

Strictly Based on Latest Syllabus Issued by CBSE
for 2014 Examination

Sample Question Papers

Solutions

Biology

Class **12**

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- **Solutions**

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ANSWERS

Sample Question Paper – 6

SECTION—A

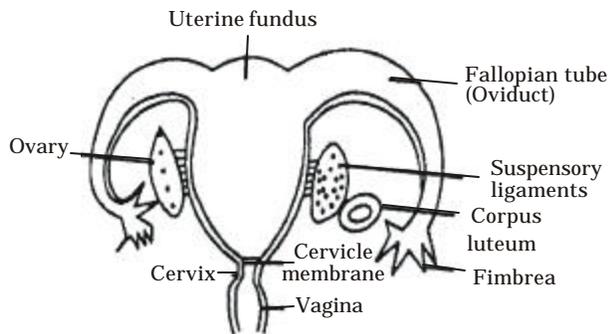
1. Foetal ejection reflex originate from the fully developed foetus and placenta is responsible for parturition. The hormone is oxytocin. [$\frac{1}{2}+\frac{1}{2}$]
2. 32-celled stage (Blastocyst). [1]
3. Because small animals have large surface area relative to their volume and lose body heat very fast when it is cold outside. [1]
4. Methanogens. [1]
5. T-hymphocytes. [1]
6. RNAi takes place in all eukaryotic organism as a method of cellular defence. It involves silencing of a specific mRNA due to a complementary ds RNA molecule. [1]
7. Polarity of a–b = 3'–5' and c–d = 5'–3'. [1]
8. Wuchereria (filarial worm). [1]

SECTION—B

9. VNTR–Variable Number Tandem Repeats.
The VNTRs of two person may be of same length and sequence at certain sites, but vary at others. The nylon membrane is immersed in a bath and radioactive probe. The probe site which resembles the bar codes. [2]
10. **Lactational Amenorrhoea** : Absence of menstruation cycle during the period of intense lactation following childbirth or parturition. As ovulation does not occur in this period, chances of contraception are almost nil; but this is effective for a maximum period of six months after parturition. [2]
11. The pioneer species in a water body are small phytoplankton whereas the climax species in a water body is trees which would be a forest.
The pioneer species of the succession in water are replaced with time by free floating angiosperms. Free floating plants are replaced by rooted hydrophytes, then sedges, grasses and finally the climax species – trees. [2]
12. Catalytic converter have expensive metals namely platinum–palladium and rhodium as the catalysts, are fitted into automobiles for reducing emission of poisonous gases and unburnt hydrocarbons are converted into CO₂ and H₂O and CO, nitric oxides are changed to CO₂ and nitrogen gas, respectively. The best fuel used for vehicles is CNG. [$\frac{1}{2}+\frac{1}{2}$]
13. Ergets often seen along with grazing cattle shows communalism. The cattle ergets always forage near to where the cattle are grazing. As the cattle animals stir up the insects are flushed out from the vegetarians. The ergets are benefitted by this as otherwise it might be difficult for the birds to detect and catch the insects. [2]
14. The DNA strand which functions as template for *m*-RNA synthesis is called DNA template strand.
The complimentary strand of DNA template is called a coding strand. [1+1]
15. a–Trichoderma polysporum
b–immuno suppressive agent in organ-transplant patients.
c–Yeast.
d–used for fermenting malted cereals and fruit juices. [$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$]
16. Copper releasing Intrauterine device is Cu-T. It prevents contraception in the following ways :
 - (i) By increasing phagocytosis of sperms within the uterus.
 - (ii) By suppressing sperm motility and thereby the fertilizing ability.
 - (iii) By making the uterus unsuitable for implanation.
 - (iv) By making the cervix hostile to sperms. [$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$]
17. DDT content in lake water are taken up by fishes from their food. The concentration increased in these birds because the birds are fish eating and hence the DDT concentration passes from fishes to birds through food chain. This will result in drastic decline in the population of fish eating hires. This phenomenon is termed as biomagnification. [2]
18. The rate of appearance of new forms is linked to the life cycle or the life span. Microbes that divide fast have the ability to multiply and become millions of individuals within hours. A colony of bacteria growing on a given medium has built in variation in terms of ability to utilize a food component. A change in the

medium composition would bring out only that part of the population that can survive under the new conditions. In due course of time this variant population outgrows the others and appears a new species. [2]

19.



Diagrammatic sectional view of the female reproductive system [2]

20. Variation due to mutation or variation due to recombination during gametogenesis or due to gene flow or genetic drift results in changed frequency of genes and alleles in future generation. Natural selection can lead to stabilization, directional change or disruption. [3]

21. (a) Meristem of *Saccharum barberi* and *S. officinarum*.

(b) A cross has been made between these species and the hybrid variety, combining the desirable qualities like thick stem, high sugar content and higher yield, is being grouped in North India.

(c) Green Revolution in Plant Breeding, *i.e.*, Tissue culture. [1+1+1]

22. Human genome possesses numerous small non-coding sequences which are repeated many times. They can be separated as satellite DNAs from the bulk of DNA during density gradient centrifugation. Depending upon length, base composition and numbers of repetitive units, satellite DNAs have sub-categories like microsatellites and minisatellites.

Uses : Satellite DNA shows polymorphism. Short nucleotides repeats in the DNA are very specific in each individual and vary in number from person to person but are inherited. These are 'Variable Number Tandem Repeats' (VNTRs) and are also called as 'minisatellites'. Each individual inherits these repeats from his/her parents which are used as genetic markers in a personal identity test. [1½+1½]

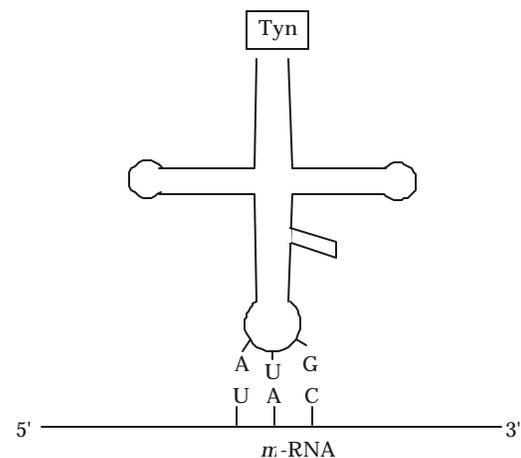
23. Amoebiasis is caused by *Entamoeba histolytica*. Infection is through contaminated food and water. The pathogen resides in the large

intestine. Its symptoms includes :

- (a) Abdominal pain and cramps.
- (b) Stools with excess mucus and blood clots.
- (c) Constipation alternating with diarrhoea.

Houseflies act as mechanical carriers and transfer the parasites from the faeces of infected person to the food articles and water. [1+1+1]

24. (a)



(b) RNA polymerase III transcribes *tRNA* in eukaryotes.

(c) AUG has dual function (i) It codes for methionine and

(ii) It also acts as initiation codon. [1+1+1]

25. (a) The trait is recessive.

(b) The trait is autosomal recessive trait eg. sickle cell anaemia.

(c) This is an autosome linked recessive trait that can be transmitted from parents to the offsprings when both the partners are carrier for the gene (or heterozygous). The disease is controlled by a single pair of allele Hb^A and Hb^S . The three possible genotypes are only homozygous individuals for Hb^S (Hb^S, Hb^S) phenotype. They are carrier of the disease as there is 50% probability of transmission of the mutant gene to the progeny. [½+½+2]

26. (a) Restriction enzyme or restriction endonucleases recognize a specific base pair in sequence in DNA called a restriction site and cleaves the DNA within the sequence.

