97. Evolutionary history of an organism is known as :
(a) Ontogeny (b) Phylogeny
(c) Ancestry (d) Paleonotology
98. Nondirectional alteration in Hardy-Weinberg equilibrium is :
(a) Gene flow
(b) Mutation
(c) Genetic drift
(d) Gene recombination
99. Which is most important for origin of life ?
(a) Oxygen (b) Water
(c) Nitrogen (d) Carbon

EVOLUTION

87. Recapitulation theory was proposed by :
(a) Von Baer (b) Darwin
(c) Haeckel (d) Aristotle
88. Mesozoic era is referred to as :
(a) Age of fishes
(b) Age of amphibians
(c) Age of reptiles
(d) Age of tribolites
89. In which era had life originated ?
(a) Palaeozoic (b) Archaeozoic
(c) Azoic (d) Mesozoic

100. Darwin's finches occur in :
(a) Australia (b) Galapagos island
(c) Siberia (d) India
101. 'Ontogeny repeats Phylogeny' is relocated to which Law ?
(a) Hardy-Weinberg Law
(b) Pauling Law
(c) Biogenetic Law
(d) Law of Thermodynamics
102. Which one is not correctly matched ?
(a) Mesozoic era - Age of Mammals
(b) Paleontology - Study of Fossils
(c) Mutation theory - Hugo de Vries
(d) Origin of Species - Charles Darwin
103. Resemblance between widely different groups due to a common adaptation is :
(a) Parallel evolution
(b) Divergent evolution
(b) Convergent evolution
(d) Retrogressive evolution
104. Origin of life occurred in :
(a) Carboniferous (b) Cambrian
(c) Pre-Cambrian (d) Ordovician
105. English scientist who worked on origin of life and settled in India was :
(a) A. I. Oparin (b) Miller
(c) Louis Pasteur (d) J. B. S. Haldane
106. Who forwarded the theory of biochemical origin of life ?
107. Which is the connecting link between reptiles and birds ?
108. Who is the father of 'Modern Embryology' ?
109. Which type of organs are Coccyx and Vermiform appendix ?
110. Who gave the view of inheritance of acquired characters ?
111. Who objected the idea of spontaneous generations of life ?
112. Name the ship in which Charles Darwin made his maiden voyage ?
113. Which is the common ancestor of apes and man ?
- BIOLOGY AND HUMAN WELFARE**
114. Which is the disease caused by *Salmonella typhi* ?
(a) Diphtheria (b) Pneumonia
(c) Plague (d) Typhoid
115. The drug which is used to reduce pain is :
(a) Opium (b) Hashish
(c) Bhang (d) Manijwana
116. Which of the following is not a component of innate immunity ?
(a) Antibodies
(b) Interferons
(c) Complement proteins
(d) Phagocytes
117. Treatment of common cold include :
(a) Antihistamines
(b) Anti-inflammatory drugs
(c) Anti-cholinergics
(d) All
118. Which organism causes elephantiasis in man ?
(a) *Plasmodium vivax*
(b) *Entamoeba histolytica*
(c) *Plasmodium ovale*
(d) *Wuchereria bancrofti*
119. Amoebiasis is caused by the infection of :
(a) Amoeba (b) Entamoeba
(c) Plasmodium (d) Leishmania
120. *Entamoeba gingivalis* is a parasite found in :
(a) Liver of sheep (b) Intestine of man
(c) Stomach of frog (d) Human gums
121. Which one is the infective stage of malarial parasite ?
(a) Gametocyte (b) Merozoite
(c) Sporozoite (d) Trophozoite
122. Elephantiasis is carried by :
(a) Culex (b) Anopheles
(c) House fly (d) Tse-tse fly
123. Which type of parasite is *Entamoeba histolytica* ?
(a) Digenetic (b) Monogenetic
(c) Trigenetic (d) Tetragenetic

124. In which disease, the man has one extra X chromosome ?
(a) Bleeder's disease
(b) Down's syndrome
(c) Turner's syndrome
(d) Klinefelter's syndrome
125. The secondary host of *Plasmodium vivax* is
(a) Female Anopheles
(b) Male Anopheles
(c) Female Culex
(d) Male Culex
126. Which is a deficiency disease ?
(a) Cancer (b) Beri beri
(c) Neurosis (d) Malaria
127. Which cell of AIDS patient is affected by HIV virus ?
(a) Helper T-cells (b) Cytotoxic T-cell
(c) MN Cells (d) Suppressive Cells
128. Which type of cell does mediate Humoral Immunity System ?
(a) B - Cells (b) T - Cells
(c) NK - Cells (d) Plasma Cells
129. Which organ is most essential for proper immune maturation and functioning ?
(a) Spleen (b) Liver
(c) Thymus (d) Thyroid
130. Immunoglobulins are :
(a) Antigens (b) Antibodies
(c) Antiseptics (d) Antibiotics
131. Which organ adversely affected by alcohol?
(a) Kidney (b) Liver
(c) Heart (d) Lung
132. Which virus causes common cold ?
(a) Rhino virus (b) T₄ virus
(c) MSZ virus (d) Simian virus 40
133. A vector host is :
(a) Disease transmitting host
(b) Natural reservoir
(c) Human parasite
(d) Pathogenic protozoan
134. The unbearable pain in the chest caused due to deficiency of oxygen supply to the heart is called ?
(a) Angiography
(b) Myocardial infarction
(c) Angina
(d) Stroke
135. The exo-erythrocytic life-cycle occurs in :
(a) Hepatic cells
(b) RBC
(c) Stomach of Anopheles
(d) Salivary glands of Anopheles
136. During allergic reactions, destructive substances produced are :
(a) Antibodies (b) Allergins
(c) Histamines (d) Immunoglobulins
137. World AIDS day is :
(a) 1st May (b) 1st June
(c) 7th July (d) 1st December
138. BCG vaccine is given against which disease?
139. Which organism do cause AIDS ?
140. What are called the protein pathogens that do not contain nucleic acid ?
141. Which is the diagnosed test for typhoid ?
142. A tumour, which consists of mass of cells is called as ?
143. The malignant growth of epithelial tissue is called :
144. What is called the drug that brings about excitement of Central Nervous System ?
145. What is called the flight, in which the virgin queen bee is followed by many drones ?
146. Which type of breed are high milk producers?
147. Which revolution is associated with operation flood of milk ?
148. Which breed of poultry stock is used for meat ?
149. Which breed of poultry stock is used for egg production ?
150. Which type of cells are attacked by HIV ?
151. What is called the loss of memory ?
152. Name the first antibiotics ?
153. What is the place called where honey bees are reared ?

BIOTECHNOLOGY AND ITS APPLICATIONS

154. Recombinant DNA Technology is also called as :
(a) Biotechnology
(b) Modern Biotechnology
(c) Genetic Engineering
(d) Transgenic Technology
155. Humulin is :
(a) A human insulin
(b) A form of chitin
(c) A digestive enzyme
(d) A powerful antibiotics
156. Bt Cotton is :
(a) Transgenic plant (b) Mutated plant
(c) Cloned plant (d) Hybrid plant
157. Who established the scientific basis of vaccination ?
(a) Edward Jenner (b) Joseph Lister
(c) Cesar Milestone (d) Louis Pasteur
158. Hybridomas are employed for :
(a) Production of somatic hybrids
(b) Killing cancer cells
(c) Synthesis of antibiotics
(d) Synthesis of monoclonal antibodies
159. Chemical knives/molecular scissors of DNA are :
(a) Endonucleases (b) Polymerases
(c) Ligases (d) Transcriptases
160. Restriction endonuclease is employed for cutting :
(a) A single stranded DNA
(b) Double stranded DNA
(c) RNA fragment
(d) m-RNA
161. Which is related to genetic engineering ?
(a) Plasmid (b) Plasmid
(c) Heterosis (d) Mutation
162. When an abnormal gene is replaced by normal gene, it is called :
(a) Gene therapy (b) Gene cloning
(c) Gene mutation (d) Gene ligation
163. Which two bacteria are most useful in genetic engineering ?
(a) *Rhizobium* and *Azetobacter*
(b) *Escherischia* and *Agrobacterium*
(c) *Rhizobium* and *Diplococcus*
(d) *Nitromonas* and *Klebsiella*
164. cDNA is :
(a) Circular DNA
(b) Coiled DNA
(c) Cytoplasmic DNA
(d) Complementary DNA
165. Extrachromosomal DNA used as vector in gene cloning is :
(a) Transposon (b) Intron
(c) Plasmid (d) Exon
166. Patent is granted for :
(a) A novel invention
(b) An invention having an industrial application
(c) A discovery made previously
(d) An invention having an inventive step existing knowledge
167. Golden rice contains maximum amount of :
(a) β -Carotene (b) Glycophosphate
(c) Luciferin (d) Bt protein
168. Which is the nodal centre for Indian biosafety network ?
(a) Department of Biotechnology
(b) Department of Science and Technology
(c) Indian Agricultural Research Institute
(d) Department of Forest & Environment Institute
169. What is genetically modified tomato ?
170. Which is a plant genetic engineer ?
171. Which is generally used as vector for the transfer of genes ?
172. Which cells are transformed by T_1 plasmids ?
173. Which DNA is formed from RNA ?
174. What is called the technique of insertion of a desired gene into DNA of plasmid vector ?
175. In which process, DNA amplification is done?
176. The passage of foreign DNA or plasmid containing the passenger DNA into a host cell is called :
177. Which is the first ever cloned animal ?
178. Who discovered PCR in 1985 ?
179. Which is the first transgenic crop ?
180. Which is used in scavenging oil spills ?

