Q&A

WORK BOOK CUM QUESTION BANK WITH ANSWERS

BOTANY

CLASS - XII

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

Work Book
cum
Question Bank with Answers

BOTANY

CLASS-XII

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

2020

FOREWORD

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

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

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

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

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

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

PREFACE

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

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

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

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

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

BOTANY

Theory	:	35 marks
Practical	:	15 marks
Total	**:**	**50 marks**

Group - A : Objective Type Compulsory

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

Group - B : Short Answer Type

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

Group - C : Long Answr Type

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

TOTAL **35 marks**

BOTANY (2nd Year) Syllabus

I. Reproduction

(a) **Reproduction in organism :** Reproduction, a characteristic feature of all organisms for continuation of species; Modes of reproduction – Asexual and Sexual; Asexual reproduction; Modes – Binary fission, sporulation, budding, gemmule formation, fragmentation; vegetative propagation in plants.

Sexual reproduction in flowering plants : Flower structure; Development of male and female gametophytes; Pollination-types, agencies and examples; Outbreeding devices; Pollen-Pistil interaction; Double fertilization; Post fertilization events Development of endosperm and embryo, Development of seed and formation of fruit; Special modes-apomixis, parthenocarpy, polyembryony; Significance pf seed and fruit formation.

II. Genetics and Evolution

(a) **Heredity and Variation :** Mendelian Inheritance; Deviations from Mendelism-Incomplete dominance, Co-dominance, Multiple alleles and Inheritance of blood groups, Pleiotropy; Elementary idea of polygenic inheritance; Chromosome theory of inheritance; Chromosomes and genes; Linkage and crossing over.

(c) **Molecular Basis of Inheritance :** Search for genetic material and DNA as genetic material; Structure of DNA and RNA; DNA packaging; DNA replication; Central dogma; Transcription, Genetic code, Translation; Gene expression and regulation – Lac Operon; Genome and human genome project; DNA finger printing.

III. Biology and Human Welfare

(b) **Improvement in food production :** Plant breeding, tissue culture, single cell protein, Biofortification.

(c) **Microbes in human welfare :** In household food processing, industrial production, sewage treatment, energy generation and as biocontrol agents and biofertilizers.

V. Ecology and environment

(a) **Organisms and environment :** Organisms and environment : Habitat and niche; Population and ecological adaptations; population interactions-mutualism, competition, predation, parasitism; Population attributes-growth, birth rate and death rate, age distribution.

(b) **Ecosystems :** Patterns, components; productivity and decomposition; Energy flow; Pyramids of number, biomass, energy; Nutrient cycling (carbon and phosphorous); Ecological succession; Ecological Services – Carbon fixation; pollination, oxygen release.

(c) **Biodiversity and its conservation :** concept of Biodiversity; Patterns of Biodiversity; Importance of Biodiversity; Loss of Biodiversity, conservation; Hotspots, endangered organisms, extinction, Red Data Book; Biosphere reserves, National parks and Sanctuaries.

Environmental Issues : Air pollution and its control; Water pollution and its control; agrochemicals and their effects; Solid waste management; Radioactive waste management; Greenhouse effect and global warming; Ozone depletion; Deforestation; Any three case studies as success stories addressing environmental issues.

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

CHSE QUESTION PAPERS WITH ANSWERS

2019 to 2017

2019 (A)

Time : 1$^{1}/_{2}$ hours ***Full Marks : 35***

The figures in the right-hand margin indicate marks.

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

Illustrate your answers with labelled diagrams and examples wherever necessary

Group - A

1. Fill in the blanks selecting the appropriate terms given under cash bit : [1x5=5]

(a) The example of start codon is _____.
(i) UAA (ii) UGA
(iii) UAG (iv) AUG

(b) The phenomenon of single gene contributing to multiple phenotypic traits is called _____.
(i) pleiotropy
(ii) codominance
(iii) incomplete dominance
(iv) polygenic inheritance

(c) Fermentation of milk sugar, _____ is done by Lactobacillus.
(i) glucose (ii) fructose
(iii) sucrose (iv) lactose

(d) The most common and abundant green-house gas is _____.
(i) methane (ii) CFC
(iii) carbon dioxide (iv) nitrous oxide

(e) Nocturnal flowers like Nyctanthes attract insects by their _____.
(i) colour (b) nectar
(iii) scent (d) edible sap

2. Correct the statement of each bit, if necessary, by changing the underlined word only : [1x5=5]

(a) Nutritive tissue of a fertilized egg in angiosperms is <u>embryo</u>.

(b) Mutation that completely eliminates a gene is called <u>silent</u> mutation.

(c) In tissue culture, amorphous mass of thin-walled parenchymatous cells developing from proliferating cells is called <u>explant</u>.

(d) <u>Carnivores</u> are always primary consumers.

(e) Yeasts generally reproduce asexually by <u>fission.</u>

Group - B

3. Write notes on any *three* of the following, each with 2 to 3 important points : [2$^{1}/_{2}$ x 3 =7$^{1}/_{2}$]

(a) Single-cell protein
(b) tRNA
(c) Ecological pyramid
(d) Population density atributes
(e) Sporulation
(f) Outbreeding devices

4. Differentiate between any *one* pair of the following with 3 to 4 important points :[3$^{1}/_{2}$]

(a) Somatic embryogenesis and Somatic hybridization
(b) Parthenocarpy and Parthenogenesis
(c) Habitat and Niche

Group - C

Answer any *two* questions, each within 200 words : [7x2=14]

5. Describe the structure of DNA molecule as per the model proposed by Watson and Crick.

6. Discuss how wastewater treatment can be done.

7. Give the structure of a typical pollen grain and its pre and post-pollination changes.

8. Describe the process of DNA replication.

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ANSWERS 2019 (A)

Group - A

1. (a) (iv) AUG
   (b) (i) Pleitropy
   (c) (iv) Lactose
   (d) (iii) Carbon dioxide
   (e) (iii) Scent
2. (a) Endosperm
   (b) Null
   (c) Callus
   (d) Herbivores
   (e) Budding

Group - B

3.(a) **Single Cell Protein -**

(i) Single Cell Protein refers to any microbial biomass obtained from uni or multicellular organisms such as algae, fungi, bacteria which can be food or feed additive.

(ii) This method of obtaining protein from biomass of microbes is advantageous because they multiply in fast pace, have high protein content is independent of climatic and seasonal hazards etc.

(b) **tRNA -**

(i) It is the smallest form of RNA made of 75 to 100 nucleotides.

(ii) It transfers amino acids from Cytoplasm to ribosomes dduring protein synthesis.

(iii) Holley proposed the detailed structure of clover leaf model which consists of 3 loops and a lump.

(c) **Ecological pyramid -**

(i) Ecological pyramids are diagrams of data representing the standing crop at each trophic level.

(ii) English ecologist coined the term pyramid of numbers of different stages of a food chain commonly observed in a field.

(iii) Pyramid of numbers explains the relative numbers of organisms at each trophic level - producers, herbivores and carnivore. Like wise pyramid of biomass, pyramid of energy have been developed.

(d) **Population density attributes -**

(i) The population density means the size in relation to unit space at a particular time.

(ii) The size of the population can be measred in several ways - such as, abundance (absolute number of population), numerial density (the number of individuals per unit area) and biomass density (biomas per unit area).

(iii) Density of a species population can be expressed with reference to total area (i.e. crude density) or with reference to actual area of habitat available to the species (ecological density).

(e) **Sporulation -**

(i) This is a general method of asexual reproduction is organisms like algae and fungi.

(ii) In the process of sporulation asexual reproductive units are borne inside the specialized organs like sporangia.

(iii) This process takes place under suitable conditions of environment in actively growing parts of the organisms.

(f) **Out breeding devices -** Self pollination for successive generations affects the progeny negatively and causes inbreeding depression.

(ii) Therefore, nature has provided certain adaptations or devices to promote cross pollination in order to form healthier offsprings.

(iii) Out breeding is phenomenon where individuals within a species tend to breed with others which are neither close relatives nor have distant genetic relation but a middle position of both.

4.(a) Somatic embryogenesis and Somatic hybridization

Somatic embryogenesis	Somatic hybridization
(i) This is a process of inducing embryo from somatic cells of cultured plant. These are known as embryoids.	(i) In protoplast technology, from any two genotypically different plants, protoplasts are isolated from somatic cells and fused to firm hybrid protoplasts.
(ii) Two different media such as one having auxin and other with no auxin or reduced amounts of it, are required in the culture.	(ii) These fused protoplasts are grown in vitro to obtain a hybrid plant.
(iii) Embryonic cells pass through 3 stages of development, e.g. globular, heart shaped and torpedo shaped to from embryoids.	(iii) Thus, in vitro fusion of plant protoplasts derived either from somatic cells of same plant or two genetically different plants is called somatic hybridization.

(b) Parthenocarpy and Parthenogenesis

Parthenocarpy	Parthenogenesis
(i) Parthenocarpy is a phenomenon in which there is development of fruit from unifertilized egg of the flower.	(i) Panthenogenesis is the process of development of female gamete (ovule) into new individual plant without fertilization.
(ii) It results in the development of seedless fruits.	(ii) This is a type of apomixis where megaspere mother cell after undergoing meiosis produces female gametes.
(iii) Parthenocarpic fruits are normally formed in many cultivated plants such as banana, citms, grapes etc.	(iii) These female gametes can directly develop into new plants wihtout the process of sexual fusion.

(c) Habitat and Niche

Habitat	Niche
(i) Habitat is a natural abode or locality where an organism grows.	(i) Each organism plays a particular role in its surrounding.
(ii) Based on environment, the dfferences in vegetation and species of different habitats are observed.	(ii) Niche is the role a species plays in the ecosystem, i.e. the role of the organism in flow of energy and nutrient cycling.

Group - C

5. **Structure of DNA molecule**

Main points.

(i) DNA is deoxyribonucleic acid. This is a polynulceotide.

(ii) Occurs in nucleus, also in the chloroplasts and mitochondria.

(iii) DNA double helix - Watson & Crick's model.

(iv) Diagram (labelled).

(v) Bonding of double helix and other peculiarits.

6. Waste water treatment

(i) What is waste water, sewage, industrial effluents and agricultural run off.

(ii) Primary, secondary & tertiary treatment.

(iii) Primary treatment - Sedimentation - aerobic and anaerobic process.

(iv) Secondary treatment - biological.

(v) Tertiary treatment - disinfection.

7. Pollen grain structure and its pre & post pollination changes

(i) Structure of pollen grain or microspore.

(ii) Pre pollination changes - 2 celled stage.

(iii) Post pollination changes.

(iv) Diagram (labelled)

8. DNA replication

(i) Semi conservative

(ii) Opening of DNA double helix and separation of DNA strands.

(iii) Priming of template strand

(iv) Assembly of the new DNA segment.

3 steps of replication are

(a) initiation

(b) elongation

(c) termination

(d) Diagram (labelled)

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2018 (A)

Time : 1$^1/_2$ hours ***Full Marks : 35***

The figures in the right-hand margin indicate marks.

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

Illustrate your answers with labelled diagrams and examples wherever necessary

Group - A

1. Fill in the blanks selecting the appropraite terms given under each bit : [1x5=5]

(a) When propagating units like seeds andspores enter a barren area to initiate the process of succession, it is called _____.
(i) nudation (ii) reaction
(iii) ecesis (iv) migration

(b) The process by which section is inserted successfully into the stock to form a new plant is called _____.
(i) layering (ii) cutting
(iii) grafting (iv) budding

(c) In _____, pollen tube enters through micropyle into the ovule.
(i) porogamy (ii) chalazogamy
(iii) mesogamy (iv) herkogamy

(d) If allele for tallness (TT) is dominant and dwarfness (tt) is recessive, then in a cross between _____, 50% of the offsprings will be dwarf.
(i) TT x tt (ii) Tt x tt
(iii) tt x tt (iv) Tt x Tt

(e) In secondary treatment of sewage in open bioreactors, the microorganisms grow and multiply to form _____.
(i) manure (ii) compost
(iii) sludge (iv) sediment

2. Correct the statements of each bit, if necessary, by changing the underlined words only : [1x5=5]

(a) The outer sterile tissue that provides nourishment to the developing microspores in microsporogenesis is called endothecium.

(b) The number of deaths taking place in a particular population in unit time is called natality.

(c) Excessive nourishment that causes algal bloom is known as biomagnification.

(d) naked plant cell without cell wall is called plasmalemma.

(e) The complementary base of adenine in RNA moleclue is thymine.

Group - B

3. Write notes on any three of the following, each with 2 to 3 important points. [2$^1/_2$ x 3 =7$^1/_2$]

(a) Biodiversity hot spots
(b) Operon concept
(c) Food chain
(d) Codominance
(e) Biofortification
(f) Alcoholic beverages

4. Differentiate between any two pairs of the following, each with 2 to 3 important points. [3$^1/_2$]

(a) Nuclear endosperm and Cellular endosperm
(b) Genetic diversity and Species diversity
(c) Explant and Callus

Group - C

Answer any two questions, each within 200 words : [7x2=14]

5. Discuss Mendel's dihybrid cross with checkerboard.

6. Give an account of development of female gametphyte of angiosperms.

7. Describe the initiation step of translation in prokaryotes.

8. Give an account of secondary air pollutants.

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ANSWERS - 2018 (A)

GROUP - A

1. (a) (iv) Migration
   (b) (iii) grafting
   (c) (i) porogamy
   (d) (ii) Tt x tt
   (e) (iii) sludge

2. (a) tapetum
   (b) Mortality
   (c) Eutrophication
   (d) protoplast
   (e) uracil

GROUP - B

3.(a) **Biodiversity hotspot -**

(i) It is a biogeographic region i.e. is the significant storehouse of biodiversity and that is threatened with destruction.

(ii) Along with great biodiversity, these areas have high level of endemism.

(iii) The Himalyas, the Western Ghats, the Indo-Burma region and the Sundaland regions of India hosts 4 biodiversity hotspots.

(b) **Operon concept -**

(i) An operon is a unit of coordinated control of gene expresson in bacteria (prokaryote) including the structural genes and the controlling sequences on DNA recognised by regulator gene product.

(ii) An operon consists of the following genes.
   (a) Regulatory gene
   (b) Promoter gene
   (c) Operator gene, and
   (d) Structural genes.

(c) **Food chain -**

(i) Feeding relationship among the organisms in an ecosystem forms food chain.

(ii) here, the transfer of energy and flow of nutrients starts from producers, ends with top carnivores on the basis of feeding and being fed relationship.

(iii) Each stage of food chain is called trophic level.

(d) **Codominance -**

(i) In this case both alleles of a gene pair in a heterozygote express themselves independently even when present together. Neither of the allele are dominant or recessive of the other.

(ii) In co-dominance a cross between homogygous red flowered plant and homozygous white flowered plant will produce heterozygote offsprings. (in F1 generation) which produce flowers with distinct red and white spots.

(iii) When F_1 generation plants are self pollinated the phenotypic and genotypic ratio of F_2 generation will be 1 : 2 : 1 (Red : spotted : white).

(e) **Biofortification -**

(i) Biofortification aims at adopting strategies by crop breeders so that there will be enhanced availability of minerals and vitamins to people from their staple food crops.

(ii) Breeders identify the varieties with high amount of micronutrients and manipulate it in such a way that the developed biofortified crop lines can be grown and marketed by the farmers and consumed by the people e.g. Biofortified maize with β-carotene traits which can supplement vitamin A deficiency.

(f) **Alcoholic beverages -**

(i) Fermented alcoholic beverages are produced throughout the world from a variety of plant product containing utilizable carbohydrates.

(ii) Sugars from fruit or starch and polysaccharides from grains are major souces of fermentable sugars.

(iii) Yeast like *saccharomyces cerevisiae, s. uvarum, s. carlbergensis, Candida brassicae. C. utilis* and bacteria (zymononas mobilis) have been employed for ethanol production in industries. The process of alcohol production is known as brewing.

4.(a) Nuclear endosperm and Cellular endosperm

Nuclear endosperm	Cellular endosperm
(i) Primary enosperm nucleus divides repeatedly without cell plate formation forming a multinucleate structure.	(i) Wall formation takes plae after every division of the primary endosperm nucleus.
(ii) Wall-formation takes place at a later stage. It starts from periphery towards centre i.e. centripetal. Still central portion remains free nucleate.	(ii) As a result endosperm is cellular from the beginning.

(b) Genetic diversity and Species diversity

Genetic diversity	Species diversity
(i) Genetic diversity is defined as variation in the genetic composition of individuals within or among species.	(i) Species diversity pertains to the variety of species present in any ecosystem, thus reveals species richness of an area.
(ii) It is related to number of genes and their alleles found in organisms.	(ii) It is related to number and distribution of species found in an area.
(iii) It is the characteristic feature of the species.	(iii) It is the characteristic feature of the community.

(c) Explant and Callus

Explant	Callus
(i) Explant is a plant part that is excised from its original location and is used for initiating a culture.	(i) A callus is an amorphous unorganised mass of (parenchymatous) cells developed from proliferating cells of plant tissue.
(ii) Explant is used for tissue culture. Parenchyma from stems, rhizomes, tubers, roots respond quickly to culture condition.	(ii) A cellus has the biological potential to form normal root, shoot and ultimately forming a plant.

Group - C

5. Dihybrid Cross

(i) Two pairs of contrasting characters tallen.

(ii) Parental generation - hybridized

(iii) F_1 generation, selfing - 16 types of progeny with ratio 9 : 3 : 3 : 1.

(iv) Checker board.

6. Development of female gametophy

(i) The lowermost cell of megaspore tetrad function as female gamete in the nucellus.

(ii) Development of embryo sac and division involved in it.

(iii) Matured embryo sac.

(iv) Diagram (labelled).

7. Initiation step of translation

Translation of mRNA molecule by ribosome occurs in 3 steps - initiation, elongation and fermentation.

Initiation - requirements.

(i) mRNA

(ii) 30s submit of ribosome

(iii) firmyl methionyl tRNA (f^{met} - $tRNA^{met}$)

(iv) initiation factors IF-1, IF-2 & IF-3

(v) GTP

(vi) 50S ribosoal submit &

(vii) mg^{2+}

All these factors act in stepwise manner to complete the initiation process.

8. Secondary pollutants

Secondary pollutants are not liberated directly from the source. They are produced as a result of interaction between primary pollutants and other environmental factors. They are -

(i) Tropospheric Ozone

(ii) PAN

(iii) Photochemical

(iv) Acid rains

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2017 (A)

Time : 1 1/2 hours ***Full Marks : 35***

The figures in the right-hand margin indicate marks.

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

Illustrate your answers with labelled diagrams and examples wherever necessary

Group - A

1. Fill in the blanks selecting the appropraite terms given under each bit : [1x5=5]

(a) Decomposers are generally _____.
- (i) green plants
- (ii) phytoplanktons
- (iii) insects
- (iv) microorganisms

(b) In curd making, _____ is useful in coagulation of milk protein.
- (i) Penicilluim (ii) Lactobacillus
- (iii) Saccharomyces (iv) Aspergillus

(c) Kranz anatomy is seen in _____ plants.
- (i) CAM (ii) submerged
- (iii) C_3 (iv) C_4

(d) A degenerative process when functional activities of an organism slow down is called _____.
- (i) seismonasty (ii) nutation
- (iii) abscission (iv) senescence

(e) The root nodules seen in the leguminous plants have a red pigment called _____.
- (i) hemoglobin
- (ii) leghemoglobin
- (iii) phycocyanin
- (iv) chromoplast

2. Correct the statements of each bit, if necessary, by changing the underlined words only : [1x4=4]

(a) In C_4 plants, the first stable product of carbon dioxide fixation in mesophyll cells is <u>3-PGA</u>.

