



# STUDY MATERIAL: 12<sup>TH</sup> BIOLOGY

SESSION – 2023-2024



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## BLUE PRINT

<b>Unit</b>	<b>Chapter</b>	<b>Section A</b> <b>1 mark Ques</b>	<b>SectionB</b> <b>2mark Ques</b>	<b>SectionC</b> <b>3 mark Ques</b>	<b>Section D</b> <b>5 mark Ques</b>	<b>T.M.</b> <b>70</b>
6. Reproduction	1.Sexual reproduction in flowering plants.	3 MCQ,			1 or 1 (choice with C-2)	8
	2.Human reproduction.	1 Blank 1MCQ ,	1			4
	3.Reproductive health.	1MCQ, 1 T/F	1 or 1 choice			4
7. Genetics and evolution.	4. Principles of inheritance and variation.	2 MCQ , 1 blank	1 or 1 choice			5
	5. The molecular basis of inheritance.	1 T/F 1MCQ	1	1		7
	6. Evolution.	1 MCQ	1	1		6
8. Biology in human welfare.	7.Human health and disease	3 Questions from Comprehension	1	1 or 1 choice with C-8		8
	8. Microbes in human welfare	1T/F 1 blank	1			4
9. Biotechnology.	9. Biotechnology: principles and processes	1 blank 1T/F	1 or 1 choice	1 or 1 choice with C- 10		7
	10.Biotechnology and its applications	1MCQ	1			3
10. Ecology.	11.Organisms and Populations	1MCQ 1T/F	1 or 1 choice with C-13			4
	12. Ecosystem	2 MCQ, 1 blank			1 or 1 choice with C-13	8
	13. Biodiversity and conservation	2 MCQ				2

## **UNIT 6: CHAPTER 1; REPRODUCTION IN FLOWERING PLANTS**

### **I. (One Mark Questions)**

#### **A. Multiple choice questions:**

##### **1. Floriculture means growing of:**

- A) Leaves
- B) Roots
- C) Stems
- D) Flowers

##### **2. The female reproductive organ of the flower is:**

- A) Stamen
- B) Pistil
- C) Petals
- D) Sepal

##### **3. How many microsporangia are present in dithecous anther?**

- A) 1
- B) 2
- C) 3
- D) 4

##### **4. The function of outer three layers of microsporangium is:**

- A) Nourishment
- B) Protection
- C) Dehiscence
- D) Both(B)and(C)

##### **5. The cells of which layer of microsporangium has dense cytoplasm and more than two nuclei:**

- A) Epidermis
- B) Endothecium
- C) Tapetum
- D) Middle layers

##### **6. Microspores are also known as:**

- A) Pollen grains
- B) Eggs
- C) Male gametes
- D) Ovules

##### **7. The most resistant organic material present in exine of pollen grain:**

- A) Lignin
- B) Suberin
- C) Cellulose
- D) Sporopollenin

##### **8. The most resistant organic material present in exine of pollen grain:**

- A) Lignin
- B) Suberin
- C) Cellulose
- D) Sporopollenin

##### **9. Which part of the flower is used as a food supplement in the form of tablets?**

- A) Pollen grains
- B) Ovules
- C) Endosperm
- D) Pistil

##### **10. How can we preserve pollen grains to maintain their viability for years in pollen banks?**

- A) In liquid nitrogen at  $-196^{\circ}\text{C}$
- B) In gaseous nitrogen at  $75^{\circ}\text{C}$
- C) In liquid methane at  $40^{\circ}\text{C}$
- D) In solid nitrogen at  $-296^{\circ}\text{C}$

**11. Which part of pistil acts as a landing platform for pollen grains?**

- A) Ovary
- B) Stigma
- C) Style
- D) Ovule

**12. Name the part that is the junction between ovule and funicle:**

- A) Placenta
- B) Micropyle
- C) Hilum
- D) Chalaza

**13. The basal part of an ovule is:**

- A) Micropyle
- B) Nucellus
- C) Funicle
- D) Chalaza

**14. An ovule generally has how many embryo sacs:**

- A) 1
- B) 2
- C) 3
- D) 4

**15. The functional megaspore mother cell in nucellus is present in:**

- A) Central region
- B) Chalazal region
- C) Micropylar region
- D) None of the above

**16. The ploidy of cells of nucellus; megaspore mother cell; functional megaspore & embryo sac respectively is:**

- A)  $n$  ,  $n$  ,  $2n$  ,  $2n$
- B)  $n$  ,  $2n$  ,  $2n$  ,  $n$
- C)  $2n$  ,  $n$  ,  $n$  ,  $2n$
- D)  $2n$  ,  $2n$  ,  $n$  ,  $n$

**17. A typical embryo sac consists of:**

- A) 8 cells & 8 nuclei
- B) 7 cells & 7 nuclei
- C) 7 cells & 8 nuclei
- D) 8 cells & 7 nuclei

**18. The nuclei present in central cell are called:**

- A) Egg nuclei
- B) Antipodal nuclei
- C) Polar nuclei
- D) Synergid nuclei

**19. In flowering plants female gamete is produced in:**

- A) Filament
- B) Anther
- C) Embryo sac
- D) Stigma

**20. The pollinators in Ornithophily is:**

- A) Insect
- B) Wind
- C) Bird
- D) Bat

**Answer Key:**

1-D	2-B	3-D	4-D	5-A	6-A	7-D	8-B	9-A	10-A
11-B	12-C	13-D	14-A	15-C	16-D	17-C	18-C	19-C	20-C

**B. True/False:**

1. The transfer of pollen grains from anther of one flower to stigma of another flower on different plants of same species is called Geitonogamy.
2. Cleistogamous flowers are invariably (surely) autogamous.
3. Pea plant bears both cleistogamous as well as chasmogamous flowers.
4. Different plants of same species or different species are genetically different.
5. The tassels in a corn cob are anthers and filaments.
6. Water hyacinth is not water pollinated.
7. Bees are dominant biotic pollinating agents.
8. Production of cleistogamous flowers habit is not an out-breeding device.
9. Both autogamy and geitonogamy are prevented in Maize.
10. The purpose of emasculation is to enhance self-pollination.

**Answer Key:**

1-F	2-T	3-F	4-T	5-F	6-F	7-T	8-T	9-F	10-F
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**B. Fill Ups:**

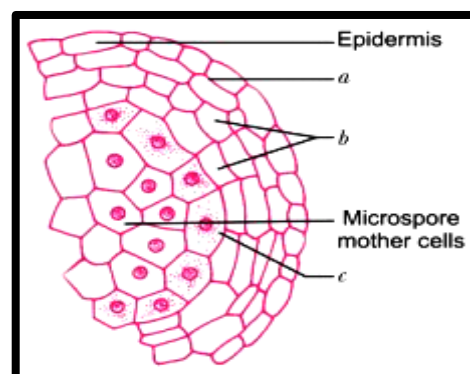
1. Pouring pollen grains on the stigma during hybridization process is called.....
2. The process of fusion of one male gamete nucleus with two polar nuclei of central cell is called.....
3. The formation of zygote in flowering plants is the result of.....
4. The coconut water is an example of..... endosperm.
5. The white kernel you eat in coconut is..... endosperm.
6. In the embryo sac the embryo develops at.....end of ovule.
7. The single cotyledon in grass family is called.....
8. The hollow foliar structure that encloses leaf primordia and shoot apex is called.....
9. Seed is often considered as.....ovule.
10. The wall of ovary develops into.....of the fruit.

**Answer Key:**

1. Dusting	2. Triple fusion	3. Syngamy	4. Free nuclear	5. Cellular
6. Micropylar	7. Scutellum	8. Coleoptile	9. Fertilized	10. Pericarp

**II. Five marks questions:**

1. Given is the microsporangium of mature anther:
  - 1) Name a, b and c layers.
  - 2) What is the function of microspore mother cell?
  - 3) What is the role of layer 'c'?
2. With a neat labeled diagram, describe the parts of a typical angiospermic ovule.
3. With a neat labeled diagram, explain 7 celled, 8 nucleate nature of female gametophyte.



4. Answer the following questions:
- Mention two strategies evolved by flowers to prevent self-pollination. (2)
  - What is Apomixis and what is its importance? (2)
  - Why apple is called false fruit? (1)
5. What is megasporogenesis? Explain the process of megasporogenesis with well labeled diagrams.

### UNIT 6: CHAPTER 2; REPRODUCTION IN HUMANS:

#### I. (One Mark questions)

##### A. Multiple choice questions:

- After ovulation Graafian follicle regresses into**  
 (a) Corpus atresia      (b) corpus callosum      (c) corpus luteum      (d) corpus albicans
- A human female reaches menopause around the age of**  
 (a) 50 years      (b) 15 years      (c) 70 years      (d) 25 years
- Which part of the sperm plays an important role in penetrating the egg membrane**  
 (a) Allosome      (b) Tail      (c) Autosome      (d) Acrosome
- In oocyte secondary maturation occurs in**  
 (a) ovary      (b) abdominal cavity      (c) Fallopian tube      (d) uterus.
- Preparation of sperm before penetration of ovum is**  
 (a) spermiation      (b) cortical reaction      (c) spermiogenesis      (d) capacitation
- Mature Graafian follicle is generally present in the ovary of a healthy human female around**  
 (a) 5-8 day of menstrual cycle      (b) 11-17 day of menstrual cycle  
 (c) 18-23 day of menstrual cycle      (d) 24-28 day of menstrual cycle.
- Which one of the following is not a male accessory gland?**  
 (a) Seminal vesicle      (b) Ampulla      (c) Prostate      (d) Bulbourethral gland
- Which of the following hormones is not secreted by human placenta?**  
 (a) HCG      (b) Estrogens      (c) Progesterone      (d) LH
- Morula is a developmental stage**  
 (a) between the zygote and blastocyst      (b) between the blastocyst and gastrula  
 (c) after the implantation      (d) between implantation and parturition.
- The membranous cover of the ovum at ovulation is**  
 (a) corona radiata      (b) zonaradiata      (c) zonapellucida      (d) chorion.
- Which of the following is correct about mammalian testes?**  
 (a) Graafian follicles, Sertoli cells, Leydig's cells  
 (b) Graafian follicles, Sertoli cells, Seminiferous tubules  
 (c) Sertoli cells, Seminiferous tubules, Leydig's cells  
 (d) Graafian follicle, leydig's cells, Seminiferous tubule
- Prostate glands are located below**  
 (a) gubernaculum      (b) seminal vesicles      (c) epididymis      (d) bulbourethral glands
- Lower narrow end of uterus is called**  
 (a) urethra      (b) cervix      (c) clitoris      (d) vulva
- After birth, colostrum is released from mammary glands which are rich in**  
 (a) fat and low in proteins      (b) proteins and low in fat  
 (c) proteins, antibodies and low in fat      (d) proteins, fat and low in antibodies.
- Spot the odd one out from the following structures with reference to the male reproductive system.**  
 (a) Rete testis      (b) Epididymis      (c) Vasa efferentia      (d) Isthmus
- Acrosome is a type of:**  
 (a) lysosome      (b) flagellum      (c) ribosome      (d) basal body.

**17. At what stage of life is oogenesis initiated in a human female?**

- (a) At puberty (b) During menarch  
(c) During menopause (d) During embryonic development

**18. The solid mass of 8-16 cells formed from zygote after successive mitotic divisions is**

- (a) blastula (b) gastrula (c) morula (d) none of these.

