

CLASS-XII
BIOLOGY
WORKSHEET-1

CHAPTER-REPRODUCTION IN ORGANISMS

- Q1 How is the continuity of species is maintained generations after generations ? 1
- Q2 What major differences you observe in the offsprings of asexually and sexually reproducing individuals ?
- Q3 Name an organism where cell division itself a mode of reproduction.
- Q4 How does penicillium reproduce asexually ?
- Q5 Mention the unique flowering phenomenon exhibited by *Strobilanthus kunthiana*. Q6 Cucurbits and Papaya plants bear staminate and pistillate flowers. Mention the categories they are put under separately on the basis of types of flower they bear.
- Q7 Name the type of cell division that takes place in the zygote of organisms exhibiting haplontic life cycle.
- Q8 Mention the unique feature with respect to flowering and fruiting in bamboo species. Q9 Name the phenomenon and one bird where the female gamete directly develops into a new organisms.
- Q10 Why do vegetative propagules in sugarcane and ginger appear from the nodes ?
- Q11 A moss plant produces a large number of antherozoids but relatively only few eggs cell. Why?
- Q12 How does the floral pattern of Mediterranean orchid *Ophrys* guarantee cross pollination?
- Q13 The cell division involved in gamete formation is not of same type in different organisms. Justify.
- Q14 State the difference between meiocyte and gamete with respect to chromosome number.
- Q15 What are postfertilization events of sexual reproduction?
- Q16 Meiocyte of an onion plant contain 32 chromosomes. Workout the number of chromosomes in the a) gamete b) Somatic cell c) endosperm Q17 Which plant is known as 'terror of bengal' and why ?
- Q18 What are gemmules ? Which organisms produce them ? Draw a labeled diagram.
- Q19 Segregate organisms on the basis of heterogamete and isogamete :
- Chlamydomonas , Cladophora , Fucus, Homo sapiens*
- Q20 Segregate organisms on the basis of monoecious and dioecious conditions :
- Chara, Marchantia, Sweet potato, Earthworm, Cockroach, Cucurbita, Coconut, Date palm, Papaya, Tape worm, Sponges, Leeches*

Q21 Write two conditions essential for external fertilization to take place. What are the disadvantages of external fertilization.

Q22 Name the single cell which begins life in all sexually reproducing individuals.

Q23 Why is the chance of survival of young ones greater in viviparous animals than in oviparous animals?

Q25 Differentiate between oestrous cycle and menstrual cycle. Q26

Write pre-fertilization events in sexual reproduction.

CLASS-XII
BIOLOGY
WORKSHEET-2

CHAPTER-SEXUAL REPRODUCTION IN FLOWERING PLANTS

Q1 An anther with malfunctioning tapetum often fails to provide viable male gametophytes. Give one reason.

Q2 A bilobed, dithecous anther has 100 microspore mother cells per microsporangium. How many male gametophytes this anther can produce? Q3 Write the functions of coleoptiles and scutellum.

Q4 Papaver and Michelia both have multicarpellary ovaries. How do they differ from each other?

Q5 Mention one application of pollen bank. How are pollens stored in a bank?

Q6 Mention the pollinating agents of an inflorescence of small dull coloured flowers with well exposed stamens and large feathery stigma. Give any one characteristics of pollen grains produced by such flowers.

Q7 Name the type of flowers which favours cross pollination.

Q8 The following statements seem to describe the water pollinated submerged plants. Which one of these statements is incorrect:

- i) The flower do not produce nectar
- ii) The pollen grains have mucilaginous covering
- iii) The brightly colored female flowers have long stalk to reach the surface

Q9 Name the type of pollination as a result of which genetically different types of pollen grains of the same species land on the stigma.

Q10 Why are non albuminous seeds so called?

Q11 How do flowers of *Vallisneria* get pollinated?

Q12 How is it possible in *Oxalis* and *Viola* plants to produce assured seed sets even in the absence of pollinators?

Q13 Normally one embryo develops in one seed but when an orange seed is squeezed many embryos of different shapes and sizes are seen. Mention how it has happened.

Q14 How many pollen grains and ovules are likely to be formed in the anther and the ovary of an angiosperm bearing 25 microspore mother cells and 25 megaspore mother cells respectively.

Q15 How many microspore mother cells would be required to produce one hundred pollen grains in a pollen sac? and Why?

Q16 How many microsporangia are present in typical anther of an angiosperm? Q17

Draw a diagram of a male gametophyte of angiosperm. Label any four parts. Why is sporopollenin considered the most resistant organic material?

Q18 Draw a diagram of anatropous ovule of an angiosperm and label the following parts . a)

That develop into seed coat

b) That develop into embryo after fertilization

c) That develop into an endosperm in an albuminous seeds

d) Through which pollen tube gain entry into the embryo sac

e) That attaches the ovule to the placenta

Q19 Differentiate between perisperm and endosperm giving one example of each.

Q20 Differentiate between geitonogamy and xenogamy in plants. Which one between the two will lead to inbreeding depression and why ?

Q21 Enumerate six adaptive floral characteristics of wind pollinated flowers .

Q22 How do flowers reward their insect pollinators ? Explain.

Q23 Mention any four strategies adopted by flowering plants too prevent self pollination. Why is geitonogamy also referred to as genetical autogamy.

Q24 Why should a bisexual flower be emasculated and bagged prior to artificial pollination?

Q25 Draw a longitudinal section of a post pollinated pistil showing entry of pollen tube into a mature embryo sac. Label filiform apparatus , chalazal end, hilum, antipodals, male gametes and secondary nucleus.

Q26 Name all the haploid cells present in an unfertilized mature embryo sac of a flowering plants. Write the total number of cells in it.

Q27 Write the cellular contents carried by the pollen tube. How does the pollen tube gain its entry into the embryo sac?

Q28 Name the product of fertilization that forms the kernel of coconut. How does the kernel differ from coconut water?

Q29 Mention the function of each of the following : a) tassels of corn cob b) tapetum in microsporangium

Q30 Where does triple fusion take place in a flowering plant? Why is it so called? Mention its significance.

Q31 In angiosperm , zygote is diploid while primary endosperm cell is triploid. Explain. Q32 a)

Describe the endosperm development in coconut. b) Why is tender coconut considered a healthy source of nutrition? c) How are pea seeds different from castor seeds with respect to endosperm?

Q33 a) Identify the figure b) Name the initial cell from which this structure has developed. c) Draw the next mature stage and label the parts.

Q34 Why is an apple called a false fruit and banana a parthenocarpic fruit ? Explain.

Q35 Explain any two ways by which apomictic seeds get developed.

Q36 If you squeeze a seed of orange you might observe many embryos of different sizes ? How is it possible? Explain.

Q37 Draw a transverse sectional view of an apple and label the following parts along with their technical names: a) edible part b) enclosed the embryo c) forms the fruit wall.

Q38 Draw a diagram of an anther lobe at microspore mother cell stage . Mention the role of different wall layers of anther.

Q39 How does the pollen mother cell develop into a mature pollen grain ? Illustrate the stages with labeled diagram.

Q40 list the components of the embryo sac and mention their fate on fertilization.

Q41 With the help of labeled diagram depict the organization of a typical embryo sac just after double fertilization. How are seeds advantageous to angiosperm ?

Q42 Explain with the help of diagram the development of a mature embryo sac from a megaspore mother cell in angiosperm.

Q43 Describe the stages of embryo development in dicot plant.

Q44 Describe in sequence the events that lead to the development of a 3 celled pollen grain from microspore mother cell in angiosperm.

Q45 Give reason :

- a) Anther of angiosperm flowers are described as dithecous
- b) Hybrid seeds have to be produced year after year
- c) Pollen grains are well preserved as fossils
- d) Pollen tablets are in use by people these days

Q47i) Why is the process of fertilization in angiosperms termed as double fertilization ? Explain.

ii) Draw a diagram of an angiospermic embryo sac where fertilization is just completed . Label the following parts :

- a) micropylar end of the embryo sac
- b) the part that develop into an embryo
- c) the part develop into an endosperm
- d) The degenerating cells at the chalazal end iii) Draw a labeled diagram of globular embryonic stage of an angiosperm.

Q48 Pistil of a flower does not accept pollen from any plant other than from its own kind. How does it happen? Explain.

Q Explain the process of artificial hybridization to get improved variety in (i) plants bearing bisexual flowers (ii) female parent producing unisexual flowers

Q Write the importance of bagging of unisexual flowers in crop improvement program me.

Q Why is it necessary to emasculate a bisexual flower in a plant breeding program me ?

Mention the condition under which emasculation is not necessary.

Q49 Give reason why :

- a) Most zygotes in angiosperms divide only after certain amount of endosperm is formed.
- b) Groundnut seeds are exalbuminous and castor seeds are albuminous
- c) Micropyle remains as a small pore in the seed coat of a seed
- d) Integuments of an ovule harden and the water content is highly reduced as the seed matures.
- e) Apple and cashew are not called true fruits

Q50 How does the megaspore mother cell develop into 7 celled , 8 nucleate embryo sac in an angiosperm ? Draw a labeled diagram of a mature embryo sac.

Q51 Double fertilization is reported in plants of both castor and groundnut. However the mature seeds of groundnut are non-albuminous and castor are albuminous. Explain the post fertilization events that are responsible for it.

Q52 A flower of tomato plant following the process of sexual reproduction produces 240 viable seeds. Answer the following questions giving reasons :

- a) What is the minimum number of pollen grains that must have been involved in pollination of its pistil?
- b) What would have been the minimum number of ovules present in the ovary ?
- c) How many megaspores mother cells were involved ?
- d) What is the minimum number of microspore mother cells involved in the above case.
- e) How many male gametes were involved in this case ?