(b) <u>Griffith</u> coined the term 'gene' for Mendelian factor.

(c) When sucrose is dissolved in water, its water potential <u>decreases</u>.

(d) An unorganized mass of cells formed during tissue culture is called <u>explant</u>.

Group - B

3. Write notes on any four of the following, each with 2 to 3 important points :[2x4=8]

(a) Law of segregation
(b) Split genes
(c) Ecosystem
(d) Biofertilizers
(e) Alcoholic fermentation
(f) Hybridization
(g) Viviparous germination

4. Differentiate between any two pairs of the following, each with 2 to 3 important points. [3x2=6]

(a) Parasite and Saprophyte
(b) Phototropism and Geotropism
(c) Micronutrients and Macronutrients
(d) Cybrid and Hybrid

Group - C

Answer any two of the following : [6x2=12]

5. Give an account of the physiological effects of auxins in plants.

6. Describe transcription in prokaryotic organisms.

7. Describe the reaction steps of Krebs cycle.

8. Discuss the transpirational pull and cohesion-tension theory of ascent of sap.

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ANSWERS 2017 (A)

Group - A

1. (a) (iv) Microorganisms
   (b) (ii) Lactobacillus
   (c) (iv) C_4
   (d) (iv) Senescence
   (e) (ii) Leghemoglobin
2. (a) OAA - Oxaloacetate
   (b) Johannsen
   (c) The statement is correct
   (d) Callus

Group - B

3.(a) **Law of Segregation :**

(i) In a diploid organism, two factors of a given character remain together without mixing and keeping their identity distinct. These are called alleles.

(ii) At the time of gamete formation, two factors segregate and a gamete receives one of the two factors randomly.

(iii) As the gamete receives only on allele of a character the gamete is said to be pure.

(b) **Split genes :**

(i) Most eukaryotic chromosomes contain a large number of genes which carry specific characters.

(ii) However, there are specific sequence which does carry any character and are called introns.

(iii) The coding or translatable sequences are known as exons.

(iv) Such sequences of genes are in a chromosome are called split genes or interrupted genes.

(c) **Ecosystem :**

(i) Ecosystem comprises of structural and functional units of living organisms and nonliving substances.

(ii) Both interact to produce an exchange of materials and transfer of energy.

(iii) Living organisms that comprises ecosystem are broadly producers, consumers and decomposers.

(iv) The nonliving components are light, air, water, nutrients and the like.

(d) **Biofertilizers :**

(i) Certain soil microbes can trap the inert atmospheric nitrogen and convert it to biologically active products like nitrates.

(ii) Similarly phosphate solubilizing bacteria cn convert insoluble phosophates into assimilable form of living organisms particularly plants.

(iii) These biologically active products are called biofertilizers.

(iv) Particularly, free living bacteria like Acetobacter Clostridium, and cyanobacteria can take part in the formation of biofertilizers.

(e) **Alcoholic fermentation :**

(i) In the absence of oxygen, yeasts, some bacteria and even green plants undergo incomplete oxidation of carbon compounds to produce ethanol and much less amount of ATP tha that produced during aerobic respiration.

$$C_6H_{12}O_6 \xrightarrow[\text{Enzyme}]{\text{Yeasts}} 2C_2H_5OH + 2CO_2 + 2ATP$$

Alcholic fermenlation

(ii) This process like glycolysis takes place in the cytosol.

(iii) All the reaction steps of glycolysis when glucose is taken as substrate take place in alcoholic fermentation.

(iv) But pyruvic acid, instead of being subjected to TCA Cycle, acted upon by the enzyme pyruvate dehydrogenase to produce alcohol and carbon dioxide.

(f) **Hybridization**

(i) It involves crossing of two genetically different individuals so as to combine desirable characters to obtain improved offsprings.

(ii) High yielding, disease resistant, greater nutrient and food value, bether taste etc. are in corporated in the offspring by this process.

(iii) Different methods like emasculation, bagging, artificial pollination are adopted in hybridization.

(g) **Out of syllabus.**

4. **(a) Parasite and Saprophyte :**

Parasite

(i) Parasite are organisms which live at the cost of the other.

(ii) Several fungi, bacteria, protozoans, insect pests act as parasities. All viruses are parasites.

(iii) Parasites are causative agents of many diseases.

Saprophyte

(i) Saprophyte live on dead, decaying organic media.

(ii) Saprophytes are otherwise called as decomposers. The complex organic substances are broken down into simple components by them.

(iii) Many micro-organisms like fungi, bacteria are saprophytes.

(b) Out of syllabus

(c) Out of syllabus

(d) Cybrid and Hybrid :

Cybrid

(i) When protoplasts of two different cell lines fuse and out of the resulting 2 nuclei, one degenerates, then it is called cybrid.

(ii) Since one of the nuclei degeneatres, the offsprings may have similarity with one of the parents.

Hybrid

(i) When after fusion of protoplasts of 2 cell lines resultant 2 nuclei fuse, the product is called somatic hybrid.

(ii) But here, two nuclei merge to form a new individual different from parents.

(h) **Micropropagation :**

(i) This is a method of vetetative propagation.

(ii) It is carried out in aseptic conditions and requires artificial nutrient medium.

(iii) A small plant cutting called explant is inoculated into a vessel containing semisolid nutrient medium at room temperature.

(iv) In a short time, a number of axillary buds ae produced which can be separated and cultured separately to complete the process of micro propagation.

***

GROUP - A

OBJECTIVE TYPE QUESTIONS

I. Fill in the Blanks

REPRODUCTION IN ORGANISMS

1. In sexual reproduction, the specialized sexual reproductive units are called _____.
2. In the sexual reproduction, the fusion products of the reproductive units are called _____.
3. Endogenously borne motile asexual reproductive units are known as _____.
4. In lower plants, when vegetative cells by accidental breakage reproduce vegetatively, it is called _____.
5. Bacteria when, asexually reproduce by dividing into two identical cells, then the process is knows as _____.
6. Yeasts generally reproduce asexually by _____ method.
7. Exogenously borne nonmotile asexual reproductive units of fungi are known as _____.
8. In grafting, the detached plant part is called _____.
9. In the grafting method, the rooted plant to which the detached plant part is joined is called _____.
10. In micropropagation method, the small plant cuttings which are inoculated to nutrient medium is known as _____.
11. The zoospore are borne inside the sac like structures called _____.
12. In *Bryophyllum*, the adventitious buds are borne on _____.

SEXUAL REPRODUCTION IN FLOWERING PLANTS

1. In flowering plants, the haploid male and feamle gametes fuse to form the diploid plant body called _____.
2. The plant body of flowering plants are sporophytes which bear reproductive organs, called _____ and gametophytes are borne in it.
3. Microsporangia are borne in _____ part of stamens.
4. Pollen grains are the first cells of _____ gametophyte.
5. Megaspore _____ cells are the last cells of sporophytic generation.
6. Embryo sac is the developed female _____ of flowering plants.
7. In flowering plants, ovules develop into _____ and _____ developes in fruit.
8. Hypodermal cells from which microspore initials develop are called _____ cells.
9. Anther wall layer that helps in dehiscencc of microspores is called _____.
10. The innermost layer of anther wall which helps in the nourishment of developing pollens is known as _____.
11. The main component of exine of microspore wall is _____.
12. In insect pollinated flowers, exine is covered by yellowish, viscous and sticky substance called _____.
13. Normally pollination takes place at _____ celled stage.
14. At the time of fertilization, two male _____ produced at the tip of the pollen tube.
15. Main body of the ovule is _____.
16. Ovules can be known as _____.
17. Normally, embryo sac is 7 celled and _____ nucleated structure.
18. Unicellular zygote of flowering plants develops into multicellular _____.

19. One male gamete fuses with the egg cell of embryo sac in the process called _____ fertilization.
20. As a result of _____ fusion, primary endosperm cell is formed.
21. Polar nuclei fuse to form _____ nucleus.
22. In _____ flowers, anthers and stigma mature at the same time.
23. Self pollinating closed bisexual flowers are _____.
24. When stamens and carpels of the same flowr mature at different times to effect cross pollination, then it is _____ condition.
25. Conspicuous colour, nectar and _____ attract the inscts to effect pollination.
26. Normally, aquatic plants pollinated in water and thus, it is called _____.
27. When incompatibility is due to the _____ of sporophyte, it is sporophytic incompatibility.
28. After pollination, pollen germinates on _____ of the carpels.
29. When pollen tube enters through the micropyle of the ovule, it is called _____.
30. When pollen tube does not enter not through micropyle and chalaza, but by penetrating integuments, it is called _____.
31. Endosperm persists in _____ seeds.
32. Endosperm is totally absent in _____.
33. In general grains, aleurone layer is made of _____.
34. Recurrent agamospermy may be called _____.
35. When embryo is formed from haploid egg cell it is called nonrecurrent agamospermy or haploid _____.
36. When fruit develops from unfertilized eggs, it is called _____.
37. Free nuclear divisions take place in _____ indosperm.
38. In _____ endosperm, the first division in cellular and subsequent division are free nuclear.
39. Formation of more than one embryo inside the ovule is called _____.
40. When female gametes develop into a new organism, it is known as _____.
41. When fruit development takes place from other than ovary, it is called _____ furits.
42. Seed coat development takes place from _____ of ovule.
43. Panthenogenesis means development of fruit without _____.
44. The outer wall of pollen grains is called _____.
45. In some mature seeds, the residual nucellus persists after being consumed by embryo and it is called _____.

HEREDITY AND VARIATION

1. Mendel is known as father of _____.
2. The science of heredity and _____ is known as genetics.
3. Mendel used garden _____ plants in his experiments.
4. In the year _____, Mendel presented his findings is Natural Society of Brunn.
5. In year 1900, Mendels work was rediscovered by a Dutch, Hugo de Vries, a German, Carl Correns and an Austrian, _____.
6. Two organisms with a pair of contrasting characters are called _____.
7. Two organisms possessing a pair of identical characters are known as _____.
8. In monohybrid cross, the experiments are done with a _____ of characters.
9. Two pairs of characters are taken in _____ cross.

10. Morphological expression of a character is _____.
11. Genetic make up of a character in the organism is _____.
12. On selfing, where progenies are identical to parental forms for several generations then it is called a _____ line.
13. Mendelian factors which determine the character of diploid organism is called _____.
14. The character which expresses itself in F_1 generation is _____ one.
15. The cross between F_1 hybrid and any one of the parents is called _____ cross.
16. The cross between F_1 hybrid and the double recessive parent is known as _____ cross.
17. Mendelian factors segregate in _____ generation and get expressed.
18. Allele that expresses itself both in homozygous and heterozygous condition is _____ character.
19. In heterozygous condition, an intermediate phenotype is observed, it is called _____ dominance.
20. In a heterozygous condition, where both alleles of a gene are expressed and neither is dominanat or recessive, then it is known as _____.
21. Blood groups are example of _____ allelism.
22. In _____ of individuals, multiple alleles are seen.
23. When a gene takes part in the expression of a number of characters, then, the gene is _____.
24. When a number of genes take part in phenotypic variability, it is called _____ inheritance.
25. Sutton and Boveri proposed _____ basis of inheritance.
26. All genes in a chromosome form a ____ group.
27. Independent assessment takes place when contrasting characters present in _____ chromosomes.

MOLECULAR BASIS OF INHERITANCE

1. Chromosomes consist of protein and _____ molecules.
2. In 1869, _____ discovered DNA molecules.
3. Griffith found _____ principle while working on different strains of *Diplococcus pneumoniae.*
4. RNAs are involved is expression of _____ information.
5. Adenine and _____ are called purine bases.
6. Uracil, thymine and cytosine are _____ type of nitrogen bases.
7. Nitrogenous base, phosphate and pentose _____ make a molecule of nucleotide.
8. In RNA, the pentose sugar is _____.
9. In DNA, _____ among Pyrimidines absent.
10. Nucleotides are joined by _____ bonds to form a polynucleotide molecule.
11. The sum of _____ and pyrimidines are equal and it is called chargaff's rule.
12. Watson and Crick proposed _____ structure of DNA.
13. DNA strands have sugar and _____ backbone.
14. B-DNA shows _____ hand helix.
15. A-DNAs have _____ number of base pairs per 360^0 turn.
16. The most stable form of RNA is _____.
17. In a double helix, two strands of DNA are held by _____ bonds.
18. Clover leaf model of tRNA was proposed by _____.
19. DNA replication starts at _____ rich region and are called Ori-C.
20. DNA replication takes place by _____ method.
21. DNA _____ enzyme unwinds the double stranded DNA molecule.

22. To keep DNA strands in separated, _____ proteins binds to the separated molecules.
23. The templates whose sequence of bases coincides with the movement of fork is known as template or _____ strand.
24. The DNA synthesis always takes place in _____ direction.
25. The strand where DNA synthesis takes place discontinuously is called _____ strand.
26. The small DNA fragments on lagging strand are called _____ fagments.
27. RNA dependent DNA synthesis is called _____ transcription.
28. Okazaki fragments are joined by _____ enzyme.
29. Flow of genetic information from DNA through RNA to protein and transmission of characters through replication is known as _____ dogma.
30. During transcription, the strand on which RNA is synthesized as per base complementarity is called _____ strand.
31. Genes with coding and noncoding sequences are _____ genes.
32. The promoter sequence to which transcribing enzyme RNA polymerase binds is known as _____ box.
33. The process of removal of intron segments from exons is called RNA _____.
34. Genetic code with three nucleotides is known as _____.
35. When more than one codons associated with coding one amino acid, it is called _____ codon.
36. AUG codes for _____.
37. Initiation codon is _____.
38. UAA, UAG and UGA are _____ codons.
39. Structural genes are transcribed to mRNA which direct the _____ of polypeptides.
40. Operator sequence, _____ genes and terminator sequence are the segments of DNA that take part is transcription.
41. The operator gene is controlled by _____ gene.
42. The presence of a substrate that makes the gene functional is known as _____ gene.
43. In response to the substrate when the function of gene is turned of then, it is called _____ gene.
44. In year 1990, _____ genome project started.
45. To identify a crime, DNA _____ done.
46. Haploid set of chromosomes in a gamete denotes _____.
47. Operator gene is controlled by _____ gene.

IMPROVEMENT IN FOOD PRODUCTION

1. Cross breeding of genetically diverse parents is called _____.
2. Sum total of all alleles of genes present in a particular crop and its related cultivated and wild varieties form _____.
3. The process of physical removal of anthers to avoid self pollination is known as _____.
4. Through the process of _____, availability of minerals and vitamins are enhanced in crop plants.
5. The capacity of plant cells and tissues to grow into full grown plants is called _____.
6. The plant part used in tissue culture is _____.
7. Amorphous mass of loosely arranged thin walled parenchymatous cells developed by tissue culture is known as _____.
8. Wallless or naked plant cells are _____.
9. Using polythene glycol (PEG) fusion of _____ can be induced.
10. Binucleate cells formed by fusion of Cytoplasmic contents of two cells leading to formation of _____.
11. When cytoplasm of two cells fuse but one of their two nuclei lost, it leads to _____ or heteroblast formation ?

12. Taxols are examples of _____ metabolite.
13. By endosperm culture, _____ are raised.
14. Somatic embryos with protective coats are called _____ seeds.
15. Technique of growing _____ embryos is called embryo rescue.

MICROBES IN HUMAN WELFARE

1. *Lactobacillus* type of organisms can utilize milk sugar called _____.
2. The process of heating and cooling to present microbial growth is called _____.
3. Selectively toxic secretions of microorganisms are called _____.
4. First antibiotic obtained in 1928 is _____.
5. The first bacterial antibiotic is _____.
6. Bread making industry is called _____.
7. Yeasts used in _____ process to prepare alcohol in brewing industry.
8. The secondary treatment of waste water is a _____ process.
9. In the secondary treatment, microorganisms multiply and accumulate their biomass to form _____.
10. Main component of biogas is _____.
11. *Bacillus thuringiensis* has insecticidal properties and are called _____.
12. Nitrogen fixing organisms are _____.
13. *Rhizobium* fixes nitrogen in root systems of legumes and such organisms are called _____.
14. *Acetobacter* does aerobic _____ of ethyl alcohol to acetic acid.

ORGANISMS AND ENVIRONMENT

1. Organisms of one kind often live together to form small or large assemblage called _____.
2. In a habitat, assemblage of several populations form a biotic _____.
3. A community when interacts with its physical environment it constitutes _____.
4. The largest ecosystem with the entire habitable part of the earth and its environment form _____.
5. The role a species play in its ecosystem is _____.
6. There is absolutely no light in _____ zone of oceans.
7. Bottom of the oceans make _____ zone.
8. Absence of cuticle, poorly developed hypedermis, near absence of mechanical and vascular tissues are the characteristics of _____.
9. The organisms that live at the cost of their host are called _____.
10. Periodic departure and return of organisms to a particular habitat is known as _____.
11. Level of reproductive potential of an organism is called _____.
12. When age distribution exhibits urn shaped pyramid, it will be then, _____ population.
13. A particular habitat that can accommodate a specific number of organisms and it is called _____ capacity.
14. Succulents grow in _____ habitats.
15. Area where two ecosystems overlap is known as _____.

ECOSYSTEMS

1. Biotic component of ecosystem is comprised of producers, consumers and _____.
2. Energy enters the ecosystem through _____ type of organisms.
3. Green plants are _____ of an ecosystem.
4. Herbivores are always _____ consumers.
5. Nutrients flow in _____ manner in an ecosystem.
6. There is unidiectional flow of _____ in the ecosystem.
7. Organisms in a food chain having similar mode of nourishment form _____ levels.

8. The rate of total production by definite vegetation is called _____.
9. Primary production is due to the process of _____.
10. When are community merges with another, the transition zone is called _____.
11. Bacteria, fungi and protozoa normally form _____ in the ecosystem.
12. Pyramid of _____ is never inverted.
13. The process by which a bare area is created is called _____ to initiate plant succession.
14. The final seral stage in which the community becomes fully developed is called _____ community.
15. When succession starts at aquatic habitat, it is called _____.

BIODIVERSITY AND ITS CONSERVATION

1. Diversity within the species is called _____ diversity.
2. Diversity among the populations is known as _____ diversity.
3. When there is species diversity among variety of species, it is called _____ diversity.
4. When the organisms live in an ecosystem in a state of equilibrium, it is called _____.
5. In 1988 _____ coined the word biodiversity hotspots.
6. In the history of biological organisms, we have known that _____ episodes of mass extinction has occurred.
7. The first biosphere reserve in India is _____.
8. Man and _____ programme started in the year 1971.
9. Areas with high density of biodiversity and endemism are called _____.
10. The factors which induce extinction of species are called _____.
11. The first national park in India is _____ national park.
12. Information about endangered species are found from _____ data book.
13. Bhitarkanika _____ park is located in Odisha.
14. One of the criterion for biodiversity hotspot is it should have 70% national _____.