**19. Delivery of developed foetus is scientifically called**

- (a) parturition (b) oviposition (c) abortion (d) ovulation.

**20. A reaction of granules content which harden the zona pellucida and ensures sure to polyspermy is**

- (a) acrosomal reaction (b) cortical reaction (c) acrosin reaction (d) binding reaction.

**Answer Key:**

<b>1-c</b>	<b>2-a</b>	<b>3-d</b>	<b>4-c</b>	<b>5-a</b>	<b>6-b</b>	<b>7-b</b>	<b>8-d</b>	<b>9-a</b>	<b>10-a</b>
<b>11-c</b>	<b>12-b</b>	<b>13-b</b>	<b>14-c</b>	<b>15-d</b>	<b>16-a</b>	<b>17-d</b>	<b>18-c</b>	<b>19-a</b>	<b>20-b</b>

**B. Fill in the blanks**

21. The process of release of ovum from a mature follicle is known as.....

22. The fusion of male and female gametes is called.....

23. Fertilization takes place in.....

24. Zygote divides to form ..... which is implanted in uterus.

25. The structure which provides the vascular connection between foetus and uterus is called .....

26. Temperature of the scrotum which is necessary for the functioning of testis is always ..... around below body temperature.

27. During oogenesis, each diploid cell produces.....

28. Implantation takes place after..... of fertilization.

29. Ovulation is induced by a hormone called .....

30. Fertilization is \_\_\_\_\_ in humans.

**Answer Key:**

<b>21.Ovulation</b>	<b>22.Fertilization</b>	<b>23.Oviduct</b>	<b>24.Blastula</b>	<b>25.UmbilicalCord</b>	<b>26.2°C</b>	<b>27.One functional egg</b>
<b>28. 7days</b>	<b>29.Leutinizing Hormone</b>	<b>30.Internal</b>				

**C. True/False**

31. Spermatozoa get nutrition from sertoli cells.

32. Androgens are produced by sertoli cells

33. Ovulation usually occurs on cycle day 16 of 28 day cycle.

34. Oxytocin hormone is inhibited during pregnancy

35. Estrogen is reproductive hormone in females that assists in endometrial re-growth, ovulation, and calcium absorption in order to prevent contractions of uterus.

36 Luteinizing hormone is the reproductive hormone in both men and women.

37 The female external genitalia includes ovary.

38 Number of chromosomes present in secondary spermatocyte is 23.

39 Mitochondria are spirally arranged in sperm at the region of middle piece.

40 Placenta is connected to the embryo through cervical canal.

**Answer Key:**

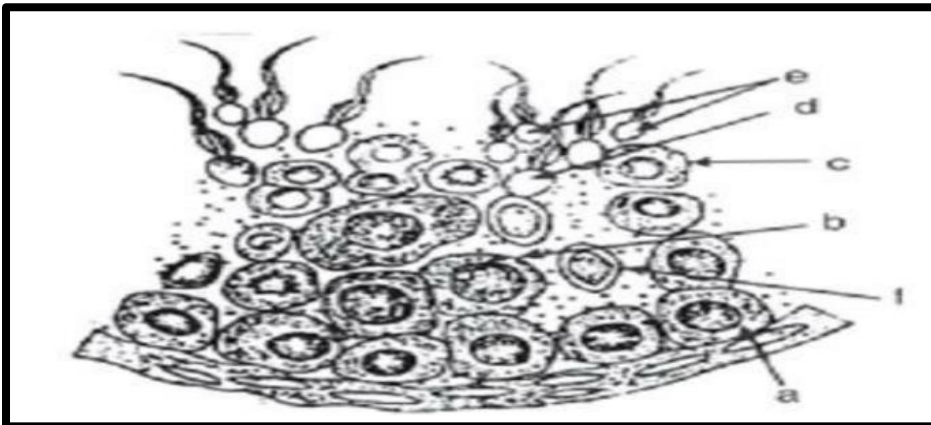
<b>1-T</b>	<b>2-F</b>	<b>3-F</b>	<b>4-T</b>	<b>5-T</b>	<b>6-T</b>	<b>7-F</b>	<b>8-T</b>	<b>9-T</b>	<b>10-F</b>
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## II. (Two marks questions)

1. Write two major functions each of testis and ovary.
2. Name the hormones involved in regulation of spermatogenesis.
3. Draw a labelled diagram of sperm.
4. Name the functions of the following.
  - (a) Corpus luteum
  - (b) Endometrium
5. What are the major components of seminal plasma?
6. What is parturition? Which hormones are involved in induction of parturition?
7. What are the major functions of male accessory ducts and glands?
8. Write the function of the seminal vesicle.
9. Mention the differences between spermiogenesis and spermiation.
10. Draw a Graafian follicle and label antrum and secondary oocyte.

## III. (Three marks questions)

1. Explain the process of spermatogenesis in humans with diagrams.
2. Explain the development of a secondary oocyte (ovum) in a human female from the embryonic stage up to its ovulation. Name the hormones involved in this process.
3. Explain the development of human embryo with diagrams.
4. Name the labels A, B, C, D, E and F in the diagram of seminiferous tubule.



5. (i) Draw a labelled diagrammatic view of human male reproductive system.  
(ii) Differentiate between vas deferens and vasa deferentia.

## UNIT 6: CHAPTER 3; REPRODUCTIVE HEALTH

### I. (One mark Questions)

#### A. Multiple choice questions:

1. The most important factor which determined the increase in human population in India during the 20<sup>th</sup> century -
  - (a) Natality
  - (b) Mortality
  - (c) Immigration
  - (d) Emigration.
2. Formula of growth rate for population in given time is:
  - (a)  $\frac{dt}{dn} = rn$
  - (b)  $\frac{dt}{rn} = dn$
  - (c)  $rN/dN = dt$
  - (d)  $dN/dt = rN$
3. Intrauterine devices are used to prevent:
  - (a) Sperm to reach ovum
  - (b) Sperm from leaving Testes
  - (c) Sperm to reach Female
  - (d) All of these



**4. Disadvantage of amniocentesis**

- (a) Determination of diseases in advanced
- (b) Sex determination of unborn child
- (c) Both (a) and (b)
- (d) None of the above.

**5. Which of the following is a component of oral pills:**

- (a) Progesterone
- (b) Oxytocin
- (c) Relaxin
- (d) None of these

**6. Growth curve is normally:**

- (a) J shaped
- (b) V shaped
- (c) S shaped
- (d) C shaped

**7. Human population growth is:**

- (a) Lag
- (b) Stationary
- (c) Exponential
- (d) None of these

**8. July 11 is observed as:**

- (a) World Population Day
- (b) No Tobacco Day
- (c) World Environment Day
- (d) World Health Day

**9. Study of human population is called as:**

- (a) Anthropology
- (b) Sociology
- (c) Demography
- (d) Geography

**10. Which of these is true for developing countries:**

- (a) Low rate of population growth
- (b) Poor living conditions
- (c) Low per capita income
- (d) All of the above

**11. Full form of STD:**

- (a) Socially transmitted disease
- (b) Sexually transmitted disease
- (c) Socially transferred dengue
- (d) Socially terminated disease

**12. Venereal diseases are the diseases or infection transmitted through:**

- (a) Air
- (b) Water
- (c) Contaminated Food
- (d) Sexual intercourse

**13. Which one of the under stated diseases is not the STD?**

- (a) Pneumonia
- (b) Gonorrhoea
- (c) Syphilis
- (d) Chlamydia

**14. Which of these STDs can also be transmitted by sharing of injection needles, surgical instrument etc:**

- (a) Chlamydia & Trichomoniasis
- (b) Hepatitis-B & HIV
- (c) Genital warts & Syphilis
- (d) Gonorrhoea & Chlamydia

**15. Among the STDs, \_\_\_ infection is most dangerous:**

- (a) Syphilis
- (b) Trichomoniasis
- (c) HIV
- (d) Gonorrhoea

**16. Infertility in a couple can be due to:**

- (a) Physical and physiological reason
- (b) congenital diseases
- (c) drugs and immunological problems
- (d) All the above

**17. Infertile couple can have children through which of the following technique:**

- (a) ARTs
- (b) MTP
- (c) IUDs
- (d) All of the above

**18. Expand the term ARTs:**

- (a) Assisted reproductive technology
- (b) Assisted reproductive technique
- (c) Artificial reproductive technology
- (d) None of the above

**19. The method of directly injecting sperm into ovum is assisted by reproductive technology called:**

- (a) GIFT
- (b) ZIFT
- (c) ICSI
- (d) ET

**20. Embryo with more than 16 blastomeres formed due to in vitro fertilization is transferred into:**

- (a) Cervix                      (b) Uterus                      (c) Fallopian tubes                      (d) Fimbriae

**Answer Key:**

1-a	2-d	3-a	4-b	5-a	6-c	7-c	8-a	9-c	10-d
11-b	12-d	13-a	14-b	15-c	16-d	17-a	18-a	19-c	20-c

**B. True Or False:**

- Increase in number of people in reproductive age leads to population explosion.
- Every sixth person in world is an Indian.
- Contraceptive methods increase population.
- Cu-T is used as birth control device by women.
- Complete lactation could help as a natural method of contraception.
- Surgical method of contraception prevents gamete formation.
- Test tube baby technique involves artificial insemination.
- Men and women are equally likely to have fertility problems.
- Complete count of individuals in an area is called population.
- Hepatitis- B, genital herpes and HIV are STDs, only HIV is incurable.

**Answer Key**

1.T	2.T	3.F	4.T	5.T	6.F	7.F	8.T	9.F	10. T
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**C. Fill in the blanks:**

- Infertility is the of \_\_\_\_\_ a couple to produce child in spite of unprotected sexual cohabitation.
- In vitro fertilization is a technique that involves transfer of \_\_\_\_\_ into the fallopian tube.
- Injectables and implants are combinations of \_\_\_\_\_ and \_\_\_\_\_ hormones.
- The sterilization procedure in males is called \_\_\_\_\_.
- IUDs increase \_\_\_\_\_ of sperms.
- Medical termination of pregnancy is legalized in \_\_\_\_\_.
- Viability of human ovum is \_\_\_\_\_.
- \_\_\_\_\_ is the official process of counting number of people in a country.
- \_\_\_\_\_ is the surgical cutting of fallopian tube.
- Main cause of population explosion is \_\_\_\_\_.

**Answer Key:**

1. inability	2.early zygote	3.progestrone and estrogen	4.vasectomy	5.phagocytosis	6.1971	7. two days
8.Census	9.Tubectomy	10.decline in death rate and increase in longevity				

**II. (Two Marks Questions)**

- Define mortality?
- What is amniocentesis?
- Give one reason to justify statutory ban on amniocentesis?
- Define zero population growth?
- What is contraception?
- What is surrogate mother?
- What do you mean by 'STD'?
- What are test tube babies?
- What is zygote intrafallopian transfer?
- What do you mean by reproductive health?