2. **Fill in the blanks with correct answer(s)/ correct the underlined portion of the sentences :**

HUMAN REPRODUCTION

- Degenerated corpus luteum is called _____.
- The hormone _____ is known as pregnancy hormone.
- Human placenta is _____.
- Ovulation is induced by a hormone called _____.
- Eggs having hard covering are called _____ eggs.
- The cavity of blastula is called _____.
- Onset of pregnancy inhibits further _____.
- The cavity of the Graafian follicles is called _____.
- The nurse cells present in mammalian testes is known as _____.
- Interstitial cells produce _____ hormone which is responsible for the development of secondary sex character.
- _____ is the structural and functional unit of testis.
- The cells which produce sperms by spermatogenesis are called _____.
- During fertilization, the fertilizins of egg interact with _____ of sperm.
- The complete fusion of male pronucleus with females pronucleus is called _____.
- Archenteron is found in _____ stage.
- The region of egg where sperms enter is known as _____.
- The germ cells which produce ovum are known as _____.
- Development of spermatid into mature sperm is called _____.
- The bunch of cells produced by cleavage without a cavity is called as _____.
- The structure which provides vascular connection between foetus and uterus is called _____.
- The vegetal pole of egg contains _____.
- The covering of an egg or egg membrane is called _____.
- One spermatogonia can produce _____ number of sperms.
- Te mitochondria is found in the _____ region of the sperm.
- Milk secretion is controlled by the hormone _____.
- Generally, fertilization mostly occurs in the _____ of the female.
- The egg of female is much _____ than the sperm.
- The final delivery of the baby is known as _____.
- The phenomenon of the retention of the testes in the abdominal cavity is known as _____.
- The low sperm count in the semen is known as _____.
- The stoppage of the menstrual cycle is termed as _____.

REPRODUCTIVE HEALTH

- Sterilization in human females is called _____.
- Removal of testis or ovary is called _____.
- Lower part of uterus is called _____.
- Hepatitis B is diagnosed by _____.
- The other term used for birth control is _____.
- The pregnancy that occurs outside the uterus is called _____ pregnancy.
- The process of bringing eligible couples under family planning programme is called _____.

39. Condom, Diaphragm and Cervical Cap etc. are the _____ methods of birth control.
40. There are two kinds of non-oral contraceptives, such as injectable and _____.
41. The non-erection of penis for sexual intercourse can be called as _____.
42. The process in which an egg is fertilised by a sperm outside the body is called _____.
43. The first test tube is known as _____.
44. When a blockage in the fallopian tubes prevents the migration of sperms to the egg, an infertility treatment _____ is used.
45. Copper Ts has a local _____ effect.
46. Fem shield is otherwise known as female _____.
47. The method of preserving sperm in frozen condition is called _____.
48. Genital Herpes is a _____.
49. Commonest STD in India is _____.
50. Sterilisation in case of female is called _____.
51. Emergency contraceptive pills are effective in first _____.
52. Human papilloma virus infection is a known cause of cancer of the _____.
53. Medical Termination of Pregnancy (MTP) is a _____ method of birth control.
60. ZZ-ZW method of sex determination is found in _____.
61. Sex-linked inheritance is otherwise called _____ inheritance.
62. The inflammation of kidney is called _____.
63. Males inherit X-chromosome from _____ parents.
64. _____ is a cytological difference between the male and female cells of humans.
65. Hypertrichosis is a _____ trait.
66. The sex-ratio of 1 is a _____.
67. Thalassaemia is a _____ disorder.
68. Genic balance theory was proposed by _____ in 1921.
69. In honeybee, male has _____ chromosomes.
70. _____ was first studied by John Cotto in 1803.
71. Sterile female in honeybee are _____.

EVOLUTION

GENETICS AND EVOLUTION

54. Baldness in man is _____ character.
55. Genes for Haemophilia is _____.
56. Down's Syndrome is due to _____ of chromosome 21.
57. No. of _____ bodies in Klinefelter's Syndrome is one.
58. Y linked genes are called _____ genes.
59. Red-green colour blindness in man is a _____ character.
72. The mutation theory was proposed by _____.
73. A reducing atmosphere lacks free _____.
74. Life originated in _____.
75. Mutation theory can not explain _____.
76. Darwin's finches are excellent examples of _____ radiation.
77. Ultimate source of variation is _____.
78. Sedimentary rock is the richest source of _____.
79. The sum total of all the genes in a population is _____.
80. Concept of genetic drift was introduced by _____.
81. Different species occurring in different geographical areas are known as _____.
82. Origin of life occurred in _____ period.
83. Stanley Miller Synthesized _____ in his experiment.

84. The raw material for evolutionary change is _____.
85. _____ is the book in which Lamack's theory was published.
86. The germplasm theory of _____ gave a thunder blow to Lamarckism.
87. Chemical evolution was proposed by J.B.S. Haldane and a Russian Scientist _____.
88. Modern Synthetic theory is otherwise known as _____.
89. The _____ era is called 'Golden Age of Reptiles'.
90. In _____ epoch, early man originated.
91. The struggle among individuals of the same species is known as _____.
92. _____ theory of Lamarck explains presence of vestigial organs in the organisms.
93. _____ method is used to determine the age of fossils.
94. _____ is a modern horse.
95. Reproductively isolated population is known as _____ population.
96. _____ proposed the theory of abiotic origin of life.
97. _____ proposed the germplasm theory.
98. Reappearance of ancestral character is called _____.
99. Biogenetic Law was proposed by _____.
100. Presence of short tail in babies is an example of _____.
101. Factors which cause cancer are called _____.
102. Typhoid is caused by _____.
103. Filariasis is caused by _____.
104. Plasmodium was discovered by _____.
105. Diarrhoea is caused by _____.
106. Poultry birds exclusively grown for meat are called _____.
107. The toxic substance is released by plasmodium in RBC and liver cells is _____.
108. *Plasmodium falciparum* causes _____ malaria.
109. The infective stage of *Ascaris* is _____.
110. Mantoux test is employed for diagnosis of _____ disease.
111. _____ is the vector of trypanosomiasis.
112. Human infection of Rhinovirus causes _____.
113. The mating between close relatives is called _____.
114. Life stock refers to _____ animals.
115. Honey bees belong to the family _____.
116. National Dairy Research Institute is situated in _____.
117. _____ is the stimulant present in the tea and coffee.
118. In 1928, Fleming discovered _____.
119. Loss of memory is called _____.
120. The effect of alcohol on CNS is a _____.
121. The prolonged use to drugs leads to the dependence of the body on them is called _____.
122. Lymph node is _____ organ.
123. The colostrum, the first milk secreted by the mother contains _____.
124. Morphine, heroin etc. are known as _____ drugs.
125. Emphysema diseases is caused by _____ addiction.

BIولوجY AND HUMAN WELFARE

101. Factors which cause cancer are called _____.
102. Typhoid is caused by _____.
103. Filariasis is caused by _____.
104. Plasmodium was discovered by _____.
105. Diarrhoea is caused by _____.

BIOTECHNOLOGY AND ITS APPLICATIONS

126. Gene transfer technique in animal cells is known as _____.
127. Herbert Boyer and Stanley Cohen (1973) first created _____.