ENVIRONMENTAL ISSUES

1. Bhopal gas tragedy occurred due to _____ gas.
2. Carbon monoxide binds with _____ of blood which reduces its oxygen binding capacity.
3. By combination of gas and liquid particles together the particulate matter _____ are formed.
4. Ruminants release _____ gas which is a primary pollutant.
5. NO_x and SO_2 are the main causes of _____ rain.
6. When nonmethane hydrocarbons and nitrogen oxides react with sunlight, there occurs _____ formation.
7. In primary treatment of waste water, the _____ solids are removed by sedimentation.
8. Luxuariant growht of phytoplanktons due to excessive nourishment leads to _____ bloom.
9. Excessive naurishment is otherwise called _____.
10. Chemical pesticides are _____ in nature and last for long time to cause pollution.
11. The process of solid waste fermentation is called _____.
12. The unit of sound is measured in _____.
13. Decrease of forest cover in an area is called _____.
14. Removal of pollution with the help of microorganisms is called _____.
15. Conversion of moist and fertile soil into acid, arid dry habitat is called _____.

II. Correct the statements by changing the underlined words only.

REPRODUCTION IN ORGANISMS

1. In sexual reproduction, zoospores are the reproductive units.
2. The fusion products of sexual reproduction are known are zoospores.
3. Zoospores are borne inside gametangia.
4. Exogenously borne nonmotile asexual reproductive units are known as zoospores.
5. Yeasts generally reproduce by fission.
6. Accidental breakage vegetative cells in lower plants that gorw into independent units is called fission.
7. Fission generally occurs in yeasts.
8. In *Chrysanthemum*,vegetative reproduction occurs by roots.
9. Endogenously borne nonmotile asexual reproductive units are called aplanospores.
10. The sterilized plant cuttings used in tissue culture are known as callus.
11. The new propagules develop due to tissue culture are called seedlings.
12. In tissue culture, the detached plant part which is inserted to a rooted plant is called stock.

SEXUAL REPRODUCTION IN FLOWERING PLANTS

1. Stamens comprise of filament and ovary.
2. Carpels consist of ovule, style and stigma.
3. Carpels and petals constitute the essential whorls of flowers.
4. When male and female flowers are borne separately on the same plant, the plant is polygamous.
5. Microspores develop in filaments.
6. Androecium and gynoecium constitute accessory whorls of the flower.
7. The innermost nourishment providing wall layer of the developing pollen is endothecium.
8. The layer responsible for dehiscence of pollen is tapetum.
9. The fertile hypodermal cells from which the microspores or megaspores develop are called germinal cell.
10. Portions of the carpels which receive pollens are known as ovary.
11. Microspore exines are made mostly of protein.
12. Pollination normally takes place at 3-celled stage.
13. The point of attachment of ovule, to the wall of ovary is funicle.
14. Integuments cover the ovules and the a small opening is left which called hilum.
15. Syngamy results in endosperm.
16. The product of triple fusion is zygote.
17. Egg cell in angiosperm ovule is seen among antipodal cells.
18. Homogamy, self sterililyand herkogamy etc. are the contrivances of self pollination.
19. In dichogamous flowers, anthers and stigmas have variable forms.
20. In herkogamy, stamens and carpels mature at different times.
21. Colour, nector and scent are the adaptations of anemophilous flowers.
22. When flowers are inconspicuous, small light pollens are produced in large numbers, poolens are called entomophilous.

23. In nuclear endosperm, each division of primary endosperm nucleus is followed by wall formation.
24. Development of more than one embryo from an ovule is called proembryo.
25. Development of fruit without fertilization is called polyembryony.
26. In dichogamy, the flowers can not be polliniated by pollen grains of the same flower or any flower of the same plant.
27. Cucurbita is a dioecious plant.
28. In the condition of dicliny, bisexual flowers have stamens and carpels which mature at different lims.
29. In protogyny, the stamens mature first and carpels mature later.
30. When male and female flowers are borne on seperate plants, the plants are called monoecious.

HEREDITY AND VARIATION

1. Morphological expression of characters are called genotype.
2. Mendel used 4 pairs of characters of Pea plant in his experiments.
3. For his contributions to genetics, Linnaeus is known as father of genetics.
4. In 1909, Johannsen discovered the Chromosomes.
5. In homozygous condition, two alleles of given pair of characters are different.
6. Genes which code for a given pair of characters are called heterozygotes.
7. The character which expresses itself is recessive one.
8. In monohybrid cross, there occurs 4 types of phenotypes.
9. Purple flowers, from a cross between red and white flowered parents, is known as paternal dominance.
10. The mutation that eliminats a gene is called silent mutation.
11. Blood group AB is universal donor.
12. In qualitative inheritance, transmitted characters can be numerically established.
13. Single gene contributing to multiple phenotypic trait is called linkage.
14. In co-dominance, the gene pair is homozygous.
15. In Mendel's monohybrid cross, the dwarf phenotype is not always homozygous.
16. Transmission of characters from parents to offsprings is called variation.
17. Mendels law of dominance is based on transmission of characters in F_2 generation.
18. Mendel's law of segregation is based on phenotypic dominance in F_1 generation.
19. Mendel performed his experiments of sweet pea plants.
20. Mendel cross pollinated the offsprings of F_1 generation in his experiments.

MOLECULAR BASIS OF INHERITANCE

1. Meischer discovered RNA in 1869.
2. Bateson gave evidence for DNA as genetic material.
3. Coat of virulent strain of *Diplococcus pneumoniae* is rough.
4. The enzyme amylase can hydrolyze DNA.
5. Ribose sugar is a component of DNA.
6. One of the pyrimidene base, of DNA is uracil.

7. Adenine and thymines are purines.
8. Nitrogenous base, sugar and phosphate combine to form nucleoside.
9. The diameter of DNA molecule is 34 A^0.
10. There are 9 nitrogenous base as per every turn of DNA double helix.
11. Clover leaf model of tRNA was proposed by Morgan.
12. DNA replication takes place by despersive method.
13. DNA replication starts of G-C rich region.
14. The enzyme that unwinds DNA molecule for replication is ligase.
15. The enzyme that joins DNA molecules is called helicase.
16. DNA synthesis always takes place in 3'-5' direction.
17. During G-phase of cell cycle, DNA replication takes place.
18. The start codon is UAA.
19. When more than one codon codes for the same amino acid, then it is nonsense codon.
20. The incoming tRNA in translation process bonds to P site.
21. In the presnece of the substrate, the constitutive gene synthesizes the enzyme.
22. In inducible system, the operator synthesizes the active repressor protein to inhibit transcription.
23. DNA fingerprinting aimed at profiling short nucleotide sequences having static number of repeats.
24. Genome means diploid number of chromosomes in each cell of an organism.
25. Transcription takes place in cytoplasm.
26. In DNA replication, lagging strand synthesizes DNA continuously.
27. Complete turn of DNA is 3.4 A^0 long.
28. In each species A/T and G/C ratio is 2:1.
29. Okazaki fgragments are joined by helicase.
40. First amino acid carried by tRNA to ribosome is Cystine.

IMPROVEMENT IN FOOD PRODUCTION

1. Cross between genetically diverse parents is known as autogamy.
2. In emasculation, ovules are physically removed.
3. New characters in the offsprings can be raised by treatment of plants to chemicals or radiation is called hybridization.
4. Process of elimination of the trace of any living organism from the media is called Pasteurization.
5. To remove the cell walls from living cells, carbohydrates are used.
6. Capacity of a plant tissue to grow into a new new individual by providing suitable nutrients is called biofortification.
7. When somatic cells can be induced to form embryos, then the products are called capsids.
8. Using tissue culture techniques, embryos are used to raise haploid plants.
9. Artificial seeds are otherwise called biofertified seeds.
10. The process of ascptic transfer of explants into nutrient medium of culture vessels is known as hybridization.
11. Microbial biomass used as food or feed additives is called single cell carbohydrate.
12. Spirulina used in single cell protein belongs to fungus group.

MICROBES IN HUMAN WELFARE

1. Yeasts are responsible for cibate fermenlation.
2. In bakery, alcohol is used.
3. Pectinase is used as a digestive agent.
4. By Pasteurization, microorganisms are completely eliminated.
5. Fleming discovered the first antibiotic streptomycin.
6. Due to secondary treatment of waste water, the accumulated biomass is called sewage.
7. Bt Cotton is hybrid plant.
8. Nitrogen fixing bacteria are called phototrophic.
9. Rhizobium is assocaited symbiotically with cereals for nitrogen fixation.
10. The major component of biogas is carbon dioxide.
11. Anabaena is a parasitic nitrogen fixer.
12. Acetobacter does anaerobic fermentation of ethyl alcohol to form vinegar.
13. CO_2 used to provide stability to dough.
14. Lactic acid bacteria can use maltose.
15. The first antibiotic synthesized was streptomycin.

ORGANISMS AND ENVIRONMENT

1. A community interacting with its physical environment form biome.
2. The role a species plays in ecosystem is called habitat.
3. Desert living organisms are called mesophytes.
4. In water scarcity conidition, hydrophytes normally grow.
5. Sunken stomata is an adaptation of hydrophytes.
6. Temperate forests are rich in biodivesity.
7. Different types of species make population.
8. Study of organisms and their relationships with environment is ecosystem.
9. Triangular age pyramid is the most stable.
10. Predaters ordinarily does not kill its host.
11. S. shaped curves are seen among microbial populations.
12. In mycorrhiza, bacteria live in assocaition of root systems.
13. To escape from the predator, the preys sometimes mimicry.
14. Inward movement which results in over population is known as natality.

ECOSYSTEMS

1. Forests, grasslands and deserts form aquatic ecosystem.
2. Mammalian herbivores are mostly parasites.
3. In cycling of nutrients, producers play important role.
4. Net primary productivity = Gross primary productivity - photosynthesis.
5. Pyramid of numbers is based on organic weight of the organisms at each trophic level.
6. When the organisms of a community modify the environment is sucha a way that the community is replaced by new one, the succession is called aerogenic succession.
7. Pioneers in hydrosere are submerged plants.
8. Ecological pyramid concept was prepared by odum.
9. The process by which a bare area is created is called invasion.

10. Net like trophic level interrelationships occur in food chain.
11. Organisms which depend only on plants for their nutrition are called predators.
12. Energy flow in the ecosystem is Cyclic.
13. Entry of propagules like seeds or spores in a new area is ecesis.
14. Pioneers on a bare rock form moss stage.

BIODIVERSITY AND ITS CONSERVATION

1. Variation of genetic material is the basis of species diversity.
2. Variation among the species of wide geographical range is called Beta diversity.
3. Latitude and longitude are two important climatic factors for uneven distribution of diversity.
4. In the tropics, genetic diversity is the maximum.
5. Introduction of keystone species reduces the abundance of species in a community.
6. Tropical rain forests show high degree of exotism.
7. The present mass extinction is due to natural cause of human activities.
8. Great Panda is an extinct species.
9. Indian Cheetah is a vulnerable species.
10. Project tiger was launched in year 1980.
11. Core zone of biosphere reserve is ecologically the least sensitive.
12. National parks, wildlife sanctuaries and manmade forests are examples of in in situ conservation.

ENVIRONMENTAL ISSUES

1. By chemical reactions with primary pollutants, subsidiary pollutants formed.
2. Chipko movement was organised to protect Olive Ridley Turtles of Garwal.
3. Freons and methane are used as coolants.
4. In the process of eutrophicalion, the concenration of pollutants increased in each trophic level.
5. Accumulation of organic biomass due to secondary treatment of waste water forms slag.
6. Minimata bay is related to lead poisoning.
7. Secondary treatment of sewage is a physical process.
8. The algal bloom due to excessive nourishment of phytoplanktons is called bioaccumulation.
9. Fluorosis is bone and skin related desease.
10. The cause of Bhopal gas tragedy was CFC.
11. CO reduces the oxygen binding capacity of plasma of blood.
12. LPG is used in vehicles to reduce automobile pollution.

***

III. Answer the following questions choosing correct answers from the alternatives given under each bit :

REPRODUCTION IN ORGANISMS

1. Which one is the non-motile, endogenously borne asexual reproductive units of the lower plants?
   (a) Zoospores (b) Conidia
   (c) Aplanospore (d) Pseudopodia
2. Motile endogenously borne asexual reproductive units are called :
   (a) gametes (b) zoospores
   (c) conidia (d) aplanospere
3. In which case is budding commonly seen ?
   (a) Yeast (b) Bacteria
   (c) *Amoeba* (d) *Ulothrix*
4. The stalk of the sporangium is called :
   (a) gemmule (b) conidiophore
   (c) sporangiophore (d) spore cap
5. Which one reproduce by zoospores among fungi ?
   (a) *Aspergillus* (b) *Penicillium*
   (c) *Ulothrix* (d) *Saprolegnia*
6. In which artificial method are two plants required for vegetative propagation ?
   (a) cutting (b) grafting
   (c) layering (d) micropropagation
7. By which one does *Dahlia* propagate ?
   (a) Stem (b) Leaf
   (c) Root (d) Seed
8. The process by which one plant part is cut and planted in the soil :
   (a) cutting (b) grafting
   (c) layering (d) budding
9. Which one method of vegetative propagation need artificial medium ?
   (a) cutting (b) grafting
   (c) layering (d) micropropagation
10. In which method can large number of plantlets generated in a short span of time ?
    (a) micropropagation (b) cutting
    (c) grafting (d) layering
11. Which one is the fusion product of sexual method of reproduction ?
    (a) zoospere (b) gamete
    (c) zygote (d) sporangium

SEXUAL REPRODUCTION IN FLOWERING PLANTS

1. Which one is not the female reproductive unit of a flower ?
   (a) Ovary (b) Style
   (c) Filament (d) Stigma
2. The outermost layer of microsporangium wall is :
   (a) epidermis (b) middle layers
   (c) tapetum (d) endodermis
3. Which is the layer that help in dehiscence of pollens ?
   (a) epidermis (b) endothecium
   (c) endodermis (d) Tapetum
4. Which one is the nutritive tissue of microsporangium ?
   (a) Endothecium (b) Epidermies
   (c) Tapetum (d) Middle layers
5. How many microspores are formed from one microspore mother cell ?
   (a) 1 (b) 2
   (c) 3 (d) 4
6. Which one is otherwise known as inverted ovule ?
   (a) Orthotropous (b) Anatropous
   (c) Campylotropous (d) Hemianatropous
7. In which case is ovule straight ?
   (a) Anatropous (b) Campylotropous
   (c) Hemianatropous (d) Orthotropous

8. How many cells make egg apparatus in embryo sac ?
   (a) 1 (b) 2
   (c) 3 (d) 4

9. In which process are pollens transfered from the anther of a flower to the stigma of the same plant ?
   (a) Autogamy (b) Geitonogamy
   (c) Xenogamy (d) Allogamy

10. Which is not a characteristic of entomophilous flowers ?
   (a) Colour (b) Nectar
   (c) Scent (d) Number

11. Which is not an outbreeding device ?
   (a) Dicliny (b) Dichogamy
   (c) Homogamy (d) Self incompatibility

12. When male and female flowers are borne on different plants, it is called :
   (a) Dioecious (b) Monoecious
   (c) Hermaphrodite (d) Unisexuality

13. Which one is the first cell of sporophytic generation ?
   (a) egg cell (b) embryo
   (c) zygote (d) embryo sac

14. Which of the following is haploid ?
   (a) zygote (b) gamete
   (c) sporophyte (d) embryo

15. Which one is different from other three ?
   (a) zygote (b) endosperm
   (c) embryo (d) sporophyle

16. In which type of endosperms is first division of primary endosperm nucleus followed by wall formation ?
   (a) Nuclear & Cellular
   (b) Cellular & helobial
   (c) Nuclear
   (d) Nuclear & Helobial

17. Which is not the part of dicot embryo ?
   (a) Two Cotyledons
   (b) Endosperm always absent
   (c) Coleorrhiza
   (d) Hypocotyle

18. True fruits develop from :
   (a) Ovule (b) Ovary
   (c) Thalamus (d) Peduncle

19. Which one is the product of sexual reproduction ?
   (a) Zygote (b) Zoospore
   (c) Unfertilized egg (d) Gamete

20. How is true polyembryony caused ?
   (a) Many embryos from single embryo sac
   (b) More embryo sacs in ovule
   (c) Pollens from embryo
   (d) Failure of triple fusion

HEREDITY AND VARIATION

1. Who is called the father of genetics ?
   (a) Morgan (b) Mendel
   (d) de Vries (d) Correns

2. What can be genotypic ratio of offsprings in monohybrid cross of F_2 generation ?
   (a) 3:1 (b) 1:1
   (c) 1:2:1 (d) 9:3:3:1

3. What was phenotypic ratio of F_2 generation in Mendel's monohybrid cross experiment ?
   (a) 1:2:1 (b) 1:1
   (c) 3:1 (d) 2:1

4. How many types of genotypes will be formed in F_2 generation of monohybrid cross ?
   (a) 1 (b) 2
   (c) 3 (d) 4

5. In which cross can there be half of the offsprings dominant type phenotypes?
   (a) Tt x tt (b) tt x tt
   (c) TT x tt (d) TT x Tt

6. In *Mirabilis* jalapa is which type of inheritance seen ?
   (a) Co-dominance
   (b) Incomplete dominance
   (c) Pleitropy
   (d) Polygenic

7. When one gene contributes for several character it is called ?
   (a) Pleiotropy (b) Codominance
   (c) Segregation (d) Multiple allelism

8. Which one is all exception of Mendelism ?
   (a) Linkage
   (b) Segregation
   (c) Dominance
   (d) Independent Assistment

9. An organism with a pair of identical characters :
   (a) heterogamous (b) heterologous
   (c) homozygous (d) heteromorphous

10. Which one does show quantitative inheritance ?
   (a) Law of dominance
   (b) Law of segregation
   (c) Incomplee dominance
   (d) Polygenic inheritance

11. Which one is deviation from linkage ?
   (a) Genes linked
   (b) Genes assort independently
   (c) Genes not preent in same chromosome
   (d) Traits present in separate homologous sets

12. Which one is the basic of continuous variation?
   (a) multiple genes
   (b) co-dominant genes
   (c) linked genes
   (d) dominant gene

13. Who did discover the genes ?
   (a) Mendel (b) Boveri
   (c) Correns (d) Johannsen

14. In F_2 generation of dihybrid cross, the parental type are greater in number than recombinants. The basis for this is.
   (a) linkage
   (b) incomplete dominance
   (c) multiple allelism
   (d) polygenic inheritance