## UNIT 7: CHAPTER 4; PRINCIPLES OF INHERTANCE.

### I. (One mark questions)

#### A. Multiple choice questions

1. Who is known as 'Father of genetics'?

- (a) Hugo De varies (b) Gregor john Mendel (c) Carl Correns (d) T.H. Morgan

2. What was the research material used by Mendel for his experiments?

- (a) *Oryza sativa* (b) *Solanum tuberosum* (c) *Pisum sativum* (d) *Drosophila melanogaster*

3. When a gene pair in an organism contains two identical alleles, the organism is said to be:

- (a) Homozygous (b) Heterozygous (c) Phenotypic (d) Genotypic

4. Which law cannot be deduced from monohybrid cross?

- (a) Law of dominance (b) Law of Paired factors  
(c) Law of segregation (d) Law of independent assortment

5. Which law is based on dihybrid cross?

- (a) Law of dominance (b) Law of segregation  
(c) Law of independent assortment (d) Both A and B

6. Which one of the following traits of pea plant studied by Mendel is dominant?

- (a) Axial flower position (b) Green seed colour  
(c) Wrinkled seed shape (d) Yellow pod colour

7. Which one of the following traits of pea plant studied by Mendel is recessive?

- (a) Yellow seed colour (b) Yellow pod colour (c) White pod colour (d) Round seed shape

8. What will be the (F<sub>1</sub>) dihybrid ratio for cross between TTAA and ttaa?

- (a) 1:2:1 (b) 9:3:3:1 (c) 3:1 (d) All the same

9. A cross between a F<sub>1</sub> hybrid and any of its parents is termed as:

- (a) Monohybrid cross (b) Dihybrid cross (c) Back cross (d) Test cross

10. In which year Mendel's Work was rediscovered?

- (a) 1900 (b) 1901 (c) 1902 (d) 1903

11. F<sub>2</sub> Phenotypic ratio in, Snapdragon plant is:

- (a) 1:1 (b) 2:1 (c) 3:1 (d) 1:2:1

12. Which of the following statements indicates parallelism in genes and chromosomes?

- (a) They occurs in pairs (b) They segregate during gamete formation  
(c) Independent pairs segregate independently (d) All are correct

13. When both alleles of a pair are fully expressed in a heterozygote, they are:

- (a) Co-dominants (b) Semi-dominants (c) Recessive alleles (d) Lethal

14. The exchange of genetic material between Chromatids of paired homologous chromosomes during first meiotic division is called:

- (a) Transformation (b) Chiasmata (c) Crossing Over (d) Synapsis

15. A bivalent consists of

- (a) Two chromatids and one centromere  
(b) Two chromatids and two centromeres  
(c) Four chromatids and two centromeres  
(d) Four chromatids and Four centromeres

**16. Sex chromosomes of female bird are represented by:**

- (a) XO (b) ZW (c) XY (d) ZZ

**17. A woman has X-linked genetic condition on one of her X chromosomes. This chromosome can be inherited by**

- (a) Only daughters (b) Only sons (c) Only grandchildren (d) Both sons and daughters

**18. Which of the following is a type of autosomal recessive genetic disorder?**

- (a) Haemophilia (b) Skeletal dysplasia (c) Sickle cell anaemia (d) None of these

**19. Which of the following is the cause of Down syndrome?**

- (a) Trisomy of 21st chromosome (b) Tetrasomy of 21st chromosome  
(c) Trisomy of 20<sup>th</sup> chromosome (d) tetrasomy of 25<sup>th</sup> chromosome

**20. The disorder in which females become sterile and have rudimentary ovaries due to absence of one X chromosome is called**

- (a) Down syndrome (b) Turner's syndrome  
(c) Klinefelter's syndrome (d) Phenylketonuria

**Answer Key:**

1-b	2-c	3-a	4-d	5-c	6-a	7-b	8-d	9-c	10-a
11-d	12-d	13-a	14-c	15-c	16-b	17-d	18-a	19-a	20-b

**B.Fill in the blanks**

- Human females are homogametic where as human males are-----.
- \_\_\_\_\_ factor expresses itself even in the presence recessive alleles.
- The Punnett Square used to understand Monohybrid and Dihybrid cross was developed by British geneticist  
-----.
- Colour blindness is a\_\_\_\_\_ linked recessive trait.
- The ancestral history of an individual is represented by ----- chart.
- Mendel's law of segregation is also called as law of -----purity of gametes.
- Thomas hunt Morgan had done experimental verification of chromosomal theory of inheritance with an insect named as -----.
- In phenylketonuria the affected individual lacks an enzyme for conversion of amino acid ----- into-----.
- In 1891the scientist-----named X-chromosome as X body but he could not explain its characteristics.
- In Mendel's experiment in F1 generation \_\_\_\_\_ and \_\_\_\_\_ seeds were dominant.

**Answer Key:**

1.Heterogametic	2.Dominant	3.Reginald C. Punnett.	4.Sex linked recessive trait	5.Pedigree	6.Purity	7. <i>Drosophila melanogaster</i>
8.Phenylalanine Tyrosine	9.Henking	10.Yellow, round				

### C. True/False:

31. The genetic constitution of an individual is called its genotype.
32. In test cross F1 hybrid is crossed with any of the parent.
33. In Incomplete dominance the phenotype and genotype ratio are same.
34. Sickle cell anaemia is an autosome linked recessive trait.
35. In Aneuploidy and polyploidy no numerical change occurs in chromosome.
36. Haemophilia and colour blindness are Mendelian disorders.
37. Crossing over can occur during either metaphase I or metaphase II.
38. Butterflies and moths have XX-XY type mechanism of sex determination.
39. Missing of one chromosome is known as trisomy.
40. Mendel was the last person who have shown that factors or genes are the units of heredity.

### Answer Key

1.T	2.F	3.T	4.T	5.F	6.T	7.F	8.F	9.F	10. F
-----	-----	-----	-----	-----	-----	-----	-----	-----	-------

### II. (Two marks questions)

1. Explain law of dominance using a monohybrid cross.
2. Differentiate between Homozygous and Heterozygous.
3. Explain law of segregation using a monohybrid cross. (2/3 marks)
4. What are the Advantages (or reasons) for selection of Pea as research material by Mendel.
5. Explain Incomplete dominance with the help of an example.
6. A child has blood group O. If father has blood group A and mother has blood group B, work out the genotypes of parents and possible genotypes of offsprings.
7. Write the cause and symptoms of Down syndrome.
8. Explain ZW-ZZ type of inheritance (sex determination) in birds.
9. Give 2-3 differences between Turner syndrome and Klinefelter's syndrome.
10. Give postulates of chromosomal theory of inheritance.

## UNIT 7: CHAPTER 5; Molecular Basis of Inheritance.

### I. (One mark Questions)

#### A. Multiple choice questions:

1. DNA ----> mRNA ---> Proteins. Name the process.

- (a) DNA fingerprinting                      (b) Central Dogma  
(c) Replication                                (d) Mutation

2. In DNA fingerprinting, DNA fragments are separated by:

- (a) Polymerase Chain Reaction              (b) Centrifugation  
(c) Electrophoresis                            (d) Gene Mapping

3. Which factor is required to bind RNA polymerase to initiate transcription?

- (a) *Rho*    (b) *Beta*  
(c) *Gamma*                                        (d) *Sigma*

4. Which of the following enzymes is used to cut the DNA fragments?

- (a) Endonuclease                                (b) Polymerase  
(c) Primase                                        (d) Ligase

5. Uracil is present in RNA at the place of:

- (a) Adenine                                        (b) Thymine  
(c) Cytosine                                       (d) Guanine

6. Copying of genetic information from one strand of DNA to RNA is:

- (a) Translation                                   (b) Transcription  
(c) Transformation                              (d) Transduction

7. Repressor protein is produced by:

- (a) Regulatory gene                              (b) Operator gene  
(c) Structural gene                                (d) Promoter gene

**8. Which of the following is referred to as soluble RNA?**

- (a) mRNA (b) tRNA  
(c) rRNA (d) dsRNA

**9. Which of the following is required as an inducer in Lac operon?**

- (a) Glucose (b) Galactose  
(c) Lactose (d) Fructose

**10. Which of the following is correct pair of pyrimidine bases?**

- (a) Adenine & Thymine (b) Adenine & Guanine  
(c) Thymine & Cytosine (d) Guanine & Cytosine

**11. Exons are the part of m-RNA code for:**

- (a) Polypeptides (b) Carbohydrates  
(c) Lipids (d) Phospholipids

**12. Name the 3 structural genes in Lac Operon in correct order:**

- (a) y, a, z (b) a, y, z  
(c) z, y, a (d) x, y, z

**13. In DNA helix is coiling is:**

- (a) Right handed (b) Left handed.  
(c) zigzag (c) opposite

**14. The reverse transcriptase is also known as:**

- (a) DNA dependent RNA polymerase  
(b) DNA dependent DNA polymerase  
(c) RNA dependent DNA polymerase  
(d) RNA dependent RNA polymerase

**15. The operator gene of Lac Operon is 'turned on' when lactose molecules bind:**

- (a) Operator gene (b) Repressor Protein  
(c) Promoter site (d) Structural gene

**16. The process of transcription involves:**

- (a) Synthesis of mRNA from DNA  
(b) Movement of RNA from Nucleus to Ribosome  
(c) Change of one form of RNA into another  
(d) Conversion of RNA to DNA

**17. Who invented DNA Fingerprinting?**

- (a) Frederick Sanger (b) Watson & Crick  
(c) Alec Jaffrey (d) Messelson & Stahl

**18. Does not follow the central dogma of molecular biology?**

- (a) Spirogyra (b) HIV  
(c) E. Coli (d) Pea

**19. What is special for the base sequence of 2 strands of DNA segment:**

5' -- T T C G A A --3'  
3' -- A A G C T T --5'

- (a) Transposons (b) Replication completed  
(c) Palindromic sequence of bases (d) Showing mutation

**20. Which of the following is not a transcription unit in DNA?**

- (a) Inducer (b) Promoter  
(c) Terminator (d) Structural Genes

**Answer Key:**

1.b	2.c	3.d	4.a	5.b	6.b	7.a	8.b	9.c	10.c
11.a	12.c	13.a	14.c	15.b	16.a	17.c	18.b	19.c	20.a

**B. True/false**

- 1.The leading strand is synthesized discontinuously during DNA replication.
- 2.Polarity of the template strand is 3'→5'.
- 3.All the 64 codons code for amino acids.
- 4.Sickle cell anaemia is an example of point mutation./
- 5.Chromosome 1 has least number of genes.
- 6.The genetic code is non-overlapping and degenerate.
- 7.Genetic material of retrovirus is DNA.
- 8.Griffith conducted transformation experiment with Bacteriophage.
- 9.The protein coat of virus is called capsid.
- 10.Euchromatin is transcriptionally active.

**Answer Key:**

1.F	2.T	3.F	4.T	5.F	6.T	7.F	8.F	9.T	10.T
-----	-----	-----	-----	-----	-----	-----	-----	-----	------

**C.Fill-ups**

- 1.\_\_\_\_\_was the first genetic material.
2. Okazaki fragments are joined by \_\_\_\_\_ enzyme.
- 3.\_\_\_\_\_ is a DNA sequence that provides a binding site for RNA polymerase during transcription.
4. Removal of introns and joining of exons is termed as\_\_\_\_\_.
- 5.\_\_\_\_\_ is an initiator codon.
6. HGP is closely associated with a new area in biology called \_\_\_\_\_.
- 7.\_\_\_\_\_ is the largest human gene.
- 8.The technique of DNA fingerprinting is initially developed by\_\_\_\_\_.
9. DNA replication takes place at \_\_\_\_\_phase of the cell cycle.
- 10.\_\_\_\_\_are positively charged basic proteins in the nucleus.