Q53 A non biology person is quite shocked to know that apple is a false fruit , mango is a true fruit and banana is a seedless fruit. As a biology student how would you satisfy this person?

Q54 a) Describe any two devices in a flowering plant which prevent both autogamy and geitonogamy. b) Explain the events up to double fertilization after the pollen tube enters one of the synergids in an ovule of an angiosperm.

Q55 Differentiate between Parthenocarpy and Parthenogenesis . Give one example each.

CLASS-XII
BIOLOGY
WORKSHEET-3
CHAPTER-HUMAN REPRODUCTION

Q1 The human testes are located outside the abdominal cavity. Give reason.

Q2 Write the location and function of sertoli cells in humans.

Q3 Mention the location and function of Leydig cells in humans.

Q4 Mention the difference between spermiogenesis and spermiation.

Q5 List the changes that the primary oocyte undergoes in the tertiary follicular stage in the human ovary.

Q6 Identify the figure given below and the labeled part 'A'

Q7 Name the embryonic stage that gets implanted in the uterine wall of a human female. Q8

What stimulate pituitary to release the hormone responsible for parturition ? Name the hormone.

Q9 Explain the function of umbellical code.

Q10 How is the entry of only one sperm and not many ensured into an ovum during fertilization in humans?

Q11 Draw a sectional view of seminiferous tubule of human. Label the following cells in the seminiferous tubule :

- a) Cells that divide by mitosis to increase their number
- b) Cells that undergo meiosis-1
- c) Cells that undergo meiosis-2
- d) Cells that help in the process of spermiogenesis.

Q12 Study the given figure :

i) Pick out and name the cells that undergo spermiogenesis ii) Name 'a' and 'b' cells. What is the difference between them with reference to the number of chromosomes

iii) Pick out and name the motile cells. iv)

What is 'f' cell ? Mention its function.

v) Name the structure of which the given diagram is labeled.

Q13 Spermatogenesis in human male is a hormone regulated process. Justify.

Q14 Draw a diagram of human microscopic sperm. Label the following parts and write their functions:

- a) Structure that help the sperm to enter the ovum
- b) Structure caring genetic material
- c) Structure that provide motility.

Q15 Mention the fate of corpus luteum and its effect on the uterus in the absence of fertilization of ovum in human female.

Q16 Differentiate between menarche and menopause stage.

Q17 Draw a diagram of the structure of a human ovum surrounded by corona radiata. Label the following parts: a) ovum b) plasma membrane c) zona pellucida

Q18 Draw a sectional view of human ovary and label : a) Primary follicle b) Graafian follicle c) Corpus luteum. Mention the role of pituitary hormone on these structures.

Q19 Draw the following diagrams related to human reproduction and label them: a) zygote after the first cleavage division b) Morula stage c) blastocyst stage (sectional view) Q20

Study the figure and answer the following questions :

- a) Name the stage of human embryo the figure represent
- b) Identify 'a' in the figure and mention its function
- c) Mention the fate of inner cell mass after implantation
- d) Where are stem cells located in this embryo?

Q21 A sperm has just fertilized a human egg in the fallopian tube. Trace the events that the fertilized egg undergo up to the implantation of the blastocyst in the uterus.

Q22 Mention the target cells of luteinising hormone in human males and female. Explain the effect and the changes which the hormone induce in each case.

Q23 Name the hormones produced only during pregnancy in human female. Mention their source organ.

Q24 Name the source of gonadotropin in human female . Explain the change brought about in the ovary by these hormones during menstrual cycle.

Q25 Where do the signal for parturition originate from in humans? Why is it important to feed the new born babies on colostrums?

Q26 Draw a diagrammatic sectional view of the female reproductive system of humans and label the parts :

- i) Where the secondary oocyte develop ii) Which help in collection of ovum after ovulation iii) Where fertilization occur
- iv) Where implantation of embryo occurs.

b) Explain the role of pituitary and ovarian hormone in menstrual cycle in human female. Q27
Draw a diagrammatic sectional view of human seminiferous tubule, label sertoli cell, primary spermatocyte, spermatogonium, and spermatozoa.

b) Explain the hormonal regulation of the process of spermatogenesis in humans.

Q28 Describe the events of spermatogenesis with the help of schematic representation. Write two differences between spermatogenesis and oogenesis.

Q29 Study the illustration given and answer the questions that follow :

- i) Identify 'a' ii) Name and state the function of 'c' iii)
Identify 'd' iv) Explain the role of hormone in the formation
and release of 'a' v) Draw the diagram of 'b' separately and label
the parts :

- That helps its entry into 'a'
- That carry genetic material
- That help in its movement

Q30 Explain the different stages of oogenesis in human starting from foetal life till its completion. When and where in the body is oogenesis completed? How do gonadotropins influence this development process.

Q31 Describe the post zygotic events leading to implantation and placenta formation in humans. Mention any two functions of placenta.

Q32 Study the flow chart. Name the hormones involved at each stage. Explain their functions

Q33 Study the graph given below and answer the questions that follow:

- a) Name the hormone 'X' and 'Y'.
b) Identify the ovarian phase during menstrual cycle:
i) 5th day to 12th day of cycle
ii) 14th day of cycle iii)
16th to 25th day of the cycle

Explain the ovarian events (i), (ii) and (iii) under the influence of hormone 'X' and 'Y'.

Q34 The following is the illustration of the sequence of ovarian events (a-i) in a human female:

- i) Identify the figure that illustrates ovulation and mention the stage of oogenesis it represents
- ii) Name the ovarian hormone and the pituitary hormone that have caused the above mentioned event.
- iii) Explain the changes that occur in the uterus simultaneously in anticipation.
- iv) Write the differences between 'c' and 'h'.
- v) Draw a labeled sketch of the structure of a human ovum prior to fertilization. Q35 Describe the process of parturition in humans.

Q36 During the reproductive cycle of human female , when , where and how does a placenta develop ? What is the function of placenta during pregnancy and embryo development? Q37 Name the stage of human embryo at which it gets implanted. Explain the process of implantation.

Q38 Describe the changes that occur in ovaries and uterus in human female during the reproductive cycle.

Q39 Briefly explain the events of fertilization and implantation in an adult human female. Comment on the role of placenta as an endocrine gland.

Q40 Why is breast feeding recommended during the initial period of n infant's growth? Give reasons.

Q41 Explain the importance of syngamy and meiosis in a sexual life cycle of an organisms. Q42

Draw a diagram of a mature human sperm. Label any three parts and write their functions.

Q43 Medically it is advised to all young mothers that breastfeeding is the best for their newborn babies. Do you agree? Give reason in support of your answer.

Q44 Explain menstrual cycle in human females. How can the scientific understanding of the menstrual cycle of human females help as a contraceptive measures?

CLASS-XII
BIOLOGY
WORKSHEET-4

CHAPTER- REPRODUCTIVE HEALTH

- Q1 Mention any two events that are inhibited by the intake of oral contraceptive pills to prevent pregnancy in humans.
- Q2 Why is tubectomy considered a contraceptive method ?
- Q3 The present population growth rate in India is alarming. Suggest ways to check it. Q4 At the time of Independence the population of India was 350 million, which exploded to over 1 billion by May 2000. List any two reasons for this rise in population and any two steps taken by the government to check this population explosion.
- Q5 Describe the lactational amenorrhea method of birth control.
- Q6 Why is Saheli considered to be an improved form of oral contraceptive for human female ?
- Q7 How do pills act as contraceptive in human females ?
- Q8 How does CuT act as an effective contraceptive for human females ?
- Q9 How do copper and hormone releasing IUDs act as contraceptives ? Explain.
- Q10 Explain the ZIFT. How is IUT different from it ?
- Q11 What is amniocentesis ? Why has the government imposed a statutory ban inspite of its importance in the medical field ?
- Q12 How are ARTs helpful to humans ? How are ZIFT and GIFT different from IUT ? Explain.
- Q13 Suggest and explain any three ARTs to an infertile couple.
- Q14 Why is medical termination of pregnancy carried out ?
- Q15 All reproductive tract infections are STDs but all STDs are not RTIs. Justify with example.
- Q16 In GIFT gametes are transferred to the fallopian tube . Can gametes be transferred to the uterus to achieve the same result ? Explain.
- Q17 Briefly explain IVF and ET. What are the conditions in which these methods are advised?
- Q18 Comment on the RCH programme of the government to improve the reproductive health of the people.
- Q19 Expand the following :
- ART, GIFT, ICSI , RTI, IUI
- Q20 Explain different types of IUDs with examples.
- Q21 After a brief medical examination a healthy couple came to know that both of them are unable to produce functional gametes and should look for an ART. Name the ART and the procedure involved that you can suggest to them to help them bear child.

Q22 An infertile couple is advised to adopt test tube baby programme. Describe two principle procedure adopted for such technologies

Q23 Reproductive and child health care (RCH) programmes are currently in operation. One of the major tasks of these programmes is to create awareness amongst people about the wide range of reproduction related aspects. As this is important and essential for building a reproductive healthy society.

- a) ' Providing sex education in schools is one of the ways to meet this goal.' Give four points in support of your opinion regarding this statement.
- b) List any two indicators that indicate reproductively healthy society.