(b) The restriction enzymes are called as molecular scissors because these cut the two strands of DNA at specific locations in their sugar-phosphate backbones. This leaves single stranded portions at the ends. The overhanging stretches on each strand are termed as sticky ends. [1½+1½]

27. (a) Because some hydrophytes do not possess

filaments to float on water.

(b) The apple is considered as the false fruit as the major part of the fruit is developed from thalamus which is not a part of a flower.

(c) Because embryo sac develops from a uninucleate megaspore. **[1+1+1]**

- 28.** The inheritance of quantitative traits, also called polygenic traits, it known as quantitative or polygenic inheritance. In this kind of inheritance, F_1 individuals are very similar to one another and are usually intermediate between the two parents. A cross between two F_1 individuals yields a widely variable F_2 generation having a few individuals like one grand parent, a few like the other grand parent and the rest ranging between the two.

Human Skin Colour : Human skin colour is believed to be controlled by at least three pairs of genes Aa, Bb and Cc located in different chromosomes and inherited independently.

The genotypes of darkest is AABBCC, of fairest is aabbcc and intermediate skin colour is AaBbCc. There will be total seven allele combination in the gametes of a person heterozygous for all the three genes.

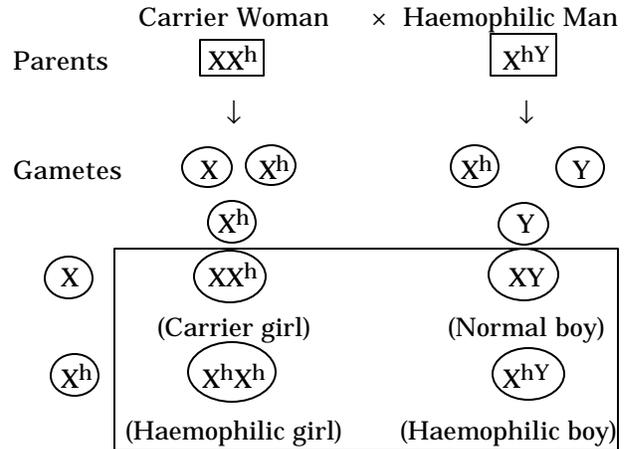
Very dark	AABBCC	1/64
Dark	AaBBCC	6/64
Fairly dark	AaBbCc	15/64
Intermediate	aaBBcc, AabbCc	20/64
Fairly light	AAbbcc	15/64
Light	Aabbcc	6/64
Very light	aabbcc	1/64

Phenotypic ratio = 1 : 6 : 15 : 20 : 15 : 6 : 1 **[2+3]**

- 29.** (a) Haemophilia is sex linked recessive disease which shows transmission from unaffected carrier female to some of the male progeny. The heterozygous female (carrier) for haemophilia may transmit the disease to son. The possibility of a female becoming a haemophilic is extremely rare because mother of such a female has to be atleast carrier and the further should be haemophilic. In males, a

single gene for the defect is able to express itself as the Y chromosome is devoid of any corresponding allele (x^{hy}).

A female can be haemophilic when her father would be haemophilic and her mother should be a carrier.



- 1 Haemophilic Girl
- 1 Carrier Girl
- 1 Haemophilic Boy
- 1 Normal Boy

(b) She has been advised for MTP as the pregnancy could be harmful to the mother or the foetus or both. MTPs are safe during the first trimester (i.e., upto 12 weeks of pregnancy) whereas MTPs, during the second trimester are riskier. **[3+2]**

- 30.** (i) It is a very useful technique particularly when embryo aborts at an early stage of development owing to the degeneration of endosperm. In sexual crosses, where fertilisation occurs but embryo fails to develop into seed, immature embryo can be excised and cultured and hybrid plants can be obtained.

(ii) Haploid is highly useful for the improvement of many crop plants as it is useful for immediate expression of mutations and quick formation of purelines.

(iii) Haberlandt gave an idea that every plant cell totipotent. **[2+2+1]**

Sample Question Paper – 7

SECTION—A

- 1. Net Primary Productivity :** It is the amount of energy left in the producer after utilization of some energy for respiration *i.e.*,
 $GPR - R = NPP$.
Gross Primary Productivity : It is the rate of production of organic matter during photosynthesis. [½+½]
- 2. Penicillium** reproduce asexually through conidia formation. Conidia are non-motile exogenously produced structures which abstract out at the tips of special hyphae called the conidiophores. [1]
- 3. Saccharomyces cerevisiae.** [1]
- 4. Dryopithecus.** [1]
- 5. Contribution of genetic maps in HGP** includes knowing total number of genes, average gene size, number of functional genes, location of different genes in specific chromosomes in humans. [1]
- 6. They are homologous and show divergent evolution.** [1]
- 7. Inbreeding increases homozygosity** which evolves a pure line in cattle. [1]
- 8. Xenogamy.** [1]
- 9. Transgenic animals** that produce useful biological products can be created by the introduction of the portion of DNA (or genes) which codes for a particular product such as human protein (α -1-antitrypsin) used to treat emphysema.
The first transgenic cow 'Rosie' produced human protein enriched milk (2, 4 grams/litre). The milk contained the human alpha-lactalbumin and was nutritionally a more balanced product for human babies than normal cow milk. [2]
- 10. Gametes are always haploid (1N) and in a haploid organism gametes are differentiated by mitotic divisions. Zygote (2N) produced by the fusion of two gametes, undergoes zygotic meiosis, to produce haploid structures, which either develop into new organisms directly or undergo few mitotic division.** [2]
- 11. Biopatent** is a government protection to an inventor of a biological material securing to him for a specific time the exclusive right of manufacturing exploiting using and selling an invention. There is most immediate need to patent varieties of our crop plants, medicinal plants, uses, products and processes based on Indian traditional system *eg.* Basmati, Turmeric, Neem etc. before they can be claimed as invention or a novelty by another country. [2]
- 12. A protein acquires charge** depending upon the abundance of amino acids residues with charge side chains. Histones are rich in the basic acid residues lysine and arginines. Both the amino acids residues carry positive charges in their side chains. [2]
- 13. Codon UGA belongs to non sense mutation.** The other codon of same category is ATT (UAA) and ATC (UAG).
A non sense mutation is the one which stops polypeptide synthesis due to formation of a terminating or non sense codon. [½+½+1]
- 14. (a) Pollen release and stigma receptivity are not synchronised *i.e.*, either the anthers mature and release the pollen grains much before the stigma is receptive (protandry) or the stigma becomes receptive much before the pollen grains of the same flower mature (protogyny). (b) Self-incompatibility is a genetic mechanism that prevents the germination of pollen grains on the stigma of the same flower.** [1+1]
- 15. $\frac{dN}{dt} = rN$**
(i) r = intrinsic rate of natural increase.
(ii) If r increases, population size also increases and reaches to the carrying capacity. If r decreases, population size also decreases. [½+½+1]
- 16. The movement of a section of population from one place to another, results in the addition of new alleles to the local gene pool of the host population. This is called gene migration. Migration causes variations at the genetic level. The random changes in gene frequency in a population occurring by chance alone rather than by natural selection is called genetic drift. The effects of genetic drift are more prominent in small populations.** [1+1]
- 17. (a) CO₂, CH₄, water vapours CFCs are commonly known as green house gases.**

(b) In stratosphere, UV rays act on CFCs release Cl^- atoms. Cl^- degrades ozone releasing molecular oxygen which deplete ozone in the formation of ozone hole. **[1+1]**

18. (i) Lipases are used in detergent formulation and are helpful in removing oil stains from the laundry.

(ii) Lactic acid bacteria grow in milk and convert it into curd.

(iii) Streptokinase is used as a 'clot-buster' for removing clots from the blood vessels of patients who have undergone myocardial infarction leading to heart attack.