128. The recombinant human insulin is called _____.
129. Patents are granted for _____.
130. The first ever cloned animal is _____.
131. The use of novel biological resource of a sovereign country without its due permission is known as _____.
132. The technique _____ is used to detect the presence of HIV antigen in suspected AIDS patient.
133. _____ is used as anti-cancer or chemotherapy drug.
134. The Ti plasmid _____ is the vector of choice for transfer of transgene in plant cells.
135. The commercial use of transgenic animals as source of pharmaceutical product is known as _____.
136. PCR was discovered by _____ in 1985.
137. The first transgenic crop was _____.
138. DNA fragments are joined by _____.
139. The uptake of plasmid DNA is known as _____.
140. A conjunct structure formed by the joining of the vector DNA and the target DNA fragment is known as _____.
141. Delivery of a piece of recombinant DNA into a fertilised egg is known as _____.
142. Transfer of separated protein molecule from the gel to a nylon membrane is known as _____.
143. Institutions for collection and maintenance of germplasm are called _____.
144. The process required for making genes from their mRNA is called _____.
145. _____ are most widely used cloning vector in genetic engineering.
146. The enzyme reverse transcriptase is used to obtain _____.
147. _____ is a natural genetic engineer.
148. pBR³²² is a/an _____.
149. The enzyme that used for cutting DNA is _____.
150. DNA fragments move towards anode during _____.
151. In ELISA technique, enzyme _____ are used.
152. Restriction endonuclease are present in _____.
153. Production of recombinant human insulin is possible due to _____.
154. Flavr savr is a genetically modified _____.
155. Bt gene which produces protein toxic to insect larvae is _____.
156. Enzymes required for PCR is _____.

GROUP - A

ANSWERS

1. Choose the correct answer from the choices given under each bit/give the answer in one words only.

1. (b) Amniotic cavity
2. (a) Alecithal
3. (a) Morula
4. (d) Fallopian tube
5. (b) Penis
6. (d) 9 months
7. (b) Acrosome
8. (a) Chorion
9. (c) Follicle cells
10. (b) Yolk
11. (c) Golgi complex
12. (b) Uterus
13. (d) Mitochondria
14. (d) Two
15. (d) Parthenogenesis
16. (a) Elephant
17. (d) 7th day
18. (a) Haemochorial
19. (b) Labia majora
20. (c) Oviduct
21. (d) Prepuce
22. (a) Secretion of Progesterone
23. (c) Testes and Testosterone
24. (a) Secondary Oocyte stage
25. (c) 50 years
26. Mesovarium
27. Oviparos
28. Graafian follicle
29. Lactation
30. Oxytocin
31. Parturition
32. Puberty
33. Ectopic
34. Urethra
35. Implantation
36. Prostrate gland
37. Epididymis
38. Non-primate
39. Follicle
40. Sperm Lysin
41. (a) ICSI
42. (d) Fallopian tube
43. (c) Medical Termination of Pregnancy
44. (c) Vasectomy
45. (b) Hysterectomy
46. (b) Pregnancy
47. (d) IUDs
48. (a) Prevents implantation
49. (b) 7 days
50. (b) Menopause
51. Saheli
52. Amniotic
53. Surrogate
54. Amniocentesis
55. MTP
56. Contraception
57. Amniocentesis
58. Neonate
59. Amenorrhoea
60. Vasectomy
61. Tubectomy
62. Teratogens
63. (d) Red & Green
64. (a) 1.5
65. (b) Recessive
66. (b) 22
67. (b) 50%
68. (b) Gynandromorph
69. (a) 0
70. (a) 45 + xx
71. (d) Klinefelter's Syndrome
72. (a) Sex-linked character
73. (d) Alleles
74. (a) Morgan
75. (c) Hormonal control of sex
76. Hypertrichosis
77. Criss-cross
78. Recessive
79. X-chromosome
80. Turner's
81. Valine
82. Birds
83. Gene
84. Aneuploidy
85. C. B. Bridges
86. W. Waldeyer
87. (c) Haeckel
88. (c) Age of reptiles
89. (b) Archaeozoic
90. (c) Oxygen
91. (b) Pasteur
92. (c) Amino acid
93. (c) Gene pool
94. (a) Small population
95. (a) Chemical theory
96. (a) Fossils
97. (b) Phylogeny
98. (c) Genetic drift
99. (b) Water
100. (b) Galapagos island
101. (c) Biogenetic Law
102. (a) Mesozoic era - Age of Mammals
103. (c) Convergent evolution
104. (c) Pre-Cambrian
105. (d) J. B. S. Haldane
106. A. I. Oparin

- | | | |
|--------------------------------------|------------------------------------|--|
| 107. Archaeopteryx | 133. (a) Disease transmitting host | antibodies |
| 108. Von Baer | 134. (c) Angina | 159. (a) Endonucleases |
| 109. Vestigial | 135. (a) Hepatic cells | 160. (b) Double stranded DNA |
| 110. Lamarck | 136. (a) Antibodies | 161. (b) Plasmid |
| 111. Pasteur | 137. (d) 1st December | 162. (a) Gene therapy |
| 112. H. M. S. Beagle | 138. Tuberculosis | 163. (b) <i>Escherischia</i> and
<i>Agrobacterium</i> |
| 113. Dryopithecus (Pre-man) | 139. Virus | 164. (d) Complementary DNA |
| 114. (d) Typhoid | 140. Prions | 165. (c) Plasmid |
| 115. (a) Opium | 141. WIDAL | 166. (c) A discovery made
by previously |
| 116. (a) Antibodies | 142. Neoplasm | 167. (a) β -Carotene |
| 117. (d) All | 143. Carcinoma | 168. (a) Department of
Biotechnology |
| 118. (d) <i>Wuchereria bancrofti</i> | 144. Stimulant | 169. Flavr-Savr |
| 119. (b) Entamoeba | 145. Swarming | 170. <i>Agrobacterium tumefaciens</i> |
| 120. (d) Human gums | 146. Milch | 171. Plasmids |
| 121. (c) Sporozoite | 147. White | 172. Plants |
| 122. (a) Culex | 148. Broilers | 173. c-DNA |
| 123. (a) Digenetic | 149. Layers | 174. Gene-splicing |
| 124. (d) Klinefetter's syndrome | 150. T-lymphocyte | 175. PCR |
| 125. (a) Female Anopheles | 151. Amnesia | 176. Transformation |
| 126. (b) Beri beri | 152. Penicillin | 177. Dolly |
| 127. (a) Helper T-cells | 153. Apiary | 178. Mullis |
| 128. (a) B - Cells | 154. (c) Genetic Engineering | 179. Tobacco |
| 129. (c) Thymus | 155. (a) A human insulin | 180. <i>Pseudomonas putida</i> |
| 130. (b) Antibodies | 156. (a) Transgenic plant | |
| 131. (b) Liver | 157. (d) Louis Pasteur | |
| 132. (a) Rhino virus | 158. (d) Synthesis of monoclonal | |

2. Fill in the blanks with correct answer(s)/correct the underlined portion of the sentences :

- | | | |
|--------------------------|---------------------------------------|--------------------|
| 1. Corpus albicans | 13. Antifertilizins | 24. Middle sperm |
| 2. Progesterone | 14. Amphimixis | 25. Prolactin |
| 3. Haemootorial | 15. Gastrula | 26. Fallopian tube |
| 4. LH | 16. Reception cone | 27. Larger |
| 5. Cledoic | 17. Oogonia | 28. Parturition |
| 6. Blastocoel | 18. Spermiogenesis/
Spermatoleosis | 29. Cryptorchism |
| 7. Ovulation | 19. Morula | 30. Azoospermia |
| 8. LH | 20. Placenta | 31. Menopause |
| 9. Sertoli Cells | 21. Yolk | 32. Tubectomy |
| 10. Testosterone | 22. Vitelline membrane | 33. Castration |
| 11. Seminiferous tubule | 23. Four | 34. Cervix |
| 12. Spermatogorial cells | | 35. ELISA |

Zoology

36. Contraception
37. Ectopic
38. Couple protection
39. Barrier
40. Implant
41. Erectile dysfunction
42. IVF
43. Louise Brown
44. ZIFT
45. Antifertility
46. Condom
47. Cryopreservation
48. Viral disease
49. Gonorrhoea
50. Tubectomy
51. 24 hours
52. Cervix
53. Spacing
54. Sex-influenced
55. Recessive
56. Trisomy
57. Barr
58. Holandric
59. Sex-linked
60. Birds
61. Criss-cross
62. Nephritis
63. Female
64. Barr bodies
65. Y-linked
66. Female
67. Mendelian
68. Calvin Bridges
69. 16
70. Haemophilia
71. Workers
72. Hugo de Vries
73. oxygen
74. Water
75. Mimicry
76. Adaptive
77. Mutation
78. Fossils
79. Gene pool
80. Sewall wright
81. Allopatric
82. Pre-Cambrian
83. Amino acid
84. Variation
85. Philosophic Zoologique
86. August Weismann
87. A. I. Oparin
88. Neo-Darwinism
89. Mesozoic
90. Pleistocene
91. Intra-specific
92. Use and disuse
93. Radioactive dating
94. Eqqus
95. Sympatric
96. A. I. Oparin
97. August Weismann
98. Atavism
99. Ernst Haeckel
100. Atavism
101. Carcinogens
102. Salmonella
103. Wuchereria
104. Charles Laveran
105. Giardia
106. Broilers
107. Haemozoin
108. Cerebral
109. Rhabditiform larva
110. Tuberculosis
111. Tse-tse fly
112. Common cold
113. Inbreeding
114. Domestic
115. Apidae
116. Karnal
117. Caffeine
118. Penicillin