CLASS-XII
BIOLOGY
WORKSHEET-5

CHAPTER-PRINCIPLES OF INHERITANCE AND VARIATIONS

- Q1 What is point mutation ? Give one example.
- Q2 Mention the type of alleles that expresses itself only in homozygous state in an organisms.
- Q3 a garden pea plant (A) produced inflated yellow pod, and another plant (B) of the same species produced constricted green pods. Identify the dominant traits.
- Q4 When a tall Pea plant was self pollinated , one fourth of progenies were dwarf. Give the genotype of parent and dwarf progenies.
- Q5 Name the respective pattern of inheritance where F1 phenotype:
- i) Does not resemble either of the two parents and is in between the two ii)
Resemble only one of the two parents
- Q6 In a dihybrid cross , when would the proportion of parental gene combination be much higher than non parental types, as experimentally shown by Morgan and his group ?
- Q7 Write the possible genotypes, Mendel got when he crossed F1 tall pea plants with a dwarf pea plant.
- Q8 Why in a test cross did Mendel cross a tall pea plant with a dwarf pea plant only ?
- Q9 Name the event during cell division cycle that results in the gain or loss of chromosome.
- Q10 A haemophilic son was born to normal parents. Give the genotypes of the parents and son.
- Q11 Name one autosomal dominant and one autosomal recessive Mendelian disorder in humans.
- Q12 Write the genotype of (i) an individual who is carrier of sickle cell anemia gene but apparently unaffected (ii) an individual affected with the disease
- Q13 A human being suffering from Down's syndrome shows trisomy of 21st chromosome. Mention the cause of this chromosomal abnormality.
- Q14 Why is it that the father never passes on the gene for haemophilia to his sons?
- Q15 Why did Mendel choose garden pea for his experiment ? How did he make sure that the plants were true breeding ?
- Q16 Mendel crossed plants that bred true for yellow seed with plants that bred true for green seeds. All seeds in the F1 generation were yellow. Work out the inheritance involved in this cross by using symbols for the trait. Which trait was dominant?
- Q17 State the principle of independent assortment. How would crossing over and linkage affect the phenomenon of independent assortment.

Q18 With the help of punnett square , find the percentage of heterozygous individuals in a F2 population in a cross involving a true breeding pea plant with green pods and a true breeding pea plant with yellow pods respectively.

Q19 For flower colour in pea , the allele for purple flower (P) is dominant to the allele for white flower(p). A purple flowered plant therefore could be of genotype PP or Pp. What genetic cross would you make to determine the genotype of a purple flowered plant? Explain how your cross gives you the correct genotype of the purple flowered plant?

Q20 Work out a cross to find the genotype of a tall pea plant . Name the type of cross. Q21 Why are F2 phenotypic and genotypic ratios same in a cross between red flowered snapdragon and white flowered snapdragon plants ? Explain with the help of a cross.

Q22 A pea plant with purple flowers was crossed with white flowers producing 50 plants with only purple flowers. On selfing , these plants produced 482 plants with purple flowers and 162 with white flowers. What genetic mechanism accounts for these results? Explain.

Q23 Inheritance pattern of ABO blood group in humans shows dominance , codominance and multiple allelism. Explain each concept with the help of blood group genotypes. Q24 Work out a cross up to F1 generation only between a mother with blood group A (Homozygous) and the father with blood group B (homozygous). Explain the pattern of inheritance exhibited.

Q25 In one family , each of the four children has a different blood group. Their mother is group A and father is group B. Explain this pattern of inheritance with the help of a cross along with the genotypes.

Q26 Explain the term homozygous and heterozygous with respect to the X-linked trait are applicable to human females but not to human males ?

Q27 During his studies on genes in Drosophila that were sex linked. T.H Morgan found population phenotype ratios deviated from the expected 9:3:3:1. Explain the conclusion he arrived at.

Q28 In a dihybrid cross white eyed , yellow bodied female Drosophila crossed with red eyed, brown bodied male drosophila produced in F2 generation, 1.3 percent recombinants and 98.7 percent progeny with parental type combinations. This observation of Morgan deviated from Mendelian F2 phenotypic dihybrid ratio. Explain giving reasons , Morgan 's observation. Q29

Who proposed chromosomal theory of inheritance ? Point out any two similarities in the behavior of chromosomes and genes.

Q30 The map distance in certain organisms between gene A and B is 4 unit, B and C is 2 units and between C and D is 8 units which one of these gene pairs will show more recombination frequency ? Give reasons in support of your answer.

Q31 Study the given pedigree chart and answer the questions that follow:

- a) Is the trait recessive or dominant ?
- b) Is trait sex linked or autosomal ?
- c) Give the genotypes of the parents in generation I and their third and fourth child in generation II

Q32 Explain the mechanism of sex determination in insects like drosophila and grasshopper.

Q33 The male fruit fly and female fowl are heterogametic while the female fruit fly and the male fowl are homogametic. Why are they called so ?

Q34 Hemophilia is a sex linked recessive disorder of humans. The pedigree chart given below shows the inheritance of hemophilia in one family. Study the pattern of inheritance and answer the questions given.

- a) Give all the possible genotypes of the members 4,5 and 6 in the pedigree chart.
- b) A blood test shows that the individual 14 is a carrier of hemophilia . The member numbered 15 has recently married the member numbered 14. What is the probability that their first child will be a hemophilic male?

Q35 A non hemophilic couple was informed by their doctor that there is possibility of a hemophilic child be born to them. Explain the basis on which the doctor conveyed this information. Give the genotypes and the phenotypes of all the possible children who could be born to them.

Q36 A relevant portion of β chain of hemoglobin of a normal human is given below :

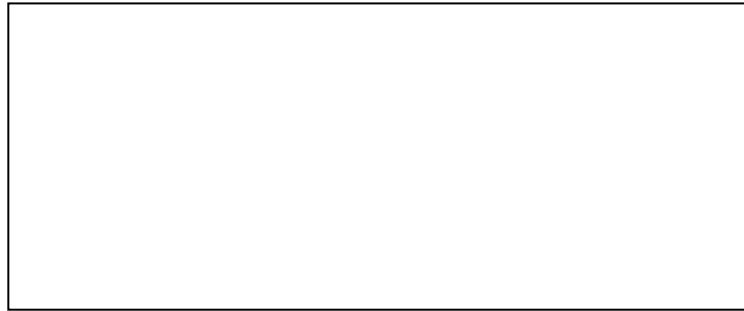
The codon for sixth amino acid is GAG. The sixth codon GAG mutates to GAA as a result of mutation 'A' and into GUG as a result of mutation 'B'. Haemoglobin structure did not change as a result of mutation 'A' whereas haemoglobin structure changed because of mutation 'B' leading to sickle shaped RBCs. Explain giving reasons how could mutation 'B' change the haemoglobin structure and not mutation 'A'.

Q37 Name a disorder , give the karyotype and write the symptoms a human suffers from as a result of monosomy of the sex chromosomes.

Q38 List any four symptoms of Down's syndrome. What is the basis of this disorder ?

Q39 How is the child affected if it has grown from the zygote formed by an XX-egg fertilized by a Y carrying sperm? What do you call this abnormality ?

Q40 Given below is the representation of amino acid composition of the relevant translated portion of β - chain of haemoglobin, related to the shape of human red blood cells.



- Is this representation indicating a normal human or a sufferer from certain related genetic disease ? Give reason in support of your answer .
- What difference would be noticed in the phenotype of the normal and the sufferer related to this gene.
- Who are likely to suffer more from the defect related to the gene represented the males, the females or both males and females equally? And Why?

Q41 Name the phenomenon that leads to situation like 'XO' abnormality in humans. How do humans with 'XO' abnormality suffer ? Explain.

Q42 In peas , tallness is dominant over dwarfness, and red color of flowers is dominant over the white color. When a tall plant bearing red flowers was pollinated by a dwarf plant bearing white flowers, the different phenotypic groups were obtained in the progeny in numbers mentioned against them.

Tall, Red = 138 ; Tall, White= 132 ; Dwarf, Red = 136 ; Dwarf, White= 128 Mention the genotypes of the two parents and of the types of four offsprings.

Q43 A man with AB blood group marries a woman with O blood group.

- Work out all the possible phenotypes and genotypes of the progeny.
- Discuss the kind of domination in the parents and the progeny in this case.

Q44 A colorblind man marries a woman with normal vision whose father was colorblind. Work out a cross to show the genotype of the couple and their respective sons.

Q45 A pedigree chart given below, present a particular generation which shows a trait irrespective of sexes. Neither of the parents of the particular generation shows the trait. Draw your conclusion on the basis of the pedigree.

Q46 Explain a monohybrid cross taking seed coat color as a trait in *Pisum sativum*. Work out the cross up to F₂ generation. State the law of inheritance that can be derived from such a cross. How is phenotypic ratio of F₂ generation different in a dihybrid cross.

Q47 A tall pea plant with yellow seeds (heterozygous for both the traits) is crossed with a dwarf pea plant with green seeds. Using a Punnett square work out the cross to show the phenotypes and the genotypes of F1 generation.

Q48 A true breeding Pea plant homozygous for Axial violet flowers is crossed with another pea plant with terminal white flowers (aavv)

- a) What would be the phenotype and genotype of F1 and F2 generation.
- b) Give the phenotypic ratio of F2 generation.
- c) List the Mendel's generalization that can be derived from the above cross.

Q49 A garden pea plant bearing terminal , violet flowers , when crossed with another pea plant bearing axial, violet flowers , produced axial , violet flower and axial white flowers in the ratio of 3:1. Work out the cross showing the genotype of the parent pea plants and their progeny. Name and state the law that can be derived from this cross and not from a monohybrid cross.

Q50 Inheritance pattern of flower color in garden pea plant and snapdragon differs. Why is this difference observed ? Explain showing the crosses up to F2 generation.

Q51 What is the inheritance pattern observed in the size of starch grains and seed shape of *Pisum sativum* ? Work out the monohybrid cross showing the above traits. How does this pattern of inheritance deviate from that of Mendelian law of dominance?