(iv) Pectinases are used to clarify the bottled fruit juices. **[$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$]**

19. Totipotency is a capacity in which a single cell is able to form the whole plant. In tissue culture, by this property callus is formed when it grows into root growing and shoot growing nutrient solution by this method explant formed and give birth to a new plant.

Advantages of Micropropagation

(i) These plants are genetically identical to the original plant from which they were grown.

(ii) It is also very helpful in the recovery of healthy plants from diseased plants. **[2+1]**

20. (i) The base sequence in one of the strands of DNA is TAGCATGAT is to be opposite. It can be written that ATCGTACTA. DNA-dependent RNA-polymerase, which catalyses the polymerization of nucleotides only in 5'-3' direction.

(ii) These base sequences are the pair of held together in a DNA molecule because the promoter refers to a particular sequence of DNA located towards the 5' end of the coding strand, where the RNA polymerase becomes bound for transcription. The terminator is a sequence of DNA located towards the 3' end of the coding strand, where the process of transcription would stop.

(iii) The base complementary rules in DNA : The two polynucleotide chains of DNA molecules are not similar to each other, but complementary to each other with respect to nitrogenous base pairs. The scientist who framed this rule is Messelson and Stahl.

[1+1+1]

21. Water is very essential for life. The three features both for plants and animals which enables them to survive in water scarce environment are :

(i) Promote decomposition, causing deoxygenation and death of animals, anaerobic bacteria produces foul smelling gases.

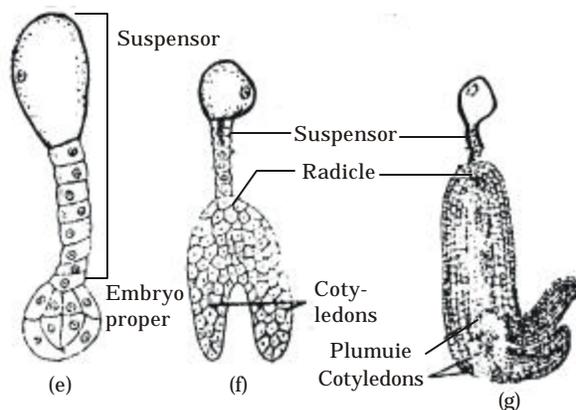
(ii) Promote algal growth, causing deoxyge-

nation and death of animals, decay of dead alga produces foul gases.

(iii) Reach human and animal bodies through contaminated food or food chains, causes poisoning, diseases and death. **[1+1+1]**

22. (a) It is a immature dicot embryo. **[$\frac{1}{2}$]**

(b) The first initial cell is Zygote. **[$\frac{1}{2}$]**



[2]

23. A useful DNA segment is isolated from the donor organism. Formation of Recombined DNA occurs when both the vector and donor DNA segment are cut in the presence of restriction endonuclease. In the presence of ligase DNA segments of both are joined to form rDNA. This rDNA is inserted into a recipient organism. The recipient (host) cells are screened in the presence of rDNA and the product of Donor gene. The transformed cells are separated and multiplied to produce human insulin. In 1983, Eli Lilly an American Company, first prepared two DNA sequences corresponding to α and β chains of human insulin and introduced them in plasmids of *Escherichia coli* to produce insulin chains. Chains α and β were produced separately, extracted and combined by creating disulphide bonds from human insulin (humulin). **[3]**

24. Von Baer, the father of modern embryology proposed Baer's law which stated that during embryonic development, the generalised features (such as brain, spinal cord, axial skeleton, aortic arches etc. are common to all vertebrates) appeared earlier than the special features (like hair in mammals only, feathers in birds only, limbs found in quadrupeds only) which distinguish the various members of the group. Later on this law was modified as the biogenetic law by Ernst Haeckel in 1866 which state that 'Ontogeny repeats phylogeny'. Ontogeny is the life history of an organism while phylogeny is the evolutionary history of the race of that organism. **[3]**

25. Bioreactors are like vessels in which raw materials are biologically converted into specific products individually enzymes or using microbial, plant, animal or human cells.

A bioreactor provides the optimal conditions for obtaining the desired product by providing optimum growth conditions such as substrate, temperature, pH, vitamins, oxygen and salts.

[1½+1½]

26. (a) Insect pollinated flowers : (i) Flowers are large, brightly coloured and showy, highly fragrant and produce nectar.

(ii) The pollen grains and the stigmatic surface are sticky.

Wind pollinated flowers : (i) The pollen grains of wind pollinated flowers are light, non-sticky/dry and winged.

(ii) The anthers are well exposed for easy dispersal of pollen grains and the stigma is often large and feathery, to easily trap the air-borne pollen grains.

(b) Functions of Pericarp :

(i) It protects the seeds.

(ii) It helps in dispersal of seeds. [1+1+1]

27. (a) The two human activities that influence carbon cycle are :

(i) By respiration.

(ii) By burning of fossil fuels.

(b) Jhum cultivation causes deforestation. Technically it is known as shifting cultivation. In India about 5 lakh hectares of land is cleared every year through lopping, burning the remainder mixing the ash with soil and sowing the cleared land with crop seeds. The land is used for 2-3 years without manuring which results in nutrient depletion, reduced moisture retention and increased soil erosion. [1+2]

28. (a) (i) This is carbon cycle.

(ii) Decomposition and burning of organic debris.

(b) Deforestation increases atmospheric CO₂ content by releasing carbon stored in organic matter and reduced primary productivity.

(c) Increase of CO₂ content in the atmosphere cause global warming. It is liable to disturb the climatic conditions of the world and melt away polar as well as alpine ice resulting in 18-20 m rise in sea level. [1+2+2]

29. Human beings have four blood groups phenotypes A, B, AB and O. The blood groups are determined by two types of antigens present in the surface coating of red blood cells – A & B.

The persons having blood group A, possesses

antigen A, group B have antigen B, AB have both antigens while blood group O persons do not carry any antigen in the erythrocytes.

Inheritance pattern of ABO blood groups in humans shows dominance, co-dominance and multiple allelism.

(i) The gene for blood group exists in three allelic form I^A, I^B and *i*.

(ii) Any individual carries two of these three alleles.

(iii) The allele I^A produces a glycoprotein A, found on the surface membrane of RBC.

(iv) The allele I^B produces a glycoprotein B found on the membrane of RBC.

(v) The allele *i* does not produce any glycoprotein.

(vi) The allele I^A and I^B are dominant over allele *i*.

(vii) When the alleles I^A and I^B are together, they are equally dominant and both the glycoproteins are produced and shows codominance.

(viii) The blood group is determined by the presence or absence of one or both the glycoproteins *i.e.*, group A has glycoprotein A, group B has glycoprotein B, group AB has both glycoprotein AB and group O has neither of them.

Blood Group	Possible Genotypes
A	I ^A I ^A or I ^A <i>i</i>
B	I ^B I ^B or I ^B <i>i</i>
AB	I ^A I ^B
O	<i>ii</i>

[5]

30. (i) Teachers and parents should impart knowledge to the children about the ill-effects of alcohol and tobacco. They should also guide children about to avoid these things and also ignore peer pressure to avoid alcohol and drugs. (ii) Yes, it is possible. One should politely and humbly avoid these things, and also make one's friends aware about the ill effects of these materials.

(iii) Common causes for drug/alcoholic abuse by adolescence are curiosity, need for adventure, excitement, experimentation stress from pressure to excel in academics or examinations.