**Answer Key:**

1.RNA	2.Ligase	3.Promoter	4.Splicing	5.AUG	6.Bioinformatics	7.Dystrophin
8. Alec Jaffrey	9.Sphase	10.Histones				

**II. (Two marks questions)**

1. Write the equation for central dogma of life.
2. Define *Ori*.
3. Name the organisms used by Griffith in Transforming Principle experiment.
4. Differentiate between DNA and RNA.
5. Why is DNA a better genetic material?
6. Name two organisms with RNA as genetic material.
7. What is meant by Semi conservative nature of DNA?
8. What are stop codons?
9. The sequence of coding strand of DNA is  
5' ATGC ATGCATGC ATGC-3'  
Write the sequence of mRNA.
10. List two functions of ribosomes during translation.

**III. (Three marks questions)**

1. Why the HGP is called a mega project?
2. What is DNA fingerprinting? Mention its applications.
3. Differentiate between template strand and coding strand.
4. Draw well labeled picture of Replication fork.
5. If double stranded DNA has 18 percent of cytosine, calculate the percentage of adenine in DNA.
6. Describe translation process in brief.
7. Explain the experiment that proved DNA is the genetic material of living organisms.
8. What is the difference between Repetitive DNA and Satellite DNA?

9. In the medium where *E. coli* was growing, lactose was added, which induced the lac operon. Then, why does lac operon shut down some time after addition of lactose in the medium?
10. What conditions a molecule must fulfill to act as a genetic material?

## **UNIT 7: CHAPTER 6; EVOLUTION**

### **I. (One mark question)**

#### **A. Multiple choice questions:**

#### **1. Which of the following provides most evident proof of evolution?**

- (a) Fossils (b) Morphology (c) Embryo (d) Vestigial organ

#### **2. Industrial melanism is an example of:**

- (a) Drug resistance (b) Darkening of skin due to pollution from industries  
(c) Protective resemblance with surrounding.

#### **3. Vertebrate forelimbs are examples of:**

- (a) Homologous organs (b) Analogous organs (c) Vestigial organs (d) Nonfunctional organs

#### **4. Species occurring in same geographical area are called:**

- (a) Sibling (b) Neopatric (c) Sympatric (d) Allopatric

#### **5. Darwin's theory does not include:**

- (a) Natural selection (b) Survival of the fittest  
(c) Evolution through inheritance (d) Struggle for existence

#### **6. The interaction in which one species is benefitted and other is harmed is called:**

- (a) Mutualism (b) Commensalism (c) Predation (d) Competition

#### **7. Evolutionary history of organism is known as:**

- (a) Phylogeny (b) Ontogeny (c) Palaeontology (d) Ancestry

#### **8. Reptile evolved into:**

- (a) Amphibians (b) Fish (c) Birds (d) None of the above

#### **9. Genetic drift operates in:**

- (a) Small isolated area (b) Large isolated area  
(c) Nonreproductive population (d) Slow reproductive population

#### **10. Urey-Miller's experiment mixture had the following except:**

- (a) Hydrogen (b) CO<sub>2</sub> (c) Methane (d) Water vapours

#### **11. Which of the following is the most primitive ancestor of man:**

- (a) *Homo neanderthalensis* (b) *Homo habilis* (c) *Ramapithecus* (d) *Australopithecus*

#### **12. Evolution is:**

- (a) Discontinuous process (b) Continuous process (c) Both a and b (d) Non essential process

#### **13. The first human like hominid was called:**

- (a) *Homo habilis* (b) *Homo erectus* (c) *Homo sapiens* (d) *Ramapithecus*

#### **14. Cranial capacity is minimum in :**

- (a) Chimpanzee (b) Rhesus monkey (c) Gorilla (d) Orangutan

#### **15. Fossils are found in:**

- (a) Igneous rocks (b) Sedimentary rocks (c) Metamorphic rocks (d) None of these

#### **16. In Hardy Wienberg equation, frequency of heterozygous individuals is represented by:**

- (a) q<sup>2</sup> (b) p<sup>2</sup> (c) 2pq (d) pq

#### **17. Homologous organs are the examples of:**

- (a) Divergent evolution (b) Artificial selection (c) Genetic drift (d) Convergent evolution

#### **18. Galapagos islands are located in:**

- (a) Southern ocean (b) Pacific ocean (c) Atlantic ocean (d) Arabian ocean

#### **19. Which group of organisms is believed to be evolved first on earth?**

- (a) Arthropods (b) Reptiles (c) Protozoans (d) Aves

#### **20. Which scientist stated that it is mutation which causes evolution and not the minor variations?**

- (a) Oparin (b) Lamarck (c) de Vries (d) Darwin



**Answer Key:**

1.a	2.c	3.a	4.c	5.c	6.c	7.a	8.c	9.a	10.b
11.c	12.b	13.a	14.b	15.a	16.b	17.a	18.b	19.b	20.c

**B.True/False:**

1. The first organisms formed were autotrophs.
2. The primitive atmosphere was reducing.
3. Palaeozoic era is known as the age of reptiles.
4. The membrane bound molecular aggregates are called coacervates.
5. Analogous organs suggest divergent evolution.
6. Eohippus is an ancient fossil of modern day Horse.
7. Amphibians have two chambered heart.
8. Potato and carrot are analogous organs.
9. The brain capacity of *Homo erectus* was about 900cc.
10. Animal husbandry and plant breeding programmes are examples of Natural selection.

**Answer Key:**

1.F	2.T	3.F	4.T	5.F	6.T	7.F	8.T	9.T	10.F
-----	-----	-----	-----	-----	-----	-----	-----	-----	------

**C. Fill in the blanks:**

1. \_\_\_\_\_ causes the recombination of genes.
2. \_\_\_\_\_ are species occurring in different geographical areas.
3. Origin of short legged **Ancon sheep** variety support the \_\_\_\_\_ theory.
4. Theory of Inheritance of germplasm was proposed by \_\_\_\_\_.
5. \_\_\_\_\_ is a connecting link between birds and reptiles.
6. A short tail in baby is \_\_\_\_\_.
7. \_\_\_\_\_ is known as Java-apeman.
8. The process of destroying all living organisms is called \_\_\_\_\_.
9. The process which prevents interbreeding between related groups of living organisms is called \_\_\_\_\_.
10. Eobionts are first cell like structures which have power of \_\_\_\_\_.

**Answer Key:**

1.crossing over	2.allopatric	3.mutations.	4.August Weismann	5.Archaeopteryx	6.atavism	7. <i>Homo erectus</i>
8.sterilization	9.isolated mechanism	10. division				

**II. (Two marks questions)**

1. What is Hardy-Weinberg principle?
2. List the main points of Lamarck's theory.
3. Differentiate connecting link and missing link.
4. What is convergent evolution?
5. What is cranial capacity of modern man?
6. What is founder effect?
7. Define vestigial organ. Give one example.
8. Write the composition of primitive earth's atmosphere.
9. Explain speciation.
10. Define Allen's Rule.

**III. (Three marks questions)**

1. "Ontogeny repeats phylogeny". Explain.
2. What are connecting links? Give two examples.
3. Explain modern concept of evolution or Neo-Darwinism.
4. Describe Darwin's theory of evolution.
5. Give a brief account of Lamarck's theory of evolution.

6. What is Industrial melanism?
7. Discuss the paleontological evidences in support of evolution.
8. What is biogeography? How does the distribution of animals and plants support evolution?
9. Describe one example of adaptive radiations.
10. "Migration may enhance or blur the effects of selection." Comment.

## **UNIT 8: CHAPTER 7; Health and Diseases - 1**

### **Comprehension Passage:**

#### **Comprehension passage - 1**

**Allergy is the exaggerated response of the immune system to certain antigens present in the environment. In metropolitan cities life style is responsible in lowering of immunity and sensitivity to allergens. More polluted environment increases the chances of allergy in children. Some symptoms of allergic reactions are sneezing, watery eyes, running nose and difficulty in breathing.**

- i. Give the definition of allergy.
- ii. How children get more allergic?
- iii. Give some symptoms of allergy.

#### **Comprehension passage - 2**

**AIDS is not a contagious disease. It does not spread through: contact; caring of infected persons; sharing meals; mosquito bite, light kissing, handshake, blood-sucking insects, etc. Main sources of epidemiology of HIV are body fluids so occurs during sexual intercourse, use of contaminated hypodermic needle and syringes by intravenous drug abusers; contaminated blood transfusion, organ transplantation, artificial insemination from infected mother to baby during parturition and Breast feeding. AIDS can be diagnosed by ELISA test.**

- i. Name the causative agent of AIDS.
- ii. How does AIDS spread?
- iii. Give the full form of ELISA.

#### **Comprehension passage - 3**

**The physical and mental dependency on smoking, alcohol and drugs, is called addiction. The person, who has become dependent upon these chemicals, is called an addict. Addiction is a psychological attachment to certain effects, euphoria and a temporary feeling of normalcy, of smoking, alcohol and drugs. But with repeated use of these, the tolerance level of these receptors increases and respond only to higher doses of these chemicals. This finally results addiction or dependency. The addictive potential of these chemicals pull the child into a vicious cycle leading to regular abuse and dependency so a child may not be able to get out fit.**

- i. What do you mean by addiction?
- ii. How these chemicals lead to dependency?
- iii. How the child affected by these chemicals?

#### **Comprehension passage - 4**

**Cancer is characterized by uncontrolled growth and division of certain body tissues, so forming a tumor, so it is called "Mitotic Run Amok". It is more common in people between 40 to 60 years of age. It is one of the chief killers of modern world so is one of the most dreaded diseases of human beings. According to estimates, every year about 10 million people throughout the world are diagnosed as having cancer (WHO-report, 2004). Cancers cause about 4 million deaths annually at world level which account for about 10% of all deaths. In India, more than one million people suffer from cancer and a large number of them die from it annually. Etiology is the study of causes of a disease. Cancer is neither contagious nor hereditary disease. The physical, biological and chemical agents, which induce cancer growth, are called carcinogens.**

- i. What do you mean by cancer?
- ii. What are carcinogens? Give examples.
- iii. Is cancer contagious or not?

### Comprehension passage - 5

Personal hygiene includes self-cleanliness by following clean habits and adopting healthy habits. Clean habits include washing hands, trimming of nails, regular bathing, regular brushing of teeth, regular washing of clothes, etc. to prevent the chances of microbial infections eg. Dental caries, formite-borne pathogens. Healthy habits include avoiding alcoholism, smoking and drug addiction, regular exercise, taking proper sleep, breathing through nose, covering of eatables, etc. to keep free from contamination.

- i. What healthy habits are?
- ii. What should we do to inculcate healthy habits?
- iii. What is personal hygiene?

### **II. (Twomarksquestions)**

1. Name the primary and secondary lymphoid organs.
2. Expand each one to its full form.  
i) MALT      ii) NACO
3. What is vaccine? Give an example of vaccine produced by recombinant DNA technology.
4. Define auto-immune disease. Give two examples.
5. Explain what is meant by metastasis.
6. What are hallucinogens? Give their two examples.
7. Differentiate between innate immunity and acquired immunity.
8. Name an opioid drug and its source plant.
9. Why cannabinoids are banned in sports and games?
10. Give the ill effects of alcohol on cerebellum.