Q52 A particular garden Pea plant produces only violet flowers.

- a) Is it homozygous dominant for the trait or heterozygous ?
- b) How would you ensure its genotypes? Explain with the help of crosses.

Q53 You are given a red flower bearing pea plant and a red bearing snapdragon plant. How would you find the genotypes of these two plants with respect to the color of the flower ? Explain with the help of crosses. Comment upon the pattern of inheritance seen in these two plants.

Q54 Let us assume in a given plant the genotype symbol 'Y' stands for dominant yellow seed color and 'y' for recessive green seed color ; symbol 'R' for round seed shape and 'r' for wrinkled seeds. Two homozygous parents with genotypes 'RRYY' and 'rryy' are crossed and their F1 generation progeny is then selfed. What shall be the :

- a) Phenotype of F1 progeny
- b) Genotype of F1 generation
- c) Phenotypic ratio of yellow seed to green seed and round seed to wrinkled seed in F2 population.
- d) phenotypic ratio of F2 generation
- e) gamete genotype of F1 progeny

Q55 Differentiate between male and female heterogamety.

Q56 A teacher wants his/her students to find the genotype of pea plants bearing purple coloured flowers in their school garden. Name and explain the cross that will make it possible.

Q57 Explain the genetic basis of blood grouping in human population.

(5) Q58

Explain mechanism of sex determination in birds .

Q59 Which chromosomes carries the mutated gene causing β thalassemia ? What are the problems caused by the mutation ?

Q60 Why did T.H Morgan select *Drosophila melanogaster* to study sex linked genes for his lab experiments ?

Q61 How are Mendelian inheritance , polygenic inheritance and pleiotropy different from each other ? Explain polygenic inheritance pattern with the help of a suitable example . Q62 Two independent monohybrid crosses were carried out involving a tall pea plant with a dwarf pea plant . In the first cross the offspring population had equal number of tall and dwarf plants , whereas in the second cross it was different. Work out the crosses and explain giving reasons for the difference in the offspring populations.

Q63 Explain the mechanism of Sex determination in birds. How does it differ from that of human being ?

CLASS-XII
BIOLOGY
WORKSHEET-6

CHAPTER-MOLECULAR BASIS OF INHERITANCE

Q1 How does the flow of genetic information in HIV deviate from the central dogma proposed by Francis crick ?

Q2 Name the parts 'A' and 'B' of the transcription unit given below.

Q3 Name the components 'a' and 'b' in the nucleotide with purine given below :

Q4 AUG code for_____.

Q5 Name the enzyme involved in the continuous replication of DNA strand. Mention the polarity of the template strand.

Q6 Name the type of synthesis 'a' and 'b' occurring in the replication fork of DNA as shown below:

Q7 Why hnRNA is required to undergo splicing ?

Q8 At which ends do the capping and tailing of hnRNA occur respectively ?

Q9 Mention two functions of the codon AUG.

Q10 What is the function of aminoacyl tRNA synthase ?

Q11 State the human chromosome has (i) the maximum number of genes (ii) the one which has the least number of genes .

Q12 Mention the contribution of genetic maps in human genome project.

Q13 It is established that RNA is the first genetic material. Explain giving three reasons.

Q14 Why DNA is considered as better genetic material than RNA ?

Q15 Study the given portion of double stranded polynucleotide chain carefully. Identify 'a', 'b', and 'c' and 5' end of the chain:

Q16 Draw a schematic diagram of a part of double stranded dinucleotide DNA chain having all the four nitrogenous bases and showing the correct polarity. Q17 List the salient features of double helix structure of DNA.

Q18 Describe Frederick Griffiths experiment on Streptococcus pneumonia. Discuss the conclusion he arrived at.

Or

- Write the scientific name of the bacterium used by Frederick Griffith in his experiment.
- How did he prove that some 'transforming principle' is responsible for transformation of the non virulent strain of bacteria into the virulent form ?
- State the biochemical nature of 'transforming principle'.
- Name the scientists who proved it.

Q19 Explain the role of ^{35}S and ^{32}P in the experiments conducted by Hershey and Chase. Q20 Name the scientists who proved experimentally that DNA is the genetic material. Describe their experiment.

Q21 Who proposed the DNA replication is semi conservative? How was it experimentally proved by Messelson and Sthal?

Q22 Answer the following questions based on Messelson and Sthals experiment :

- Why did the scientists use $^{15}\text{NH}_4\text{Cl}$ and $^{14}\text{NH}_4\text{Cl}$ as sources of nitrogen in the culture medium for growing E.Coli
- Name the molecule(s) that ^{15}N got incorporated into.
- How did the distinguished between ^{15}N labeled molecules from ^{14}N ones.
- Mention the significance of taking the E.Coli samples at definite time intervals for observations.
- Write the observations made by them from the samples taken at the end of 20 minutes and 40 minutes respectively.
- Write the conclusion drawn by them at the end of experiment.

Q23 The average length of a DNA double helix in a typical mammalian cells is approximately 2.2 m and the dimensions of the nucleus is about 10^{-6} m.

- How is it possible that long DNA polymers are packed within a very small nucleus.
- Differentiate between euchromatin and heterochromatin .
- Mention the role of non histone chromosomal protein.

Q24 a) Explain the process of DNA replication that occurs in a replication fork in E.coli.

b) How are translational unit and untranslated regions in mRNA different from each other?

Q25 a) Write the specific features of the genetic code AUG.

b) Genetic codes can be universal and degenerate. Write about them , giving one example of each.

c) Explain aminoacylation of the t RNA.

Q26 (i) Describe the role of RNA polymerase in transcription in bacteria and in eukaryotes. (ii)

Name the scientist who postulated the role of an 'adaptor' in protein synthesis. Name the adaptor molecule.

Or

a) Describe the process of synthesis of fully functional mRNA in a eukaryotes.

b) How is this process of mRNA synthesis different from that in prokaryotes?

Or

Where do transcription and translation occur in bacteria and eukaryotes respectively ? Explain the complexities in transcription and translation in eukaryotes that are not seen in bacteria.

Q27 a) Explain the process of aminoacylation of tRNA. Mention its role in translation.

b) How do ribosomes in the cells act as factories for protein synthesis ?

c) Describe 'initiation' and 'termination' phases of protein synthesis.

Q28 Study the schematic representation of the genes involved in the lac- operon given below and answer the questions that follows :

- (i) Identify and name the regulatory gene in this operon. Explain its role in 'switching off' the operon .
- (ii) Why is lac- operon 's regulation referred to as negative regulation?
- (iii) Name the inducer molecule and the products of the genes 'z' and 'y' of the operon. Write the functions of these gene products.

OR

a) State the arrangement of different genes that in bacteria is referred to as 'Operator'.

b) Draw a schematic labeled illustration of lac-operon in a 'switched on' state.

c) Describe the role of lactose in lac- operon.

Q29 Two blood samples A and B picked up from the crime scene were handed over to the forensic department for genetic fingerprinting. Describe how the technique of genetic fingerprinting is carried out. How will it be confirmed whether the samples belonged to the same individuals or to two different individuals ?

Q30

- a) What is this diagram representing ?
- b) Name the parts a, b and c .
- c) In eukaryotes , the DNA molecules are organized within the nucleus. How is the DNA molecule organized in a bacterial cell in the absence of nucleus.

Q31 a) Draw a neat labeled diagram of a nucleosome .

b) Mention what enables histones to acquire a positive charge.

Q32

a) Look at the above sequence and mention the events (A) ,(B), (C).

b) What does central dogma state in molecular biology ? How does it differ in some viruses ?

Q33 The base sequence in one of the strands of DNA is TAGCATGAT

- a) Give the base sequence of its complementary strand .
- b) How are these base pair held together in a DNA molecule?
- c) Explain the base complementary rules. Name the scientist who framed this rule.

Q34 State the dual role of deoxyribonucleoside triphosphates during DNA replication. Q35 Why do you see two different types of replicating strands in the given DNA replication fork ? Explain. Name these strands.

Q36 Draw a schematic representation of the structure of a transcription unit and show the following in it :

- a) Direction in which the transcription occur
- b) Polarity of the two strands involved
- c) Template strand
- d) Terminator gene
- e) Mention the function of promoter gene

Q37 a) Describe the initiation process of transcription in bacteria. b)

Describe the elongation process of transcription in bacteria.

c) Describe the termination process of transcription in bacteria.

Q38 Construct a complete transcription unit with promoter and terminator on the basis of the hypothetical template strand given below:

b) Write the RNA strand transcribed from the above transcription unit along with its polarity.

Q39 a) Name the enzymes responsible for the transcription of tRNA and the amino acid the initiator tRNA linked with.

c) Explain the role of initiator tRNA in initiation of protein synthesis.

Q40 Name the enzyme that catalyse the transcription of hn RNA. Why does hn RNA need to undergo changes ? List the changes that hn RNA undergoes and where in cell such changes take place.

Q41 What are the three types of RNA ? Mention their role in relation to protein synthesis.

Q42 State the conditions when 'genetic code ' is said to be :

- i) Degenerate ii) unambiguous iii) universal

Q43 One of the codon on mRNA is AUG. Draw the structure of tRNA adaptor molecule for this codon. Explain the uniqueness of this tRNA. Or Why it is called an adaptor molecule? Q44

Study the mRNA sequence given above which is complete to be translated into a polypeptide chain.

a) write the codon 'a' and 'b'.

b) What do they code for ?

c) How is peptide bond formed between two amino acids in the ribosomes ?

