2022	I	19	2	SEAT NUMBER				

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XI & XII Science (CBSE/state)
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NEET, MH-CET , NDA
Mo. No. 9595445177/9021445177

Branches : Chhatrapati Sq., Mangalmurti Sq.

(4 Pages)

calculator is not allowed.
5. All symbols having their usual meanings unless otherwise stated.
6. For each MCQ, correct answer must be written along with its alphabet.
7. Evaluation of each MCQ would be done for the first attempt only.

SECTION-A

Q.1 Select and write the correct answers to the following questions: **[10]**

1) A dithecous anther is
d) tetrasporangiate **(1)**

2) Which of these is the male reproductive organ in human?
c) testis **(1)**

3) Phenotypic ratio of incomplete dominance in *Mirabilis jalapa.*
b) 1:2:1 **(1)**

4) From the following _____ individual produces two types of gametes.
d) heterozygous **(1)**

5) Which The molecular knives of DNA are
c) Endonucleases **(1)**

6) The cranial capacity of Neanderthal man was
d) 1600cc **(1)**

7) The Which one of the following water is present in pores between neighbouring soil particles?
d) Capillary Water **(1)**

8) ABA Association between sea anemone and the clown fish living in its tentacles is that of
a) Mutualism **(1)**

9) The pioneer organisms in hydrarch are
b) Zooplanktons
(1)

10) Select the odd one out on the basis of *Ex situ* conservation.
d) Cryopreservation **(1)**

Q.2 Answer the following questions in one sentence: **[8]**

(1) **Describe pollen pistil interaction.** **(1)**

Ans:

1. Pistil has ability to recognise right type of pollen.
2. Special proteins help in determining compatibility.
3. Physiological mechanism operates on stigmatic surface.

(2) **Differentiate between test cross and back cross?** **(1)**

Ans:

1. **Back cross:** Back cross is the cross between F_1 individual with one of the parents.
2. **Test cross:** Test cross is the cross of F_1 hybrid with the homozygous recessive parent.

(3) **The ratio obtained in pleiotropy is 2:1. Justify.** **(1)**

Ans:

When a single gene controls two or more characters it is called pleiotropy or pleiotropism. The gene is called a pleiotropic gene. As per Mendel's principle, one gene control one character but this is a different way of expression. For example, Marriage between two carriers of Sickle cell will produce normal, carriers and sickle-cell anaemic children in 1: 2: 1 ratio. Sickle cell anaemic dies and we have only carriers and normal in the ratio of 2: 1.

(4) **What is founder effect?** **(1)**

Ans:

A group of individuals separates from a larger population to form a new group. This is known as founder effect.

(5) **Why is respiration in insects called direct respiration?** **(1)**

Ans:

Respiration in insect is called direct because tracheal tubes exchange O_2 and CO_2 directly with the haemocoel which then exchange them with tissues.

(6) **What is the cause of abnormal elongation of long bones of arms and legs and bone of lower jaw?** **(1)**

Ans:

Excessive secretion of growth hormone.

(7) **Name the causative agent of typhoid fever.** **(1)**

Ans:

Salmonella Typhii

(8) **Expand YAC used in the field of Biotechnology.** **(1)**

Ans:

YAC stands for yeast artificial chromosomes. It is used for mapping and sequencing of genomes. When yeast cells are multiplied at that point they can be isolated and put into work with DNA mapping and sequencing.

SECTION-B

Attempt any eight of the following questions:
[16]

Q.3 What is autogamy?
(2)

Ans:
Autogamy is a type of pollination in which bisexual flower is pollinated by its own pollen grains.

Q.4 What are cells of Rauber? **(2)**

Ans:
These are the cells of trophoblast which are in contact with the embryonal knob.

Q.5 Write a note on Phenylketonuria. **(2)**

Ans:

1.

(1) PKU means phenylketonuria which is an autosomal recessive inborn error.

(2) In this disorder the metabolism of phenylalanine does not occur due to deficiency of phenylalanine hydroxylase (PAH) enzyme.