### **III. (Threemarksquestions)**

1. What measures would you take to prevent water-borne diseases?
2. How is cancerous cell different from a normal cell?
3. List the harmful effects caused by drug abuse.
4. What are interferons? How do they help in developing resistance to infection?
5. What motivates youngsters to take to alcohol or drugs and how can this be avoided?
6. What are the various public health measures, which you would suggest to safeguard us against infectious diseases?
7. What is the mechanism by which the AIDS virus causes deficiency of immune system of the infected person?
8. Why is using tobacco in any form injurious to the health? Explain.
9. Name and explain the two types of immune responses in humans. Differentiate between the two.
10. Enumerate the different measures for control and prevention of drugs/alcohol abuse among adolescent.

## **UNIT 8: CHAPTER 7; Health and Diseases - 2**

### **Comprehension based questions:**

#### **Comprehension passage-1**

The human immune system consists of lymphoid organs, tissues, cells and soluble molecules like antibodies. Immune system recognizes foreign antigens responds to these and remembers them. The immune system also plays an important role in allergic reaction, auto-immune diseases and organ transplantation. Lymphoid organs are the organs where origin and maturation and proliferation of lymphocytes occur. The primary lymphoid organs are bone marrow and thymus where immature lymphocytes differentiate into antigen-sensitive lymphocytes. After maturation the lymphocytes migrate to secondary lymphoid organs like spleen, lymph node, tonsils, Peyer's patches of small intestine and appendix. The secondary lymphoid organs provide the sites for interaction of lymphocytes with the antigens.

- Q1. What is main role of immune system?
- Q2. Name two primary lymphoid organs?
- Q3. What happens to mature lymphocytes?

### Comprehension passage-2

**AIDS (Acquired Immuno Deficiency Syndrome) is caused by the Human Immunodeficiency Virus (HIV) a member of a group of viruses called retrovirus, which have an envelope enclosing the RNA genome. Transmission of HIV infection generally occurs by a) sexual contact with infected person b) by transfusion of contaminated blood and blood products c) by sharing infected needles by drug abusers d) from infected mother to her child through placenta. After getting into the body of the person, the virus enters into macrophages where RNA genome of the virus replicates to form viral DNA with the help of the enzyme reverse transcriptase. The viral DNA gets incorporated into host cell's DNA and directs the infected cells to produce virus particles. In this way it acts like a HIV factory.**

Q1. Why sharing of injection needles between two individuals is not recommended?

Q2. What is genetic material of HIV?

Q3. What happens when HIV enters the macrophage?

### Comprehension passage-3

**The exaggerated response of the immune system to certain antigens present in the environment is called allergy. The substances to which such an immune response is produced are called allergens. The antibodies produced to these are of IgE type. Common examples of allergens are mites in dust, pollens, animal dander, etc. Symptoms of allergic reactions include sneezing, watery eyes, running nose and difficulty in breathing. Allergy is due to the release of chemicals like histamine and serotonin from the mast cells.**

**For determining the cause of allergy, the patient is exposed to inject with very small doses of possible allergens, and the reactions studied. The use of drugs like anti-histamine, adrenalin and steroids quickly reduce the symptoms of allergy.**

**Somehow, modern-day lifestyle has resulted in lowering of immunity and more sensitivity to allergens – more and more children in metro cities of India suffers from allergies and as they are sensitive to the environment.**

1. What are allergens? Give two examples.
2. How our body responds to allergy.
3. Name the chemicals released by mast cells.

### Comprehension passage-4

**Acquired immunity is pathogen specific. It is characterized by memory. It means when our body encounters a pathogen for the first time it produces a response called primary response which is of low intensity. The primary and secondary immune responses are carried out with the help of two special types of lymphocytes in our blood i.e. B-lymphocytes and T-lymphocytes. The B-lymphocytes produce an army of proteins in response to pathogens onto our blood to fight with them. These are called antibodies. The T-cells themselves do not secrete antibodies but help B cells to produce them. Each antibody molecule has four peptide chains, two small called light chains and two longer called heavy chains. Hence an antibody is represented as  $H_2L_2$ .**

Q1. Name the two special types of lymphocytes in humans.

Q2. Why is an antibody represented as  $H_2L_2$ ?

Q3. Write difference between B-cells and T-cells.

### Comprehension passage-5

**The exaggerated response of the immune system to certain antigens present in the environment is called allergy. The substances to which such an immune response is produced are called allergens. The antibodies produced to these are of IgE type. Common examples of allergens are mites in dust pollens, animal dander etc. Symptoms of allergic reactions include sneezing, watery eyes, running nose and difficulty in breathing. Allergy is due to the release of chemicals like histamine and serotonin from the mast cells. For determining the cause of allergy, the patient is exposed to or**

**injected with very small doses of possible allergens. The use of drugs like anti-histamine, adrenalin and steroids quickly reduce the symptoms of allergy.**

Q1. What are allergens?

Q2. The symptoms like watery eyes and running noses show a person is allergic? Name the type of antibody and chemicals responsible for such allergy.

Q3. Name some drugs used to reduce the symptoms of allergy.

**II. (Two marks questions)**

- 1) In which way the study of biology has helped educate to control infectious diseases?
- 2) Write the pathogen and symptoms of: 1) Typhoid 2) Malaria?
- 3) Why DPT is called triple vaccine?
- 4) Differentiate between communicable and non-communicable diseases?
- 5) What are lymphoid organs and give its types?
- 6) Expand ELISA and MRI?
- 7) What is autoimmunity? Name one autoimmune disease of human beings.
- 8) What are interferons and how they act?
- 9) Draw the structure of Antibody.
- 10) Give two differences between innate immunity and Acquired immunity.

**Three marks questions:**

- 1) Discuss some types of cancer.
- 2) What are allergens? How they cause allergies?
- 3) Write a short note on AIDS.
- 4) What is drug addiction? Describe the effects of opium and its derivatives on body.
- 5) Differentiate between B cells and T cells.
- 6) Define the following:
  - a) Interferons
  - b) infestation
  - c) vaccination
- 7) Describe the life cycle of plasmodium in human body.
- 8) What are tumors? Differentiate between Benign and Malignant tumour.
- 9) Describe psychotropic drugs depending upon their act on mind.
- 10) Explain briefly the psychological and sociological effects of alcohol.

**UNIT 8: CHAPTER 8. Microbes in Human welfare**

**I. (One-mark questions)**

**A. Multiple choice questions:**

**1. A bioreactor is:**

- |   |                                  |
|---|----------------------------------|
| (a). Fermentation tank                      | (b). Culture containing isotopes |
| (c). Culture for synthesis of new chemicals | (d). Hybridoma.                  |

**2. Biogas production is:**

- |                                  |                                    |
|----------------------------------|------------------------------------|
| (a). Single step aerobic process | (b). Two step aerobic process      |
| (c). Three step aerobic process  | (d). Three step anaerobic process. |

**3. Methanogens convert:**

- |                                  |                               |
|----------------------------------|-------------------------------|
| (a). Methyl alcohol into methane | (b). Formic acid into methane |
| (c). Acetic acid into methane    | (d). All of the above         |

**4. Primary treatment of sewage is**

- |                         |                          |
|-------------------------|--------------------------|
| (a). Physical process   | (b). Chemical process    |
| (c). Biological Process | (d). Biochemical Process |

**5. Primary sludge is used for:**

- |                             |                            |
|-----------------------------|----------------------------|
| (a). Preparation of compost | (b). Preparation of manure |
| (c). Biogas production      | (d). All the above         |

**6. A nitrogen fixing bacterium that forms a loose association with the roots of crop plants is**

- (a). Azotobacter (b). *Bacillus polymyxa*  
(c). Clostridium (d). Azospirillum

**7. Mycorrhiza is a symbiotic association between:**

- (a). Bacteria and fungi ( b). Blue green algae and roots of higher plants  
(c). Fungi and roots of higher plants (d). Algae and fungi

**8. If BOD of sample water is very high, the sample is**

- (a). highly polluted (b). less polluted  
(c). not polluted (d). potable

**9. Fermentation of sugar to yield alcohol is carried out by:**

- (a). Microorganisms (b). Zymase  
(c). Raised temperature (d). Decomposition of sugar

**10. Curd, milk, cheese and butter are produced with the use of:**

- (a). Yeast (b). Penicillium  
(c). Streptococcus (d). None of the above

**11. Lactic acid is formed by the process of:**

- (a) fermentation (b) glycolysis  
(c) citric acid cycle (d) BETA-oxidation

**12. The primary treatment of waste water involves the removal of:**

- (a) Dissolved impurities (b) Solid particles  
(c) Toxic substances (d) harmful bacteria.

**13. Nitrogen fixation in root nodules of *Alnus* is brought about by:**

- (a) Frankia (b) Azospirillum  
(c) Nostoc (d) Rhizobium

**14. Propionibacterium produces large holes in swiss cheese due to the**

- (a) process of oxidation of the dough (b) formation of large amount of CO<sub>2</sub>  
(c) Consumption of carbohydrates (d) all of these

**15. Which one of the following is not a nitrogen fixing organism?**

- (a) Anabaena (b) Nostoc  
(c) Azotobacter (d) Pseudomonas

**16. *Bacillus thuringensis* is used to control:**

- (a) fungal pathogens (b) nematodes  
(c) Bacterial pathogens (d) insect pests.

**17. Which one of the following alcoholic drinks is produced without distillation?**

- (a) Wine (b) Whisky  
(c) Rum (d) Brandy

**18. The residue left after methane production from cattle dung is.....**

- (a) Burnt (b) Burned in land fills  
(c) Used as manure (d) Used in civil construction.

**19. Methanogens, growing anaerobically on cellulosic material, produce:**

- (a) methane gas (b) methane and carbon dioxide  
(c) Methane and hydrogen (d) methane, carbon dioxide, hydrogen.

**20. Antibiotics are the most effective on:**

- (a) Bacteria (b) Virus  
(c) Fungi (d) None of the above

**Answer Key:**

1.a	2.d	3.d	4.a	5.d	6.d	7.c	8.a	9.b	10.c
11.a	12.b	13.a	14.b	15.d	16.d	17.a	18.c	19.d	20.a

**B. True/False:**

1. Untreated sewage can cause air borne diseases.
2. Alcoholic drinks are prepared by the process of fermentation.
3. Large holes present in Swiss cheese.
4. Lesser BOD means greater polluting level of water.
5. Rhizobium is a free-living nitrogen fixing bacteria.
6. Main component of biogas is carbon dioxide.
7. Statins are blood cholesterol lowering agents.
8. Beer, whisky and rum are non-alcoholic beverages.
9. Bt and Trichoderma are biocontrol agents.
10. LAB increase Vitamin B12 in curd.

**Answer Key:**

1.F	2.T	3.T	4.F	5.F	6.F	7.T	8.F	9.T	10.T
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**C. Fill in the blanks:**

1. \_\_\_\_\_ are masses of bacteria associated with fungal filaments to form a mess like structure.
2. \_\_\_\_\_ is commonly called Baker's yeast.
3. Many members of genus \_\_\_\_\_ form mycorrhiza.
4. \_\_\_\_\_ Symbiotic association of fungi with roots of higher plants.
5. B.O.D stands for \_\_\_\_\_.
6. \_\_\_\_\_ cheese is ripened by growing a specific fungus on it.
7. Dragon flies are used to get rid of \_\_\_\_\_.
8. Cyclosporin A is used as an \_\_\_\_\_ agent.
9. \_\_\_\_\_ was the first antibiotic to be discovered.
10. \_\_\_\_\_ enzymes are used in detergent formulation.