Q45 a) Identify the polarity from a to a' in the given diagram and mention how many more amino acids are expected to be added to this polypeptide chain.

b) Mention the DNA sequence coding for serine and the anticodon of tRNA for the same amino acid.

c) Why are some untranslated sequence of bases seen in mRNA coding for polypeptide ?

Where exactly are they present on mRNA?

Q46 a) Name the scientist who called tRNA an adaptor molecule .

b) Draw a clover leaf structure of tRNA showing the Phenylalanine attached to its amino acid site and anticodon for this amino acid in its correct site. c) What does the actual structure of tRNA look like ?

Q47 Three codon on mRNA are not recognized by tRNA what are they ? What is the general term used for them ? What is their significance in protein synthesis ? Q48 Study the figure given below and answer the questions :

- a) How does the repressor molecule get inactivated ?
- b) When does the transcription of lac mRNA stop ?
- c) Name the enzyme transcribed by the gene 'z'.

Q49 a) Name the molecule 'X' synthesized by 'i' gene. How does this molecule get inactivated?
b) Which one of the structural gene code for β - galactosidase ?
c) When will the transcription of this gene stop ?

Q50 a) Name the molecule 'M' that binds with the operator. b)
Mention the consequences of such bindings.
c) What will prevent the binding of the molecule 'M' with the operator gene ? Mention the events that follows.

Q51 a) Explain DNA polymorphism on the basis of genetic mapping of human genome. b)
State the role of VNTRs in DNA fingerprinting.

Q52 What are satellite DNA in a genome? Explain their role in DNA fingerprinting. Q53
Describe the structure of RNA polynucleotide chain having four different types of nucleotides.

Q54 Differentiate between codon and anticodon.

Q51 a) A DNA segment has total of 1000 nucleotide, out of which 240 of them are adenine containing nucleotides. How many pyrimidine bases this DNA segment possesses ?

- c) Draw a diagrammatic stretch to support your answer.

Q52 Following the collision of two trains a large number of passengers are killed. A majority of them are beyond recognition. Authorities want to hand over the dead to their relatives . Name

a modern scientific method and write the procedure that would help in identification of Kinship.

Q53 How did Hershey and Chase establish that DNA is transferred from virus to bacteria? 5

Q54 A geneticist interested in studying variations and patterns of inheritance in living beings prefers to choose organisms for experiments with shorter life cycle. Provide a reason. Q55

Write the dual purpose served by deoxyribonucleoside triphosphate in polymerization. Q56

Write the scientific name of organisms T.H. Morgan and his colleagues worked with for their experiments. Explain the correlation between linkage and recombination with respect to genes as studied by them. B) How did Sturtevant explain gene mapping while working with Morgan?

Q58 State the central dogma as proposed by Francis Crick. Are there any exceptions to it ?

Support your answer with a reason and an example. B) Explain how the biochemical nature of transforming principle was determined which was not defined from Griffith's experiments.

Q59 Although a prokaryotic cell has no defined nucleus, yet DNA is not scattered throughout the cell. Explain

Q60. Expand VNTR and describe its role in DNA fingerprinting. List any two applications of DNA fingerprinting technique.

CLASS-XII

BIOLOGY

WORKSHEET-7 CHAPTER-EVOLUTION

Q1 State the significance of Coelacanth in evolution.

Q2 State the significance of biochemical similarities amongst diverse organism in evolution.

Q3 Name the common ancestors of the great apes and man.

Q4 When does a species become founders to cause founder effect ?

Q5 What does Hardy- Weinberg equation $p^2+2pq+q^2=1$ convey?

Q6 Mention how is mutation theory of Hugo de Vries different from Darwin's theory of natural selection.

Q7 What causes speciation according to Hugo de Vries ?

Q8 Sweet potato and potato tubers are the result of convergent evolution. Justify the statement.

Q9 Identify the examples of convergent evolution from the following:

- i) Flippers of penguins and dolphin ii)
- Eyes of octopus and mammals iii)
- Vertebrate brains

Q10 Are the wing of a bird and the forelimb of a horse homologous or analogous? Name the type of evolution that explain the development of such structures.

Q11 What did Louis Pasteur's experiment on killed yeast demonstrate ? Name the theory that got disproved on the basis of experiment.

Q12 State the significance of the study of fossils in evolution.

Q13 Name any two vertebrate body parts that are homologous to human forelimbs.

Q14 What was the composition of the primitive atmosphere that favoured abiotic origin of life on earth ?

Q15 Write the Oparin and Haldane's hypothesis about the origin of life on earth. How does meteorite analysis favour this hypothesis ?

Q16 Mention the contribution of S.L Miller's experiment on origin of life.

Q17 Give one example of analogy and homology in plants .

Q18 What is adaptive radiation ? Explain with the help of a suitable example where adaptive radiation has occurred to represent convergent evolution.

Q19 Convergent evolution and divergent evolution are the two concepts explaining organic evolution. Explain each one with the help of an example.

Q20 Branching descent and natural selection are the two key concepts of Darwinian theory of evolution. Explain each concept with the help of suitable example.

Q21 How do Darwin and de Vries differ in their views on the mechanism of evolution of life on earth ?

Q22 State Hardy- Weinberg principle of genetic equilibrium . Knowing the genetic drift disturbs this equilibrium , mention what does this disturbance in genetic equilibrium lead to. Q23 In England during the post industrialized period, the count of melanic moths increased in urban areas but remained low in rural areas. Explain.

Q24 What is divergent evolution ? Explain taking an example of plants.

Q25 Explain adaptive radiation and convergent evolution by taking example of some of Australian marsupials and Australian placental mammals.

Q26 How do Darwin's finches illustrate adaptive radiation ?

Q27 Explain giving two reasons why pollen grains can be best preserved as fossils .

Q28 How does Darwin's theory of Natural Selection explain the appearance of new forms of life on earth ?

Q29 Anthropogenic action can hasten the evolution. Explain with the help of a suitable example.

Q30 Refer to Fig

- a) Mention the specific geographical region where these organisms are found.
- b) Name and explain the phenomenon that has resulted in the evolution of such diverse species in the region.
- c) Explain giving reasons the existence of placental Wolf and Tasmanian Wolf sharing the same habitat.

Q31

- a) Write your observations on the variation seen in the Darwin's finches shown above.
- b) How did Darwin explain the existence of different varieties of finches on Galapagos Islands ?

Q32 Fig

What does the pictures 'a' and 'b' illustrate with reference to evolution ? Explain. Q33 Evolution is change in gene frequencies in a population in response to change in the

environment in a time scale of years and not centuries. Justify this statement with reference to DDT. How does the theory of Hugo de Vries support this ?

Q35 Discovery of lobefins is considered very significant by evolutionary biologists. Explain. Q36 Rearrange the following in an ascending order of evolutionary tree:

Reptiles, salamander , lobefins, frogs

Name two reproductive characters that probably make reptiles more successful than amphibians.

Q37 List the two main propositions of oparin and Haldane .

Q38 Fitness is the end result of the ability to adapt and get selected by nature. Explain with suitable example.

Q39 Natural selection operates when nature , selects for fitness. Explain.

The rate of appearance of new forms is linked to the lifespan of an organism. Explain with the help of suitable example.

Q40 List the various causes of variations in the progeny of the population. Describe the three different ways in which the natural selection operates in nature with regard to organic evolution.

Q41 List the various factors which affect the hardy Weinberg equilibrium.

Q42 a) Name the primates that lived about 15 million years ago. List their characteristic features.

b) Where was the first man like animal found ? Write the order in which Neanderthals , Homo habilis and Homo erectus appeared on earth. State the brain capacity of each one of them. c) When did modern *Homo sapiens* appear on this planet ?

Q43 In a certain population , the frequency of three genotypes is as follows :

Genotypes:	BB	Bb	bb
Frequency :	22%	62%	16%

What is likely frequency of B and b alleles ?

Q44 Gene flow occurs through generations and occur across language barriers in humans. If we have a technique of measuring specific allele frequencies in different population of the world, can we not predict human migratory patterns in pre history and history ? Do you agree or disagree ? Provide explanation to your answer .

Q45 State a reason for the increased population of dark coloured moths coinciding with the loss of lichens during industrialization period in England.

Q46 Explain adaptive radiation with suitable example.

Q47 Explain the interpretation of Charles Darwin when he observed a variety of small black birds on Galapagos Islands.

Q48 Write the names of the following:

a) A 15 mya primate that was ape like

b) A 2mya primate that lived in East African grasslands

Q49 With the help of algebraic equation , how did Hardy- Weinberg explain that in a given population the frequency of occurrence of alleles of a gene is supposed to remain the same through generation.

Q50 Differentiate between analogous and homologous structures.