(iv) As these materials cause cancers of different body organs like stomach, lungs etc., damage nervous system and liver. It is better to prevent to take alcohol and tobacco instead of taking their treatments. [2+1+1+1]

Sample Question Paper – 8

SECTION—A

1. In-vitro conservation, especially cryopreservation is useful technique for preserving vegetatively propagated crops. eg. potats, seeds of plants and preserving sperms, eggs, cells and embryonic tissues of animals at -196°C temperature. [1]
2. AUG : Which signals the start of transtation.
UGA : is terminator codon which reaches the A site but is not read and joined by the anticodon of any tRNA-amino acid complex. [1]
3. Gametogenesis *i.e.*, formation of gametes. [1]
4. Spirulina which is harvested and processed to serve as food rich in proteins. [1]
5. Human immuno deficiency virus (HIV).
Genetic material : Single stranded RNA. [$\frac{1}{2}+\frac{1}{2}$]
6. The separated molecules of DNA fragments are stained by ethidium bromide and visualised by exposure to UV-radiations, as bright orange colour bands. [1]
7. The pollen grains can be stored for years in liquid nitrogen in pollen banks and can be used later in plant breeding programmes. The temperature in pollen banks is -196°C . [1]
8. Ancestral line of angiosperms is seed ferns. [1]
9. **Benign Tumours** : Tumours remain confined to their original location and do not spread to other organs. They cause little damage.
Malignant Tumours : They are masses of proliferating cells called naoplastic or tumour cells, which grow rapidly, invading and damaging the surrounding normal tissues/cells. Cells slough off from these tumours and reach distant sites through blood, where they lodge and give rise to a new tumour. This damaging property of malignant tumours is called metastasis. [1+1]
10. Colour blindness is a recessive sex-linked trait in which the eye fails to distinguish red and green colours. The gene for the normal vision is dominant. The normal gene and its recessive allele are carried by X-chromosome. In females normal vision appears when function as carrier if a single recessive gene for colour blindness is present (XX^{c}). However, in human males the defect appears in the presence of a single recessive gene ($\text{x}^{\text{c}}\text{y}$) because y-chromosome of male does not carry any gene for colour vision. [2]
11. **Cross breeding** : Sachharum barberi originally growing in N. India, had poor sugar contents. S. officinarum (tropical cane) grown in S. India has thicker stem and higher sugar contents. A cross made between these two species and the hybrid variety, combined the desirable qualities of high yield, thick stem, high sugar and ability to grow in the sugarcane areas of N. India. [2]
12. Ecological niche is a specific part of habitat occupied by individuals of a species which is circumscribed by its range of tolerance, range of movement, microclimate type of food and its availability, shelter, type of predator and timing of activity. No two species cannot have the same niche. [2]
13. DNA has to be isolated in pure form for the action of restruaction enzymes. DNA can be released from the cells by digesting the envelope by the use of enzymes like lysozyme for bacterial cells. Since, DNA is intertwined with histone proteins and RNA proteins are removed by treatment with proteases and RNAs by ribonucleases. The purified DNA is precipitated by the addition of chilled ethanol. [2]
14. Cu-T prevents contraception in the following ways :
 - (i) By increasing phagocytosis of sperms within the uterus.
 - (ii) By supressing sperm motility and therby the fertilizing ability.
 - (iii) By making the uterus unsuitable for implantation.
 - (iv) By making the cervix hostile to sperms.[$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$]
15. After industrialization banks got covered by smokes so white moths were selectively picked up by birds. But black moth escaped unnoticed so they managed to survive resulting in more population of black moths.
This phenomenon provides an excellent instances of operations of selection in natural conditions. [1+1]

16. a = it is a fruit wall developed from ovary wall.
b = scutellum
c = points upward towards plumule and downwards towards radicle.
d = Perisperm. [$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$]

17.

Grazing Food Chain	Detritus Food Chain
(i) Chain begins with producers as first trophic level.	Chain begins with detritivores, decomposers as first trophic level.
(ii) Energy comes from Sun.	Energy comes from organic remains or detritus.
(iii) Producers are consumed by herbivores.	Decomposers are consumed by small carnivores.

[1+1]

18. Tobacco contains a large number of chemical substances including nicotine, alkaloid etc. Nicotine stimulates adrenal gland to release adrenaline and nor-adrenaline into blood pressure and increase the heart rate. Smoking is associated with increased incidence of cancer of lungs, urinary bladder, throat, heart disease and gastric ulcers etc. [2]

19. Methods of breeding for disease resistance

: The conventional method of breeding for disease resistance is that of hybridizations and selection. Its steps are essentially identical to those for breeding for any other agronomic characters such as high yield.

Some crop varieties breed by hybridization and selection. For disease resistance to fungi, bacteria and viral disease are released.

(a) **Wheat to leaf and stripe rust** : Crops of wheat, variety is Himgiri and the resistance to disease is leaf and stripe rust, and hill bunt.

(b) **Brassica to white rust** : Brassica of mustard, variety is Push Swarnium and resistance to diseases is white rust. [1+1+1]

20. The ability of gene to have multiple phenotypic effects because it influences a number of characters simultaneously is called pleiotropy and genes are called pleiotropic genes. The effect of pleiotropic gene is more evident in case of one trait (major effect) and less evident in case of others (secondary effect) eg. sickle cell anaemia. [3]

21. This condition is suspended in higher plants, seeds and some other vegetative reproductive structures, serve as means to tide over periods of stress besides helping in dispersal, they germinate to form new plants under favourable moisture and temperature conditions, they do so by reducing their metabolic activity and

gaining into a state of dormancy.

In animals, the organism if unable to migrate, might avoid these stress by escaping in time. The familiar case of bears going into hibernation during winter is an example of escape in time. Some snails and fish go into aestivation to avoid summer related problem heat and desiccation, under unfavourable conditions many zooplankton species in lakes and ponds are known to enter diapause, a stage of suspended development. [3]

22. (i) The two harmless gases released are nitrogen and oxygen.

(ii) Electrostatic precipitator is the most widely used method for the removal of particulate matter. It has electrode wires and a stage of collecting plates. The electrode wires are maintained at several thousand volts, which produce a corona that release electrons. The electrons get attached to the dust particles and give them a net negative charge. The collecting plates are grounded and attract the charged dust particles. The velocity of the air between the plates must be low enough to allow the particles to fall on them. [1+2]

23. (a) Chromosome No. 1 has 2968 genes (the maximum) and the Y chromosome has 231 genes (the least).

(b) (i) Having the complete sequence of human genome will enable a radically new approach to biological research.

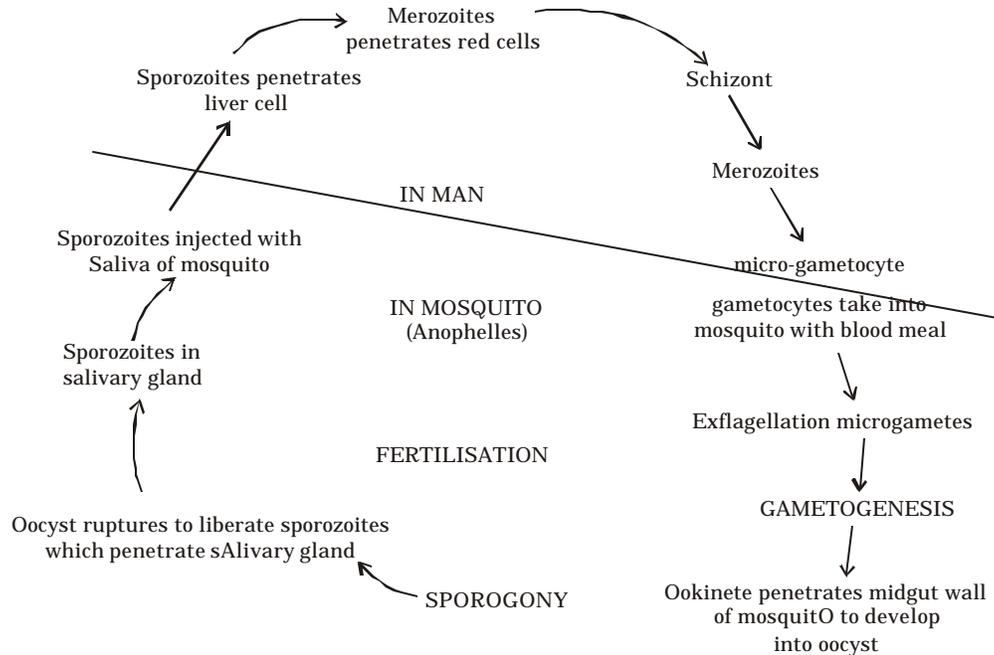
(ii) All the genes in a genome or all the transcripts in a particular tissue/organ/tumour can be studied.