15. If TtRr are self pollination what will be ratio of pure TTRR and ttrr ?
   (a) 1:1 (b) 3:1
   (c) 1:2:1 (d) 9:3:3:1

MOLECULAR BASIS OF INHERITANCE

1. Which enzyme can hydrolyse DNA ?
   (a) helicase (b) DNAase
   (c) RNAse (d) Polymerase

2. How many types of nitrogenous base are seen ?
   (a) 2 (b) 4
   (c) 6 (d) 8

3. Which is the base absent in DNA ?
   (a) Adenine (b) Guanine
   (c) Cytosine (d) Uracil

4. Which is a purine ?
   (a) Cytosine (b) Thymine
   (c) Uracil (d) Guanine

5. Which types of bonds are formed between nucleotides to form polynucleotide ?
   (a) Peptide (b) Phosphodiester
   (c) Glycosidic (d) Hydrogen

6. Sugar molecules present in nucleic acids are:
   (a) hexoses (b) tetroses
   (c) pentoses (d) trioses

7. Watson & Crick proposed the model of :
   (a) BDNA (b) ZDNA
   (c) ADNA (d) CDNA

8. Two complementary DNA strands are joined by
   (a) Covalent bonds
   (b) Hydrogen bonds
   (c) Ionic bonds
   (d) Electrostatic interactions
9. In DNA double helix, thymine is paired with :
   (a) Guanine (b) Uracil
   (c) Cytosine (d) Adenine
10. For which type of RNA was clover leaf model proposed ?
   (a) mRNA (b) rRNA
   (c) tRNA (d) sRNA
11. The enzyme responsible for removing DNA strands is :
   (a) helicase (b) polymerase
   (c) ligase (d) replicase
12. Which is the enzyme responsible for joing DNA fragments ?
   (a) helicase (b) ligase
   (c) polymerase (d) isomerase
13. DNA synthesis from another DNA molecule is called :
   (a) translation (b) transcription
   (c) replication (d) tranformation
14. Which one is called Kornberg enzyme ?
   (a) Replicase
   (b) DNA polymerase I
   (c) DNA polymerase II
   (d) DNA polymerase III
15. Enzyme that forms short primers are called :
   (a) polymerase (b) helicase
   (c) ligase (d) primase
16. Which is not a termination codon ?
   (a) UGA (b) UAA
   (c) UAG (d) AUG
17. A gene of operon which synthesizes a reprocessor protein is :
   (a) regulator (b) operator
   (c) inducer (d) promoter
18. In split genes, coding sequence, are called :
   (a) Introns (b) Cistrons
   (c) Operons (d) Exons
19. How many nitrogenous bases form codon ?
   (a) 1 (b) 2
   (c) 3 (d) 4
20. Copying a genetic information from one strand of DNA to RNA is called :
   (a) translation (b) transformation
   (c) replication (d) transcription

IMPROVEMENT IN FOOD PRODUCTION

1. Physical removal of anthers is done by process of :
   (a) Begging (b) Hybridization
   (c) Emasculation (d) Sterilization
2. What can be done to be produce disease resistant crops ?
   (a) Mutation (b) Bagging
   (c) Tagging (d) Self polliniation
3. Which are is removed in emasculation ?
   (a) Ovary (b) Stigma
   (c) Ovule (d) Anther
4. Plant cells devoid of cell walls are
   (a) Cybrid (b) Plantlet
   (c) Protoplast (d) Embryoid
5. To obtain haploid plants are which one cultured ?
   (a) Embryo (b) Pollen
   (c) Zygote (d) diploid cells
6. The process of obtaining large number of plantlets is called :
   (a) micropropagation (b) biofertification
   (c) totipotency (d) hybridization
7. Which type of tissue can be totipotent ?
   (a) Sclerenchyma (b) Pholem fibres
   (c) Tracheid (d) Parenchyma

8. Which the algae is cultured for Single Cell Protein ?
   (a) *Polyporus* (b) *Spirulina*
   (c) *Agaricus* (b) *Rhizobium*

9. Potentiality of a living plant cell to grow into a new plant is called :
   (a) cloning (b) hybridization
   (c) totipotency (d) somatogamy

10. Growing immature embryo into complete plants is called :
   (a) Micropropagation
   (b) Embryo rescue
   (c) Artificial Seeds
   (d) Endosperm Culture

IMPROVEMENT IN FOOD PRODUCTION

1. In which fermentation are Lactobacilli used :
   (a) acetic acid (b) lactic acid
   (c) ethanol (d) methanol

2. Which are used first in vinegar production process ?
   (a) Yeast (b) Acetobacter
   (c) Lactobacillus (d) Rhizobium

3. Which is the first syntehsized bacterial antibiotic ?
   (a) Penicillin (b) Streptomycin
   (c) Chloromycetin (d) Neomycin

4. Which is used as a preservative ?
   (a) alcohol (b) biogas
   (c) acetic acid (d) pectinase

5. What is done in primary treatment of water?
   (a) sedimentation
   (b) biological treatment
   (c) chemical treatment
   (d) sterilization

6. What type of plant is bt bringal ?
   (a) hybrid (b) cybrid
   (c) protein rich (d) transgenic

7. Which one is in assocaition with root systems form mycorrhizae ?
   (a) algae (b) bacteria
   (c) viruses (d) fungi

8. Which type of nitrogen fixer in *Azotobacter*?
   (a) free living (b) symbiotic
   (c) transgenic (d) parasitic

9. Entire Kingdom of which one does form microbes along wiht protista ?
   (a) Plantae (b) Fungi
   (c) Monera (d) Animalia

10. Which component of milk is coagulated by Lactobacillus ?
   (a) Carbohydrate (b) Protein
   (c) Fat (d) Vitamins

MULTIPLE CHOICE QUESTIONS

1. An interacting community with its physical environment when show nutrient cycling and energy transfer is called :
   (a) population (b) biosphere
   (c) organism (d) ecosystem

2. In which case are root pockets seen ?
   (a) xerophytes (b) mesophyte
   (c) hydrophyte (d) epiphytes

3. The type of water available to plants is :
   (a) gravitational (b) capillary
   (c) hygroscopic (d) surface

4. What is transition zone between vegetation regions called ?
   (a) ecotone (b) ecoline
   (c) ecotype (d) ecosystem

5. Waterlogged conditions are considred as :
   (a) physically dry (b) physiologically dry
   (c) water rich (d) humus rich

6. Which does not affect death rate ?
   (a) Overcrowding (b) Disease
   (c) Predation (d) Fertility

7. Carrying capacity of a population depends on :
   (a) Natility (b) Resource
   (d) Mortality (d) Immigration
8. The part of the earth that supports life is called:
   (a) biosphere (b) hydrosphere
   (c) atmosphere (d) lithospheric
9. The mode of nutrition where one organisms always suffers is known as
   (a) saprophytism (b) parasitism
   (c) commensalism (d) muttualism
10. The reproductive potential of an organism is called
   (a) fertility (b) birth rate
   (c) death rate (d) fecundity

ECOSYSTEMS

1. Which is a manmade ecosystem ?
   (a) Lake (b) Ocean
   (c) Grassland (d) Cultivated field
2. Microorganisms are called :
   (a) Consumers (b) Decomposers
   (c) Producers (d) Herbivers
3. Herbivores are always :
   (a) Producer
   (b) Carnivores
   (c) Primary consumers
   (d) Omnivores
4. What is each step of fod chain called ?
   (a) trophic level (b) biotic community
   (c) population (d) parasites
5. Nearly what is percentage of energy passed on to each trophic level ?
   (a) 1 (b) 10
   (c) 20 (d) 50
6. Net primary productivity is equal to
   (a) GPP
   (b) GPP + Loss due to respiration
   (c) Loss due to respiration
   (d) GPP - Loss due to respiration.
7. Minerals present in plant and animal debris is released by the action of :
   (a) Producers (b) Consumers
   (c) Decomposers (d) Omnivores
8. Whcih type of food chain is produced by decomposers ?
   (a) parasitic (b) detritus
   (c) aquatic (d) gram band
9. Which is not the abiotic component in photosynthesis ?
   (a) Chlorphyll (b) CO_2
   (c) Light (d) Water
10. The process of establishing a community successfully in a new environment is :
   (a) pioneer (b) propagules
   (c) nudation (d) ecesis
11. The process by which a bare area is created for succession is :
   (a) nudation (b) ecesis
   (c) migration (d) reaction

BIODIVERSITY AND ITS CONSERVATION

1. Which is not the cause of genetic diversity ?
   (a) genetic recombination
   (b) mutation
   (c) genome variation
   (d) population
2. Diversity of species acrosss wide geographical range is called :
   (a) Alpha diversity
   (b) Beta diversity
   (c) Gamma diversity
   (d) Community diversity
3. Where can we find the maximum species diversity ?
   (a) Poles (b) Tropics
   (c) Deserts (d) Marshy land

4. Where are the limited human activity permitted in biosphere reserves ?
   (a) Core Zone (b) Transition Zone
   (c) Buffer Zone (d) Border Area
5. Gir forest is home for :
   (a) lions (b) tigers
   (c) cheetah (d) elephants
6. Who did coin biodiversity hotspot ?
   (a) Norse (b) Myers
   (c) Lovejoy (d) Mc Manus
7. Which is a keystone species ?
   (a) Tiger (b) Lion
   (c) Elephant (d) Beaver
8. Red Data Book is published by
   (a) PCB (ii) CITES
   (c) IUCN (d) MOEF
9. Which is a critically endangered species ?
   (a) One horned Rhinoceros
   (b) Cheetah
   (c) Tiger
   (d) Leopard
10. Which is a differentiating feature of national park and biosphere reserve ?
    (a) Permanent status
    (b) in situ conservation
    (c) conservation of ecosystems
    (d) biodiversity

ENVIRONMENTAL ISSUES

1. Which are the gases responsible for acid rain?
   (a) NO_2 & SO_2 (b) O_2 & SO_2
   (c) CO & NO_2 (d) O_2 & NO_2
2. Which gas does absorb UV rays ?
   (a) O_2 (b) O_3
   (c) CO (d) CO_2
3. Which gas is emitted during digestion of ruminants ?
   (a) CO_2 (c) CO
   (c) O_2 (d) CH_4
4. Which is not the effect of lead poisoning ?
   (a) Liver damage
   (b) Damage of cental nervous system
   (c) Bone deformity
   (d) Infertility
5. Which is a secondary pollutant ?
   (a) PAN
   (b) Smoke
   (c) Particulate matter
   (d) Dust
6. Which type of posoning does lead to spotted skin disease ?
   (a) Lead (b) Arsenic
   (c) Mercury (d) Fluoride
7. Algal bloom is due to :
   (a) Global Warming
   (b) Biomagnification
   (c) Eutrophication
   (d) Pesticide use
8. Which is used as antilocking agent ?
   (a) Smog (b) Tetraethyl lead
   (c) Arsenic (d) CFC
9. Global warming is a consequence of :
   (a) Acid rain
   (b) Green house effect
   (c) Ozone depletion
   (d) Radio active emission
10. Most harmful waste pollutant like plastic is :
    (a) biodegradable (b) corrosive
    (c) inflammatory (d) Nonbiodegradable

***

GROUP - A
ANSWERS

I. Fill in the Blanks

REPRODUCTION IN ORGANISMS

1. Gametes
2. Zygote
3. Zoospore
4. Fragmentation
5. Fission
6. Budding
7. Conidia
8. Scion
9. Stock
10. Explant
11. Sporangium
12. Leaves

SEXUAL REPRODUCTION IN FLOWERING PLANTS

1. Sporophyte
2. Flowers
3. Anthers
4. male
5. mother
6. gamete
7. seeds
8. Archesporial
9. Endothecium
10. Tapetum
11. Sporopollenin
12. Pollenkitt
13. 2
14. gametes
15. nucellus
16. megasporangium
17. 8
18. embryo
19. Syngamy
20. triple
21. definite
22. homogamous
23. Cleistogamous
24. dichogamy
25. Scent
26. Zoophily
27. genotypic
28. stigma
29. porogamy
30. mesogamy
31. albuminous or endospermous
32. Exalbuminous or nonendospermous
33. Protein
34. apospony
35. apogamy
36. Parthenocarpy
37. Nuclear
38. helobial
39. Polyembryony
40. Gametophyte
41. False
42. integuments
43. Fertilization
44. exine
45. Perisperm

HEREDITY AND VARIATION

1. genetics
2. variation
3. pea
4. 1865
5. (Eric Van) Tschermark
6. allele
7. homozygous
8. pair
9. dihybrid
10. phenotype
11. genotype
12. pure
13. alleles
14. dominant
15. back
16. test
17. segregate
18. dominant
19. incomplete
20. co-dominance
21. multiple
22. population
23. pleiotropy
24. Polygenic
25. Chromosomal
26. Linkage
27. homologous

MOLECULAR BASIS OF INHERITANCE

1. DNA
2. Meischer
3. transforming/transformation
4. genetic
5. guanine
6. Pyrimidine
7. Sugar
8. ribose
9. uracil
10. Phosphodiester
11. Purines
12. DNA
13. Phosphate
14. right
15. 11
16. rRNA
17. Hydrogen/H
18. Holley

19. A-T
20. semi-conservative
21. helicase
22. SSB/Single strand binding
23. leading
24. 5'-3'
25. lagging
26. Okazaki
27. Reverse
28. ligase
29. Central
30. leading
31. Split
32. TATA/Pribnow
33. Splicing
34. triplet
35. degenerate
36. Methionine
37. Start
38. Stop/nonsense
39. translation
40. Structural
41. regulator
42. inducer
43. repressor
44. human
45. fingerprinting
46. genome
47. regulator

IMPROVEMENT IN FOOD PRODUCTION

1. hybridization
2. germplasm
3. emasculation
4. biofortification
5. totipotency
6. explant
7. callus
8. protoplast
9. protoplast
10. heterokaryon/heterocytes
11. Cybrid/Cytoplasmic hybrid
12. Secondary
13. triploids
14. Synthetic
15. immature

MICROBES IN HUMAN WELFARE

1. Lactose
2. Pasteurization
3. antibiotics
4. Penicillin
5. Streptomycin
6. bakery
7. fermentation
8. biological
9. sludge
10. methane
11. biopesticides
12. diazotrophs
13. symbiotic
14. fermentation

ORGANISMS AND ENVIRONMENT

1. Population
2. Community
3. ecosystems
4. biosphere or ecosphere
5. niche
6. profundal
7. benthic
8. hydrophyte
9. parasite
10. migration
11. fecundity
12. declined/negative
13. Carrying
14. dry/xeric
15. ecotone

ECOSYSTEMS

1. decomposer
2. Producer
3. producers
4. Primary
5. Cyclic
6. energy
7. trophic
8. gross producitivty
9. Photosynthesis
10. ecotone
11. decomposers
12. energy
13. nudation
14. climax
15. hydrosere

BIODIVERSITY AND ITS CONSERVATION

1. genetic
2. Organismal/species
3. alpha
4. homoestasis
5. (Norman) Meyers
6. 5
7. Nilgiris
8. biosphere
9. hotspots
10. drivers
11. Corbett/Hailey's
12. Red
13. national
14. Vegetation

ENVIRONMENTAL ISSUES

1. Methyl isolyanate/MIC
2. haemoglobin
3. aerosols
4. methane
5. acid
6. Peroxyacelyl nitrate/PAN
7. Sedimentation
8. algal
9. eutrophication
10. non-biodegradable
11. composting
12. decibel
13. deforestation
14. bioremediation
15. desertification.

II. Correct the statements

REPRODUCTION IN ORGANISMS

1. gametes
2. Zygote
3. Sporangia
4. Conidia
5. Budding
6. Fragmentation
7. Bacteria
8. Stems
9. Zoospores
10. Explant
11. Plantlets
12. Scion

SEXUAL REPRODUCTION IN FLOWERING PLANTS

1. anther
2. ovary
3. stamens
4. dioecious
5. anthers
6. essential
7. Tapetium
8. endothecium
9. archesporium
10. stigma
11. sporopollenin
12. 2
13. hilum
14. micropyle
15. embryo
16. endosperm
17. synergids
18. cleistogamy
19. heteromorphism
20. dichogamy
21. entomophilous
22. anemophilous
23. cellular
24. polyombriyo
25. parthenocarpy
26. herkogamy
27. monoecious
28. dichogamy
29. Protandry
30. dioecious

HEREDITY AND VARIATION

1. genotype
2. 7
3. Mendel
4. genes
5. alike or similar
6. allele
7. dominant
8. dihybrid
9. incomplete
10. null
11. 0
12. quantitative
13. pleitropy
14. heterozygous
15. tall
16. heredity
17. segregation
18. dominance
19. garden
20. self

MOLECULAR BASIS OF INHERITANCE

1. DNA
2. Griffith
3. smooth
4. DNAse/deoxyriboncelease
5. deoxyribose
6. thymine
7. guanine
8. nucleotide
9. 20
10. 10
11. Holley
12. semiconservative
13. A-T
14. helicase
15. ligase
16. 5'-3'
17. 5
18. AUG
19. degenerate
20. A
21. inducer
22. regulator
23. variable
24. haploid
25. nucleus
26. leading
27. 34
28. 1 : 1
29. ligase
30. methionine

IMPROVEMENT IN FOOD PRODUCTION

1. hybridization
2. anthers
3. mutation
4. sterilization
5. cellulase
6. totipotency
7. embryoids
8. pollens
9. synthetic
10. inoculation
11. proteins
12. alga

MICROBES IN HUMAN WELFARE

1. alcoholic
2. brewery
3. clarifying
4. sterilization
5. Penicillin
6. sludge
7. transgenic
8. diazotrophic
9. Legumes
10. methane
11. symbiotic
12. aerobic
13. sponginess
14. Lactose
15. Penicillum

ORGANISMS AND ENVIRONMENT

1. ecosystem
2. niche
3. Xerophytes
4. Xerophytes
5. Xerophytes
6. Tropical
7. Community
8. ecology
9. bell shaped
10. Parasites
11. J
12. fungi
13. Camouflage
14. Immigration

ECOSYSTEMS

1. terrestrial
2. predaters
3. decomposers
4. respiration
5. biomass
6. autogenic
7. Plankton
8. Elton
9. nudation
10. Web
11. herbivores
12. unidirectional
13. migration
14. crustose-lichen

BIODIVERSITY AND ITS CONSERVATION

1. genetic
2. gamma
3. geographic
4. Species
5. Extinction
6. endemism
7. manmade
8. endangered
9. extinct
10. 1973
11. transitional
12. reserve

ENVIRONMENTAL ISSUES

1. secondary
2. destruction of forests
3. CFC
4. biomagnification
5. sludge
6. Mercury
7. biological
8. eutrophication
9. teeth
10. MIC
11. Haemoglobin
12. CNG

III. Answer the following each question choosing correct answers from the alternatives given under each bit :

REPRODUCTION IN ORGANISMS

1. (c) aplanospore
2. (b) Zygote
3. (a) yeast
4. (c) Sporangiophore
5. (d) Saprolegnia
6. (b) grafting
7. (c) root
8. (a) Cutting
9. (d) Micropropagation
10. (a) Micropropagation
11. (c) Zygote

SEXUAL REPRODUCTION IN FLOWERING PLANTS

1. (c) Filament
2. (a) epidermis
3. (b) endothecium
4. (c) Tapetum
5. (d) 4
6. (b) anatropous
7. (d) Orthotropous
8. (c) 3
9. (a) autogamy
10. (d) number
11. (c) Homogamy
12. (b) monoecious
13. (c) Zygote
14. (b) gamete
15. (b) endosperm
16. (b) Cellular & helobial
17. (c) Coleorrhiza
18. (a) Ovary
19. (a) Zygote
20. (b) more embryo sacs in ovule