Select and write analogous structures from the list given below:

a) Wings of butterfly and Birds

b) Vertebrate Hearts

c) Tendrils of Bougainvillea and Cucurbita

d) Tubers of sweet potato and potato

CLASS-XII
BIOLOGY
WORKSHEET-8

CHAPTER-HUMAN HEALTH AND DISEASE

- Q1 High fever , loss of appetite , stomach ache and constipation are some of the symptoms seen in a patient. How would the doctor confirm that the patient is suffering from typhoid and not amoebiasis ?
- Q2 Recently chikungunya cases were reported from various parts of the country. Name the vector responsible.
- Q3 What causes swelling of lower limbs in patient suffering from filariasis ?
- Q4 Malaria , Typhoid , pneumonia and Amoebiasis are some of the human infectious diseases. Which ones of these are transmitted through mechanical carriers ?
- Q5 State two different role of spleen in the human body .
- Q6 What are interferons ?
- Q7 Which category of adaptive immunity is provided by vaccination ?
- Q8 In what ways are monocytes a cellular barrier in immunity?
- Q9 What role do macrophages play in providing immunity to humans ?
- Q10 Given below are some human organs. Identify one primary and one secondary lymphoid organ : Liver, Thymus, Stomach, Thyroid, Tonsils
- Q11 It was diagnosed by a specialist that the immune system of the body of a patient has been suppressed. Name the disease the patient is suffering and its causative agents.
- Q12 What is that prevents a child to suffer from a disease he/she is vaccinated against ? Give one reason.
- Q13 Some allergies trigger sneezing and wheezing in human beings . What causes this type of response by the body ?
- Q14 A boy of 10years had chicken pox. He is not expected to have the same disease for the rest of his life. Mention how it is possible.
- Q15 How does smoking tobacco in human lead to oxygen deficiency in their body ?
- Q16 Name the category of disease Rheumatoid arthritis .
- Q17 Why sharing of injection needles between two individuals is not recommended ?
- Q18 When does the human body elicit an anamnestic response ?
- Q19 State the function of mast cells in allergy response.
- Q20a) Name the respective forms in which the malarial parasite gain entry into i) human body and ii) body of female anopheles
- b) Name the host where the sexual and the asexual reproduction of malarial parasite occur respectively.

c) Name the toxin responsible for the appearance of symptoms of malaria in humans . Why do these symptoms occur periodically?

Q21 Trace the life cycle of malarial parasite in human body when bitten by an infected female Anopheles . or Describe the asexual and sexual phases of life cycle of *Plasmodium* that causes malaria.

Q22 Name the host and the site where the following occur in the life cycle of a malarial parasite :

- a) Formation of gametocytes
- b) Fusion of gametocytes

Q23 How is innate immunity different from the immunity that you acquire through vaccines ? Describe any two ways by which innate immunity can be accomplished .

Q24 Name the two special types of lymphocytes in humans . How do they differ in their roles in immune response?

Q25 How do B cells direct humoral immunity ?

Q26 Name and explain the types of barriers of innate immunity , where some cells release interferons when infected.

Q27 What is colostrums ? Why is it important to be given to the newborn infants ?

Q28 a) Name the causative agent of typhoid in humans. b) Name the test administered to confirm the disease.

- c) How does the pathogen gain entry into the human body ? Write the diagnostic symptoms and mention the body organ that gets affected in severe cases.

Q29 a) Name the protozoa parasite that causes amoebic dysentery in humans. b) Mention two diagnostic symptoms of disease.

c) How is this disease transmitted to others ?

Q30 a) Write the scientific names of the two species of filarial worms causing filariasis. b) How do they affect the body of infected person(s)?

c) How does the disease spread ?

Q31 Name any two organisms that are responsible for ringworms in humans. Mention two diagnostic symptoms. Name the specific parts of the human body where these organisms thrive and explain why ?

Q32 Identify a,b,c and d in the following table :

S.No	Name of human disease	Name of the casual bacteria/virus	Specific organ or its part affected
i)	Typhoid	<i>Salmonella typhi</i>	a
ii)	Common cold	b	c
iii)	Pneumonia	<i>Streptococcus pneumoniae</i>	d

Q33 list the specific symptoms of Pneumonia. Name the causative organism.

Q34 Why is antibody represented as H_2L_2 ?

Q35 Identify a,b and c in the schematic diagram of an antibody given alongside and answer the questions.

- a) Write the chemical nature of antibody.
- b) Name the cells that produce antibodies in humans .
- c) Mention the types of immune response provided by an antibody.

Q36 How are auto immune diseases different from immunodeficiency disease ? Give one example of each in human.

Q37 Explain the role of the following in providing defence against infection in human body :

- a) Histamines
- b) Interferons
- c) B- Cells

Q38 a) What is a Vaccine ? Give an example of a vaccine produced by recombinant DNA technology.

- b) Name the disease against which DPT vaccine develops immunity .

Q39 Explain the response initiated when a dose of vaccine is introduced into the human body.

Q40 Why does a doctor administer tetanus antitoxin and not a tetanus vaccine to a child injured in a roadside accident with a bleeding wound ? Explain.

Q41A student on a school trip started sneezing and wheezing soon after reaching the hill station for no explained reasons. But on return to plains , the symptoms disappeared. What is such a response called ? How does the body produce it ?

Q42 A young boy when brought a pet dog home started to complain of watery eyes and running nose. The symptoms disappeared when the boy was kept away from the pet.

- a) Name the type of antibody and the chemicals responsible for such a response in the boy.
- b) Mention the name of any one drug that could be given to the boy for immediate relief from such a response .

Q43 State the functions of primary and secondary lymphoid organs with examples.

Q44 Highlight the role of Thymus as a lymphoid organ . Name the cells that are released from the mentioned gland and how they help in immunity ?

Q45 Name the types of human cells the AIDS virus first enters into after getting inside the human body. Explain the sequence of events that the virus undergoes within these cells to increase their progeny.

Q46 A person has been diagnosed to be HIV⁺.

- a) Name the test which the person has undergone.
- b) Write the full name of the pathogen involved and describe its structure.

c) Which particular cells of this person are likely to get destroyed ?

Q47 Enumerate any three properties of cancer cells that distinguish them from normal cell.

Q48 Write the full form of c-onc gene. Give its other name.

Q49 All humans have cellular oncogenes but only a few suffer from cancer disease. Give reasons. How is a malignant tumor different from a benign tumor ?

Q50 Explain metastasis . Why is it fatal ?

Q51 Why is using tobacco in any form injurious to the health ? Explain.

Q52 Why do sports persons often fall a victim to cocaine addiction ?

Q53 Name an opioid drug and its source plant. How does the drug affect the human body ?

Q54 What are hallucinogens ? Give their two examples. Mention their clinical use if any. Q55

a) Name a drug used i) as an effective sedative and pain killer ii) for helping patients to cope with mental illness like depression , but often misused.

b) How does the moderate and high dosage of cocaine affect the human body ?

Q56 Write the source and effect on the human body of the following drugs :

i) Morphine ii) Cocaine iii) Marijuana

Q57 Name the plant source of the drug popularly called ' smack'. How does it affect the body of the abuser ?

Q58 Name the plant source of ganja. How does it affect the body of the abuser?

Q59 Name the plant source of cocaine. How does it affect the body of the abuser? Q60 If a regular dose of drugs or alcohol is not provided to an addicted person , he shows some withdrawl symptoms. List any four withdrawl symptoms .

Q61 Name the types of antibodies involved in a) allergies b) colostrums.

Q62 A team of students are preparing to participate in interschool sports meet. During a practice session you find some vials with labels of certain cannabinoids.

a) Will you report to the authorities ? Why ?

b) Name a plant from which such chemicals are obtained.

c) Write the effect of these chemicals on human body.

Q63 Name two diseases whose spread can be controlled by the eradication of Aedes mosquito.

Q64 How do cytokine barriers provide innate immunity in humans ?

Q65 Name the source plant of heroin drug. How is it obtained from the plant? Write the effects of heroin on the human body.

CLASS-XII
BIOLOGY
WORKSHEET-9

CHAPTER-STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION

Q1 List any two economically important products for humans obtained from *Apis indica*. Q2 Which one of the following is used in apiculture :

Hilsa , Apis indica , Sonalika

Q3 Write the name of the following a) the most common species of bees suitable for apiculture
b) an improved breed of chicken

Q4 Mention the strategy used to increase homozygosity in cattle for desired traits.

Q5 Write the importance of MOET.

Q6 Name the Indian variety of rice patented by an American company .

Q7 What is the economic value of *Spirulina*?

Q8 How can pollen grains of wheat and rice which tend to lose viability within 30 minutes of their release be made available months later for breeding programmes?

Q9 Which of the following is the semi-dwarf wheat that is high yielding and disease resistant ?

Pusa shubra , Kalyan sona , Ratna

Q10 Write the names of two semi- dwarf and high yielding rice varieties developed in India after 1966.

Q11 Why is the South Indian sugarcane preferred by agriculturist ?

Q12 State any one significance of interspecific hybridization in plants.

Q13 State the importance of biofortification.

Q14 Name any two disease the 'Himgiri' variety of wheat is resistant to .

Q15 Explain the efforts which must be put in to improve health , hygiene and milk yield of cattle in dairy farm.

Q16 List any four important component of poultry farm management.

Q17 Give the scientific name of the most common species of honey reared in India. Why is it advantageous to keep beehives in crop field during flowering periods ?

Q18 Explain the advantages of animal inbreeding plant programme. Mention when would inbreeding depression occur and how is it overcome ?

- What is inbreeding in plants ? What happens to the recessive alleles in this process ?
- State one advantage and disadvantage of inbreeding.
- Differentiate between inbreeding and outbreeding in cattle. State one advantage and disadvantage for each one of them .

- Explain how to overcome inbreeding depression in cattle. List three advantages of inbreeding in cattle. Name an improved breed of cattle.
- Enlist the steps involved in inbreeding of cattle. Suggest two disadvantages of this practice.

Q19 Describe the technology that has successfully increased the herd size of cattle in a short time to meet the increasing demands of growing human population.

Q20 Name the Indian scientist whose efforts brought 'green revolution' in India. Mention the steps that are essentially carried out in developing a new genetic variety of crop under plant breeding programme.

Q21 IARI has released several varieties of crop plants that are biofortified. Give three examples of such crops and their biofortification.

Q22 How can crop varieties be made disease resistant to overcome food crisis in India? Explain. Name one disease resistant variety in India of :

- Wheat to leaf and stripe rust
- Brassica to white rust

Q23 Explain the advantage of cross breeding of the two species of sugarcane in India.

Q24 Scientists have succeeded in recovering healthy sugarcane plants from a diseased one .