(iii) It will be possible to understand the functioning of enormous number of genes and proteins in interconnected networks. [1+2]

24. Restriction endonuclease cuts the two strands of the double helix at specific points in their sugar phosphate backbones, a little away from the centre of the palindrome sites, but between the same two bases on both the strands. As a result, single stranded portions called sticky ends are produced at the end of the DNA, this stickiness of the ends facilitates the action of enzyme DNA ligase. [3]

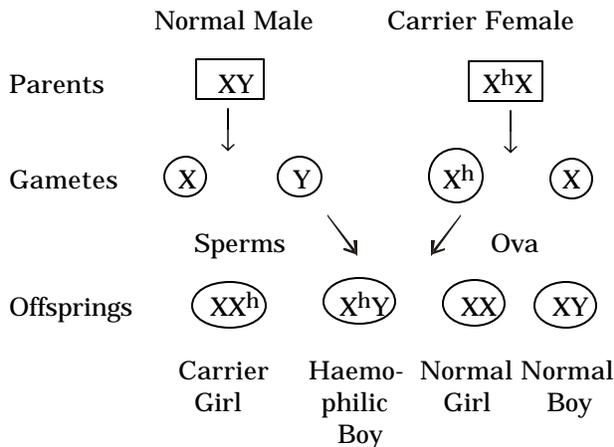
25. Apomixis is a form of asexual reproduction, that forms new individuals from specialized or non-specialized parts of parents without the reduction division of gametes and their fusion. It gives rise to genetically similar plants obtained from the same individual and are called as clones. It gives rise to new individuals without fertilization. Polyembryony is the phenomenon of occurrence of more than one embryo in a seed. [1+1+1]

26. The name of the malarial parasite is *Plasmodium*. The gametocytes develop in the digestive tract.



[1/2+1/2+2]

27.



Doctor conveyed this because the carrier chromosome (X^h) of mother fuses with the Y-chromosome of father. **[3]**

28. (i) Plasmids and bacteriophages are the commonly used vectors. Presently genetically engineered/synthetic vectors are also used for easily linking the foreign DNA and selection of recombinants from non-recombinants. The following features are required to facilitate cloning in a vector :

- (a) Origin of replication (ori).
 - (b) Selectable marker
 - (c) Cloning (Recognition) site
 - (d) Small size of vector.
- (ii) DNA being hydrophilic cannot pass through the cell membrane of a host cell.

(a) Competent host is essential for transformation with recombinant DNA. Many kinds of host cells, including *E.coli*, yeast etc. are available for genetic engineering and the kind of host cell to be used recombinant DNA. Many kinds of host cells, including *E.coli*, yeast etc. are available for genetic engineering and the kind of host cell to be used mainly depends on the aim of the cloning experiment.

(b) Since, DNA is a hydrophilic molecule, it cannot pass through membranes, so the bacterial cell must be capable to take up DNA. This is done by treating them with a specific concentration of a divalent cation, such as calcium which increase the efficiency with which DNA enters the bacterium through pores in its cell wall.

(c) Recombinant DNA can then be forced into such cells by incubating the cells with recombinant DNA on ice, followed by placing them briefly at 42°C and putting them back on ice. This enables the bacteria to take up the recombinant DNA.

[2+3]

29. Darwin either ignored these observations or kept silent. In the first decade of twentieth century, Hugo de Vries based on his work on evening primrose brought forth the idea of mutations. Large difference arose suddenly in the population. He believed that it is a mutation which causes evolution and not the minor variations that Darwin talked about. Mutations

are random and directionless while Darwinian variations are small and directional. Evolution for Darwin was gradual while de-Vries believed mutation caused speciation and hence called it saltation. Studies in population genetics, later, brought out some clarity.

Branching descent and natural selection are the two key concepts of Darwinian theory of evolution. He gave the examples of giraffes who in an attempt to forage leaves on tall trees had to adopt by elongation of their necks. As they passed on this acquired character of elongated necks to succeeding generations, giraffes slowly, over the years, came to acquire long necks. Nobody believes this conjecture any more. Natural selection is based on certain observations as stability in size except for seasonal fluctuation, members of a population vary in characteristics even though they look superficially similar, most of variations are inherited etc.

The fact that population sizes in reality are limited, means that there had been competition

for resources. Only some survived and grew at the cost of others that could not flourish. The novelty and brilliant insight of Darwin was this, he asserted that variation, which are inheritable and which make resource utilization better for few will enable only those to reproduce and leave more progeny. Hence for a period of time, over many generations, survivors will leave more progeny and there would be a change in population characteristics and hence new forms appear to arise. **[5]**

- 30.** (i) Human activities like cutting of forest for wood and for land, colonisation on lands, building apartments and planting industries etc. (ii) New species are being added into the earth's treasury of species by In-situ and Ex-situ conservation of biodiversity. (iii) No, deliberately we don't want to make a species extinct. We have an essential duty to care for their well-being and pass on the biological legacy in a proper form to our future generations. **[2+1+2]**

Sample Question Paper – 9

SECTION—A

- | | |
|---|--|
| <p>1. It helps in implantation and leads to pregnancy. [1]</p> <p>2. The unit used for measuring ozone thickness is Dobson unit (DU). [1]</p> <p>3. Biofortification involves breeding crops with higher levels of vitamin and minerals. It is important to improve public health. [1]</p> <p>4. Azospirillum (free living bacteria). [1]</p> <p>5. It is due to the exaggerated response of the immune system which produces the antibodies IgE type. [1]</p> | <p>6. It is a genetic disorder which is produced by changes in the genes lying in the sex chromosomes, so it is incurable. [1]</p> <p>7. In animals, organism are unable to migrate, avoid the unfavourable environment by escaping in time. Snails undergo aestivation to avoid summer related problems like heat and desiccation. [1]</p> <p>8. RNA is labile and easily degradable, it is not stable and mutates faster. [1]</p> |
|---|--|

9.

In Situ Conservation	Ex-Situ Conservation
<p>1. It is the process of protecting the endangered species of plant or animal in the natural habitat, either by protecting or cleaning up the habitat itself or by protecting the species from predators.</p> <p>2. It helps in recovering population in the surrounding where they have developed their distinctive features.</p>	<p>It is the process of protecting the endangered species of plant or animal by removing it from the unsafe or threatened habitat and placing under the care of humans.</p> <p>It helps in recovering population or preventing their extinction under stimulated condition that closely resemble their natural habitat.</p>

[1+1]

10. Cellular Barriers : Polymorphonuclear leukocytes, neutrophils, monocytes and natural killer (type of lymphocytes-WBCs) in blood as well as macrophages in tissues can phagocytose and destroy microbes.