**Answer Key:**

1. Flocs	2. <i>Saccharomyces cerevisiae</i>	3. Glomus	4. Mycorrhiza	5. Biochemical oxygen demand	6. Roquefort	7. Mosquitoes
8. Immuno-suppressive	9. Penicillin	10. Lipases				

**II. (Two marks questions)**

1. Name any two species of fungus which are used to produce antibiotics.
2. What are the two main steps of physical treatment of sewage.
3. Define sewage. Why is it harmful to us?
4. Why is *Saccharomyces cerevisiae* called brewer's yeast?
5. What is meant by activated sludge?
6. What is B.O.D?
7. Why bottled juices bought from the market are clearer than fresh homemade juice?
8. Organic farming is very helpful to save the environment. How?
9. Expand IARI and KVIC.
10. Name the bacteria present in the rumen of cattle. How is it useful to the cattle?

**III. (Three marks questions)**

1. Write chemical composition of biogas.
2. Explain the role of microbes in sewage treatment.
3. What are biofertilizers? Write their advantages.
4. Write a note on SCPs.
5. Discuss briefly the role of microbes as Biocontrol agents.
6. Differentiate between primary and secondary sewage treatment.
7. Draw a well labelled diagram of typical biogas plant.

8. In which food you would find LAB? Mention their useful applications.
9. Name some traditional Indian foods made of wheat, rice and Bengal gram (or their products) which involve use of microbes.
10. Three water samples namely river water, untreated sewage water and secondary effluent discharged from a sewage treatment plant was subjected to BOD test. The samples were labeled A, B and C but the laboratory attendant didn't note which was which. The BOD values of the three samples A, B and C were recorded as 20 mg/L, 8 mg/L and 400 mg/L respectively. Which sample of the water is most polluted? Can you assign the correct label to each assuming the river water is relatively clean?

## **UNIT 9: CHAPTER 9. Biotechnology- Principles and processes.**

### **I. (One-mark Question)**

#### **A. Multiple choice question:**

##### **1. Bacterial plasmid contains:**

- (a). RNA                      (b). Proteins                      (c). DNA                      (d). RNA and protein

##### **2. Enzymes used in biotechnology for cutting the DNA are:**

- (a). DNA polymerase   (b). Alkaline phosphatase   (c). DNA ligase   (d). Restriction endonuclease

##### **3. The natural genetic engineer of plant is:**

- (a). *E. coli*.                      (b). *Agrobacterium tumefaciens*   (c). *Rhizobium*                      (d). *Pseudomonas putida*

##### **4. A foreign DNA and plasmid cut by same restriction endonuclease can be joined to form recombinant DNA by enzyme:**

- (a). Polymerase II   (b). Taq polymerase                      (c). Ligase                      (d). EcoRI

##### **5. Which of the following is used ultimately to purify DNA out of cell:**

- (a). Ethidium bromide   (b). Ribonuclease                      (c). Protease                      (d). Chilled ethanol

##### **6. If a target gene is inserted at sal I site of recombinant plasmid 322 will show resistance for:**

- (a). Ampicillin                      (b). Tetracycline                      (c). Streptomycin                      (d). Both a and b

##### **7. Which one of the following is used as vector for cloning genes into higher organisms?**

- (a). Baculovirus                      (b). Salmonella                      (c). Rhizopus                      (d). Retrovirus

##### **8. Manipulation of DNA in genetic engineering is possible due to the discovery of:**

- (a). Restriction endonuclease   (b). DNA ligase                      (c). Primase                      (d). Transcriptase

##### **9. Isolation of DNA from plant cells involves the use of enzymes:**

- (a). Chitinase                      (b). Lysozyme                      (c). EcoRI                      (d). Cellulase

##### **10. Agarose extracted from sea weeds find use in:**

- (a). PCR                      (b). Gel electrophoresis                      (c). Spectrophotometry                      (d). Tissue culture

##### **11. Ballistic method is suitable for:**

- (a). Transformation of plant cell.   (b). DNA fingerprinting   (c). Disarming pathogen vector   (d). To cut DNA

##### **12. The DNA fragment is shooted in the cell in which method:**

- (a). Chemical method.   (b). Gene gun method                      (c). Microinjection                      (d). Electroporation

##### **13. Stirred tank has been designed for:**

- (a). Availability of oxygen throughout the process   (b). Purification of product  
(c). Ensuring anaerobic conditions                      (d). Addition of preservative to product

##### **14. Which of the following is not a component of down streaming processing?**

- (a). Separation                      (b). Purification                      (c). Preservation                      (d). Expression

##### **15. Plasmids are used as cloning vector because:**

- (a). Can be multiplied in culture                      (b). Self-replication in bacterial cells  
(c). Can be multiplied in laboratories with the help of enzymes                      (d). Replicate freely outside bacterial cells

##### **16. 'Restriction' in Restriction enzyme refers to:**

- (a). Cutting each of the two strands of DNA at specific points in sugar phosphate backbone  
(b). prevention of the multiplication of bacteriophage in bacteria  
(c). Cleaving of phosphodiester bond in DNA by the enzyme  
(d). Cutting of DNA at specific position only



**17. Elution is:**

- (a). Separating the restricted DNA fragments on agarose gel
- (b). Staining the separated DNA fragments with ethidium bromide
- (c). Cutting out of the separated band of DNA from agarose gel and extracting them from gel
- (d). Constructing rDNA by joining purified DNA fragments to the cloning vector.

**18. Restriction endonucleases are useful in:**

- (a). Breaking DNA at specific Sites
- (b). creating sticky ends
- (c). Both a and b
- (d). Crossing over

**19. DNA segment cleaved by EcoRI is:**

- (a). ATTCGA TAAGCT
- (b). GAATTC CTTAAG
- (c). GCTTAA CGAATT
- (d). GTTCAA CAAGTT

**20. Which one is not a process of recombinant DNA technology?**

- (a). Isolation of genetic material
- (b). Chromatography
- (c). Cutting of DNA at specific location
- (d). Amplification of gene of interest using PCR.

**Answer Key:**

1.c	2.d	3.b	4.c	5.d	6.a	7.d	8.a	9.d	10.b
11.a	12.b	13.a	14.d	15.b	16.a	17.c	18.c	19.b	20.b

**B. Fill in the blanks:**

1. PCR was discovered by\_\_\_\_\_
2. \_\_\_\_\_is part of Ti plasmid from which tumor forming genes have been deleted
3. Indirect transfer of a gene is carried out with the help of a \_\_\_\_\_
4. In method called \_\_\_\_\_, recombinant DNA is directly injected into the nucleus of an animal cell
5. Plasmids and phages are the \_\_\_\_\_ which are used for cloning purposes in prokaryotes
6. EFB stands for\_\_\_\_\_
7. DNA fragments are joined by \_\_\_\_\_
8. In gel electrophoresis, separated DNA strands can be seen after staining with compound known as\_\_\_\_\_
9. Thermostable DNA polymerase called Taq polymerase is isolated from bacterium \_\_\_\_\_
10. \_\_\_\_\_is used to dissolve the cell wall of fungal cells

**Answer Key:**

1. Kary Mullis	2.T-DNA	3.VECTOR	4.microinjection	5.vectors	6. European federation of Biotechnology	7.ligase
8.Ethidium Bromide	9. <i>Thermus aquaticus</i>	10.chitinase				

**C. True/ False:**

1. Exonucleases remove nucleotides at specific positions within DNA.
2. Chilled alcohol is used in precipitating protein from other cellular contents
3. Plasmid is extrachromosomal, self-replicating DNA segment
4. To act as vector, a DNA molecule should have origin of replication
5. Gel electrophoresis is used to make copies of DNA
6. Cellulase is used for dissolving bacterial cell wall
7. For large scale production of bioengineered products, bioreactors are used.
8. Ori is sequence where DNA replication starts.
9. In gel electrophoresis, DNA fragments separate according to their size
10. The first recombinant DNA molecules were generated in 1972 by Herbert Boyer, and Stanley Cohen.

**Answer Key:**

1.F	2.F	3.T	4.T	5.F	6.F	7.T	8.T	9.T	10.T
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**II. (Two marks questions)**

1. How is DNA isolated in purified form from a bacterial cell?
2. Name the source of Agrose. Mention one role of Agrose in biotechnology.
3. Give the characteristic feature of and source organism of the DNA polymerase used in PCR.
4. Explain the role of Ti plasmid in biotechnology
5. How do you visualise DNA on an agrose gel?
6. Mention the difference in the mode of action of exonuclease and endonuclease
7. Write two vector- less methods of gene transfer used in Recombinant DNA technology.
8. What are bio reactors? Name its two types.
9. What are molecular scissors?
10. Expand PCR. Mention its importance in biotechnology.

**III. (Three Marks questions)**

1. With the help of diagrams, show the steps of Recombinant DNA technology.
2. Explain the importance of **ori, amp and rop** in the E.coli vector PBR 322.
3. Explain gel electrophoresis
4. Write different steps in PCR process
5. Write a short note on restriction enzymes
6. How has *Agrobacterium tumefaciens* been modified to act as cloning vector?
7. What are essential features of a vector?
8. Write a short note on two types of bioreactors.
9. Explain the different types of enzymes used in Recombinant DNA technology.
10. Explain the different steps involved in isolating the genetic material from different types of cells.

**UNIT 9: CHAPTER 10. Biotechnology and its Application.****I. (One mark Questions)****A. Multiple Choice Questions:**

**1. Cry-I endotoxins obtained from *Bacillus thuringiensis* are effective against:**

- (a). Nematodes      (b). Flies      (c). Mosquitoes      (d). Boll worms

**2. A transgenic food crop which may help in solving the problem of night blindness in developing countries is :**

- (a). Golden Rice      (b). Flavr Savr tomatoes      (c). Bt soyabean      (d). Star link maize

**3. The genetically modified brinjal in India has been developed for:**

- (a). Drought resistance (b). Enhancing mineral content (c). Enhancing shelf life      (d). Insect resistance

**4. Which kind of therapy was given in 1990 to a four-year-old girl with ADA deficiency? (Adenosine Deaminase)?**

- (a). Radiation Therapy (b). Gene Therapy      (c). Radiation Therapy      (d). Immunotherapy

**5. The maximum number of existing transgenic animals is of -**

- (a). fish      (b). mice      (c). cow      (d). pig

**6. The process of RNA interference has been used in the development of plants resistant to-**

- (a). insects      (b). nematodes      (c). fungi      (d). viruses

**7. The first ever human hormone produced by recombinant DNA technology is -**

- (a). progesterone      (b). insulin      (c). estrogen      (d). progesterone

**8. GMO stands for -**

- (a). genetically matured organisms      (b). genetically mental organs  
(c). genetically modified organisms      (d). genetically mutant organism

**9. A GM crop is -**

- (a). mature crop      (b). infected crop      (c). raised to green manure      (d). transgenic crop

**10. An important objective of biotechnology in the area of agriculture is -**

- (a). to decrease seed number (b). to produce pest-resistant varieties of plants  
 (c). to increase phosphorus, nitrogen production (d). to reduce the number of plants