- Name the part of plant used as explants by the scientists.
- Describe the procedure that the scientists followed to recover the healthy plants.
- Name this technology used for crop improvement.

Q25 Identify A,B,C and D in the table given below :

Crop	Variety	Resistance to disease
Wheat	A	Leaf and stripe rust
B	Pusa shubhra	Black rot
Cow pea	Pusa komal	C
Brassica	Karan Rai	D

Q26 What is single cell protein? What is the significance of such a protein? or How does culturing of *Spirulina* solve the food problems of growing human population.

Q27 Mention the property that enables the explants to regenerate into new plant. A banana herb is virus infected. Describe the method that will help in obtaining a healthy banana plants from this diseased plant.

Q28 How are somaclones cultured from explants in *in vitro* conditions? Why are somaclones so called?

Q29 Explain how is it possible to grow on commercial scale banana crop . Explain the advantages of micropropagation.

Q30 How are biofortified maize and wheat considered nutritionally improved ?

Q31 How can we improve the success rate of fertilization during artificial insemination in animal husbandry programmes ?

Q32 a) What is plant breeding ? List the two steps the classical plant breeding involves.

b) How has the mutation breeding helped in improving crop varieties ? Give one example where this technique has helped.

c) How has the breeding programme helped in improving the public nutritional health ? State two examples in support of your answer .

Q33 Name any two common Indian millet crops . State one characteristic of millet that has been improved as a result of hybrid breeding so as to produce high yielding millet crops. Q34 Enumerate four objectives for improving the nutritional quality of different crops for health benefits of human population by the process of ' Biofortification ' .

Q35 Your advice is sought to improve the nitrogen content of the soil to be used for cultivation of a non leguminous terrestrial crop.

a) Recommend two microbes that can enrich the soil with nitrogen.

b) Why do leguminous crops not require such enrichment of the soil?

Q36 Explain out breeding , out crossing, and cross breeding practices in animal husbandry

CLASS-XII

BIOLOGY

WORKSHEET-10

CHAPTER- MICROBES IN HUMAN WELFARE

Q1 Which one of the following is the baker's yeast used in fermentation ?

Q2 Milk starts to coagulate when lactic acid bacteria (LAB) is added to warm milk as a starter. Mention any other two benefits that LAB provides.

Q3 Name the organism commercially used for the production of single cell protein .

Q4 Name the group of organisms and substrate they act on to produce biogas .

Q5 Which of the following is a free living bacteria that can fix nitrogen in soil ?

Spirulina, Azospirillum, Sonalika

Q6 Which of the following is a cyanobacterium that can fix atmosphere nitrogen ?

Azospirillum, Oscillatoria , Spirulina

Q7 How is the presence of cyanobacteria in the paddy fields beneficial to rice crop ? Q8

Write the scientific name of the microbe used for fermenting malted cereals and fruit juices .

Q9 Why is distillation required for producing certain alcoholic drinks ?

Q10 How does addition of a small amount of curd to fresh milk help in the formation of curd ?

Mention a nutritional quality that gets added to the curd. OR How does starter added to milk help it to set into curd ?

Q11 Mention the importance of Lactic acid bacteria to humans other than setting milk into curd .

Q12 Name the bacterium responsible for the large holes seen in 'Swiss cheese . What are these holes due to ?

Q13 Name the source of statin and state its action on the human body . Q14

Name the blank spaces a,b,c,and d in the table given below :

Type of microbe	Name	Commercial product
Fungus	a	penicillin
Bacterium	<i>Acetobacter aceti</i>	b
c	<i>Aspergillus niger</i>	Citric acid
Yeast	d	Ethanol

Q15 Name the source of streptokinase. How does this bioactive molecule function in our body

Q16 Mention the product produced and its use by each of the microbes listed below : a)

Streptococcus

b) *Lactobacillus*

c) *Saccharomyces cerevisiae*

Q17 Name the blank spaces a,b,c,and d in the table given below :

Type of microbe	Name	Commercial product
Bacterium	a	Lactic acid
Fungus	b	Cyclosporin A
c	<i>Monoascus purpureus</i>	Statins
Fungus	<i>Penicillium notatum</i>	d

Q18 Name the blank spaces a,b,c,and d in the table given below :

Types of microbes	Scientific name	Product	Medical application
Fungus	a	Cyclosporin	b
c	<i>Monoascus purpureus</i>	Statin	d

Q19 Name the source of Cyclosporin- A . How does this bioactive molecule function in our body ?

Q20 Name the enzyme produced by Streptococcus bacterium. Explain its importance in medical science .

Q21 Why are some molecules called bioactive molecule ? Give two examples of such molecules .

Q22 a) Why are fruit juices brought from market clearer as compared to those made at home.

b) Name the bioactive molecules produced by *Trichoderma polysporum* and *Monascus purpureus*.

Q23 a) How is activated sludge produced during sewage treatment ? b)

Explain how this sludge is used in biogas production .

Q24 Name the two different categories of microbes naturally occurring in sewage water .

Explain their role in cleaning sewage water into usable water.

Q25 a) Baculoviruses are excellent candidates for integrated pest management in an ecologically sensitive area . Explain giving two reasons.

b) What is organic farming ? Why is it suggested to switch over to organic farming ? Q26

What are biopesticides ? Give the scientific name and use of first commercially used biopesticides in the world.

Q27 Why should biological control of pests and pathogens be preferred to the conventional use of chemical properties ? Explain how the following microbes act s biocontrol agents :

a) *Bacillus thuringiensis*

b) Nucleopolyhedrovirus Q28

How do methanogen help in producing biogas ?

Q29 An organic farmer relies on natural predation for controlling plant pests and diseases. Justify giving reasons why this is considered to be a holistic approach.

Q30 How do mycorrhizae act as biofertilizers ? Explain. Name a genus of fungi that forms a mycorrhizal association with plants.

Q31 Explain the role of the following in increasing the soil fertility and crop yield :

a) Leguminous plants

b) Cyanobacteria

c) Mycorrhizae

Q32 Explain the different steps involved in sewage treatment before it can be released into natural water bodies.

Q33 What are methanogens ? How do they generate biogas ?

Q34 Choose any three microbes from the following which are suited for organic farming , which is in great demand these days for various reasons. Mention one application of each one chosen .

Mycorrhiza; Monascus; Anabaena ; Rhizobium ; Methanobacterium ; Trichoderma Q35

Draw a labeled sketch of a typical biogas plant .

Q36 Organic farmers prefer biological control of diseases and pests to the use of chemicals for the same purpose. Justify. Give an example of a bacterium, a fungus, and an insect that are used as biocontrol agents.

CLASS-XII

BIOLOGY

WORKSHEET-11

CHAPTER- BIOTECHNOLOGY:PRINCIPLES AND PROCESSES

Q1 Write the two components of the first artificial recombinant DNA molecule constructed by Cohen and Boyer.

Q2 Name the technique used for separating DNA fragments in the laboratory.

Q3 What is the host called that produce a foreign gene product ? What is this produce called ?

Q4 Mention the use of cloning vector in biotechnology .

Q5 How does an alien DNA get entry in a plant cell by biolistics methods ?

Q6 List the steps involved in r DNA technology.

Q7 List the key tools used in recombinant DNA technology .

Q8 What is Eco R1 ? How does Eco R1 differ from an exonuclease ?

Q9 Explain the action of the restriction endonuclease EcoR1.

Q10 Explain with the help of suitable example the naming of a restriction endonuclease .

Q11 Why are molecular scissor so called ? Write their use in biotechnology.

Q12 Explain palindromic nucleotide sequence with the help of suitable example.

Q13 Prepare a flow chart in the formation of recombinant DNA by the action of restriction endonucleases enzyme Eco R1.

Q14 Name and explain the technique that helps in the separation and isolation of DNA fragments.

Q15 Write any four ways used to introduce a desired DNA segment into a bacterial cell in recombinant technology experiments.

Q16 What is Ti plasmid ? Name the organism where it is found. How does it help in genetic engineering ?

Q17 Expand the following and mention one application of each i) PCR ii) ELISA

Q18 Explain insertional inactivation used in the selection of recombinants in biotechnology experiments.

Q19 Mention the role of Vectors in recombinant DNA technology. Give any two examples. Q20 Many copies of a specific gene of interest are required to study the detailed sequencing of bases in it . Name and explain the process that can help in developing large number of copies of this gene of interest.

Q21 What are cloning sites in a cloning vector ? Explain their role. Name any two such sites in PBR322.

Q22 Mention the difference in the mode of action of exonuclease and endonuclease.

Q23 How are sticky ends formed on a DNA strand ? Why are they so called ?

Q24 Draw a schematic sketch of pBR322 plasmid and label the following in it :

a) Any two restriction sites b) Ori and rop genes c) An antibiotic resistant gene Q25

How is the coding sequence of β galactosidase considered a better marker than the antibiotic resistant sites present in vectors as selectable markers ?

Q26 Why *Agrobacterium tumifaciens* a good cloning vector ? Explain.

Q27 Why and how bacteria can be made competent ?

Q28 Name the source of the DNA polymerase used in PCR technique. Mention why it is used.

Q29 Mention the number of primers required in each cycle of PCR. Write the of primers and DNA polymerase in PCR.

Q30 How are recombinant vectors created ? Why is only one type of restriction endonuclease required for creating one recombinant vector ?

Q31 Explain the process by which a bacterial cell can be made competent . Why is it essential to make bacterial cells competent in r DNA technology ?

Q32 How is DNA isolated in purified form from a bacterial cell ?

Q33 Draw a labeled sketch of sparged stirred tank bioreactor. Write its application.

Q34 What are recombinant proteins ? How do bioreactors help in their production ?