Cytokine Barriers : Interferons produced by the virus infected cells protect non-infected cells from further infections. [1+1]

11. In RNA transcription, a specific region of DNA unwinds and splits into single strands to expose the bases, ribonucleotides units are joined by the enzyme RNA polymerase through hydrogen bonding to the appropriate bases of the sense DNA, forming a complementary RNA strand, the RNA strand separates from the DNA template, and the split region of the DNA molecule gets hydrogen bonded and spirally coiled to resume its original form. [2]

12. (a) *Cuscuta* is known to receive even the flower inducing hormone or florigen from the host. It is, therefore short day plant in contact with short day plant host and long day plant in

contact with long day plant host.

(b) *Calotropis* produces highly poisonous cardiac glycosides that is why cattles do not browse on this plant. [1+1]

13. The spread of cancer from one part of the body to another. A tumour of cells that have spread is a metastatic tumour or metastasis. The metastatic tumour contains cells that are like those in the original tumour. [2]

14. Emasculation is the process of removal of the stamens before they shed the pollens from a bisexual flower, which is to be used as the female parent.

It is important in hybridisation because it prevents self-pollination in these flower. [1+1]

15. After ovulation many of the follicular cells remain in the collapsed follicle on the surface of the ovary. The follicular cells enlarges and fills with a yellow pigment lutein. Such a follicle is called corpus luteum. It releases progesterone, estrogen and relaxin hormones. [1+1]

16. (a) Two enzymes from *E. coli* have been isolated, that were responsible for restricting

the growth of bacteriophage; one of them added methyl groups to the DNA and the other cut the DNA into segments is called restriction endonucleases.

Each restriction endonuclease functions by inspecting the length of a DNA sequence and binds to the DNA at the recognition sequence.

(b) DNA polymerase used in PCR reaction is known as Tag polymerase, which is obtained from a bacterium *Thermus aquaticus*. [2]

17. (a) Use of pesticides/insecticides has resulted in resistant varieties of organisms in a less time eg., DDT resistance in mosquitoes. It is also true with microbes, many antibiotic-resistant varieties of disease causing bacteria are appearing in a very short period.

(b) The fitness of the individual, according to Darwin, refers ultimately to reproductive fitness. Such fit individuals leave more progeny (with more fit individuals) than others. They are selected by nature to survive and reproduce.

[1+1]

18. PCR technique involves selective amplification of a specific region of DNA molecule. In cancer patients, the normal proto oncogenes mutate into oncogenes, the cancer causing genes. The PCR is used to detect the presence of a specific mutation that is responsible for causing cancer before the actual onset of the disease. [2]

19. (i) **Morphine** : It is the active product of Opium. It is most valuable analgesic. It causes addiction.

(ii) **Cocaine** : It is extracted from the dried leaves and young twigs of the South American shrub named *Erythroxylon coca*. It is also synthesized from ecgonine or its derivatives. It is not connected with beverage cocoa. Cocaine is a CNS stimulant and creates mental alertness and physical strength.

(iii) **Marijuana** : It is obtained from the direct inflorescence and top leaves of female plant *cannabis sativa*. It interferes with short-term memory, impairs thoughts and reasoning, heightens sensory perception, changes the perception of time. It also lowers the levels of sex hormones.

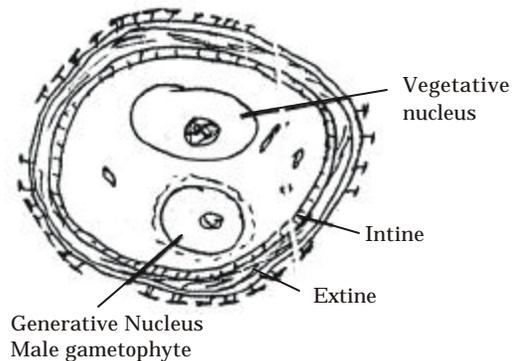
[1+1+1]

20. **Sex-determination in honeybees** : In honeybees the drones (males) are entirely derived from the queen, their mother. The diploid queen has 32 chromosomes and the haploid are all genetically identical except for the mutations. The genetic makeup of the female worker bees is half derived from the mother, and half from the father, but the male bees genetic makeup is entirely derived from the mother. Thus, if a queen bee mates with

only one drone, any two of her daughters will share, on an average, $3/4$ of their genes. The diploid queen's genome is recombined for her daughters, but haploid father's genome is inherited by his daughter 'as is'.

While workers can lay unfertilized eggs that become their sons, haplodiploid sex determination system increases the individual's fitness due to indirect selection. Since the worker is more related to the queen's daughters (her sisters) than to her own offspring, helping the queen's offspring to survive, aids the spread of the same genes that the worker possesses more efficiently than direct reproduction. Batches of worker bees are short lived and are constantly being replaced by the next batch, so this kin selection is possibly a strategy to ensure the proper working of the hive. However, since queens usually mate with a dozen drones or more, not all workers are full sisters. Due to the separate storage of drone sperm, a specific batch of brood may be more closely related than a specific batch of brood laid at a later date. [3]

21. Following is the labelled diagram of a male gametophyte of an angiosperm.



Sporopollenin is considered to be the most resistant organic material because it is chemically very stable and is usually well preserved in soils and sediments. It can withstand high temperature, acidic and alkaline conditions, and enzymes. [3]

22. (a) Origin of Replication (ori) is a sequence from where replication starts and any piece of foreign DNA is linked to this sequence. The replication occurs inside the host cells. This new sequence is responsible for controlling copy number of linked DNA.

(b) pBR322 is the first artificial cloning vector. It has two selectable markers; tetracycline tet^R and ampicillin amp^R is to identify and eliminate non-transformants and selectively permits the growth of the transformants.

(c) Rop codes for the protein involved in the replication of the plasmid. [1+1+1]

23. hnRNA is a heterogenous nuclear RNA (hnRNA). It contains the sequences of both exons and introns. Changes involved are as follows :

(1) It involves the binding of RNA polymerase at the promoter site DNA.
 (2) As it moves along the DNA 48 winds and one of the two strands acts as a template to synthesise and meaningful RNA.

(3) A complementary RNA strand is synthesised with A, U, G and C as bases.

(4) RNA synthesis is terminated when the RNA polymerase reaches the terminator sequence on the DNA.

(5) In eukaryotes three different RNA polymerases I, II and III catalyse the synthesis of ribosomal RNA, messenger RNA and t-RNA respectively. **[1+2]**

24. (a) The excess growth of planktonic algae that causes colouration of water is called algal bloom. Nutrients present in sewage and fertilizers cause dense growth of plants and planktonic algae. Soon planktonic algae increase in number and impart a characteristic colouration to water depending upon the pigments present in them.

(b) Algal blooms are toxic to animals and humans. Algal blooms cut off light from submerged plants. There is drastic decrease in oxygen replenishment inside water. It causes organic loading of water. Decreased oxygen levels also kill aquatic animals further adding to organic loading.

(c) The name of the phenomenon is eutrophication. **[1+1+1]**

25. Two precautionary measures taken by plant breeders are emasculation and bagging.

(1) Emasculation is removal of stamens from the floral buds of female parent so that chances of self-pollination are eliminated.

(2) Bagging is the covering of flowers by butter paper or polythene.

(3) The emasculated floral buds of the female parents and the floral buds of the male parents are bagged in order to protect them from contamination.

(4) Pollen grains of the male parents are collected as their mature anthers.

(5) As the stigmas of the emasculated flowers of the female parents mature, the covering bags are removed one by one for dusting their

stigmas with pollen grains of desired variety.