Question Bank with Answers

119. Amnesia
120. Depressant
121. Drug addiction
122. Secondary Lymphoid
123. IgA
124. Narcotics
125. Tobacco
126. Microinjection
127. GMO
128. HUMULIN
129. Inventions
130. Dolly
131. Biopiracy
132. ELISA
133. Vincristine and Vinblastine
134. *Agrobacterium tumefaciens*
135. Pharming
136. K. Mullis
137. Tobacco
138. Ligase
139. Transformation
140. Recombinant DNA
141. Microinjection
142. Blotting
143. Gene banks
144. Reverse transcription
145. Plasmids
146. c-DNA
147. *Agrobacterium tumefaciens*
148. Plasmid
149. Restriction endonuclease
150. Electrophoresis
151. Peroxidase/
Alkaline phosphatase
152. Bacteria
153. *Escherichia coli*
154. Tomato
155. Cry
156. Taq Polymerase

GROUP - B**SHORT TYPE QUESTIONS**

3. Answer any Three of the following (Restrict your answer within two to three sentences) [2.5x3=7.5]

HUMAN REPRODUCTION

1. Why meiosis and gametogenesis are always interlinked ?
2. What is organogenesis ?
3. What is implantation
4. What are fallopian tubes & mention its functions.
5. What is fertilisation ? State its significance.
6. Write the functions of Bartholin's gland.
7. What is oestrous cycle ?
8. Why are testes extraabdominal in human beings?
9. What is secondary sexual character ?
10. What is prostate gland ?
11. What is artificial insemination ?
12. What is Parturition ?
13. What is placenta ?
14. State spermiogenesis.
15. What are Leydig's cell ? Write its functions.
16. Define cleavage. Mention its significance.

REPRODUCTIVE HEALTH

17. What is Reproductive health ?
18. What are the two natural barriers for birth control ?
19. What is nonplant and mention its effective timeperiod in birth control ?
20. What is abstinence ?
21. What is cervical caps ?
22. What is GIFT ?
23. Mention two drawbacks of IUCDs ?
24. What is surrogate mother ?

GENETICS AND EVOLUTION

25. What is criss-cross inheritance ?
26. What is barr body ?
27. What is gynandromorphs ?

28. What is sex reversal ?
29. Give two examples of Y-linked inheritance.
30. State genic balance theory.
31. What is fossil ?
32. What is atavism ?
33. What is fossilization ? Mention its methods.
34. What is carbon dating ?
35. What is vestigial organ ?

BIOLOGY AND HUMAN WELFARE

36. What is drug addiction ?
37. Mention the functions of immune system.
38. Write the symptoms of Ascariasis.
39. What are the agents that cause cancer.
40. What is superovulation ?
41. What are carriers ?
42. What is attenuation ?
43. Write the different methods of vaccination.
44. Mention the common problems of adolescence.
45. Write four symptoms of drug addict.
46. What is Schizophrenia ? Write its symptoms.
47. Mention the economic importance of honey.
48. What are the reasons for drinking ?
49. Mention the social implications of alcoholism.

BIOTECHNOLOGY AND ITS APPLICATIONS

50. What are cloning vectors ?
51. What are cosmids ?
52. What is antisense therapy ?
53. What are the applications of the microbe, *Escherichia coli*.
54. Write the advantages of GMOs.
55. What is Pharming ?
56. What is Golden rice ?

4. Differentiate between any One of the following : (Restrict each answer to 3 to 4 important sentences). [3.5x1=3.5]

HUMAN REPRODUCTION

1. Amnion and Chorion.
2. Embryo and Larva.
3. Morula and Blastula.
4. Primary Sex Organ and Secondary Sex Organ.
5. Asexual Reproduction and Sexual Reproduction.
6. Menstrual Cycle and Oestrous Cycle.
7. Spermatogenesis and Oogenesis.
8. Holoblastic cleavage and Meroblastic cleavage.
9. Sperm and Ovum.
10. Testes and Ovary.
11. Vas deferens and Vas efferentia.
12. Corpus Luterum and Corpus albicans.
22. Gynandromorph and Free-Martin.
23. X-Chromosome and Y-Chromosome.
24. Down's syndrome and Turner's syndrome.
25. Super male and Supe female.
26. Analogons organ and Humologoius organ.
27. Lamarckism and Neo-Lamarckism.
28. Darwinism and Neo-Darwinism.
29. Divergent evolution and Convergent evolution.
30. Lamarckism and Darwinism.
31. Fossils and Living fossils.
32. Moulds and Casts.
33. Chemical evolution and Biological evolution.
34. Genetic drift and Natural selection.
35. Abiogenesis and Biogenesis.

REPRODUCTIVE HEALTH

13. Vasectomy and Tubectomy.
14. Natural method of a birth control and Barrier method of birth control.
15. GIFT and ZIFT.
16. Conventional Vasectomy and Non-Scalpel Vasectomy.
17. Spacing method and Terminal method
18. Chemical method and Natural method.
36. B-Lymphocyte and T-Lymphocyte.
37. Communicable disease and Non-communicable disease.
38. Active immunity and Passive immunity.
39. Depressant and Stimulant.
40. Humoral immunity and Cell-mediated immunity.
41. Antibody and Antigen.
42. Broilers and Layers.

GENETICS AND EVOLUTION

19. Phenotype and Genotype.
20. Monogenic inheritance and Polygenic inheritance.
21. Autosome and Allosome.
43. Exonuclease and Endonuclease
44. Plasmid DNA and Chromosomal DNA.
45. In-vivo Gene therapy and Ex-vivo Gene therapy.

BIOTECHNOLOGY AND ITS APPLICATIONS

GROUP - B

ANSWERS

3. Answer any Three of the following (Restrict your answer within two to three sentences)

1. (a) Gametogenesis is associated with reduction in chromosome number, thus gamete formed contains half of the chromosome number (haploid).
(b) In meiosis, the reduction in chromosome number takes place from diploid ($2n$) to haploid set (n) takes place.
2. (a) The implanted embryo undergoes gastrulation and then organogenesis.
(b) The various tissues, organs and organ system develops during organogenesis.
3. (a) Blastocyst gets partially embedded in the wall of the uterus for attachment and nourishment.
4. (a) The fallopian tubes/oviducts is connected with uterus on one side and forms funnel shaped openings around ovary.
(b) These tubes have cilia, movement of cilia together with the peristaltic movement of smooth muscles propel the ova towards the uterus.
(c) Fertilisation occurs in the fallopian tube.
5. (a) The fusion of a haploid male gamete (sperm) with a haploid female gamete (ovum) to form a diploid zygote ($2n$) is called fertilisation.
(b) It restores diploidy in the zygote.
6. (a) Bartholin's gland (homologous to Cowper's gland of male) secrete mucus to lubricate vagina at the time of mating and parturition.
(b) They are one pair in number present behind the 'labia minora' are on either side of vaginal orifice.
7. (a) Oestrous cycle comprises cyclic changes in female reproductive system of non-primate mammals like cows, dogs etc.
(b) It consists of a short period of sexual responsiveness (or high sexual urge) called oestrous or heat period.
(c) Here bleeding does not take place.
8. (a) Testis are extra-abdominal, i.e. present outside abdomen but inside the "Scrotal Sacs or Scrotum" hanging from lower abdominal wall between the legs in humans.
(b) Scrotal sacs act as "thermoregulators" and keep the testicular temperature " 2°C lower" than body temperature, ideal temperature for forming sperm.
9. (a) The secondary sexual characters are the characters, which develop after puberty.
(b) In males, they are moustaches, beard, hairs on the chest, public hairs, low pitched voice etc.
(c) In females, they are the development of breasts, broader pelvis, fat deposition in thigh, buttocks and face, high pitched voice, pubic hairs etc.
10. (a) It secretes a milky fluid, that aids in sperm motility, and provides alkaline pH to the semen and the secretion constitutes 30% of the semen.
11. (a) Artificial insemination is a method in which semen collected from a selected bull is stored at low temperature.
(b) A small part of the semen is introduced mechanically into the reproductive tract of selected female cow.
(c) In this method, semen obtained from a single bull can be used to inseminate as many as 550 cows.