**11. GM rice is enriched with vitamin -**

- (a). K (b). D (c). A (d). E

**12. GMOs can minimize the use of fertilizers.**

- (a). true (b). false

**13. \_\_\_\_ was the first transgenic crop.**

- (a). potato (b). brinjal (c). cotton (d). tobacco

**14. An example of abiotic stress is -**

- (a). pest (b). insect (c). drought (d). vectors

**15. Bt toxin is produced by a bacterium called -**

- (a). *bacillus thuringiensis* (b). *bacillus anthracis*  
 (c). *bacillus thermophilus* (d). *bacillus subtilis*

**16. .... can be used to identify genetic disorders-**

- (a). centrifugation (b) PCR (c) chromatography (d) RIA

**17. A single-stranded DNA or RNA tagged with a radioactive molecule is called \_\_\_\_**

- (a). probe (b). ss DNA (c). probe (d). ss RNA

**18. Autoradiography is used for the detection of -**

- (a). cold (b). cancer (c). fatigue (d). fever

**19. ELISA is based on the principle of ..... reaction.**

- (a). antibody-antibody (b). antigen-antigen (c). antigen-antibody (d). DNA-RNA

**20 The hybrid of the radioactive probe and its complementary DNA is detected by \_\_\_\_**

- (a). ELISA (b). RIA (c). autoradiography (d). PCR

**Answer Key:**

1.d	2.a	3.d	4.b	5.b	6.b	7.b	8.c	9.d	10.b
11.c	12.a	13.c	14.d	15.a	16.b	17.c	18.b	19.c	20.c

**B. True Or False:**

- Transgenic mice are being developed for use in testing the safety of vaccines before they are used on humans.
- Production of transgenic animals require transfections of eggs or embryos
- The gene transferred to another organism artificially by technique of genetic engineering is called wonder gene.
- Meloidogyne incognitia* infect stem of tobacco plant
- RNA interference is essential for the cell defense.
- Insulin hormone consists of lipids and organic acid.
- Insulin isolated from other slaughtered animal not cause any kind of allergy in human being.
- In 1983 Eli Lilly an American company took initiative to produce recombinant insulin.
- Lymphocytes are immortal.
- ADA enzyme is crucial for immune system to function.

**Answer Key:**

1.T	2.T	3.F	4.F	5.T	6.F	7.F	8.T	9.F	10.T
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**C. Fill in the blanks:**

- The first transgenic cow, Rosie, produced human milk with protein measured to be.....
- The protein secreted in the milk of transgenic goats can be used in treatment of disease ....
- The alkaline pH in the midgut of insect larvae triggers the activation of...
- Using..... Vectors, nematode-specific genes are introduced into host plants.
- The genes cry IAb and cry IIAb produce toxins against .....and..... , respectively.
- ..... Number of recombinant pharmaceutical products approved for human use on word level.
- It is very easy to produce..... on a large scale with the help of biotechnology.

8. Basmati rice is distinct for its unique aroma and
9. Plants, bacteria, fungi and animals whose genes have been altered by manipulation called
10. In GM plants, genetic modification enhances

**Answer Key:**

1. 2.4gm per litre	2. Coronary thrombosis	3. Bt. toxin	4. Agrobacterium	5. Corn borer, cotton bollworm	6.30	7. Recombinant therapeutics
8. Flavour	9. Genetically modified organisms	10. Nutritional				

**II. (Two Marks Questions)**

1. What are transgenes?
2. The protein secreted in the milk of transgenic goats can be used in the treatment of which disease?
3. Why are transgenic mice are most preferred model of human diseases?
4. What are Cry proteins? Name an organism that produces it.
5. What are the problems associated with GMO?
6. Nematode resistant transgenic plants have been produced. Explain diagrammatically.
7. How is Prohormone different from hormones?
8. Why is recombinant therapeutics safe for human use?
9. What do you know about processing of insulin from proinsulin?
10. What are transgenic bacteria? Illustrate using any one example.

**III. (Three Marks Questions)**

1. Compare and contrast the advantages and disadvantages of production of genetically modified crops.
2. Right a short note on Bio piracy?
3. What are transgenic organisms?
4. What are disadvantages of GM crops?
5. What is meant by gene therapy?
6. What is ADA Deficiency?
7. How can ADA Deficiency be cured?
8. What is a retroviral vector?
9. Diagrammatically represent the experimental steps in cloning and expressing a human gene (say the gene for growth hormone) into a bacterium like E. coli?
10. Can you suggest a method to remove oil (hydrocarbon) from seeds based on your understanding of rDNA technology and chemistry of oil.

**UNIT 10: CHAPTER 11. Organisms and Population.**

**I. (One mark Questions)**

**A. Multiple choice questions:**

**1. Eutrophication is often seen in:**

- (a) Fresh Water Lakes (b) Ocean (c) Mountains (d) Deserts

**2. Mycorrhiza is an example of:**

- (a) Decomposers (b) Endoparasitism (c) Symbiotic Relationship (d) Ectoparasitism.

**3. Mark the odd one:**

- (a) Pistia (b) Hydrilla (c) Vallisneria (d) Casurina

**4. A plant living for a few days is:**

- (a) Annual (b) Ephemeral (c) Biennial (d) Perennial

**5. Annual Migration does not occur in case of:**

- (a) Arctic Tern (b) Salmon (c) Siberian Crane (d) Salamander

**6. Praying mantis is a good example of:**

- (a) Camouflage (b) Warning colouration (c) Social insect (d) Mullerian Mimicry

**7. Percentage of precipitation that can be stored in dams of India:**

- (a) 55 (b) 18 (c) 10 (d) 43

**8. Mycorrhizae are the example of:**

- (a) Antibiosis (b) Mutualism (c) Fungistasis (d) Amensalism

**9. The principle of competitive exclusion was stated by:**

- (a) Macarthur (b) Verhulst and Pearl (c) C. Darwin (d) G.F. Gause

**10. Soil carried by gravity is:**

- (a) Alluvial (b) Eluvial (c) Colluvial (d) Glacial

**11. Another term for cold-blooded animals is:**

- (a) Endotherm (b) Ectotherm (c) Homiotherm (d) Thermoregulator

**12. Troublesome America water weed found in India is:**

- (a) Vallisnaria (b) Eichhornia (c) Hydrilla (d) Lemna

**13. Cuscuta is an example of:**

- (a) Mutualism (b) Commensalism (c) Parasitism (d) Competition

**14. Term "niche" was first used by:**

- (a) Clements (b) Grinnell (c) Warming (d) Odum

**15. Which one is the edaphic factor in biosphere?**

- (a) Light (b) Temperature (c) Water (d) Soil

**16. Xerophytes are mostly:**

- (a) Succulents (b) Water Related (c) Mesophytes (d) None of these.

**17. A<sub>0</sub> layer is rich in:**

- (a) Minerals (b) Humus (c) Litter (d) None of these.

**18. Root cap is absent in:**

- (a) Xerophytes (b) Hydrophytes (c) Mesophytes (d) Halophytes

**19. Sunken stomata occur in:**

- (a) Xerophytes (b) Hydrophytes (c) Mesophytes (d) Opsanophytes

**20. Halophytes are:**

- (a) Salt Resistant (b) Fire Resistant (c) Cold Resistant (d) Sand Loving

**Answer Key:**

1.a	2.c	3.d	4.b	5.d	6.a	7.c	8.b	9.d	10.c
11.b	12.b	13.c	14.b	15.d	16.a	17.b	18.b	19.a	20.a

**B. True and false:**

1. Hibernation is overwintering in dormant state having high respiration by animals.
2. Mimicry is a phenomenon in which prey is deceived by predator.
3. Some animals develop certain protective mechanisms to avoid the enemies called camouflage.
4. Warm-blooded animals are called homoeothermic.
5. In commensalism one organism is benefitted and the other is not harmed.
6. The study of plant communities is called autecology.
7. Heliophytes are shade loving plants.
8. Ephemerals are those plants which are short lived.
9. The two species having similar requirements cannot live at the same place permanently.
10. Zooplanktons feed on phytoplanktons.

**Answer Key:**

1.F	2.F	3.T	4.T	5.T	6.F	7.F	8.T	9.T	10.T
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**C. Fill in the blanks:**

1. Temperature, water, light and soil are..... factors.
2. In India, sex ratio is..... (2011 census).
3. Plants growing on burnt soil are called as .....
4. Many kind of population of plants, animals and microbes living together and form a .....
5. The natural home of the organism is called.....
6. Main cause of population explosion is.....

7. Brood parasitism occurs in.....
8. The study of soil is called.....
9. According to 2011 census, Indian population was.....
10. Exponential phase of human population started in.....

**Answer Key:**

1. Abiotic	2. 940F: 1000M	3. Pyrophytes	4. Biotic community	5. Habitat	6. Rapid decline in death rate	7. In certain species of birds e.g. Koel
8. Paedology	9. 1210.2 Million	10. 175 A.D.				

**II. (Two marks questions)**

1. Define an ecotype?
2. Name the complete stem parasite of angiosperms?
3. What do you mean by biotic community?
4. What is commensalism?
5. Give the term for the number of organisms per unit area.
6. Define ectotherm?
7. What is carrying capacity?
8. Write down the most significant adaptations of hydrophytes?
9. Which interaction is possessed by termites and flagellates?
10. Name two important factors which affect population size?

**UNIT 10: CHAPTER 12. Ecosystem.**

**I. (One-mark Questions)**

**A. Multiple choice questions:**

**1. From which of the following detritus food chain will start?**

- (a) Algae                      (b) Bacteria                      (c) Protozoa                      (d) Virus

**2. Which is food component of the grazing food chain?**

- (a) Decomposers              (b) primary producer      (c) Photosynthetic organism      (d) secondary consumer

**3. System resulting from interaction of all known living factors and population of all species of a unit area is**

- (a) Ecology                      (b) Genetics                      (c) Science of plants and animals      (d) Ecosystem

**4. In which of the following, plants are included in any food chain**

- (a) Primary producer      (b) Primary consumer      (c) Primary predators                      (d) Primary Decomposers

**5. As we proceed in food chain, biomass**

- (a) Remain same              (b) Decreases                      (c) Increases                      (d) Initially same and later keep decreasing

**6. Which of the following uses maximum energy?**

- (a) Primary consumer      (b) Secondary consumer      (c) Decomposers                      (d) Primary producers

**7. At each tropical level, in which form energy is lost?**

- (a) Heat                      (b) chemical                      (c) Light                      (d) None

**8. Which of the following is not a functional unit of Ecosystem?**

- (a) Stratification              (b) Flow of energy                      (c) Decomposers                      (d) Productivity

**9. In an Ecosystem, which of the following is unidirectional?**

- (a) Sulphur                      (b) Organic nutrition                      (c) Carbon                      (d) Free energy

**10. The second trophic level in a lake is:**

- (a) Phytoplankton              (b) Zooplankton                      (c) Benthos                      (d) Fishes

**11. What is indicated by the Pyramid of number?**

- (a) Number of individuals at each tropical level      (b) Species belonging to particular region  
(c) Number of members of biotic community      (d) None of the above.