[3]

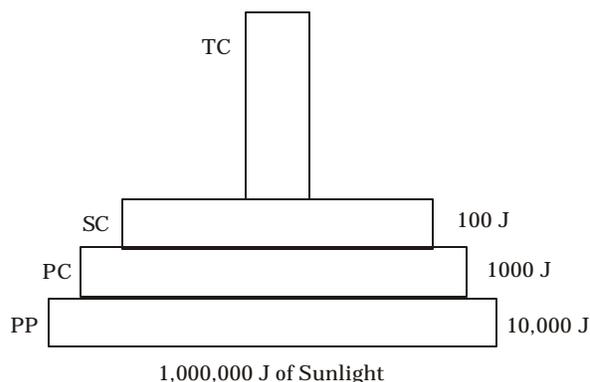
26. Role of DNA Dependent RNA Polymerase :

(i) DNA dependent RNA polymerase is required for the synthesis of RNA primer.

(ii) It is combined with helicase and forms primosome.

(iii) It is required for replication process. **[1+1+1]**

27.



[3]

28. (i) Cutting this desired gene at specific location :

(a) Fragmentation of DNA is carried out by incubating purified DNA molecules with restriction enzyme at optimal conditions of temperature and pH for that specific enzyme.

(b) Agarose gel electrophoresis technique is employed to check the progression of restriction enzyme digestion.

(c) The similar process is repeated with vector DNA.

(ii) **Synthesis of multiple copies of this desired gene :**

Amplification of the DNA/gene of Interest

Amplification refers to the process of making multiple copies of the DNA segment (*in-vitro*). It employs polymerase chain reaction (PCR).

The process was designed by K. Mullis.

The double stranded DNA is denatured by using high temperature.

Two sets of primers are used; primers are the chemically synthesised short segments of DNA (Oligonucleotides), that are complementary to the segment of DNA (of interest).

DNA polymerase is the enzyme used to make copies of DNA making use of the genomic template DNA and the primer. **[3+2]**

29. (a) Purify air, water, mitigate droughts and floods, nutrient cycling, generate fertile soil, provide wildlife habitat are the products of healthy ecosystems which are named as ecosystem services.

(b) Difference Between Hydrarch And Xerarch Succession

Hydrarch Succession	Xerarch Succession
1. Succession starts in water.	It starts in dry areas or desert.
2. Pioneer species is phytoplanktons.	Pioneer species is lichens and blue green algae.
3. They are replaced with time by free floating angiosperms.	With time, they are succeeded by bigger plants.

Similarities Between Hydrarch and Xerarch Succession :

- (i) Both are slow process that may take thousand of years for the establishment of climax community.

(ii) Both succession lead to the establishment of similar mesic conditions. **[1+2+2]**

30. (i) The study of the factors that affect the growth, stability and decline of population as well as the interactions of those factors is called population dynamics.

(ii) Organic variations refers to the change in properties of organisms or groups of such population over a number of generations. It is due to mutations.

(iii) Due to modern scientist, evolution simply means an orderly 'change' from one condition to the other.

(iv) The change in allele frequency may become so drastically different that they form a new species. **[2+1+1+1]**

Sample Question Paper – 10

SECTION—A

1. Because organisms found in ocean or salty water have a problem of how internal water content due to exosmosis. [1]
2. Meiotic division. [1]
3. DNA is enclosed within the membranes, we have to break the cell open to release DNA. This can be achieved by treating the bacterial cell with lysozyme enzyme. [1]
4. Meiosis and Mitosis. [1]
5. (i) LAB improves its nutritional quality by increasing vitamin B₁₂
(ii) LAB checks disease causing microbes.

[½+½]

6. Meiocyte has 24 chromosomes (2n).
Its gamete will have $24/2 = 12$ chromosomes.
Therefore endosperm will have $12 \times 3 = 36$ chromosomes (3n). [1]
7. a- Fishes, b-Amphibians [½+½]
8. The transformation of spermatids into spermatozoa is called spermiogenesis. It occurs in the seminiferous tubules of testes. [½+½]

9.

Albuminous Seed	Non-Albuminous Seed
(i) They retain a part of endosperm and is not completely used up during embryo development.	They have no residual endosperm and is completely consumed during the embryo development.
(ii) eg. wheat, maize.	e.g., per, groundnut.

[1+1]

10. Type of Immune System

(i) Humoral of Antibody-Mediated Immune System

It is formed of proteinous defensive chemicals called antibodies which are produced by B-lymphocytes and circulate in the plasma of blood and lymph and protect the body from bacteria and viruses that enter the blood and lymph.

(ii) Cell Mediated Immune System

It is formed of highly specialized cells, called T-lymphocytes, which directly attack the pathogenic microorganism that have entered the host's body or grafts such as transplanted

kidney or skin grafts taken from another person (allografts). It also protects the body from its own cells which have become cancerous.

[1+1]

11. When a nature is over-exploited by man for the natural resources such as food and shelter, many species become extinct in the process eg. Steller's Sea Cow, passenger pigeon etc. many marine fishes are over harvested, endangered the continued existence of some commercially important species. [2]

12.

(i) Test Tube Baby : In the method, ova from the wife or a donor female and the sperms from the husband or a donor are allowed to fuse under stimulated conditions in the laboratory it is called in vitro fertilisation (IVF).

(ii) Gamete Intra Fallopian Transfer-(GIFT) : This method involves the transfer of an ovum collected from a donor female into another female who cannot produce ova, but can provide suitable conditions for fertilisation and further development of the foetus upto parturition. [1+1]

13. Micropropagation is the method of producing thousands of plants through tissue culture in short duration. Each of these plants are genetically similar to the original plant from which explant was taken *i.e.*, they are called somaclones.

Somatic hybrids are the plants which are formed by the fusion of protoplast of somatic cells derived from two different varieties or species of plants. [1+1]

14. (i) The ligated DNA is introduced into the recipient cells. The recipient cells make them competent to receive and take up DNA present.
(ii) The recipient cells made competent by treating them with a specific concentration of calcium, that increases the efficiency with which DNA enters the cell through the pores in its cell wall.
(iii) Recombinant DNA can then be forced into such cells by incubating the cells with recombinant DNA on ice followed by placing them at 42°C and then putting them back on ice.
(iv) Microinjection is a method in which the

recombinant DNA is directly injected into the nucleus of the animal cell with the help of microneedles desired pathogens are used as vectors, when they are as vectors, when they are allowed to infect the cell, they transfer the recombinant DNA into the host. [2]

- 15.** Transformation of normal cells into cancerous cells is induced by carcinogens. Carcinogens are those physical, chemical and biological agents which bring about uncontrolled proliferation of cells (cancer). Continuous cell division in cancerous cells gives rise to masses of cells called tumours and these tumour viruses are called viral oncogenes.

Several genes called cellular oncogenes or protooncogenes have been identified in normal cells which when activated under certain conditions, change into oncogenes to replicate rapidly which transform the normal cells to cancerous cells causing malignant tumours.

[1+1]

16.

	Euchromatin	Heterochromatin
(i)	They are loosely packed and light stained chromatin.	They are densely packed, darkly stained chromatin.
(ii)	These chromatin are transcriptionally active.	These chromatin are transcriptionally inactive.

[1+1]

- 17.** (a) Fossils are the remains and/or impressions of organisms that lived in the remote past.
 (b) Fossils found in the rocks support organic evolution. Rocks are formed by sedimentation and a cross-section of the earth's crust indicates the arrangement of the sediments one over the other during the long history of earth. Different sediments (of different ages) contain different life forms which probably died during the formation of the particular sediment. [$\frac{1}{2}+1\frac{1}{2}$]

- 18.** (a) Parasitism.
 (b) Commensalism.
 (c) Parasitism.
 (d) Mutualism.