HEREDITY AND VARIATION

1. (b) Mendel
2. (c) 1 : 2 : 1
3. (c) 3 : 1
4. (c) 3
5. (a) Tt Xtt
6. (b) incomplete dominance
7. (a) Pleitropy
8. (a) linkage
9. (c) homozygous
10. (d) Polygenic inheritance
11. (b) genes assert independently
12. (b) Codominant gene
13. (d) Johannsen
14. (a) linkage
15. (d) 9:3:3:1

MOLECULAR BASIS OF INHERITANCE

1. (b) DNAse
2. (a) 2
3. (d) Uracil
4. (d) guanine
5. (b) Phosphodiester
6. (c) Pentoses
7. (a) BDNA
8. (d) hydrogen bonds
9. (d) adenine
10. (c) tRNA
11. (a) helicase
12. (b) ligase
13. (c) replication
14. (d) DNA Polymerase
15. (d) Primase
16. (d) AUG
17. (a) regulator
18. (d) exons
19. (c) 3
20. (d) transcription

IMPROVEMENT IN FOOD PRODUCTION

1. (c) emasculation
2. (a) mutation
3. (d) anther
4. (c) protoplast
5. (b) Pollen
6. (a) micropropagation
7. (d) Parenchyma
8. (b) Spirulina
9. (c) totipotency
10. (b) embryo rescue

MICROBES IN HUMAN WELFARE

1. (b) Latic acid
2. (a) yeast
3. (b) streptomycin
4. (c) acetic acid
5. (a) Sedimentation
6. (d) transgenic
7. (d) fungi
8. (a) free living
9. (c) monera
10. (b) protein

ORGANISMS AND ENVIRONMENT

1. (d) ecosystem
2. (c) hydrophytes
3. (b) capillary
4. (a) ecotone
5. (b) Physiologically dry
6. (d) Fertility
7. (b) resource
8. (a) biosphere
9. (b) parasitism
10. (d) fecundity

ECOSYSTEMS

1. (d) cultivated field
2. (b) decomposers
3. (c) Primary Consumers
4. (d) trophic level
5. (b) 10
6. (d) GPP - less due to respiration
7. (c) decomposers
8. (b) detritus
9. (a) Chlorophyll
10. (d) ecesis
11. (a) nudation

BIODIVERSITY AND ITS CONSERVATION

1. (d) population
2. (c) gamma diversity
3. (b) tropics
4. (a) Core Zone
5. (a) lions
6. (b) Myers
7. (d) Beaver
8. () IUCN
9. One horned rhinoceros
10. (a) Permanent status

ENVIRONMENTAL ISSUES

1. (a) NO_2 & SO_2
2. (b) O_3
3. (d) CH_4
4. (c) bone deformity
5. (a) PAN
6. (b) arsenic
7. (c) eutrophication
8. (b) Tetraethyl lead
9. (b) green house effect
10. (d) nonbiodegradable

GROUP - B

SHORT TYPE QUESTIONS

I. Differentiate between

1. (a) Fission & Budding
   (b) Zoospores & Conidia
   (c) Zoospores & Gametes
2. (a) Androecium & Gynoeccium
   (b) Endothecium & Tapetium
   (c) Gietonogamy & Xenogamy
   (d) Dichogamy & Cleistogamy
   (e) Heterostyle & Herkogamy
   (f) Double fertilization & Triple fusion
   (g) Nuclear endosperm & Cellular endosperm
   (h) Parthenocarpy & Partherogensis
   (i) Embryo & Endosperm
   (j) Seed & Fruit
3. (a) Phenotype & Genotype
   (b) Monohybird Cross & Dihybrid cross
   (c) Homozygous & Heterozygous
   (d) Back Cross & Test Cross
   (e) Dominance & Recessiveness
   (f) Linkage & Crossing Over
4. (a) Purines & Pyrimidines
   (b) Nucleosides & Nucleotides
   (c) Messenger RNA & Ribosomal RNA
   (d) Leading strand & Lagging strand
   (e) Transcription & Translation
   (f) Exons & Introns
   (g) Degeneate Codons & Termination Codons
   (h) Inducer & Repressor
5. (a) Callus & Explant
   (b) Endosperm Culture & Antherculture
   (c) Hybrid & Cybrid
   (d) Embryoids & Embryo rescue
6. (a) Bakery & Brewery
   (b) Biogas & Biofertilizers
7. (a) Habitat & Niche
   (b) Hydrophyte & Xerophyte
   (c) Mutualism & Competition
   (d) Predation & Parasitism
   (e) Mortality & Natality
8. (a) Consumer & Decomposer
   (b) Producer & Consumer
   (c) GPP & NPP
   (d) Energy flow & Nutrient Cycling
   (e) Primary succession & Secondary succesion
   (f) Nudation & Invasion
   (g) Abiotic Components & Biotic Components
   (h) Food Chain & Food Web
9. (a) Species diversity & Genetic diversity
   (b) α - Diversity & β - Diversity.
   (c) National Park & Wildlife Sanctuary
   (d) National Park & Biosphere Reserve
10. (a) Aerosol & Photochemical Smog
    (b) PAN & Smog
    (c) Primary Pollutants & Secondary Pollutants
    (d) Eutrophication & Biomagnification

II. Write notes on the following with 2 to 3 valid points

1. (a) Fragmentation
   (b) Budding
   (c) Fission
   (d) Zoospore
   (e) Vegetative Propagation
   (f) Grafting
   (g) Micropropagation
   (h) Cutting

2. (a) Archesporium
   (b) Tapetum
   (c) Endothecium
   (d) Pollen grain
   (e) Embryo sac
   (f) Syngamy
   (g) Gietonogamy
   (h) Xenogamy
   (i) Dichogamy
   (j) Cleistogamy
   (k) Allogamy
   (l) Dicliny
   (m) Self serility
   (n) Anemophily
   (o) Zoophily
   (p) Entomophily
   (q) Outbreeding devices
   (r) Pollen-Pistil interactions
   (s) Apomixis
   (t) Polyembryony
   (u) Parthenogenesis

3. (a) Hybridization
   (b) Selfing
   (c) Monohybrid cross
   (d) Dihybrid cross
   (e) Reciprocal cross:
   (f) Law of dominance
   (g) Law of segregation
   (h) Dihybrid Cross
   (i) Principle of Independent assortment
   (j) Incomplete dominance
   (k) Co-dominance
   (l) Multiple allelium
   (m) Pleiotropy
   (n) Polygenic inheritance
   (o) Linkage
   (p) Pure lines

4. (a) Transformation
   (b) DNA
   (c) RNA
   (d) tRNA
   (e) Semiconservative replication
   (f) DNA polymerase
   (g) Primer
   (h) Okazaki fagments
   (i) Central dogma
   (j) Transcription
   (k) TATA box
   (l) Templates
   (m) Coding strand
   (n) RNA splicing
   (o) Genetic Code
   (p) Operon
   (q) Human genome project
   (r) DNA fingerprinting
   (s) Replication
   (t) Split gene

5. (a) Hybrid vigour
   (b) Emasculation
   (c) Biofortification
   (d) Callus
   (e) Tissue Culture
   (f) Explant
   (g) Somatic embryogenesis
   (h) Somaclonal variation

(i) Protoplast culture
(j) Synthetic seeds
(k) Secondary metabolites
(l) Embryo rescue
(m) Single Cell Protein

6. (a) Antibiotics
(b) Biofertilizers
(d) Diazotrophic bacteria
(e) *Rhizobium*
(e) Alcoholic beverages
(f) Bioreacter
(g) Sludge
(h) Biogas
(i) *Bacillus thuringiensis*

7. (a) Habitat
(b) Hydrophyte
(c) Mesophyte
(d) Xerophytes
(e) Amphibious hydrophytes
(f) Mutualism
(g) Predation
(h) Parasitism
(i) Population growth rate

8. (a) Ecosystem
(b) Producers
(c) Consumers
(d) Productivity
(e) Decomposition
(f) Food chain
(g) Primary consumer
(h) Abiotic Component
(i) Ecological Pyramids
(j) Pyramid of energy
(k) Pyramid of numbers
(l) Pyramid of biomass
(m) Food web
(n) Nutrient Cycling
(o) Ecesis
(p) Nudation
(q) Climax forest
(r) Plant succession

9. (a) Genetic diversity
(b) Species diversity
(c) Ecological diversity
(d) Homoeostasis
(e) Habitat destruction
(f) Red data book
(g) Mass extinction
(h) Biodiversity Hotspots
(i) National Park
(j) Wildlife sanctuary
(k) IUCN
(l) Keystone species

10. (a) Bhopal gas tragedy
(b) Particulate matter
(c) Radioactive Pollution
(d) PAN
(e) Smog
(f) Acid rain
(g) Eutrophication
(h) Algal bloom
(i) Biomagnification
(j) Plastic-as Waste material
(k) Green house effect
(l) Global Warming
(m) Ozone hole
(n) Montreal protocol
(o) Chipko Movement
(p) Deforestation
(q) Bioremediation

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GROUP - B
ANSWERS

I. Differentiate between

1.(a) Fission & Budding

Fission

(i) Organism enlarges in size

(ii) Nuclear material equationally divided

(iii) Two identical parts develop

Ex. - Bacteria

Budding

(i) Anywhere on the cell surface, enlargement appears.

(ii) Nuclear material along with cytoplasm migrates.

(iii) Buds get segregated from the parent cells, which may not be similar size of parent cell.

Ex. - Yeast

(b) Zoospores & Conidia

Zoospores

(i) Borne inside sporangia

(ii) Motile, bears one or two flagella

(iii) Need water or liquid molecule for its motility

Conidia

(i) Borne on fertile cells

(ii) Nonmotile, borne exogenously

(iii) Floats freely in the air and attached superficially.

(c) Zoospores & Gametes

Zoospores

(i) Borne inside sporangia

(ii) Motile, asexual reproductive units

(iii) Develop under suitable conditions of environment

Gametes

(i) Borne in game tangia

(ii) Motile or nonmotile sexual reproductie units

(iii) Develop at the end of the growing season under unsuitable conditions.

2. (a) Androecium & Gynoeccium

Androecium

(i) Male reproductive organ - differentiated into filament and anther.

(ii) Once mature, form pollen grains and these are pollinated to stigma.

Gynoeccium

(i) Female reproductive organ, differentiated into ovary, style, and stigma.

(ii) Bears egg, when fertilization effected, develop into zygote, embryo, seed and fruit.

(b) Endothecium & Tapetium

Endothecium

(i) Second layer, present below the epidermis of microsporangium wall

(ii) The cells have are radially elongated, may be U-shaped or ring shaped.

(iii) Helps in dehiscence of pollen.

Tapetium

(i) Innermost layer of microsporangium wall.

(ii) Cells multinucleate, contain reserve nutrients.

(iii) Helps in nutrition of pollens.

(c) Gietonogamy & Xenogamy

Gietonogamy

(i) Here pollination occurs between flowers of same plant.

(ii) A type of self pollination

(iii) Pollination takes place in the plant with same genetic make up

Xenogamy

(i) Here pollution occurs between flowers of two different plants

(ii) It is cross pollination

(iii) Pollination occurs between plants with different genetic make up.

(d) Dichogamy & Cleistogamy

Dichogamy

(i) This is a contrivance of cross pollination.

(ii) Here, flowers may be bisexual, but they mature at different times to avoid self pollination. When androecium matures first it is protandry and when gynoecium matures first, the condition is protogyny.

Cleistogamy

(i) This is a contrivance of self pollination.

(ii) Flowers are closed so that only self pollination can occur.

(e) Heterostyly & Herkogamy

Heterostyly

(i) Plants may have two or three different forms of flower called dimorphism or trimorphism.

(ii) It is based on the position of anthers and stigmas which are placed at different levels.

(iii) Such heteromosphous flowers with styles at different lengths is a contrivance of cron pollination.

Herkogamy

(i) Plants have bisexual flowers.

(ii) Anthers and styles act as barriers to prevent self pollination.

Example - Cruciferous plant.

(f) Double fertilization & Triple fusion

Double fertilization

(i) Pollen tube carries two male gametes at its tip. When one of it fuses with the egg nucleus, then syngamy occurs and another fuses with definite nuclei in the embryo sac. This is called double fertilization.

Triple fusion

(i) Fusion between male gamete nucleus and fusion product of two polar nuclei results in triploid primary endosperm. This is the process of triple fusion.

(g) Nuclear endosperm & Cellular endosperm

Nuclear endosperm

(i) Primary endosperm nucleus divides repeatedly to form large number of free nuclei.

(ii) No cell plate formation occurs.

(iii) Later, a central vacuole appears which pushes the free nuclei to the periphery and then centripetal cell plate formation occurs but it is never complete.

Cellular endosperm

(i) Divison of primary endosperm nucleus is followed by cell plate formation.

(ii) Subsequent divisions are also accompanied with cell plate formation.

(iii) As a result, the endosperm becomes cellular from the beginning.

(h) Parthenocarpy & Partherogensis

Parthenocarpy	Partherogensis
(i) Development of fruit without fertilization is called panthenocarpy.	(i) Process of development of female gametes into a new individual without fertilization.
(ii) Unfertilized egg of the flower may develop here, into fruits. Such fruits are seedless.	(ii) Here haploid eggs without fertilization develop into embryos and ultimately forms viable plants.

(i) Embryo & Endosperm

Embryo	Endosperm
(i) After syngamy zygote is formed which divides and redivides to form embryo.	(i) Primary endosperm nucleus which develops due to triple fusion develops into endosperm.
(ii) Seed and plant are formed from embryo.	(ii) This is the nutritive tissue of the embryo.

(j) Seed & Fruit

Seed	Fruit
(i) Matured ovule after fertilization develops into seed.	(i) Matured overy after fertilization develops into fruit.
(ii) Seeds possess embryo, seed coat, endosperm (if present).	(ii) Fruits possess seeds and pericarp surrounding it.

3.(a) Phenotype & Genotype

Phenotype	Genotype
(i) Morphological expression of a character is phenotype.	(i) Internal factors which are responsible for expression of such character is genotype.
(ii) For example when pure tall (TT) and pure dwarf (tt) parents are crossed, F_1 offsprings are tall.	(ii) Tallness in Mendels F_1 hybrids here is only morphological expression but their genotypic make up is Tt, called hybrid tall.

(b) Monohybird Cross & Dihybrid cross

Monohybird Cross	Dihybridcross
(i) When hybridization experiments are done with one pair of contrasting characters, it is called monohybrid cross. Example - Tallness and dwarfness	(i) When hybridization experiments are done with 2 pairs of contrasting characters, then it is called dihybrid cross.
(ii) When its F_1 hybrids are self pollinated, the phenotypic ratio of tall and dwarf will be 3:1 but genotypic ratio will be 1:2:1	(ii) When their F_1 hybrids are self pollinated, 16 types of offsprings will be produced with ratio of 9:3:3:1.

(c) Homozygous & Heterozygous

Homozygous

(i) A pure breeding plant for a particular character, for example, tallness contains two similar factors for tallness - TT.

(ii) Such parents when self pollinated will have only tall offsprings and hence it is homozygous.

Heterozygous

(i) A hybrid tall - Tt - does not contain similar factors but it possess the alternate characters.

(ii) Such parents when self pollinated will produce tall and dwarf offsprings. This is heterozygous conditions.

(d) Back Cross & Test Cross

Back Cross

(i) Cross between F_1 hybrid and any of two pure parents is done here.

(ii) When crossed with dominant parent, all the offsprints will be dominant type. But with recessive the, the result will be half dominant and half recessive.

Test Cross

(i) Cross between F_1 hybrid and double recessive parent is done here.

(ii) It is done to test the genotype of the phenotype.

(e) Dominance & Recessiveness

Dominance

(i) In a cross between two alleles, the character that expresses is called dominant.

(ii) Dominant character always expressed phenotypically.

Recessiveness

(i) In a cross between two pure characters, hybrids are formed where one character expresses, other remain eclipsed.

(ii) Recessive character remains in genotype.

(f) Linkage & Crossing Over

Linkage

(i) When genes present in a chromosome can not assort independently, then they form linkage group.

(ii) The number of linkage groups for any organism is equal to the haploid chromosome number.

(iii) Strength of linkage depends on proximity of genes.

(iv) Helps to maintain improved variety.

Crossing Over

(i) Recombination during meiosis result in crossing over.

(ii) Crossing over occurs in 4 steps. Synapsis, tetrad formation, cross over and disjunction.

(iii) Cross over frequency increases when genes are placed apart.

(iv) It is the source of variation and evolution.

4.(a) Purines & Pyrimidines

Purines

(i) Nitrogenous bases adenine and guanine are purines.

(ii) Purines are 2 carbon ring structures.

Pyrimidines

(i) Nitrogenous bases cytosine, thymine and uracil are the pyrimidines.

(ii) One carbon nitrogen ring structure.

(b) Nucleosides & Nucleotides

Nucleosides

(i) Formed by linkage of purine or pyrimidine base with ribose or deoxyribose.

(ii) With ribose, ribonucleoside and with deoxyribose, deoxyribonucleosides formed.

Nucleotides

(i) Nucleosides with phosphate.

(ii) Nucleosides when phosphorylated nucleotides - ribonucleotide and deoxyribonucleotide respectively formed.

(c) Messenger RNA & Ribosomal RNA

Messenger RNA

(i) This RNA is formed during protein synthesis.

(ii) 5-10% cellular RNA are of this type.

(iii) It is short lived.

(iv) Synthesized in nucleus.

Ribosomal RNA

(i) Most stable RNA.

(ii) 80% of cellular RNA one of this type.

(iii) It is the protein synthesizing machinery.

(iv) It is synthesized in nucleolus region of the cell nucleus.

(d) Leading strand & Lagging strand

Leading strand

(i) Synthesize DNA continuously.

(ii) Okazaki fragments absent.

(iii) DNA synthesized normally in 5'-3' direction.

Lagging strand

(i) Synthesize DNA discontinuously.

(ii) Okazaki fragments present.

(iii) Primers are formed here.

(e) Transcription & Translation

Transcription

(i) Transfer of genetic information from DNA to RNA.

(ii) Takes place in 3 steps - initiation, elongation and termination.

(iii) Takes place is nucleus.

Translation

(i) Process of protein synthesis of ribosomes.

(ii) Steps involved are activation of amino acids, initiation, elongation and termination.

(iii) Takes place in Cytoplasm i.e. at ribosomes.

(f) Exons & Introns

Exons

(i) Carry genetic information

(ii) Translates mRNA.

Introns

(i) Does not carry genetic information.

(ii) Only joins the exons.

(g) Degeneate Codons & Termination Codons

Degeneate Codons

(i) Occurrence of more than one codon for an amino acid.

(ii) For example 6 codons are there for serine - UCU, UCC, UCA, UCG, AGU, AGC

Termination Codons

(i) Stops the amino acid synthesis.

(ii) 3 stop codons, UAA, UAG, UGA.

(h) Inducer & Repressor

Inducer

(i) When synthesis of enzyme occurs in response to a substrate, the substrate itself is the inducer.