**12. What is the percentage of photosynthetically active radiation (PAR) in the incident solar radiation?**

- (a) 100% (b) 50% (c) 1-5% (d) 2-10%

**13. Which of the following is an ecosystem service provided by a natural ecosystem?**

- (a) cycling of nutrients (b) Prevention of soil erosion  
(c) pollutant absorption and reduction of threat of global warming (d) All the above

**14. Which of the following substances are formed along with humus due to the process of decomposition?**

- (a) organic substances (b) Minerals (c) Inorganic substances (d) Fragments

**15. What are complex organic remains of dead plants and faecal matter called?**

- (a) Humus (b) Excrete (c) Mucus (d) Detritus

**16. Which is the example of detritivore?**

- (a) Monkey (b) Elephant (c) Termites (d) Flatworm

**17. What is the process of formation of a dark coloured amorphous substance called:**

- (a) Leaching (b) Fragmentation (c) Catabolism (d) Humification

**18. Pyramid of number, in a grassland ecosystem is**

- (a) Upright (b) Inverted (c) Spindle shaped (d) None of these

**19. Which ecological Pyramid is always upright?**

- (a) Pyramid of energy (b) Pyramid of biomass (c) Pyramid of number (d) None of above

**20. Energy enters the food chain through:**

- (a) Producers (b) Decomposers (c) Herbivores (d) Carnivores

**Answer Key:**

1.b	2.a	3.d	4.a	5.d	6.a	7.a	8.a	9.d	10.b
11.a	12.b	13.b	14.c	15.d	16.d	17.d	18.a	19.a	20.a

**B. True /false:**

1. Climax community is the end point of the succession
2. Pyramid of number defines the individual of each species belonging to trophic level in an ecosystem
3. Plants are Abiotic components of ecosystem
4. Decomposers are important part of the ecosystem because they recycle nutrients
5. Earthworm breakdown detritus into small particles. This process is called fragmentation.
6. Decomposition rate is higher, if detritus is rich in lignin and chitin.
7. Low temperature and anaerobiosis inhibit decomposition
8. Autotrophs make their own food
9. Biotic components include sunlight, soil, temperature and water
10. Saprophytes are not given any place in ecological Pyramids even though they play important role in the ecosystem

**Answer Key:**

1.T	2.T	3.F	4.T	5.T	6.F	7.T	8.T	9.F	10.T
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**C. Fill in the blanks:**

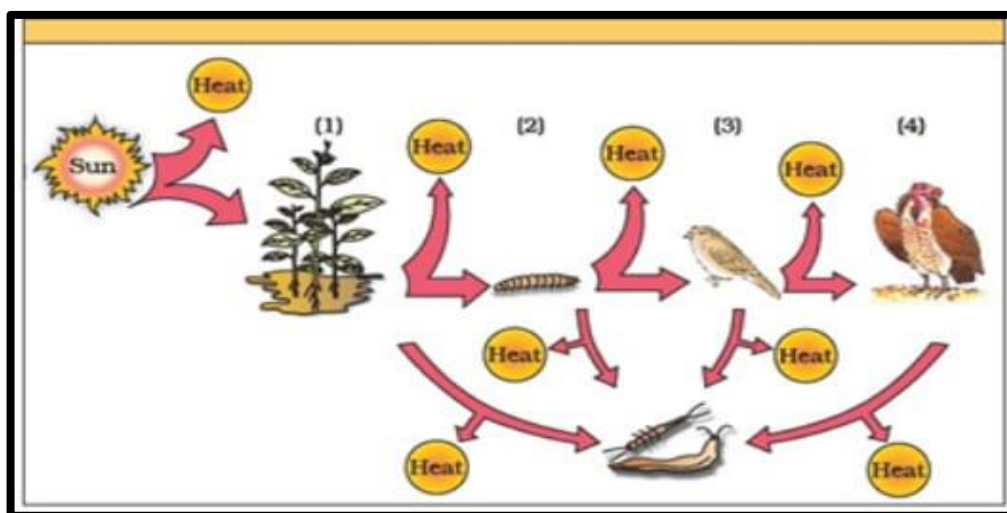
1. \_\_\_\_\_ is structural and functional unit of Ecology
2. \_\_\_\_\_ are important parts of Ecosystem which recycle nutrients
3. \_\_\_\_\_ are the most abundant producers
4. Very low temperature reduces the rate of \_\_\_\_\_
5. Decomposers secrete \_\_\_\_\_ over the detritus. It changes complex organic substances into simple inorganic substances
6. In an aquatic ecosystem the limiting factor for the productivity is \_\_\_\_\_
7. Each higher trophic level in a food chain can utilize only \_\_\_\_\_ of energy.
8. The Pyramid of \_\_\_\_\_ is always upright.
9. Plants are called as \_\_\_\_\_ because they fixed carbon dioxide.
10. The amount of food energy produced or obtained or stored by a particular trophic level per unit area in a unit time is \_\_\_\_\_.

**Answer Key:**

1.Ecosystem	2.Decomposers	3.Plants	4.Decomposition	5.Digestive enzymes	6. Light	7.Ten%
8.Energy	9. Autotrophs	10.Biomass				

**II. (Five marks questions)**

- 1.Name the components of Ecosystem and describe each component in detail.
- 2.Define decomposition. Describe the process of decomposition and write products of decomposition.
- 3.Write a note on flow of energy in the Ecosystem.
- 4.Define ecological Pyramids and describe with diagram pyramid of energy and number.
- 5.Give an account of energy flow in an ecosystem.
- 6.a)Fill up for the tropic levels, labelled 1,2,3,4 in the given figure  
b)The flow of energy through various trophic levels in an ecosystem is unidirectional and noncyclic. Explain.

**UNIT 10: CHAPTER 13. Biodiversity and its Conservation.****I. (Onemark Questions)****A. Multiple choice questions:****1. Which of the following countries has the highest biodiversity?**

- (a) Brazil                                      (b) south Africa                                      (c) Russia                                      (d) India

**2. Which one of the following is a pair of endangered species?**

- (a) Garden lizard                                      (b) Rhesus monkey and Sal tree                                      (c) Indian peacock and carrot grass  
(d) Hornbill and Indian Aconite

**3. Which of the following is not a cause for loss of biodiversity:**

- (a) Destruction of habitats                                      (b) Invasion by alien species                                      (c) Keeping animals in zoological parks  
(d) Over-exploitation of natural resources

**4. Chipkomovement is concerned with:**

- (a) Plant conservation                                      (b) Project tiger                                      (c) Plant breeding  
(d) Animal breeding

**5. Deforestation is the major causative agent of:**

- (a) Genetic erosion                                      (b) Desertification of the habitat                                      (c) Environmental pollution  
(d) Depletion of natural resources

**6. Percentage of land covered by forests in India is:**

- (a) 9-18%                                      (b) 18-27%                                      (c) 27-36%                                      (d) More than 50%



**7. Which one of the following is not a major characteristic feature of biodiversity hotspots?**

- (a) large number of species (b) large number of exotic species (c) abundance of endemic species  
(d) destruction of habitat

**8. In national park protection is given to:**

- (a) flora only (b) fauna only (c) fauna and flora (d) entire ecosystem

**9. Amongst the animal group give below which one has the highest percentage of endangered species?**

- (a) Insects (b) mammals (c) amphibians (d) reptiles

**10. Among the ecosystems mentioned below, where can one find maximum biodiversity?**

- (a) Mangroves (b) desert (c) coral reefs (d) Alpine meadows

**11. In- situ conservation of genetic diversity is done in the form of:**

- (a) National Park (b) wildlife sanctuaries (c) biosphere reserve (d) all of these

**12. One of the Ex-situ conservation methods for endangered species is:**

- (a) wildlife sanctuaries (b) Cryopreservation (c) biosphere reserve (d) National Park

**13. Which of the following group of plant exhibit more species diversity?**

- (a) Angiosperm (b) Algae (c) Bryophytes (d) Fungi

**14. Which of the below mentioned regions exhibit less seasonal variations:**

- (a) Tropics (b) Temperate (c) Alpine (d) both A and B

**15. Kaziranga is famous for:**

- (a) wild ass (b) Elephant (c) cow (d) Rhinoceros

**16. The species listed in Red data book are:**

- (a) Rare (b) threatened (c) Endangered (d) all of these

**17. Total number of all species of organisms in a given region is known as regions:**

- (a) Biota (b) Flora (c) fauna (d) Biome

**18. Corbett National Park is located in:**

- (a) Punjab (b) Uttarakhand (c) Haryana (d) Himachal Pradesh

**19. The richest region of endemic flora and fauna in India are:**

- (a) Himalayas (b) Indo- Burma region (c) Western Ghats (d) all of these

**20. Which technique is used to preserve embryonic tissues, seeds of propagated crops etc, at -196 °C?**

- (a) Gene banks (b) Frozen zoo (c) Cold storage  
(d) Cryopreservation

**Answer Key:**

1.a	2.d	3.c	4.a	5.b	6.b	7.b	8.d	9.c	10.c
11.d	12.b	13.d	14.a	15.d	16.d	17.a	18.b	19.c	20.d

**B. True /false:**

1. Man and biosphere programme was started by the UNESCO in 1986.
2. Largest flying bird is ostrich.
3. Gir forests are home for tiger.
4. Wild life includes plants and animals only.
5. 5<sup>th</sup> June is world's environment day.
6. National animal of India is tiger.
7. Indian cheetah is an endangered species.
8. Yak research centre is located is Odessa.
9. The outer part of biosphere reserve is called buffer zone.
10. The world conservation union was formally known as IUCN.

**Answer Key:**

1.T	2.F	3.F	4.F	5.T	6.T	7.F	8.F	9.F	10.T
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**C. Fill in the blanks:**

1. Biodiversity day falls on \_\_\_\_\_.
2. Silent valley, Kerala is a natural park of \_\_\_\_\_ forest.
3. \_\_\_\_\_ are traditional protected areas.
4. The bird 'DODO' became extinct because of \_\_\_\_\_.
5. Ranthambhore national park is situated in \_\_\_\_\_.
6. \_\_\_\_\_ is in vitro conservation at very low temperature.
7. Desert national park is famous for \_\_\_\_\_.
8. Lion project is in progress at \_\_\_\_\_ of Gujarat.
9. First biosphere reserve in India was \_\_\_\_\_.
10. \_\_\_\_\_ was the first national park in India.

**Answer Key:**

1. 29 <sup>th</sup> December	2. Tropical Evergreen	3. Sacred Forest	4. Excess hunting	5. Rajasthan	6. Cryopreservation	7. Great Indian Bustard
8. Gir forest	9. Nilgiri Biosphere Reserve	10. Corbett National Park				

**II. Two marks question:**

1. Name three categories of threatened species.
2. Define greenhouse effect.
3. Write short note on Red data book.
4. Give names of two non-biodegradable pollutants.
5. Write short note on Hot-spots.
6. Write two major uses of Red data book.
7. What are sacred groves? What is their role in conservation?
8. Define In-situ conservation.
9. Define Ex-situ conservation.
10. Briefly explain the ecological role of biodiversity.

**III. Five marks questions:**

1. Discuss various causes of loss of biodiversity.
2. List some benefits of biodiversity.
3. What is In-situ conservation? Discuss in detail.
4. What is Ex-situ conservation? Discuss in detail.
5. a. Difference between national park and sanctuary.  
b. List some conservation strategies to protect the wild life.

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**Dear Students, hope that you will definitely get benefit from the study material given above.  
Wish you good luck and all the best for your exams.**

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