12. (a) Parturition is the process of giving birth to a baby. It is controlled by a neuroendocrine mechanism.
- (b) Foetus and placenta cause mild uterine contraction called foetal ejection reflex.
- (c) It has 3 stages - Dilation stage, Expulsion stage and After birth.
13. (a) It is a mass of tissue through which the embryo gets attached to the wall of uterus inside the mother's womb. It is partly developed from the uterine wall of mother and the Chorion.
- (b) The placenta obtain nutrients and oxygen from the mother's blood and get rid of carbon dioxide and metabolic wastes.
- (c) It secretes a hormone called hCG (Human Chorionic Gonadotropin) which helps in maintaining pregnancy.
14. (a) Spermiogenesis is the metamorphosis of the spermatid into sperm.
- (b) Here, a circular spermatid is metamorphosed and changed to a true sperm being differentiated into head, neck and tail.
15. (a) Leydig cells are also called interstitial cells/endocrine cells of the testes.
- (b) It secretes testosterone exchange of which controls the development secondary sex characters.
16. (a) It is a rapid, mitotic division of zygote to form a hollow, spherical, multicellular structure, the blastula (each cell is called blastomere).
- (b) It brings about the distribution of cytoplasm of the zygote amongst the blastomeres.
- (c) It restores the cell size and the nucleocytoplasmic ratio and characteristic of species.
17. (a) Reproductive health refers to the diseases, disorders and conditions that affect the functioning of the female reproductive system during all stages of life.
18. The two natural barrier methods for birth control :
- (a) *Periodic abstinence* - Couple should avoid coitus from 10th to 17th day of menstrual cycle.
- (b) *Coitus interruptus* - Male partner withdraws his penis from the vagina just before ejaculation of semen.
19. (a) Norplast is a hormonal implant used for birth control. It is effective for upto five years.
20. (a) This is a natural method of birth control, where the couples avoid or abstain from coitus from 10th to 17th day of menstrual cycle (fertile period).
21. (a) Cervical caps are small sized diaphragms that cover the cervix closely.
- (b) It prevents sperm entry and is without any side effects.
22. (a) In this method, both sperms and unfertilised oocytes are transferred into fallopian tubes.
- (b) Fertilisation occurs inside the body of the female.
23. (a) Risk of perforation of uterus and risk of infection.
- (b) Possibility of fallopian tube pregnancy and causes excess menstrual bleeding and pain.
24. (a) A woman who substitutes the real mother to nurse the embryo is called surrogate mother.
- (b) In this process, a developing embryo is implemented in the uterus of another female.
25. (a) It is a type of sex-linked inheritance where the genes of one parent are transferred to the grand children through children of opposite sex.
- (b) It is a two types - Digynic and Diandric.

26. (a) Murray Barr (1949) noticed a small body in the nucleus of the nerve cells of a female cat, which stained heavily.
- (b) Many other cells of the female cat body had these bodies, known as sex chromatin or barr bodies.
- (c) Total nos. of x chromosome - 1 = Barr body, for example in human females, it is (2 - 1=) 1 barr body.
27. (a) An gynandromorph is an organism that contains both male and female characters. It develops due to non-disjunction of X chromosome at cleavage.
- (b) The half of the body is female, which develops from a blastomere containin $2A + 2X$ chromosomes.
- (c) In humans, SRY genes (sex-determing region of Y-chromosome) present in Y-chromosome influences the development of testes in males.
28. (a) Sex reversal is a phenomenon, where the removal of gonads (testes or ovary) of secondary sexual characteristics of opposite sex.
- (b) It is observed in fishes, amphibians, birds and some other mammals.
29. (a) It is the inheritane of TDF (Testis Determining factor).
- (b) The trait of having hair on each pinna (Hypertrichosis) in males only.
30. (a) It was proposed by Bridges (1926) and is based on his work on *Drosophila*. It is based on the sex ratio of $\frac{X}{A}$, where X is sex Chromosome and A is the autosome.
- (b) According to him, the female determining genes are located on the X-chromosome, while male determining genes on autosomes.
- (c) When X/A raio is 1, it is normal female, when the ratio is 0.5, it becomes male. If the ratio is more than 1, it is super female. If the ratio is less than 0.5, it is super male. If the ratio remains between 0.5 and 1.0, it is inter sex.
31. (a) Fossils are remains of ancient animals and plants preserved in any form (remnants or impressions) by the natural means in the sedimantary rocks, in tar pits or in frozen ice.
- (b) They are classified as original fossil, frozen fossil, petrified fossil and moulds, casts and prints.
32. (a) It is the reappearance of a remote ancestral form of a trait, which has otherwise become reduced and nonfunctional in the present generation.
- (b) Atavism confirms the retrogressive evolution.
33. (a) Fossilization is the process of formation of fossils.
- (b) There are two methods - (1) Direct Embedding, (2) Sedimentation.
34. (a) Carbon dating was discovered by Libby (1949). Radioactive C^{14} occurs naturally.
- (b) It enters food chain and found in all living beings. C^{14} delays to form N^{14} . It can measure articles upto 25000 years old.
35. (a) These organs are useful, non-functional and greatly reduced in the body and are called vestigeal organs.
- (b) These show the evidences of evolution and represents the remnants of organs, which were functional in their ancestors.
- (c) Examples - Vermiform appendix, ear muscles and coccyx in man.
36. (a) The prolonged use of some drugs may lead to dependence of body on them called drug addiction.
- (b) The causes may be curiosity, temptation, frustation, in security, excitement and adventure.

37. (a) The immune system performs specific defense against agents, the antigens that are foreign or harmful to the body.
38. (a) It is accompanied by severe stomach ache, diarrhoea, vomiting and slight rise in the body temperature.
- (b) In children, they dull the mental capacity and stunt growth.
- (c) Their juveniles cause inflammation and haemorrhage in the lungs, which result in pneumonia.
39. (a) High energetic radiations (e.g. X-rays, UV rays etc.), chewing of tobacco and betel leaves.
- (b) Heavy smoking of cigarettes and bidis etc., different type of harmful chemicals and oncogenic viruses.
40. (a) In this technique, gonado-tropic hormone is injected into the female body and forcing the female to ovulate large number of ova.
- (b) The fertilised ova are used for transplantations.
41. (a) Carrier is generally an organism, which simply carries or transfers the parasite (pathogenic microbe) from infected person to a healthy person by its body surface or appendages.
- (b) The carrier itself does not get infected by the microbe, e.g. Housefly.
42. (a) Attenuation involves either treating the antigenic molecule or organism with a chemical formation or repeated infection with host cells until it's toxicity is reduced.
43. (a) Injecting dead pathogens to human body.
- (b) Injecting inactive pathogens to human body.
- (c) Injecting living mutant pathogen and transgenic pathogen to human body.
44. (a) Disfigurement of the body, addiction, phobias, early marriages, teen age pregnancy.
- (b) Pre-marital sex, malnutrition, obesity, unsafe abortions and HIV infection etc.
45. (a) Loss of interest in daily routine.
- (b) Loss of appetite
- (c) Loss of health
- (d) Sleeplessness and lethargy.
46. (a) Schizophrenia is a nervous disorder, which has the following symptoms.
- (1) Distracted thought, (2) Laughing, crying and shouting without reasons, (3) weak perception, (4) indifferent to pleasure and pain.
47. (a) Honey has high food value containing levulose, dextrose, maltose and enzymes etc.
- (b) It has medicinal importance and used as laxative, antiseptic and sedative.
- (c) It is used in the manufacturing of cakes. It is also used against disorders of digestion, dysentery, vomiting, stomach and liver problem.
48. (a) Social pressure, desire for excitement, linking of taste, curiosity of pressure.
- (b) Feeling of independence, unhappy life at home, to escape from disappointments.
49. (a) Easy involvement in corruption, negligence to family.
- (b) Frequent road accident, frequent social crimes like rape and murder.
50. (a) These are carriers or vehicles of desired DNA fragments, which can undergo independent replication to increase copies of desired genes, e.g. Plasmids, bacteriophages.
- (b) We are able to recombine a piece of DNA with bacteriophage genome or a plasmid and introduce the same in a plasmid free bacterium, the vector would multiply.

51. (a) Cosmids are plasmids, in which phage lambda cos sites have been inserted. It can be packed in the phage coat.
(b) It is useful in carrying large DNA fragments. It is formed by recombining phage DNA with plasmid.
52. (a) Extra activity of genes of a particular region can be checked, by introducing specific RNA fragments. The treatment is called antisense therapy.
53. (a) It helps in the production of human insulin, human growth factor, erythropoietin, interferons, interleukin, fertility hormone.
54. (a) The advantages are higher yield, nutritional value, stresses, pre-harvest losses, disease resistance, mineral utilisation, pharmaceuticals and commercial products.
55. (a) It is a word used in biotechnology to describe the commercial use of transgenic animals as sources of important pharmaceutical products.
(b) Super mouse was genetically altered to produce tissue plasminogen activator (tPA), an agent that dissolves blood clot.
56. (a) It is a transgenic variety of rice with an elevated level of β -carotene (Provitamin A), a precursor of vitamin A.
(b) A variety of tomato plant has been successfully engineered, which bears tomatoes known as Flavr-Savr tomatoes. This variety exhibits a delayed ripening.