(ii) It is a process of resource reservation.

Repressor

(i) When the expression of gene in turned off is response to a substrate, the process is repression.

(ii) The repressing substance is available at end of enzymatic pathway.

5.(a) Callus & Explant

Callus	Explant
(i) Undifferentiated mass of thein walled parenchymatous cells, developed as a result of tissue culture.	(i) It is the plant part used in tissue culture.
(ii) It develops from explant.	(ii) Healthy and young actively growing plant part to be chosen.
(iii) By the process of induction, cell division and cell differentiation new plantlets grow.	(iii) Mostly parenchyma from stems, rhizome and tubers used.

(b) Endosperm Culture & Antherculture

Endosperm Culture	Antherculture
(i) Triploids are used.	(i) Grown to raise haploid plantlets.
(ii) Commercially used to grow seedless fruit trees like apple, pear etc.	(ii) These haploids may not have any commercial interest but may be used develop diploid homozygotes by colchicine treatment.

(c) Hybrid & Cybrid

Hybrid	Cybrid
(i) When nuclei of two different cell lines fuse after fusion of protoplasts, it is hybrid, formed.	(i) When one of two nuclei of fused cells disintegrate, a cybrid is formed.
(ii) Genetically different cell lines or species are formed and sexually they are not compatible.	(ii) Cybrids are sexually compatile with one of the parent species.

(d) Embryoids & Embryo Rescue

Embryoids	Embryo Rescue
(i) In this process, somatic cells in culture are induced to form embryo.	(i) In specific cases, it has been observed that pollination and fertilization is successfully completed but embryo does not grow aften initial development.
(ii) Two different media are required to obtain embryoids. First medium contains auxin for initiation of embryonic cells. Second medium lacks auxin or auxin in reduced concentration induces plantlets.	(ii) In such cases, embryos are directed out from the fruit or seed and induced to grow is artificial nutrient medium. Finally, plantlet develops.

6.(a) Bakery & Brewery

Bakery	Brewery
(i) Bakery means bread making industry when CO_2 of alcoholic fermentation is used to enhanced sponginess of dough.	(i) Brewery means wine making industry where different types of starch containing substrates are fermented to form ethyl alcohol.
(ii) This is done by yeast, certain bacteria.	(ii) This is done predominantly by yeasts.
(iii) Alocohol is waste product here.	(iii) CO_2 is a byproduct here.

(b) Biogas & Biofertilization

Biogas

(i) Anaerobic digestion of organic molecules by methanogenic bacteria for production of methane gas. This is the main component of biogas.

(ii) Biogas is a form of renewable, clean energy source.

Biofertilizers

(i) Inert nitrogen gases by certain soil borne microorganisms converted to utilizable form called biofertilizer.

(ii) Bacteria like *Azotobacter, Clostridium* can fix nitrogen freely but *Rhizobium* can fix it in association with roots of leguminous plants.

7. (a) Habitat & Niche

Habitat

(i) Habitat is a natural abode of plant and animal community.

(ii) Here abiotic factors like climatic, edphic and topographic factors influence the populations.

Niche

(i) Each organism plays a particular role in its surrounding. It is called niche.

(ii) It includes role of the organism in flow of energy through its ecosystem.

(b) Hydrophyte & Xerophyte

Hydrophyte

(i) Plants living in aquatic or water rich conditions are called hydrophytes.

(ii) Hydrophytes show cerain morphological, anatomical and physiological adaptations to live in aquatic condition.

For example, reduction of root system, spongy, slender surface, elimination conducting tissue systems etc.

Xerophyte

(i) Plants living in water scarce regions are called xerophyte. Dry condition may be physical or physiological.

(ii) On the other hand, xerophytes have certain morphological adaptations like reduction of transpiring surface, elaboration of conducting system etc.

(c) Mutualism & Competition

Mutualism

(i) Interaction between two or more species for mutual benefit.

(ii) Example - Lichen - Algae and fungi live together to develop the composite organism, lichen.

Competition

(i) Interaction between two individual or specially for limited resources.

(ii) It may happen among members of the same species or between members of different species of a community.

(d) Predation & Parasitism

Predation

(i) In predation, one kills another animal or plant for food.

(ii) Here predator is benefitted and the interaction its detrimental to other species.

Parasitism

(i) Here, two organisms live together where one is benefited and other is harmed.

(ii) Parasitism is mainly food coaction but it may be for shelter and protection.

(e) Mortality & Natality

Mortality

(i) The number of deaths at a place during a unit time is called natality.

(ii) During logarithmic phase of population growth, it is minimum and increases during later phase of population growth.

Natality

(i) The number of births during a given period of time which adds to the initial density of pupulation.

(ii) It is the maximum dewing log phases and then diminished during later phases.

8.(a) Consumer & Decomposer

Consumer

(i) These organisms ingest animal or plant food entirely.

(ii) Digestion is carried out inside the body.

(iii) Obtain food from preceding trophic levels.

Decomposer

(i) The organims live on decarrying organic matter and absorb it.

(ii) Digestion takes place outside body.

(iii) Form ditritus food chain and can obtain food from every trophic level.

(b) Producer & Consumer

Producer

(i) Producers can synthesize their own food themselves from the inorganic components.

(ii) Only producers can fix solar energy and convert it to chemical energy.

Consumer

(i) Depend directly or indirectly on producers.

(ii) Can not use solar energy but depend on chemical energy.

(c) GPP & NPP

GPP

(i) It is the measure of total amount of organic matter production due to photosynthesis in an ecosystem.

NPP

(i) All organisms including autotrophs respire. During respiration, some amount from gross primary productivity is lost, so NPP=GPP-Respiration.

(d) Energy Flow & Nutrient Cycling

Energy Flow

(i) Energy fixed by producers is passed onto successive trophic levels.

(ii) In every level, major amount of energy is utilized and a fraction of it is made available to next trophic level. It has been estimated that only 10% of energy is passed on.

(iii) Therefore, the energy depletes and its flow is unidirectional.

Nutrient Cycling

(i) Every organism need nutrients. These may be macro and micro-nutrients.

(ii) With the death of the organism, the nutrient is decomposed by decopores and the released nutrients are made available to the produces, i.e. green plants.

(iii) This is called nutrient cycling.

(e) Primary succession & Secondary succesion

Primary succession

(i) Starts on a substratum where there is no living being.

(ii) So on such a bare area when succession of populations living organisms takes place, it is called primary succession.

Secondary succesion

(i) Here, succession takes place on a substratum where living beings were residing previously.

(ii) It has disappeared due to certain natural or man made disaslus.

(f) Nudalion & Invasion

Nudalion

(i) The process by which a bare area is created is nudation.

(ii) Reasons for nudation may be topographic, climatic or biotic.

Invasion

(i) The process by which new species reach and establish in a bare area.

(ii) Three stages of invasion are migration, ecesis-propagules germinate, survive grow and reproduce and aggregate.

(g) Abiotic Component & Biotic Components

Abiotic Component

(i) Non-living sourrounding of an ecosystem is a biotic component.

(ii) These are inorganic nutrients like C,N,H, etc. Organic compounds of living systems and environmental factors.

Biotic Components

(i) Biotic component is highly organized. In order to survive and maintain internal order, organisms require relevant nutrients.

(ii) They have three proper of organizations. Producers, consumers and decomposers.

(h) Food Chain & Food Web

Food Chain

(i) Transfer of energy in form of food from producers through a series of trophic levels with repeated eating and being eaten is called food chain.

(ii) No food chain can operate is isolation, hence, it is not natural.

Food Web

(i) Interconnected matrix of food chain in an ecosystem is food web.

(ii) Food webs really operate in nature. It provides strength and stability to ecosystem.

9. (a) Species diversity & Genetic diversity

Species diversity

(i) Refers to the number of species in a population in a given space and time.

(ii) It measured by species richness, species composition and relative abundance.

(iii) 3 types of species diversity are there alpha diversity, Beta diversity and gamma diversity.

Genetic diversity

(i) Refers to variations in genetic material among a species which reults in phenotypic variations.

(ii) Arises due to genetic recombination, sexual reproduction and mutation.

(iii) Increases adaptability and results in evolution of species.

(b) α - Diversity & β - Diversity

α - Diversity

(i) Relates to variety of species within a community.

(ii) Also refers to species richness.

β - Diversity

(i) It is the diversity of species among communities.

(ii) It occurs due to change in habitat of the community along environmental gradients.

(c) National Park & Wildlife Sanctuary

National Park

(i) Operated by Central Government.

(ii) Any type of public intervention not allowed.

Wildlife Sanctuary

(i) Enacted by corresponding State or Central Government.

(ii) Limited human intervention allowed.

(d) National Park & Biosphere Reserve

National Park	Biosphere Reserve
(i) Category II of the protected area specified by IUCN and enacted by Central Government.	(i) Category V protected area under man and Biosphere programme under UNESCO.
(ii) No human exploitation allowed. Bhitarkanika of Odisha.	(ii) It is a vast stretch habitat having core zone, buffer zone and zone of human encroachment. Similipal was a bioshpere reserve.

10. (a) Aerosol & Photochemical Smog

Aerosol	Photochemical Smog
(i) These are particulate matter where combination of gas and liquid particles found together.	(i) During waim sunny weather oxides of nitrogen, sulphur and hydrocarbons when undergo, photochemical oxidation, this smog is formed.
(ii) Contain particles less than 2.5 mm in diameter.	(ii) These combine with tropospheric ozone forming brownish hazy fume called photo chemical smong.
(iii) Retained permanently in the air and cause severe respiratory problems.	(iii) It irritates eyes and lungs and extensive damage to vegetation and rubber goods.

(b) PAN & Smog

PAN	Smog
(i) Sunlight reacts with nonmethane hydrocarbons and nitrogen oxides to form PAN.	(i) Denotes combination of smoke and fog fromed particularly in winter.
(ii) Vehicular emissions contain various primary pollutants and these pollutants react among themselves to form PAN.	(ii) Water vapour surround smoke, dust, sooty particles forming secondary pollutants and remain suspended in air.

(c) Primary Pollutants & Secondary Pollutants

Primary Pollutants	Secondary Pollutants
(i) Directly emitted from the source.	(i) Not directly emitted from source but primary pollutants react with other substances even among themselves to secondary pollutants.
(ii) Primary pollutants are particulate matter many hazardous gases like CO, CO_2, SO_2, SO_3, CFC etc.	(ii) Secondary pollutants are PAN, Smog, acid rain etc.

(d) Eutrophication & Biomagnification

Eutrophication	Biomagnification
(i) Run off from agricultural fields, effluents, from industry, serve as nutrients and thus, cause excessive growth of phytoplanktons, particularly algal flora. It is called algal blowm.	(i) Nonbiodegradable pesticides get accumulated in each trophic level of the food chain. These are not metabolized or assimulated by living beings.
(ii) It upsets ecosystem balance in the aquatic food chain by preventing sunlight to penetrate deeper water layers.	(ii) When it passes through successive trophic level of food chains, it gets accumulated and the cumulative effect becomes fatal.

II. Write notes on

1.(a) **Fragmentation :**

(i) Due to certain external factors like wind, water currents etc., an organism, breaks into pieces. This is called accidental breaking.

(ii) These new peices can grow into new individuals under suitable conditions of environment.

(b) **Budding :**

(i) Normally, it occurs among yeasts.

(ii) Under favourable conditions, anywhere on the peripheral position of yeast cells, outgrowths develop.

(iii) These are the bud and into these cytoplasm and nucleus of the mother cell migrate.

(iv) Gradually, when the buds segregate, can grow into independent organisms.

(c) **Fission :**

(i) This is generally asexual means of reproduction of bacteria.

(ii) At the outset, the cells enlarge in size and nuclei divide mitotically and separate into two halves.

(iii) Each of it can grow into new individual.

(d) **Zoospere :**

(i) Zoospers are motile, endogenously borne asexual reproductive units.

(ii) Zoospers are borne inside sporangia under suitable conditions.

(iii) The zoospores always need water or liquid in the medium for their successful development.

(e) **Vegetative propagation :**

(i) In this method of multiplication no specialized reproductive units are formed.

(ii) This method of multiplication is seen among lower and higher plant groups.

(iii) Lower plants multiphy by fragmentation, fission, whereas higher groups of plants reproduce by root, stem or leaf parts.

(f) **Grafting :**

(i) Here, two plants of same species or varieties needed.

(ii) The plant whose parts are cut are known as scion and plant to which it gets attached is known as stock.

(iii) On the grafted portion, growth promoters are added to grow a new individual grows.

(g) **Micropropagation :**

(i) Here, small plant cuttings called explants are taken, provided nutrients under aseptic conditions.

(ii) Within a short span of time, a large number of shoots prolifeate.

(iii) Each of these can grow into new individuals.

(h) **Cutting :**

(i) The part of the stem is conveniently cut and grown under favourable conditions.

(ii) This can develops into new individual, forming root and shoot systems like normal plants. Example - *Bangainvillea.*

2.(a) **Archesporium :**

(i) In micro-sporogenesis or mega-sporogenesis, certain hypodermal cells get differentiated from the rest by larger size, more prominent nucleus and radial elongation. These are called archesporial cells.

(ii) Ultimately, archesporial cells, after a series of divisions and redivisions develop into microspores or megaspores.

(b) **Tapetum :**

(i) This is the innermost layer of microsporangium wall.

(ii) These cells may be multinucleate with reserve food materials and provide nourishment to the developing microspore.

(c) **Endothecium :**

(i) In the microsporangium wall, this endothecium layer occurs inner to the epidermis.

(ii) The cells are here radially elongated and help in the dispersal of microspers.

(d) **Pollen grain :**

(i) Microspores are otherwise known as pollen grains. It has a prominent nucleus and 2 layered wall - exine and intine.

(ii) Its development comprises of 2 stage. Prepollination stage and post pollination stage.

(iii) Pollination of pollen grains takes place normally during 2-celled stage.

(e) **Embryo sac :**

(i) This is the female gametophyto of angiosperms.

(ii) It is 8 inucleate and 7-celled structure and comprises of egg apparatus, definite nucleus and antipodal cells.

(iii) In this structure of angiosperms, double fertilization and triple fusion occur.

(f) **Syngamy :**

(i) After penetrating through female reproductive parts of angiosperms, the body cell of the pollens divides into 2 male gametes.

(ii) One male gamete fuses with egg cell located in the embryo sac. This is called syngamy.

(g) **Gietonogamy :**

(i) Here, the plant may have bisexual flowers or they may be monoecious.

(ii) In this type of pollination, pollination occurs between the flowers borne by the same plant.

(h) **Xenogamy :**

(i) Transfer of pollen grains occur between two different plants of the same species.

(ii) Since there is genetic variation between two plants, it leads to development of better viable plants.

(i) **Dichogamy :**

(i) Flowers may be bisexual but self polleination is avoided since stamens and conpels mature at different times.

(ii) When androecium matures first it is protandry and condition in which gynoecium mature first, it is protogyny.

(j) **Cleistogamy :**

(i) This is a centrivance for self pollination.

(ii) Here, flowers are closed to avoid cross pollination and they never open.

(k) **Allogamy :**

(i) It can be otherwise called cross pollination.

(ii) Allogamy may be geitonogamy or xenogamy.

(iii) It leads to the development of new, better adapted plants.

(l) **Dicliny :**

(i) It can be otherwise called unisexuality.

(ii) In this condition, the plants may be monoecious or dioecious. Here male and feamle flowers may be borne on same plant or diffeent plants respectively.

(m) **Self sterility :**

(i) This is a contrivance of cross pollination.

(ii) Here flowers may be bisexual but pollens can not effect fertilization to the carpels borne in the same flower.

(n) **Anemophily :**

(i) Plants are pollinated by wind.

(ii) Flowers are small and inconspicuous, never coloured and showy.

(iii) Pollens are produced in large numbers

(o) **Zoophily :**

(i) Animal pollinated plant come under zoophily.

(ii) Based on the type of animal, it may ornithophily, cheiropteriphily or malacophily.

(p) **Entomophily :**

(i) Insect pollinated flowers.

(ii) Attract insects by colour, nectar and scent.

(iii) Pollens are sticky and hence, can be easily carried by the body parts of insects.

(q) **Outbreeding devices**

(i) Since continuous self pollination leads to inbreeding depression, angiosperms have adopted many devices to avoid it.

(ii) For example, pollen release and stigma reception are not synchronised or anther and stigma are not at convenient positions so that they can not come in contact. Third device is self incompatibility.

(r) **Pollen - Pistil interactions**

(i) Ability of pistil to recognise pollen by its acceptence or rejection is the result of pollen-pistil interactions.

(ii) This interaction is mediated by enzymes, certain substates like carbohydrates, growth promoters etc.

(iii) As a result, pollen germinates by pollen tube and development of male gamete takes place.

(s) **Apomixis :**

(i) Development of seeds without fertilization is apomixis.

(ii) When diploid egg cell without division develops into embryo, it is diploid apospory.

(iii) Development of fruit from haploid cell is called nonrecurrent apomixis or apogamy.

(t) **Polyembryeny :**

(i) The phenomenon of development of more than one embryo inside ovule or seed is known as polyembryony.

(ii) Out of these, only one embryo attains maturity.

(u) **Pantherogenesis :**

(i) It is development of female gamete into a new individual without fertilization.

(ii) Haploid homozygous plants are produced.

(iii) Parthenogenesis process can also be induced.

3.(a) **Hybridization :**

(i) When crosses are performed between two varieties of plants showing contrasting characters, it is called hybridization. For examples tall plant and dwarf plant.

(ii) Hybridization leads to development of viable, better adapted plants.

(b) **Selfing**

(i) Selfing means self pollination done in bisexual flowers.

(ii) Mendel in his experiments on pea plants, self pollinated the offsprings of F_1 generation to obtain second filial generation.

(c) **Monohybrid cross :**

(i) When experiments, are done with single pair of contrasting characters to observe the nature of inheritance, it is monohybrid cross.

(ii) Example - Tall (TT) & Dwarf (tt) plants. Mendel in his experiments seleted 7 pairs of such characters.

(d) **Dihybrid Cross :**

(i) In this type, two pairs of characters are taken to observe the pattern of inheritance.

(ii) Example - Tall plant with round seeds crossed with dwarf plant with wrinkled seeds. Here, the phenotypic ratio at F_2 generation was 9:3:3:1.

(e) **Reciprocal cross :**

(i) Areciprocal cross is a breeding experiment to test the role of parental sex on a given inheritance pattern.

(ii) All parent organisms must be true breeding to carry out such experiment.

(iii) In one cross, a male expressing the trait of interest will be crossed with a female not expressing the traint. In other, a female expressing the trait of interest will be crossed with a female not expressing the trait.

(f) **Law of dominance :**

(i) Here, when pure parents with contrasting pair of characters are crossed, the offsprings obtained are called filial generation.

(ii) The character which is expressed is called dominant character and the one which is not expressed is recessive one.

(g) **Law of segregation :**

(i) In any diploid organism two factors of a given character remain together without getting mixed.

(ii) Identify of both becomes visible is the F_2 generation in Mendel's experiments.

(iii) During gamete formation, only one allele of character is passed on and it retains the purity.