[$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$]

19. Significance of seed and fruit formation in flowering plants

- (i) helps to peremate unfavourable period.
 (ii) remains viable for several years.
 (iii) seeds (in fruit) possess special structures for dispersal, thus helping in introducing the species into new areas.
 (iv) due to low water contents seeds can be stored for consumption by animals and man.
 (v) Seed banks have been established for genetic conservation of plants. [3]

- 20.** Thalassaemia is a group of inherited autosomal recessive blood disorders that originated in the Mediterranean region. In thalassaemia the genetic defect, which could be either mutation or deletion, result in reduced rate of synthesis or no synthesis of one of the globin chains that make up haemoglobin. The thalassaemia is classified according to which chain of the haemoglobin molecule is affected. In α thalassaemia, production of α globin chain is affected, while in β thalassaemia production of the β globin chain is affected. [3]

- 21.** Sex determining mechanism in humans is XY type. Out of 23 pairs of chromosomes, present 22 are autosomes. A pair of X-chromosomes are present in females, whereas the presence of an X and Y chromosome are in males. During spermatogenesis among males, two types of gametes are produced.

50 percent of the total sperm produced, carry X-chromosome and the rest 50 percent has Y chromosome. In case the ovum fertilizes with sperm carrying X-chromosomes the zygote develops into female (XX) and with Y chromosomes results into male (XY) offspring. [3]

- 22.** Climax community is the stable, self perpetuating and final biotic community that developed at the end of biotic succession and is in perfect harmony with the physical environment.

The various biotic communities that developed during the biotic succession are termed as seral or transitional communities. The entire sequence of development stages of biotic succession from pioneer to a climax community is known as sere. The series of development stages of biotic succession in an arid area is termed as xerosere and succession taking place in water is termed as hydrosere. [1+2]

- 23.** Recombinant DNA (rDNA) is the DNA formed by combining DNA from two different organism.

The features of recombinant DNA are :

- (i) Isolation of DNA.
 (ii) Fragmentation of DNA by restriction endonuclease.
 (iii) Isolation of the desired DNA fragment.
 (iv) Amplification of gene of Interest.
 (v) Ligation of the DNA fragment into a vector using DNA ligase.
 (vi) Transfer of recombinant DNA into host.
 (viii) Culturing the host cells on a suitable host. Restriction endonuclease cut the DNA at specific position any where in its length. Each restriction endonuclease functions by

inspecting the length of a DNA sequence and binds to the DNA at the recognition sequence, the DNA fragments yield same kind of 'sticky ends' which can be joined end-to-end by DNA ligase. **[1+2]**

- 24. Out-crossing :** Out-crossing is the practice of mating of animals of the same breed, but have no common ancestors on either side of their pedigree upto 4-6 generations. The offspring of outcrossing is called an outcross. A single outcross helps to overcome inbreeding depression. It is the best breeding method for animals that are below average in productivity and growth rate.

Cross-breeding : It is a method of outbreeding in which superior males of one breed are mated with the superior females of another breed of the same species. This helps in combining the desirable qualities of the two different breeds into the progeny. The hybrid progeny may be directly used for commercial production or they may be subjected to some form of inbreeding and selection, to develop new stable breeds. One example of cross-breeding is hisardale, a new breed of sheep developed by crossing Bikaneri ewes and Marino rams.

[1½+1½]

25.

Logistic/Sigmoid Growth Curve

Every environment/habitat has resources to support a particular maximum number of individuals, called its carrying capacity, beyond this there is no increase in the size/density of a population.

Logistic growth is described by the equation,

$$dN/dt = rN \left(\frac{K-N}{K} \right), \text{ where}$$

N = Population density at time t

r = Intrinsic rate of natural increase

k = Carrying capacity

This growth model is more realistic in nature because no population can sustain exponential growth indefinitely, as there will be completion for the basic needs. **[3]**

- 26.** Bee-keeping is relatively easy and requires the following considerations :
- Knowledge of the nature and habits of bees.
 - Selection of suitable location of keeping beehives.
 - Catching and hiving of swarms.
 - Management of beehives during different seasons.
 - Handling and collection of honey and beewax.

Apiculture economically beneficial because :

- Honey bees are mainly maintained for the production of honey and bee wax.
- Honey is used as food of high nutritive value and medicine in Ayurveda.
- Bee wax is used in industry for the preparation of cosmetics and polishes.
- Bees are the pollinators of many crop plants and hence keeping beehives in crop fields during flowering seasons increases pollination efficiency and thereby improves the yield.

[1½+1½]

- 27.** (a) The BOD of sewage or waste is reduced significantly, the effluent is then passed into a settling tank where the bacterial 'flocs' are allowed to sediment. This sediment is called activated sludge.
- (b) A small part of the activated sludge is pumped back into aerated tanks to serve as they inoculum. The remaining major part of the sludge is pumped into a large tanks called anaerobic bacteria or sludge digesters. During this digestion bacteria produce a mixture of gases such as methane hydrogen sulphide and carbon dioxide. These gas from biogas and can be used as source of energy as it is inflammable.

[1+2]

- 28. (a) El Nino effect :** El Nino is a sever atmospheric and oceanic disturbance in the Pacific ocean that occurs every seven to fourteen years. It is called Ek Nino, meaning "the Child" because it usually appears near the Christmas season. Warm surface water flow from the central Pacific towards eastern pacific. So that El Nino is this geoengineering study focussed on-also because El Nino are actually thought to be potentially more damaging on global scale, as they may cause floods and mudslides in Latin America, but also month-long drought in Southeast Asia and Australia-through man-lit Borneo forest fires also causing environmental damage with increase CO₂ emission and biodiversity loss.

(b) These are the three measures that we as an individual would take, to reduce environment pollution :

- Electostatic precipitator :** It is the most widely used method for removal of particulate matter, about 99% of particulate pollutants are removed from the exhaust of thermal power plant.
- Scrubber :** Water dissolves the gases and lime reacts with sulphur dioxide to from a precipitate of calcium sulphate or sulphite.
- Catalytic converters :** As the exhaust passes through the catalytic converter, unburnt

hydro-carbons are converted into carbon dioxide and water, carbon monoxide and nitric oxide are changed into carbon dioxide and nitrogen gas respectively. **[2+3=5]**

29. (a) Double Fertilization : The pollen tube releases the two male gametes into the cytoplasm of an embryo sac.

One of the male gametes moves towards the egg cell and fuses with it, this fusion is called syngamy and it results in the formation of a diploid cell, the zygote, that later develops into the embryo.

The second male gamete fuses with the secondary nucleus (formed by fusion of two polar nuclei) in the central cell to form a triploid primary endosperm nucleus (PEN); this fusion is called triple fusion, as three haploid nuclei are involved in the fusion.

Since two fusions, syngamy and triple fusion occur in an embryo sac, the phenomenon is known as double fertilization and it is unique to angiosperm. The central cell with the primary endosperm nucleus is now called as primary endosperm cell (PEC) and develops into the endosperm.

(b) (i) The Integuments of the matured ovule forms the seed coat of the seed. Outer

integument forms testa and inner integument forms tegmen.

(ii) Micropyle is a small opening found on the seed coat.

(iii) The cotyledons are generally thick and swollen with food material.

(iv) The embryonal axis has hypocotyl and radicle on its lower end and epicotyl and plumule on its upper end. **[3+2]**

30. (i) Organic farming is a cyclical, zero-waste procedure, where waste products from one process are cycled in as nutrients for other processes.

(ii) Bee-keeping helps him in the production of honey and bee waxes, which are of commercial use. Dairy management enhances the production of milk and the dung of the cattle is used as manure. Water harvesting helps in the conservation of water, used for different purposes.

(iii) Cattle excreta can be used as manure. Decayed crops, vegetable peels, organic matter are decomposed by microbes to form compost. Some microbes like bacteria, cyanobacteria or fungi are also used as biofertilizers. **[1+3+1]**

●●