4. Differentiate between any One of the following : (Restrict each answer to 3 to 4 important sentences).

1. Amnion and Chorion

Amnion

- (i) The inner cell mass of the human zygote gets differentiated as the amnion.
(ii) The cavity between the amnion and the embryo is termed the amniotic cavity.
(iii) The function of the amnion is protection of embryo from the danger of desiccation.

Chorion

- (i) The outer cell mass of the human zygote gets differentiated as the chorion.
(ii) The cavity between the amnion and chorion is the chorionic cavity.
(iii) The function of the chorion is exchange of substances between the embryonic tissue and the material environment.

2. Embryo and Larva

Embryo

- (i) Early stage is direct development.
(ii) Not self reliant.
(iii) Formed during development of eggs containing enough amount of Yolk.
(iv) Development on mother of yolk for food.
(v) Example - Chick embryo inside egg shell.

Larva

- (i) Early stage is indirect development.
(ii) Self reliant.
(iii) Formed during development of eggs containing less amount of Yolk.
(iv) Independently collects food.
(v) Example - Tadpole larvae of frog.

3. Morula and Blastula**Morula**

- (i) The Zygote undergoes cleavage and gives a 32-celled solid ball like mass of cells called morula.
- (ii) It is formed of 'blastomers', which may be unequal (as in frog) - micromeres and megameres.

Blastula

- (i) Morula further divides to 64-celled stage with a cavity inside called Blastocoel. The embryo is called blastula or blastocyst.
- (ii) It is formed of outer nutritive envelope of cells, the trophoblast and inner cell mass or embryonal knob.

4. Primary Sex Organ and Secondary Sex Organ**Primary Sex Organ**

- (i) They produce gametes (Sperm & Ova).
- (ii) They secrete sex hormone.
- (iii) Their growth, maintenance and functions are controlled by gonadotropins of anterior pituitary.
- (iv) Example - Testes in male and ovaries in female.

Secondary Sex Organ

- (i) These help in conduction of gametes.
- (ii) They do not secrete sex hormone.
- (iii) Their growth, maintenance and function are controlled by sex hormones secreted by gonads.
- (iv) Example - Epididymis, Penis etc. in male and oviducts, uterus etc. in female.

5. Asexual Reproduction and Sexual Reproduction**Asexual Reproduction**

- (i) It occurs only in invertebrates and lower chordates.
- (ii) It is uniparental reproduction, where no gametes and fertilisation are involved.
- (iii) Only mitotic division takes place.
- (iv) Daughter organisms are genetically similar to parents.
- (v) Multiplication occurs rapidly.

Sexual Reproduction

- (i) It occurs at most in all types of animals.
- (ii) It is biparental reproduction where gametes undergo fertilisation to form zygote.
- (iii) It involves both mitosis and meiosis.
- (iv) Daughter organisms are genetically different from the parent.
- (v) Multiplication is slow.

6. Menstrual Cycle and Oestrous Cycle**Menstrual Cycle**

- (i) It occurs in primates (monkey, apes and human beings)
- (ii) Menstruation or blood flow occurs in the last few days of the cycle.
- (iii) The broken endometrium goes out with menstrual flow.
- (iv) Sex urge is not increased during menstruation
- (v) Female does not allow copulation during the cycle period.

Oestrous Cycle

- (i) It occurs in non-primates such as cows, dogs etc.
- (ii) No menstruation occurs in this cycle.
- (iii) The broken endometrium is reabsorbed.
- (iv) Sex urge is increased during this period.
- (v) Female permits copulation only during this cycle period.

7. Spermatogenesis and Oogenesis**Spermatogenesis**

- (i) It occurs in the seminiferous tubules of testes.
- (ii) Finally 4 functional sperms are formed from each spermatogonium.
- (iii) Sperms are minute, yolkless and motile.
- (iv) Polar bodies are not formed.
- (v) Process is completed in testes.
- (vi) Spermiogenesis is present.

Oogenesis

- (i) It occurs in the ovaries.
- (ii) Finally 1 functional ovum is formed from each oogonium.
- (iii) Ova are much larger often with yolk and non-motile.
- (iv) Polar bodies are formed.
- (v) Process stops at secondary oocyte stage until fertilization.
- (vi) No such phenomenon occurs.

8. Holoblastic cleavage and Meroblastic cleavage**Holoblastic cleavage**

- (i) Zygote divides completely. Blastomeres formed may be equal or unequal.
- (ii) It occurs in alecithal, microlecithal, oligolecithal & telolecithal eggs.
- (iii) It is seen in starfish, Amphioxus, frog, insects and mammals (human being) etc.

Meroblastic cleavage

- (i) Division is confined to animal pole or peripheral region (yolk free area) of egg.
- (ii) It takes place in megalecithal and centrolecithal eggs.
- (iii) It is seen in Reptiles, Birds, egg laying mammals and some insects etc.

9. Sperm and Egg**Sperm**

- (i) Produced in testes.
- (ii) One spermatogonium gives rise to four spermatozoa.
- (iii) Differentiated into head, neck, middle piece and tail.
- (iv) It is motile and penetrates the ovum.
- (v) Spiral mitochondria present in the neck region.

Egg

- (i) Produced in ovary.
- (ii) One oogonium produces one ovum.
- (iii) It is globular and not differentiated into any region.
- (iv) Immobile and engulfs the sperm.
- (v) Scattered mitochondria in the ovum.

10. Testes and Ovary**Testes**

- (i) It is the male gonad.
- (ii) It produces spermatozoa.
- (iii) It is located outside the body.
- (iv) It produces testosterone.
- (v) It requires less than 20°C temperature to produce sperm.

Ovary

- (i) It is the female gonad.
- (ii) It produces ova.
- (iii) It is located inside the body.
- (iv) It produces oestrogen & progesterone.
- (v) It produces ova at body temperature.

11. Vasa deferens and Vasa efferentia**Vasa deferens**

- (i) It is the main duct, which carries the sperm from epididymic to urethra.
- (ii) It conveys mature sperms.
- (iii) Accessory sex glands pour their secretions into vas deferens.

Vasa efferentia

- (i) There are 10 to 20 small tubules leading from testes to epididymis.
- (ii) It conveys immature sperms to epididymis, where they are stored temporarily till they attain maturity.
- (iii) No secretions are added to the vasa efferentia.

12. Corpus luteum and Corpus albicans**Corpus luteum**

- (i) After ovulation, the graafian follicle changes into corpus luteum in mammalian ovary.
- (ii) It is made up of luteal cells.
- (iii) It secrets hormone progesterone.

Corpus albicans

- (i) If there is no pregnancy, the corpus luteum degenerate into corpus albicans in the ovary.
- (ii) It is made up of a scar tissue.
- (iii) It does not secrete any hormone.

13. Vasectomy and Tubectomy**Vasectomy**

- (i) Method of sterilization in males.
- (ii) Vasa differentia of both sides are cut and tied.
- (iii) Prevents the movement of sperm at the cut end.

Tubectomy

- (i) Method of sterilization in females.
- (ii) Fallopian tubes of both sides are cut and tied.
- (iii) Prevents movement of egg at cut end.

14. Natural method of birth control and Barrier method of birth control.**Natural method of birth control**

- (i) Meeting sperm and ovum is avoided.
- (ii) Example - Abstinence, withdrawal and Absence of menstruation.

Barrier Method of birth control

- (i) Ovum and sperm are prevented from physically meeting with the help of barriers.
- (ii) Example - Condoms, Diaphragms, Cervical caps and vaults.

15. GIFT and ZIFT**GIFT**

- (i) Gamete Intrafallopian transfer is an assisted reproductive technology to counter infertility.
- (ii) Eggs are removed from a donor ovary and placed in fallopian tube of recipient along with semen.
- (iii) Fertilisation occurs and the zygote is implanted and the woman becomes pregnant.

ZIFT

- (i) Zygote intrafallopian transfer is a type of infertility treatment in females.
- (ii) It is a treatment for a female who has a blockage in her fallopian tubes.
- (iii) The eggs are removed from the ovulating woman's ovary and in-vitro fertilised.

16. Conventional Vasectomy and Non-Scalpel Vasectomy**Conventional Vasectomy**

- (i) In this method, a transverse incision is made on the skin of scrotum with help of a scalpel.
- (ii) Each vas deferens is expressed and cut and two ends are separated and tied with a gap of 1-4 cm.