(h) **Dihybrid Cross**

(i) When experiments are done with two pairs of alternate characters and process of inheritence is observed in F_1 and F_2 generations, it is called dihybrid cross.

(ii) Example - Tall plants with round seed and dwarf plants with wrinkled seed.

(iii) In F_2 generation the offsprings will have phenotypic ratio of 9:3:3:1.

(i) **Principle of Independent assortment**

(i) When two pairs of contrasting characters are taken for observation, the characters were transmitted independently in its F_2 generation.

(ii) For example - in cross between Tall round and dwarf wrinkled plant, there were four types of offsprings in F_2 generation. Tall round, Tall wrinkel, dwarf round, dwarf wrinkled plants.

(j) **Incomplete dominance**

(i) In this condition, neither parents were seen to be dominant.

(ii) As a result, an intermediate phenotype observed.

(iii) In *Mirabilis jalapa* red flowers when crossed with white ones, plants bearing purple coloured flowers observed.

(k) **Co-dominance**

(i) In certain heterozygous condition, both alleles of a gene pair are fully expressed.

(ii) Hence, none is dominant or recessive.

(iii) These occurs quantitative interaction of genes so that if red and white flowered plant crossed, in their offspring flowers both red and white patches become visible.

(l) **Multiple allelision**

(i) Multiple allelism is seen is a population.

(ii) Here, different pairs of alleles may show different types of dominant recessive relationship.

(iii) Some may be completely dominant other may be incompletely dominant and still others are co-dominant. Example - ABO blood groups.

(m) **Pleiotropy**

(i) Single gene contributing to many phenotypic traits is called pleiotropy.

(ii) In Mendel's experiments, the seed coat colour gene is not only responsible for seed coat colour, it contributes to flower and axil pigmentation also.

(n) **Polygenic inheritance**

(i) Quantitative characters are generally governed by large number of genes.

(ii) Contributions of each such gene is so small to the phenotype that individual effects can not be detected by Mendelian methods.

(iii) When a number of genes influence a single trait, it is called polygene and such characters being inherited is known as polygenic inheritance.

(o) **Linkage**

(i) It was observed that the genes situated in a chromosome are linked. They form linkage groups in the same chromosome.

(ii) Linkage is a deviation from Mendelism as it shows that genes are not assorted independently.

(p) **Pure lines :**

(i) Where plants of a given variety is self pollinated for several generations to produce progenies which breeds true.

(ii) For example phenotypic tall plants were self pollinated for generations to have only tall plants.

4.(a) **Transformation :**

(i) While working on *Streptococcus pneumoniae,* Griffith observed that heat killed virulent strains injected with avirulent strains into mouse body, killed them.

(ii) From this, it was concluded that some transforming principle is present in heat killed virulents so that avirulent becomes virulent.

(b) **DNA :**

(i) Deoxyribonucleic acid is a double helical structure.

(ii) These are polydoxyribonucleotides.

(iii) Each nucleotide is held by phosphodioester bonds. They have nitrogenous bases, deoxyribose sugar and phosphate groups.

(iv) DNA structure was first proposed by Watson & Crick in the year, 1953.

(c) **RNA :**

(i) Polyribonucleotides make a RNA molecule.

(ii) Ribose sugars, nitrogenous bases and Phosphates make a ribonucleotide.

(iii) There are many types of RNA and three main types are mRNA, tRNA and rRNA.

(d) **tRNA :**

(i) It is the smallest form of RNA made of 7.5 to 100 nucleotides.

(ii) In, 1964, Holley proposed the detailed clover-leaf model of DNA molecule.

(iii) It has anticodon, TYC, DHU loops. 3'end of tRNA ends with CCA-OH. Which acts as amino acid attachment site during protein synthesis.

(e) **Semiconservative DNA replication :**

(i) Here, the two strands of DNA separate during replication and appropriate complementary nucleotides are assembled on each exposed molecule to form two DNA molecules.

(ii) In these two new DNA molecules, one strand each from original molecule replicated and one strand each newly synthesized.

(iii) Such type of replication, where one strand is parental and other synthesized new is called semiconservative replication.

(f) **DNA Polymerase**

(i) Arthur Kornberg and his Colleagues in 1956 isolated DNA polymerase and called Kornberg enzyme. This was later named Polymerase I.

(ii) DNA polymerase needs a template to syntehsize new strands in 5'-3' direction.

(iii) Polymerase I and Polymerase II are involved in DNA repair and proof reading. But Polymerase III is involved in DNA replication.

(g) **Primer**

(i) Primsome protein complex moves along the lagging strand and forms RNA primers at intervals on which Okazaki fragments are syntehsized.

(ii) DNA Polymerase-I enzyme removes RNA primers from the lagging strand through its exonuclease activity.

(iii) Primer is a short segment of RNA that is synthesized by primase using DNA during DNA replication.

(h) **Okazaki gragments :**

(i) Small DNA strands on the lagging strand are called Okazaki fragments.

(ii) These are fragments of 1000-2000 nucleotides long in prokaryotes and 100-200 nucleotide long in eukaryotes.

(i) **Central dogma :**

(i) The informations coded in genes or particular segments of DNA are transferred to mRNA molecules in the nulceus. The process is called transcription.

(ii) In the following step, the mRNA molecules moves out of the nucleus into ribosomes, wherein the amino acids are arranged in specific manner to from proteins. This is translation process.

(j) **Transcription :**

(i) Transfer of genetic information from DNA to mRNA is called transcription.

(ii) It takes place in 3 steps - initiation, elongation and termination.

(iii) A number of enzymes, protein factors are required is the procur.

(k) **TATA box :**

(i) Promoter is a sequence to which the transcribing enzyme, RNA polymerase blinds.

(ii) So, TATA box is a DNA sequence that indicates where a genetic sequence can be read and decoded.

(iii) In eukaryotes, it is located 25-35 base pairs before transcription skul site.

(l) **Templates :**

(i) This is a strand of DNA which set, the genetic sequence of new strand during replication.

(ii) As transcription proceeds, RNA polymerase traverses the template strand and uses base pairing with DNA template to create RNA copy.

(m) **Coding strand :**

(i) It is the DNA strand whose base sequence corresponds to the base sequence of the RNA transcript produced except thymine replaced with Uracil.

(ii) It is the strand that contains codons.

(n) **RNA splicing :**

(i) It is a process of RNA processing in which a newly made precursor mRNA transcription is transformed into a mature mRNA.

(ii) During spliceing, initrons are removed and exous are joined.

(o) **Genetic Code :**

(i) It is a code for amino acids or presence of bases on mRNA molecule in 5'-3' direction.

(ii) 61 codons code for 20 amino acids, out of which AUG is start codon and UAA, UGA and UAG are stop codons.

(p) **Operon :**

(i) A part of the genetic mataerial which act as single regulated unit having one or more structural genes, a repressor gene and an inducer or co-repressor gene.

(ii) Structural gene synthesizes mRNA under operational control of operator.

(q) **Human genome project :**

(i) Haploid set of chromosomes in a gamete from genome.

(ii) Human genomic project was launched in the year 1990 with the goal to determine the sequence of base pairs which make human DNA and also identifying and mapping all genes of human genome.

(r) **DNA fingerprinting :**

(i) It is profiling or typing of short nucleotide sequences having variable number of repeats called variable tandem number repeats (VTNR).

(ii) VTNR of two individuals may be of same length and same sequence at certain sites of DNA but many at others. This is used to determine percentage or ethnic group of an individual.

(s) **Replication :**

(i) During S-phase of cell cycle, new copies of DNA are syntesized.

(ii) Here parental strands unwind and separate.

(iii) Each parental strand serves as template and new DNA molecules is synthesized in semiconservative manner.

(t) **Split gene :**

(i) Certain genes have segments of exons and introns. Such genes are called split genes or interrupted genes.

(ii) Here exons carry genetic information where as introns do not possess any genetic information.

5.(a) **Hybrid vigour :**

(i) Through breeding between genetically different parents, hybrids are produced.

(ii) When offspring show superiority with respects to disease, drought resistance, productivity and nutrient value etc. then it is called hybrid vigour.

(b) **Emasculation :**

(i) Physical removal of anthers to avoid self pollination to obtain hybrids.

(ii) Again, other methods like dipping panicles in warm water or exposing to chemical may be adopted for emasculation.

(c) **Biofortification :**

(i) To enhance availability of minerals and vitamins in the diets by manipulation in quality of crop plants is called biofortification.

(ii) Plant breeders use these variety to develop new, productive and bifortified crolines.

(d) **Callus :**

(i) An amorphous mass of loosely arranged thin walled cells developed by tissue culture are called callus.

(ii) Its development occurs in 3 phases - induction, cell division and differentiation.

(e) **Tissue Culture :**

(i) A differentiated mass of cells having similar origin and definite function are tissue.

(ii) Since plant cells are totipotent, these differentiated mass of cells can be dedifferentiated to divide and grow into new individual when definite nutrients are provided.

(f) **Explant :**

(i) The plant part inoculated for tissue culture is an explant.

(ii) The entire process is carried out under aspetic conditions, so that pure mass of cells may be developed form it.

(g) **Somatic embryogenesis :**

(i) The process of embryo formation from somatic cells of cultured plant tissue is caled somatic embryogenesis. Here, embryiods are formed.

(ii) Two different media are used one will have auxins and other will have no auxin or reduced amount of auxin.

(h) **SomacInal variation :**

(i) Cultured cells are grown from single explants and in the long period of their maintenance, genetic variability get marked in the culture.

(ii) Due to spontaneous mutation and variability of culture environment, this may happen.

(i) **Protoplast Culture :**

(i) Cell walls of plant cell can be removed mechanically or enzymatically. Resultant is now called protoplast.

(ii) This biologically active protoplasts when induced to grow in culture media, it is called protoplast culture.

(j) **Synthetic seeds :**

(i) Somatic embryoids/plantlets encapsulated in protective capsules of calcium alginates to prevent dessication is known as synthetic or artificial seeds.

(ii) These are used for rapid propagation of crop plants.

(k) **Secondary metablites :**

(i) Cell suspension cultures in plant tissue culture are used in the commercial production of secondary metabolites like alkaloids, tanning, resins etc.

(ii) Secondary metabolites are organic compounds produced by bacteria, fungi or plants which are not directly involved in the normal growth, development or reproduction of the organism.

(l) **Embryo rescue :**

(i) In certain cases, pollination and fertilization are successfully completed but embryos do not develop after few initial divisions.

(ii) In such cases, immature embryos are dissected out and grown in adequate nutrient culture media to develop new plantlets. This is called embryo rescue.

(m) **Single Cell Protein :**

(i) Microbial biomass contains very high percentage of protein and this can be utilized to supplement food.

(ii) Hence, single cell protein is any microbial biomass obtained from uni or multicellular microorganisims such as algae, bacteria or fungi which can be used as source of food.

6.(a) **Antibiotics**

(i) Antibiotics are secretions of microorganisms which are selectively toxic.

(ii) The antibiotics are used as medicines to cure several bacterial diseases.

(iii) First antibiotic, penicillin was synthesized by Sir Alexander Fleming in the year 1929.

(b) **Biofertilizers :**

(i) Biologically active products are called biofertilizers and are obtained by metabolism of microbes like bacteria and fungi so that it becomes source of nutrients to plants.

(ii) Two nutrients like nitrogen and phosphorous are the most essential plant parts obtained respectively by action of nitrogen fixing and phosphate solubilizing bacteria.

(iii) There are two types of nitrogen fixers such as freeliving and symbiotic.

(c) **Diazotrophic bacteria :**

(i) Nitrogen fixing bacteria such as *Rhizobium, Frankia, Azotobacter, Clostridium, Klebsiella* and Cyanobacteira obtain nitrogn from the atmosphere and hence, these nitrogen fixers are called diazotrophic.

(ii) They do it by the process of biological nitrogen fixation.

(d) ***Rhizobium :***

(i) *Rhizobium* is a symbiotic bacterium which fixes atmospheric nitrogen remaining in the root system of legumes.

(ii) The organisms live with mutual benefit here and the bacterium produces root nodules.

(e) **Alcoholic Beverages**

(i) Using a sugar source, unicellular yeasts and certain bacteria can produce ethanol.

(ii) This process of formation of alochol is called alcoholic fermentation and the industry is known as brewery.

(f) **Bioreactor**

(i) Bioreactors are vessels in which biochemical reactions are carried out in order to obtain specific products.

(ii) All the reactions are done here under aseptic conditions.

(g) **Sludge**

(i) During the treatment of waste water, the residual, semisolid material is produced as byproduct called sludge.

(ii) This sludge is separated, dewatered and may be utilized in several ways.

(h) **Biogas**

(i) Biogas is a complex mixture of gases that contains methane, carbon dioxide, nitrogen, hydrogen etc. methane being the predominant component.

(ii) Methandgenic bacteria can only utilize to obtain biogas from organic wastes.

(iii) Methane obtained is a souce of biofuel.

(i) ***Bacillus thuringiensis***

(i) It is a gram positive soil bacterium having insecticidal properties.

(ii) Its genes have been successfully cloned and introduced to crop plants by tissue culture method, thereby transgenics have been created.

(iii) Transgenic plants so obtained have inherent insecticidal properties.

7.(a) **Habitat**

(i) It is the place where an organism maintains its livelihood.

(ii) These include climatic, edaphic, topographic and similar other physical factors of the area.

(iii) Climatic factors are light, temperature, precipitation, humidity, wind and edaphic factors are related to the soil condition. Topographic factors are related to slope, altitude and such other factors of a habitat.

(b) **Hydrophytes**

(i) Hydrophytes are plants which live in aquatic habitat.

(ii) Again, hydrophytes may be submerged, free floating or amphibious.

(iii) In order to live in watery habitat, hydrophytes have undertaken certain morphological, anatomical or physiological adaptations. It includes reduction in their root system, slender, spongy shoot system, no anatomical elaborations and reduction in transpiration rate etc.

(c) **Mesophytes**

(i) Mesophytes are terrestrial or land plants.

(ii) These plants grow luxuriantly in the soil and air of moderate humidity.

(iii) These plants generally lack structural, anatomical and physiological adaptation as seen among hydrophytes and xerophytes.

(d) **Xerophytes**

(i) Xerophytes are plants that live in conditions of water scarcity.

(ii) Therefore, adaptations of such plants include efficiency in water absorption, retention, reduced transpiration.

(iii) These plants have extensive root systems, reduced transpiring surface like leaves, and their cell sap concentration is high.

(e) **Amphibious hydrophytes**

(i) These are plants that live partly is water and partly in air.

(ii) The aquatic part may be in shallow water or muddy substratum.

(iii) Morphological and anatomical features of these plants are different in parts that are contact with water and parts exposed to air.

(f) **Mutualism**

(i) It is a type of obligate assocaition of two organsims where both live together and can not live separately. Example, Lichen.

(ii) Here, the algal component synthesizes food through photosynthesis and the fungal component absorbs nutrients and provides protection to the algal partner.

(iii) There are other types of symbiotic relationships like plant root and bacterium relationship as seen in legume root and *Rhizobium*.

(g) **Predation**

(i) In predator-prey relationship, one partner is benefited and another is killed for the purpose of food.

(ii) By doing so predators keep the prey population in check and thus, ecological balance is maintained.

(iii) Prey undertakes several types of adaptations to escape the notice of prey.

(h) **Parasitism**

(i) Here one organism lives at the cost of the other.

(ii) Parasitism is mainly a food coaction but parasites derive shelter and protection from the host.

(i) **Population grwoth rate**

(i) Population growth at a definite habitat depends on factors like notality, mortality, immigration and emigration.

(ii) Growth rate of population can be determined by number of birth minus number of deaths divided by average population at a particular time at a particular area.

8.(a) **Ecosystem**

(i) Ecosystem comprises of structural and functional units of living organisms and nonliving substances.

(ii) They interact to produce exchange of materials among themselves.

(iii) Structural living components are - producers, consumers and nonliving components are inorganic nutrients, organic compounds and environmental factors.

(iv) Functional components of ecosystem include productivity, decomposition, energy flow and nutrient cycling.

(b) **Producers**

(i) These are green plants which synthesize organic compounds from the inorganic materials in the presence of the sunlight. The process is called photosynthesis where light energy is converted to chemical energy in the green pigments of plants.

(ii) Besides photosynthesizing plants, there are certain bacteria which can use chemical energy to convert inorganic molecules into organic one. These organisms are also the producers or autotrophs.

(c) **Consumers**

(i) Consumers are animals which utilize organic materials directly or indirectly from producers and are called heterotrophs.

(ii) Primary consumers are herbivores and they directly consume only plants or plant materials.

(iii) Then, there are secondary or tertiary consumers who feed on the herbivores.

(iv) Omnivores are the carnivores who feed upon plants or animals.

(d) **Productivity**

(i) Producers convert solar energy into chemical energy to utilize it in their metabolic processes.

(ii) This accumulation of biomass is called productivity and it can be of two types - Gross primary productivity (GPP) and net primary productivity (NPP).

(iii) GPP is total measure of organic matter production due to photosynthesis.

(iv) All organisms use some energy in their catabolism process, particularly respiration. Hence, remaining amount of energy left after respiration is NPP. Hence NPP = GPP - Respiration.

(e) **Decomposition**

(i) Decomposition is a process which involves decomposers and these organisms like fungi, bacteria and protozoa help breaking down complex organic materials into inorganic molecules.

(ii) The deed remains and waste materials of plants and animals are disintegrated by the micro-organisms in this decomposition process. These organisms from the detritus food chain.

(f) **Food chain**

(i) In an ecosystem, relationship exists among the organisms that form a trophic level in their feeding habit.

(ii) Organisms at a particular trophic level feeds upon the organisms of the preceding trophic level and in turn, they are eaten by the organisms that form the succeeding trophic level.

(iii) Trophic structure of eating and being eaten relationship form a food chain.

(g) **Primary Consumers**

(i) Primary consumers are always herbivores.

(ii) Such consumers form a trophic level where the organism depend only on green plants for their food and energy. Example - Deer, Cow etc.

(h) **Abiotic Components**

(i) Nonliving surrounding of the ecosystem forms the abiotic components.

(ii) These abiotic components can be categorised into 3 parts such as

- Inorganic nutrients like C,H,N,O etc.
- Organic compounds which constitute the living organism and
- Environmental factors like, light, temperature, rainfall, humidity etc.

(i) **Ecological pyramids**

(i) Ecological pyramids are diagrammatic presentation of standing crop at each trophic level in a quantitative manner.

(ii) It is based on the principle of number of organisms, organic biomass of organisms or rate of transfer of energy of each trophic level in an ecosystem.

(iii) There are three types of pyramids - Pyramid of numbers, Pyramid of bimass and Pyramid of energy.

(j) **Pyramid of energy**

(i) It shows the rate of flow of energy from one trophic level of community to another.

(ii) This is measured energy/area/time i.e. kj/ha/yr.

(iii) This pyramid is never inverted.

(k) **Pyramid of numbers**

(i) Pyramid of numbers show the relative numbers of organisms at each trophic level such as producers, herbivores, carnivores.

(ii) If the food chain is grazing one, then, the number of organisms at each trophic goes on decreasing so that the pyramid will be upright one.