Q35 Name two commonly used bioreactors . State the importance of using bioreactor.

Q36 Why is it essential to have a selectable marker in a cloning vector ?

Q37 Why is the enzyme cellulase needed for isolating genetic material from plant cell and not from animal cell?

Q38 Mention the type of host cells suitable for the gene guns to introduce an alien DNA .

Q39 Name the host cells in which microinjection technique is used to introduce an alien DNA.

Q40 Write the name of enzymes that are used for isolation of DNA from bacterial and fungal cells respectively for r DNA technology.

Q41 Explain how to find whether an E.coli bacterium has transformed or not when a recombinant DNA bearing ampicillin resistant gene is transferred into it. What does ampicillin gene act in above case.

Q42 ' A very small sample of tissue or even a drop of blood can help determine paternity ' .

Provide scientific explanation to substantiate the statement.

Q43 Explain the significance of satellite DNA in DNA fingerprinting technique. Q44

Rearrange the following in the correct sequence to accomplish an important biotechnological reaction :

a) In vitro synthesis of copies of DNA of interest

b) Chemically synthesized oligonucleotide

- c) Complementary region of DNA
- d) Nucleotide provided
- e) Thermostable DNA polymerase
- f) Denaturation of ds DNA
- g) Enzyme DNA polymerase
- h) Genomic DNA template
- i) Primers

Q45 How has the development of bioreactor helped in biotechnology? Name the most commonly used bioreactors and describe its working.

Q46 Explain the role of the following with the help of n example each in recombinant DNA technology:

- a) Restriction enzymes
- b) Plasmids

CLASS-XII
BIOLOGY
WORKSHEET-12

CHAPTER- BIOTECHNOLOGY AND ITS APPLICATION

- Q1 Mention the source organism of the gene cryI_{Ac} and its target pest.
- Q2 What was the specialty of the milk produced by the transgenic cow Rosie ?
- Q3 How are two short polypeptide chains of insulin linked together ?
- Q4 State a method of cellular defence which work in all eukaryotic organisms.
- Q5 Name the molecular diagnostic technique to detect the presence of pathogen in its early stage of infection.
- Q6 State the purpose for which the Indian government has set up GEAC.
- Q7 State the role of C-peptide in human Insulin.
- Q8 Suggest any two possible treatments that can be given to a patient exhibiting Adenosine deaminase deficiency. Q9 What is biopiracy ?
- Q10 A multinational company outside India tried to sell new varieties of turmeric without proper rights. What is such an act referred to ?
- Q11 Name the first transgenic cow developed and explain the improvement in the quality of the product produced by it.
- Q12 State how has *Agrobacterium tumefaciens* been made a useful cloning vector to transfer DNA to plant cell.
- Q13 Mention the chemical change that proinsulin undergoes, to be able to act as mature insulin.
- Q14 Name the insect pest that is killed by the products of cryI_{Ac} gene. Explain how the gene makes the plant resistant to the insect pest.
- Q15 Name a genus to which baculovirus belong. Describe their role in integrated pest management.
- Q16 How has the use of *Agrobacterium* as vectors helped in controlling *Meloidogyne incognita* infestation in tobacco plants ? Explain in correct sequence.
- Q17 List any four beneficial effects of GM plants. Explain how has *Bacillus thuringiensis* contributed in developing resistance to cotton bollworms in cotton plants.
- Q18 Explain the work carried out by Cohen and Boyer that contribute immensely in biotechnology.
- Q19 Describe the gene therapy procedure for an ADA deficient patient.
- Q20 Describe the responsibility of GEAC set up by the Indian government.

Q21 What are transgenic animals ? Explain any four ways in which such animals can be beneficial to human.

Q22 Why does the Bt toxin not kill the bacterium that produces it but kills the insect that ingest it ?

Q23 How is Rosie considered different from a normal cow ? Explain.

Q24 How did an American company Eli Lilly use the knowledge of r-DNA technology to produce human insulin?

Q25 Mention the cause and body system affected by ADA deficiency in humans. Write the conventional methods used to treat it. How recombinant DNA technology help in the cure of this disease. Write the problems and permanent solutions to it.

Q26 How has the development of bioreactor helped in biotechnology? Name the most commonly used bioreactor and describe its working.

CLASS-XII

BIOLOGY

WORKSHEET-13

CHAPTER- ORGANISMS AND POPULATION

Q1 Write the basis on which an organisms occupies a space in it community/ natural surroundings.

Q2 Which one of the two stenothermals or eurythermals, shows wide range of distribution on Earth and Why ?

Q3 Why do predators avoid eating Monarch butterfly? How does the butterfly develop this protective features?

Q4 State Gause's competitive exclusion principle.

Q5 List any two adaptive features evolved in parasites enabling them to live successfully on their host.

Q6 Name the interaction between:

- a) Whale and barnacle growing on its back
- b) Sea anemone and Hermit crab
- c) Cuscuta and shoe flower bush
- d) Orchids grows on mango tree
- e) Cuckoo lays her egg in the crows nest

Q7 What do phytophagous insects feed on?

Q8 Explain with the help of an example how the percentage cover is a more meaningful measures of population size than mere numbers.

Q9 How do snails , seeds, bears, zooplanktons, fungi and bacteria adapt to conditions unfavourable for their survival?

Q10 Water is essential for life. Write any three features both for plants and animals which enable them to survive in water scarce environment.

Q11 List any three ways of measuring population density of a habitat. Mention the essential information that can be obtained by studying the population density of an organism.

Q12 a) Explain ' birth rate' in a population by taking a suitable example.

- c) Write the other two characteristics which only a population shows but an individual cannot.

Q13 Mention what do the following stand for in the equation given below: i)

N_{t+1} ii) B iii) E

$$N_{t+1} = N_0 + [(B+I) - (D+E)]$$

Q14 Explain with the help of a graph the population growth curves when resources are i) Limited ii) Not limited

b) Nature has carrying capacity for a species. Explain.

Q15 How does human body maintain constant temperature both in summers and winters? Explain.

Q16 Why are small animals rarely found in the polar regions? Explain.

Q17 How do organisms which cannot migrate, tend to overcome adverse environmental conditions? Explain taking one example each from vertebrates and angiosperms respectively.

Q18 What does S shaped pattern of population growth represent? How is J shaped pattern different from it and why ?

Q19 Explain giving reasons why the tourists visiting Rohtang pass or Mansarovar are advised to resume normal active life only after a few days of reaching there.

Q20 Between amphibians and birds which will be able to cope with global warming? Give reason.

Q21 If 8 individuals in a laboratory population of 80 fruit flies died in a week, then what would be the death rate of population for same period?

Q22 In a pond there were 200 frogs. 40 more were born in a year. Calculate the birth rate of the population.

Q23 Many fresh water animals cannot survive in marine environment. Explain.

Q24 Construct three different types of age pyramids for human population

Q25 Construct a pyramid of numbers by taking suitable examples for each trophic level in an ecosystem.

Q26 Analysis of age pyramids for human population can provide important inputs for long term planning strategies. Explain

Q27 Following are the responses of different animals to various abiotic factors. Describe each one with the help of an example.

- a) Regulate b) Conform c) Migrate d) Suspend

Q28 Study the graph given below and answer the questions that follow:

- Write the status of food and space in the curves (a) and (b)
- In the absence of predators which one of the two curves would approximately depict the prey population ?
- Time has been shown on X axis and there is parallel dotted line above it. Give the significance of this dotted line.

CLASS-XII
BIOLOGY
WORKSHEET-14
CHAPTER- ECOSYSTEM

Q1 Differentiate between standing state and standing crop in an ecosystem.

Q2 What is a detritus food chain made up of? How do they meet their energy and nutritional requirement?

Q3 Mention the role of pioneer species in primary succession on rocks.

Q4 How are productivity, gross productivity, net productivity and second productivity related?

Q5 What does secondary productivity in an ecosystem indicate? List two factors by which productivity is limited in an ecosystem.

Q6 It is possible that a species may occupy more than one trophic level in the same ecosystem at the same time. Explain with the help of one example.

Q7 Explain with the help of two examples how the pyramid of number and the pyramid of biomass can look inverted.

Q8 Explain how does a primary succession start on a bare rock and reach a climax community.

Q9 Explain the function of reservoirs in a nutrient cycle. List the two types of nutrient cycle in nature.

Q10 Differentiate between xerarch and hydrarch succession.

Q11 Describe the process of decomposition of detritus under the following heads:

Fragmentation, leaching, catabolism, humification, and mineralization Q12 How does phosphorus cycle differ from carbon cycle?

Q13 Explain the carbon cycle with the help of a simplified model.

Q14 Why pyramid of energy is always upright? Explain.

Q15 Construct an ideal pyramid of energy when 1000000 joules of sunlight is available. Label all its trophic level.

Q16 Draw the pyramid of biomass in a sea and in a forest. Explain giving reasons why the two pyramids are different.

Q17 Write any two limitations of ecological pyramids.

Q18 Describe the advantage for keeping the ecosystem healthy.

Q19 All the primary productivity is not available to a herbivore. Give reasons. Q20

How is stratification represented in a forest ecosystem?

Q21

a) Name the biogeochemical cycle shown above.

- b) Name the activity of the living organisms not depicted in the cycle by which this nutrient is returned to the atmosphere.
- c) How would the flow of nutrient in the cycle is affected due to large scale deforestation ? Explain giving reasons.
- d) Describe the effect of an increased level of this nutrient in the atmosphere on our environment.

Q22 What is tropic level in an ecosystem? Explain the role of the first trophic level in an ecosystem. How is detritus food chain connected with the grazing food chain in a natural ecosystem?