Non-Scalpel Vasectomy

- (i) In this method, the skin of scrotum is punctured by a dissecting forcep and a ringed forcep.
- (ii) Each vas differens is taken out and it is occluded by heat and clips removing 1-2 cm followed by ligation of ends.

17. Spaning method and Terminal method**Spaning method**

- (i) It is a temporary method of family planning.
- (ii) It is used to postpone the birth of children.
- (iii) It includes barrier method, use of IUD, chemical method, hormonal method, natural method and MTP.

Terminal method

- (i) It is a permanent method of family planning.
- (ii) It is a surgical method to block the passage of male and female gamete.
- (iii) It includes vasectomy in males and tubectomy in females.

18. Chemical method and Natural method**Chemical method**

- (i) In this method, contraceptive contains spermicidal chemicals, which kills sperm.
- (ii) It includes from 5th day to 10th day and from 23rd day to 28th day of menstrual cycle.

Natural method

- (i) This method does not need any device, chemical or medicine for contraception.
- (ii) It is from 11th day to 22nd day of menstrual cycle.

19. Phenotype and Genotype**Phenotype**

- (i) The morphological expression of an animal with respect to its genetic make up is called its pheno type.
- (ii) Here only morphological expression can be observed.
- (iii) Example - The pheno type ratio of Mendel's monohybrid cross is 3:1.

Genotype

- (i) The exact genetic composition of an individual by its chromosome study is called genotype.
- (ii) Here exact genetic make up of an individual can be known.
- (iii) Example - The genotype ratio of Mendel's monohybrid cross is 1:2:1.

20. Monogenic inheritance and Polygenic inheritance.**Monogenic inheritance**

- (i) Monogenic character is controlled by a gene.
- (ii) It exhibits two external phenotypes.
- (iii) The F_1 progeny resembles the dominant parent.

Polygenic inheritance

- (i) Polygenic character is controlled by two or more genes.
- (ii) It exhibits grades of phenotypes between two extremes.
- (iii) The F_1 progeny has phenotype intermediate between the two parental phenotypes.

21. Autosome and Allosome**Autosome**

- (i) Autosomes carry genes to control body characters.
- (ii) In humans, the autosome no. is 44.
- (iii) The homologous pair of autosomes are structurally similar.

Allosome

- (i) Allosomes or sex chromosomes contains genes to control sex and body characters.
- (ii) The sex chromosome no. is 2.
- (iii) The sex chromosome, i.e. x and y are structurally dissimilar.

22. Gynandromorph and Free-Martin**Gynandromorph**

- (i) A gynandromorph is an organism that contains both male and female characteristics (half male and half female).
- (ii) It is due to non-disjunctions of X-chromosomes during the cleavage e.g. Drosophila.

Free-Martin

- (i) Free martin is a sterile female cattle of the twins, where the male is normal.
- (ii) It is due to influence of male sex hormone on the female foetus of the twins, e.g. cattle twins.

23. X-Chromosome and Y-Chromosome**X-Chromosome**

- (i) It is a larger sex chromosome that is present in both male and female.
- (ii) SRY genes are present.
- (iii) It contains more genes.

Y-Chromosome

- (i) It is smaller sex chromosome that is present only in male.
- (ii) SRY genes are present in the banded parts of Y-chromosome and it makes male sex organs.
- (iii) It contains less genes.

24. Down's syndrome and Turner's syndrome**Down's syndrome**

- (i) It is caused by presence of an extra 21st chromosome.
- (ii) It occurs in both males & females.
- (iii) The Karyotypes of Down's syndrome is $45+xx$ or $45+xy=47$.
- (iv) It is caused by trisomy.

Turner's syndrome

- (i) It is caused by a missing of one of the two X-chromosomes.
- (ii) It can occur only in male.
- (iii) The Karyotype of Turner's syndrome is $44+ x 0 = 45$.
- (iv) It is caused by monosomy.

25. Super male and Super female**Super male**

- (i) Super males are produced with genetic sex ratio of 0.33 ($xy/3A$) in Drosophila.
- (ii) They are called metamales.
- (iii) They are sterile male.

Super female

- (i) Super females are produced with genetic sex ratio of 1.5 ($3x/2A$) in Drosophila.
- (ii) They are called meta females.
- (iii) They are sterile females.

26. Analogous organ and Homologous organ**Analogous organ**

- (i) They show superficial resemblance.
- (ii) Internal structure of these organs is quite different.
- (iii) They often arise from different positions over the body.
- (iv) They perform similar functions.
- (v) These organs show convergent evolution.
- (vi) They are found in unrelated organism.

Homologous organ

- (i) They differ phenotypically.
- (ii) These organs have similar internal structure.
- (iii) They arise from similar position over the body.
- (iv) They perform different functions.
- (v) These organs show adaptive radiation.
- (vi) They occur in related organism.

27. Lamarckism and Neo-Lamarckism**Lamarckism**

- (i) It was the original theory proposed by Lamarck.
- (ii) It is the presence of an internal.
- (iii) Change in environment develops new needs and desires.
- (iv) There is a lot of stress on use and disuse of organs.
- (v) All acquired characters are to be inherited.

Neo-Lamarckism

- (i) It is modification of Darwin's theory in order to remove the defects.
- (ii) It explains the origin of various types of variations.
- (iii) It believes that only genetic variations are inheritable.
- (iv) Natural selection operates through differential reproduction.
- (v) Isolation is pre-requisite for formation of new species.

28. Darwinism and Neo-Darwinism**Darwinism**

- (i) It is the theory proposed by Darwin.
- (ii) It does not give reason for appearance of variations.
- (iii) It believes that all useful variations are inheritable.
- (iv) Natural selection operates through survival of the fittest.
- (v) It does not give importance to isolation.

Neo-Darwinism

- (i) It is modification of Darwin's theory in order to remove the defects.
- (ii) It explains the origin of various types of variations.
- (iii) It believes that only genetic variations are inheritable.
- (iv) Natural selection operates through differential reproduction.
- (v) Isolation is pre-requisite for formation of new species.

29. Divergent evolution and Convergent evolution**Divergent evolution**

- (i) It is formation of functionally different forms.
- (ii) The different forms develop from a basically similar structure.
- (iii) It occurs in related organisms.

Convergent evolution

- (i) It is formation of functionally similar structure.
- (ii) Similar structures develop from basically different structures.
- (iii) It occurs in unrelated organisms.

30. Lamarckism and Darwinism**Lamarckism**

- (i) Lamarck proposed inheritance of acquired characters of use and disuse theory.
- (ii) This theory states that there is an internal vital force in all organisms.
- (iii) According to this theory, if an organ is constantly used, it would be better developed whereas disuse of organs degenerates.
- (iv) It does not believe in survival of the fittest.

Darwinism

- (i) Darwin proposed natural selection theory.
- (ii) It does not believe in internal vital force.
- (iii) An organ develops further or degenerates only due to continuous variation.
- (iv) It is based on survival of the fittest.

31. Fossils and Living fossils**Fossils**

- (i) Fossils are remains of dead organisms in the sedimentary rocks.
- (ii) They provide information for evolution, e.g. Archaeopteryz, Eohippus.

32. Moulds and Casts**Moulds**

- (i) It is a true copy of shape of fossil.
- (ii) The body of a dead organism is decayed leaving a cavity just like the animal.

33. Chemical evolution and Biological evolution**Chemical evolution**

- (i) It is a process of formation of most stable molecules from smaller forms.
- (ii) The non-cellular form of life originated about 3.5 billion years ago.
- (iii) Particles aggregate to form coacervates.

34. Genetic drift and Natural selection**Genetic drift**

- (i) The allelic frequency change by chance.
- (ii) It is called Sewall-Wright effect.
- (iii) Have the character is non-adaptive.

35. Abiogenesis and Biogenesis**Abiogenesis**

- (i) It means life originated from life-less matters.
- (ii) This theory was first described by Aristotle.
- (iii) It is a spontaneous generation and it was strengthened by A.I. Oparin and J.B.S. Haldane.

36. B-Lymphocyte and T-Lymphocyte**B-Lymphocyte**

- (i) These are processed in some unknown places of the body.
- (ii) It forms plasma cells, which produce antibodies.
- (iii) These antibodies are responsible for humoral immunity.
- (iv) These antibodies cause agglutination and neutralisation of foreign antigens.

Living fossils

- (i) Living fossils are living organisms on the earth's surface.
- (ii) They remain unchange since million of years, hence called living fossils, e.g. Sphenodon, Coelocanth fish.

Casts

- (i) It is a petrified fossil with minerals.
- (ii) The cavity inside the mould is filled with minerals.