(iii) However, in a parasitic food chain the pyramid will be inverted.

(l) **Pyramid of biomass**

(i) In this pyramid, biomass is calculated for a given unit area, i.e. the biomass producers, herbivores, carnivores and so on.

(ii) In fact, very few pyramids of biomass have ever been determined since it is quite difficult and time consuming.

(iii) Generally, pyramids of biomass are upright but if we consider an occean ecosystem, we will find phytoplanktons have lower body mass than the zooplanktins. Thus, the pyramid becomes inverted.

(m) **Food web**

(i) Food chains do not exist in isolation. Because organisms at a trophic level feed on a variety of ways to a large number of organisms.

(ii) Thus a network of trophic relationship in an ecosystem is established and this is called food web.

(iii) Food web provides strength and stability to the ecosystem so that it does not easily collapse.

(n) **Nutrient cycling**

(i) An ecosystem requires constant supply of nutrients like crabon, hydrogen, oxygen, phosphorus, sulphur etc. These grouped under macro and micronutrients.

(ii) The amount of nutrient present in the soil or atmosphere at any given point of time is called standing state. This shows seasonal and climatic variations.

(iii) Nutrients are never lost from the ecosystem, yet move through different constituents and come back to become available to the producers. This is called nutrient cycling. Examples - Carbon Cycle, Nitrogen Cycle, Sulphor Cycle etc.

(o) **Ecesis**

(i) On a bare area when propagules reach, they germinate in the new environment but many plants fail to survive.

(ii) Among them, the plants that survive, grow and reproduce so that they can successfully perennate and establish there. This is caused ecesis.

(iii) The first species that establishes itself is called pioneers.

(p) **Nudation**

(i) It is the process by which a bare area is created.

(ii) The reasons for this may be topographic - soil eresion, land slides, volcanic eruptions; climatic - glaciation, storms etc. or biotic - anthropogenic activities.

(q) **Climax forest**

(i) It is the final stage in which the community has developed and it is not replaced and hence, called climax community.

(ii) A climax community has three characteristics such as unity, stability and phylogenetic relationships.

(iii) In a geographical area, if only one community exists and dominates, it is monoclimax community but in polyclimax community, a number of communities may coexist.

(r) **Plant succession**

(i) A community is not a stable structure. It goes on changing until a balance is established with the environment.

(ii) The process of change of habitat accompanied by the change in a social manner is called plant succession.

(iii) Plant succession may start on a precisely barren area or one in which living organisms were existent.

9.(a) **Genetic diversity**

(i) Genetic variation among the individuals of a species leads to their phenotypic variations like size, shape, colour etc. and this is known as genetic diversity.

(ii) This diversity arises through genetic recombination as a result of sexual reproduction and mutation.

(iii) Genetic diversity increases adaptability and helps in the evolution of species.

(b) **Species diversity**

(i) it refers to the number of species in a population in a given space and time.

(ii) It is measured by species richness (the number of species in a given area at a particular period of time), species composition (list of species) and relative abundance (relative number of individuals of different species).

(iii) International Union for conservation of Nature and Natural resources (IUCN) recognises three types of species diversity - alpha divresity, beta diversity and gamma diversity.

(c) **Ecological diversity**

(i) Ecological diversity explains different types of ecosystems present in the biosphere.

(ii) The community composition (assemblage of several interacting population in a given space) at a particular point of time) is affected directly by the environment.

(d) **Homeostasis**

(i) All organisms in an ecosystem interact with each other and with the environment in a concerted manner and influence its functions.

(ii) They recycle the life sustaining elements so that air is suitable to breathe in, water to drink and nutrient rich soil to grow.

(iii) As a consequence, these elements are generated as much as these are used so that a state of equilibrium or homeostasis is maintained.

(e) **Habitat destruction**

(i) Destruction of habitats is the primary reason for the loss of biodiversity in terrestrial and coastal ecosystems.

(ii) Conversion of forest land for agriculture, developmental projects, mining operations etc. leads to destruction of natural habitats of organisms.

(iii) Encroachment of wetlands, cultivation of grasslands etc. also contribute to the habitat.

(iv) The result of all these leads to the loss of biodiversity.

(f) **Red data book**

(i) Red data book is the record book and source book of all the endangered animals and plants.

(ii) It is a public document which is created for the recording of endangered and rare species including plants, animals, fungi as well as some local subspecies which is present within the region of the state or country.

(g) **Mass extinction**

(i) An extinction is widespread and rapid decrease in the biodiversity on Earth.

(ii) Such an event is identified by a sharp change in divesity and abundance of multicellular organisms.

(iii) It occurs when the rate of extinction increases with respect to the rate of speciation.

(h) **Biodiversity Hotspots**

(i) Biodiversity hotspot is a biogeographic region with a significant reservoir of diversity that is under threat from humans due to habitat loss.

(ii) Two criteria have been taken to qualify for biodiversity hotspot. (a) It must contain at least 0.5% or 15,00 of the World's 3,00,000 species of vascular plants as endemics (b) and should have lost at least 70% of its primary vegetation.

(i) **National Park**

(i) National Park comes under category II of the protected areas specified under IUCN.

(ii) It is an area dedicated to conserve environment, natural and historical objects, and wildlife and to provide enjoyment in such a manner and by such means that will leave them unimpaired for future generations.

(iii) National Park is established by a special statute of the Central Government.

(j) **Wildlife sanctuary**

(i) It is a category IV of the protected areas specified by IUCN.

(ii) It is created by Gazette notification of the State Government where Vulnerable, endangered and critically endangered wild animals are protected.

(k) **IUCN**

(i) Full form of IUCN is the international union for conservation of Nature and Natural resources. It is an international organization working in the field of conservation and sustainable use of natural resources.

(ii) It involved data gathering and analysis, research, field projects, advocacy and education.

(l) **Keystone species**

(i) It influences plant and animal communities and entire biodiversity.

(ii) Without keystone species, the ecosystem would be dramatically different or cease to exist alltogether.

(iii) Some keystone species example - wolf.

10.(a) **Bhopal gastragedy**

(i) It is considered as a mjaor industrial disaster of the world.

(ii) Nearly 42 tons of toxic methyl isocyanate - MIC gas leaked from union carbide's pesticide factory in Bhopal on the night of 2nd October, 1984.

(iii) More than 8000 people died and 500,000 people suffered due to this killer gas.

(b) **Particulate matter**

(i) Particulate matters are 10 μm or less in diameter.

(ii) These include both solid and liquid suspensions.

(iii) Solid particles are soil particles, soot, asbestos and fly ash.

(iv) Dry land without vegetation is subjected to soil erosion, which releases excess minute soil particles into the atmospher. This forms dust.

(c) **Radioactive pollution**

(i) Natural source of radioactivity is cosmic radiation coming from Sun and even beyond.

(ii) Another natural sources of radioactivity is occurrence of radioactive elements on lithosphere.

(iii) Manmade sources are making and testing nuclear weapons, use of nuclear fuel in power plants and use of several radioisotopes in research laboratories.

(iv) These radioactive materials and their waste have ionising radiation effect causing hazardous mutagenic effect.

(d) **PAN**

(i) When Sunlight reacts with nonmethane hydrocarbons and nitrogen oxides, PAN (Peroxyacetyl nitrate) is formed.

(ii) Acetaldehyde, methyl glyoxyl and various byproducts of oxidation of aromatic compounds are precursors of PAN.

(iii) Primary pollutants liberated from vehicular emissions react among themselves giving rise to secondary pollutant. PAN is one of them and thus, PAN is a secondary pollutant.

(e) **Smog**

(i) By the combination of smoke with fog particularly during winter smog is formed.

(ii) Water vapours surround smoke, dust or soot particles forming secondary pollutant which remain suspended in the air.

(iii) This smog is reducing is nature.

(f) **Acid rain**

(i) Burning of fossil fuel like coal, petroleum products and natural gas, forest fire, vehicular exhausts and other human activities release a number of oxides of nitrogen, sulphur dioxide and chlorine into the atmosphere.

(ii) All these primary pollutants react with atmospheric water vapour and form respective acids like sulphuric and nitric acid etc.

(iii) These fall on ground is form acid rain causing extensive damage to fauna and flora of that particular area.

(g) **Eutrophication**

(i) Due to run of excess fertilizers from crop fields into water bodies, the phytoplanktons get excessive nourishment causing their luxuariant growth. This is called eutrophication.

(ii) This upsets ecological balance in the aquatic food chain by preventing the sunlight to penetrate deeper layers.

(iii) In the long run, water becomes' depleted of oxygen that causes larger life forms such as fishes to suffocate and die.

(h) **Algal bloom**

(i) As a result of run off from agricultural fields, the excess nitrogen and chemical fertilizers flow down to the water bodies and cause excessive growth of phytoplanktons particularly algae. This is called algal bloom.

(ii) Floating plants when grow luxuriantly, they prevent organisms living there at the bottom of water bodies. They do not to receive it adequately. Therefore, their untimely death occurs and ecological balance becomes upset.

(i) **Biomagnification**

(i) Certain pesticides are used in crop fields to enhance food production by controlling insect pests. Excess use of such toxic substances lead to run off to nearby water bodies.

(ii) When ingested by aquatic organisms these hazardous wastes instead of getting decomposed get magnified while passing through trophic levels of the concerned food chain. This is called biomagnification.

(iii) Example DDT when assimilated by phytoplanktons at 0.03 ppm ultimately gets converted to 30 ppm when ultimately reaches birds eating the fishes of that aquatic ecosystem.

(j) **Plastic as waste material**

(i) Present age is the age of plastics and we use plastic materials in our all type of requirements.

(ii) However, plastics are nonbiodegradable and once thrown, these materials accumulate in the form of waste.

(iii) Animals and birds often eat plastic carry bags and die.

(iv) Plastic carry bags blow away to distant places, choke sewage system and can accumulate in the form of solid waste. Thus, this waste causes air, water and soil pollution.

(k) **Green house effect**

(i) The major portion of the Sunlight that enters the earth is reflected by earth and absorbed by clouds and waterbodies and a number of gases.

(ii) These gases trap the Sunlight in the same way as green house and in this house the temperature is very high contributing green house effect.

(iii) Major green house gases are carbon dioxide, methane, halones, CFC etc.

(iv) The result of green house effect is global warming and this contributes to catastrophic effect on plant and animal populations of the world.

(l) **Global Warming**

(i) The result of green house effect is global warming whereby the average temperature of earth is being increased.

(ii) Scientists predicted that such increase the temperature will have disastrous impact on life and ecological balance.

(iii) This will lead to climate change, melting of ice and water balance and above all, on the life of plants, animals and man.

(m) **Ozone hole**

(i) In the stratosphere of the atmosphere the Ozone layer acts as a shield that prevents energy of the sun's harmful ultraviolate rays.

(ii) Chlorofluorocarbons released from the earth's surface moves vertically upwards and reacts with ozone.

(iii) Depletion of ozone leads to ozone hole and shield for a UV is broken. This may have adverse impact like skin cancer, mutation, blindness etc.

(n) **Montreal Protocol**

(i) The depletion ozone layer became evident in 1980s which initiated debate among the countries if world. However there was no legal binding on the issue.

(ii) In order to Governments to adopt stronger measures for production and use of CFCS and many halones, the Montreal protocol was signed in 1987.

(iii) 96 ozone depleting chemicals were tested for phasing out.

(iv) The protocol became the first ever treaty to be ratified by all member countries in 2009.

(o) **Chipko movement**

(i) In 1970s, an organised resistance to destruction of forests was spread throughout India and it was known as Chipko movement.

(ii) The name of the movement comes from the word embrace, as the villagers hugged the trees and prevented contractors from felling them.

(iii) This movement was led by the Gandhian social activist Shri Sunderlal Bahuguna.

(p) **Deforestian**

(i) Forests are cleared for timber, firewood, paper industry, new human settlements, setting up industries and mining operations. These are all anthropogenic causes of forest depletion.

(ii) Natural calamities like earthquake, volcanic eruptions, land slide and forest fire are natural causes of deforestation.

(iii) As a result of deforestation carbon dioxide concentration increases and that adds to global warming, climate change etc.

(q) **Bioremediation**

(i) This is an innovative process of biotechnology where genetically engineered hydrocarbon eating bacteria are used successfully in clearing waste.

(ii) This process is used particularly in converting hydrocarbon wastes into the utilizable form.

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GROUP - C
LONG TYPE QUESTIONS

Illustrate your answers with labelled diagrams.

1. Describe the development of male gametophytes of angiosperms.
2. Describe the development of female gametophyte of a typical angiospermic plant.
3. Describe the structure of the typical embryo sac of an angiosperm.
4. Give an account of double fertilization and triple fusion in angiosperms.
5. Describe the development of male and feamle gametophytes of angiosperms.
6. With chequer board, give an account of Mendel's monohybrid cross.
7. State and explain Mendel's laws of inheritance.
8. Illustate Mendel's dihybrid cross experiment.
9. Give the detailed structure of a DNA molecule.
10. Describe a typical B-DNA molecule.
11. Explain the mechanism of translation in prokaryotes.
12. Give an account of abiotic components of an ecosystem.
13. Give an account of biotic components of an ecosystem.
14. Describe the components of a pond ecosystem.
15. Give an account of functional attributes of ecosystem.
16. Describe how does nutrient cycling and energy flow occur in an ecosystem.
17. Discuss the importance of biodiversity.
18. Describe how does the loss of biodiversity occur at a place.
19. Describe the steps taken for the conservation of bidiversity.
20. What is biodiversity ? Describe the reasons of the loss of biodiversity and effects taken for its conservation.
21. Give an account of air pollution and its control measures.
22. Describe the primary pollutants which cause air pollution.
23. Describe the secondary air pollutants and their control measure.
24. What is water pollution ? Discuss how is an surface water getting polluted.
25. Give an account of ground water pollution and its control measure.
26. Give an account marine pollution and its control measures.

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GROUP - C
ANSWERS

1. Describe the development of male gametophyte

Microspore is the first cell of male gametophyte formed due to meiosis of microspore mother cell.

(a) Structure of microspore - (labelled diagrams)

(b) Prepollination changes

(c) Post pollination development (diagram)

2. Describe the development of female gametophyte

(a) Formation megaspore - the first cell of female gametophyte

(b) Functioning megaspore - the lowermost one.

(c) Embryo sac structure (labelled diagrams)

3. Structure of embryo sac

(a) Functioning megaspore by division and enlargement

(b) Typical anatropous ovule funicle, raphe, hilum, micropyle, chalaza, egg apparatus, antipodally, definite nuclei, - labelled diagram.

4. Double Fertilization and Triple Fusion

(a) Passage of pollen

(b) Division of pollen nuclei

(c) Syngamy and triple fusion

5. Development of male and female gametophytes

Answers of both 1 & 2 to be included

6. Monohybrid Cross

(a) Experimental material & experiment

(b) Parental & filial generations

(c) Crossing and selfing

(d) Law of dominance

(e) Law of segregation

(f) Checker board

7. State and explain Mendel's laws of inheritance

(a) Law of dominance

(b) Law of segregation

(c) Law of independent assortment

(d) Example with chequer board

8. Mendel's dihybrid Cross

(a) Experimental material

(b) experiment

(c) results

(d) chequer board

9. Detailed structure of DNA molecule

(a) Occurrence of DNA at nucleus, chloroplast & mitochondria

(b) DNA double helix - Watson's & Crick's model

(c) diagram

(d) Bonding - each form

10. Structure of BDNA

(a) Occurrence of DNA at nucleus, chloroplast & mitochondria

(b) DNA double helix - watsou's model

(c) diagram

(d) Bonding - each form

11. Mechanism of translation

(a) What happens by translation

(b) Mechanism

(i) activation of amino acid

(ii) initiation of polypeptide chain

(iii) Elongation

(iv) Termination

12. Abiotic Components of an ecosystems

Ecosystem - Structural and functional units of living organism and nonliving substances interacting to produce exchange of materials between themselves. Broadly two components - living or biotic and nonliving or abiotic. Abiotic divided into 3 parts :

(a) inorganic components like C, H, O, N, etc.

(b) organic compounds

(c) environmental factors such as light temperature, humidity, soil conditions latitude and longitude.

13. Biotic Components

Ecosystem - as described above.

Biotic Components - Producers, Consumers and decomposers to be described.

14. Pond ecosystem description

It is aquatic condition - Biotic and abiotic components to be discussed together.

15. Functional attribute of ecosystem

Functional attributes are

(i) Productivity

(ii) Decomposition

(iii) Energy Flow

(iv) Nutrient Cycling - all to be described separately ?

16. Nutrient Cycling and energy flow

Energy flow - 1st law and 2nd law of thermodynamics

Energy trap by producer - transfer to herbivores - carrivores 10%, rule, Lindemann Concept.

Nutrient Cycling : nutrients to be in constant supply, essentiality of nutrients - carbon, phosphorous etc. cycling.

17. Importance of biodiversity

What is biodiversity - 2 uses (major)

Direct & Indirect

(a) Direct - Food, shelter, clothing, medicines, industrial prodcuts.

(b) Indirect - Biological Control, Environmental regulations

Ecosystem services, Ecotourism.

These points are to be elaborated with examples.

18. Causes of loss of biodiversity

Natural and man made or artificial. The points given below are to be elaborated.

(a) Habitat loss and fragmentation

(b) Introduction of alien invasive species

(c) climate change

(d) environmental pollution

(e) population explosion

(f) overexploitation

19. Steps taken for conservation of biodiversity

Steps taken for in situ conservation - National park, Wildlife sancutary, Biosphere reserves.

Ex-situ conservation - gene banks, botanic gardens, tissue culture, cryopreservation, Application of biotechbology.

20. What is biodiversity ? Describe cause of loss of biodiversity and efforts for its consrvation.

Answers for 19 & 20 to be combained.

21. Air pollution and control

Importance of air - air pollution

Natural sources - Human activities - pollutants.

Primary pollutants - Particulate matter, oxides of carbon, nitrogen and sulphur, hydrocarbons, toxic, heavy metals, CFCS, ammonia and radioactive wastes.

Secondary pollutants - Ozone, PAN, Petrochemical smog, acid rains.

Control measures - Control of particulate matter, control of industrial emissions, control of vehicular emission.

22. Describe primary pollutants

Primary pollutants - Particulate matter, oxides of carbon, nitrogen and sulphur, hydrocarbons, toxic, heavy metals, CFCS, ammonia and radioactive wastes.

23. Describe Secondary pollutants

Secondary pollutants - Ozone, PAN, Petrochemical smog, acid rains - how formed and effects.

24. Water Pollution - Surface Water Pollution

Importance of water and its pollution.

Surface water pollution - suspended solids and sediment, domestic sewage, Toxic Chemicals, Radioactive water, Hot water emission.

25. Ground water polution and its control

Need for ground water $\rightarrow$ different types of ground water poisoning $\rightarrow$ Leaching Contamination & its effet.

Measures to control it - Purification, waste water treatment.

26. Marine Pollution and its control

Marine water significance and its pollution causes of pollution. Industrial effluents, agricultural run off, oil spill, human activities. Control

(a) Beach cleanup
(b) Control of industrial run off
(c) Control of agricultural waste pollution
(d) Oil spill treatment.

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