Biological evolution

- (i) It is a genetical change in a population that is inherited over several generations.
- (ii) The first cellular form of life originated 2 million years back.
- (iii) First prokaryotes are formed in sea water.

Natural selection

- (i) It is a genetical change in a population that is inherited over several generations.
- (ii) The first cellular form of life originated 2 million years back.
- (iii) First prokaryotes are formed in sea water.

Biogenesis

- (i) It means life originated from living matters.
- (ii) This theory was first described by Louis Pasteur.
- (iii) Example - Flies develop from larvae.

T-Lymphocyte

- (i) These are processed in the thymus gland.
- (ii) It is developed into T-Lymphocyte (like cytotoxic, Helper, Suppressor and Killer Cells).
- (iii) These are responsible for cell-mediated immunity.
- (iv) These are killer cells and killed by the help of Lysoenzymes.

37. Communicable disease and Non-communicable disease**Communicable disease**

- (i) It is one in which the causative organisms is carried from one person to another either directly or indirectly.
- (ii) Viral diseases (Influenza, Mumps, AIDS, Small Pox etc.), Bacterial diseases (Cholera, Typhoid, TB, Tetanus etc.), Protozoan diseases (dysentery) etc. are examples of this type.

Non-communicable disease

- (i) The non-communicable diseases remains confined to the persons, who suffer from them. They are not transmitted from infected persons to other persons.
- (ii) Diabetes, Cardiovascular diseases, Arthritis, Cancer etc. are examples of this type.

38. Active immunity and Passive immunity**Active immunity**

- (i) It is developed when the person's own cells produce antibodies in response to infection or vaccine.
- (ii) It provides relief only after a long period.
- (iii) It has no side effects.
- (iv) It is long lasting.

Passive immunity

- (i) It is developed when antibodies produced in other organisms are injected into a person to counter act antigen such as snake venom.
- (ii) It provides immediate relief.
- (iii) It may cause reactions.
- (iv) It is not long lasting.

39. Depressant and Stimulant**Depressant**

- (i) This decreases the activity of CNS.
- (ii) This induces calming effects, relaxation and drowsiness.
- (iii) Induces sleep e.g. Benzoidazepines.

Stimulant

- (i) It increases the activity of CNS.
- (ii) It induces excitement, alertness, more wakefulness.
- (iii) Inhibits sleep, e.g. cocaine, caffeine.

40. Humoral immunity and Cell-mediated immunity**Humoral immunity**

- (i) It is the type of immunity in which certain cells of body produce antibodies agglutinins in blood.
- (ii) It protects the body against bacteria and viruses that enter circulating body fluids through antigen - antibody reaction.
(Agglutination reaction)
- (iii) Antigen specific B-cells (or B-Lymphocytes) produce this immunity.

Cell-mediated immunity

- (i) It is the type of immunity in which specialised cells circulate in blood & tissue and directly attack on antigens or pathogens.
- (ii) These cells either directly attack or produce clones of cells (T-Lymphocytes mainly), which respond to antigens.
- (iii) T cells (T-Lymphocytes) from cell mediated immunity.

41. Antibody and Antigen**Antibody**

- (i) It is also called immunoglobulin.
- (ii) It is a glycoprotein.
- (iii) It is synthesized by plasma cells.
- (iv) Antibody interacts with antigen to destroy it.

Antigen

- (i) It is also called immunogen.
- (ii) It is a protein or polysaccharide.
- (iii) It is usually a foreign material that stimulates antibody formations.
- (iv) Antigen binds to a macrophage to reach a helper T-cell to initiate immune response.

42. Broilers and Layers**Broilers**

- (i) There are unsexed males & females.
- (ii) They are reared for meat purpose.
- (iii) They are reared for 38-42 days.
- (iv) Broilers are reared in batches in a single rearing shed.

Layers

- (i) These are females.
- (ii) They are reared for egg production.
- (iii) Layers attain sexual maturity around 20-22 weeks.
- (iv) Layers are reared as per different growth stages in different shed.

43. Exonuclease and Endonuclease**Exonuclease**

- (i) It breaks DNA from the ends.
- (ii) The separated fragments can not be used in genetic engineering.
- (iii) The separated fragments are small nucleotides.

Endonuclease

- (i) It cuts DNA from inside.
- (ii) The desirable separated fragments are used in genetic engineering.
- (iii) The separated fragments are generally large sized.

44. Plasmid DNA and Chromosomal DNA**Plasmid DNA**

- (i) It is extracellular DNA.
- (ii) It carries nonvital genes.
- (iii) A bacterial cell may carry one to several plasmid DNAs.

Chromosomal DNA

- (i) It is nuclear DNA.
- (ii) It possesses vital genes.
- (iii) A bacterial cell carries only one chromosomal DNA.

45. In-vivo Gene therapy and Ex-vivo-therapy**In-vivo Gene therapy**

- (i) The affected cells are not removed from the body. However cloned genes are directly introduced into the affected cells of the person.
- (ii) The individual cells cannot be cultured to a sufficient number

Ex-vivo Gene therapy

- (i) The affected cells are removed from the body and transformed by remedial gene *in-vitro*.
- (ii) The transformed cells are grown in a culture medium and then implanted in the body.

GROUP - C

LONG TYPE QUESTIONS

5. **Answer any two questions (restrict your answer within 200 words).** **[7x2=14]**
1. Give a detailed account of female reproductive system in human being.
 2. Give a detailed account of male reproductive system in human being.
 3. Give a detailed account of spermatogenesis.
 4. Describe the mechanism of Oogenesis.
 5. What is sex-linked inheritance ? Discuss the mechanism with reference to colourblindness or haemophilia.
 6. Explain the mechanism of chromosomal basis of sex determination.
 7. Discuss the Darwin's theory of Natural Selection.
 8. Discuss the evidences of organic evolution from comparative anatomy and morphology.
 9. Discuss embryological evidences of evolution.
 10. Describe the mechanism of Recombinant DNA Technology.
 11. Give an account of Tumber's syndrome and Klinefetter's syndrome.

GROUP - C

ANSWERS

1. The female reproductive system becomes fully developed after maturity (puberty).
 - (A) (i) Sexual reproduction
 - (ii) Development of foetus
 - (iii) Endocrine functions
 - (B) List of Organs - A pair of ovary, A pair of oviduct, single uterus, single vagina, External genital organ, A pair of mammary glands.
 - (C) Brief description of all parts with diagrams.
 - (D) T. S. of ovary & functions of all parts.
2. The male reproductive system consists of a pair of testes, a duct system, a copulatory organ called penis and several accessory glands.
 - (A) Detailed description of Scrotum, Testes, History of testes and all other organs, Accessory sex glands like seminal vesicles, prostate gland, Cowper's gland & semen.
3. The process of formation of spermatozoa inside seminiferous tubule of testes is called spermatogenesis.
 - (A) The whole process of spermatogenesis is completed in two phases, i.e. Formation of Spermatids, Metamorphosis of spermatid to sperm called spermatoleusis.
 - (B) Formation of spermatid takes place in 3 phases - Phase of multiplication phase of growth and phase of maturation.
 - (C) Detailed diagram with labelling of the process.
 - (D) Structure of sperm - Head, Neck, Middle piece and tail.
4.
 - (A) Oogenesis of human female.
 - (B) Oogenesis is found of 3 phases - Multiplication phase, Growth phase and Maturation phase.
 - (C) Detailed description of all phases.
 - (D) Diagram with labelling.

5. (A) Definition of sex-linked inheritance
(B) Characteristics of sex-linked inheritance.
(C) Diagram of Colourblindness and Haemophilia.
(D) Detailed description of colourblindness and Haemophilia.
(E) Explain the phenomena with criss-cross inheritance.
6. (A) Preliminary idea about sex chromosome and autosomes.
(B) Mechanism of sex determination-
(i) xx-xy method (ii) xx-xo method
(iii) zw-zz method (iv) zo-zz method
7. (A) Introduction
(B) Enormous fertility
(C) struggle for existence :
(i) Intraspecific
(ii) Interspecific
(iii) Struggle with the environment
(D) Variation and heredity
(E) Survival of the fittest
(F) Natural selection
(G) Origin of New species
8. (A) Anatomical evidences & Morphological evidences :
(i) Homologous organ
(ii) Analogous organ
(iii) Vestigeal organs
(iv) Connecting links
9. (A) Introduction
(B) Recapitulation theory
(C) Von Baer's principle
10. (1) Steps involved in the production of r-DNA.
(2) Isolation of Plasmid vector.
(3) Insertion of desired gene into vector
(4) Introduction of r-DNA into host cells.
(5) Identification of cloned genes.
(6) Applications etc.
11. (1) Genetic constitution
(2) How it occurs.
(3) What are its phenotypic & Genotypic.
(4) How to overcome these defeats.