(3) This enzyme is necessary to metabolize the amino acid phenylalanine to the amino acid tyrosine.

(4) When PAH activity is reduced, phenylalanine accumulates in blood and cerebrospinal fluid and is converted into phenylpyruvate or phenyl-ketone which is a toxic compound. This may cause mental retardation. Excess phenylalanine is excreted in urine, hence this disease is called phenylketonuria.

(5) PKU is caused by mutations in the PAH gene on chromosome no. 12.

(6) Untreated PKU causes abnormal phenotype which includes growth failure, poor skin pigmentation, microcephaly, seizures, global developmental delay and severe intellectual impairment. However, at birth if an infant is checked for PKU, the further abnormalities can be avoided.

Q.6 Compare X chromosome and Y chromosome. **(2)**

Ans:

X-chromosome	Y-chromosome
1. X-chromosome is straight, rod like and longer than Y-chromosome. It is metacentric.	1. Y-chromosome is shorter chromosome which is acrocentric.
2. X-chromosome has large amount of euchromatin and small amount of heterochromatin.	2. Y-chromosome has small amount of euchromatin and large amount of heterochromatin.
3. X-chromosome has large amount of DNA, hence it is genetically active due to more genes.	3. Y-chromosome has less amount of DNA, hence it is genetically less active or inert due to lesser genes.
4. Non-homologous region of X-chromosome is longer and contains more genes.	4. Non-homologous region of Y-chromosome is shorter and contains lesser genes.
5. Contains X-linked genes on non-homologous region.	5. Contains Y-linked genes on non-homologous region.
6. X-chromosome is present in men as well as women.	6. Y-chromosome is present only in men.

Q.7 What is the difference between DNA in prokaryotes and eukaryotes? **(2)**

Ans:

Ans. DNA in prokaryotes	DNA in eukaryotes
1. It is present in the cytoplasm.	1. It is present in the nucleus.
2. It is not associated with histones.	2. It is associated with histones.
3. It is circular.	3. It is linear.
4. Genes do not contain introns.	4. Genes contain introns along with exons.
5. Genes are polycistronic.	5. Genes are monocistronic.

Q.8 Write a short note on *Homo habilis.* **(2)**

Ans:

1. The fossils of this primitive man were discovered from the Olduvai Gorge, Tanzania (Africa).
2. Homo habilis evolved in Africa in the late Pliocene or early Pleistocene epoch about 2.5 to 1.4 million years ago.
3. It lived in open grassy land, moved erect, and probably did not eat meat.
4. The lower jaw was lightly built and the dentition was more like that of a modern man.
5. It had smaller molars. They made tools from stones.
6. Its cranial capacity was about 650 to 800 cc. it was called handy man.

Q.9 Classify the various types of water present in soil. **(2)**

Ans:

i. **Gravitational water:** The water which percolates deep in the soil, due to the gravity is called 'gravitational water'. This water goes beyond the reach of roots of most of the plants, thus is not available to plants for absorption.

ii. **Hygroscopic water:** Fine soil particles imbibe/adsorb water and hold it very tightly. This is called 'hygroscopic water'. Roots cannot absorb it.

iii. **Combined water:** Water present in the form of hydrated oxides of silicon, aluminium, etc., is called 'combined water'. It is also not available to plants for absorption.

iv. **Capillary water:** Some amount of water is held in pores present between the neighbouring soil particles, due to capillarity. This is called capillary water which is available for absorption.

Q.10 Give reasons –

(a) Arterial walls are thicker than those of veins. **(1)**

(b) Walls of left ventricle are thicker than those of the other chambers of heart. **(1)**

Ans:

(a) Arterial walls are thicker than those of veins.

(1) Arteries have relatively thick walls to enable them to withstand the high pressure of blood ejected from the heart.

(2) Arteries expand when the pressure increases as the heart pushes blood out but then recoil (shrink) when the pressure decreases when the heart relaxes between heartbeats.

(3) This expansion and recoiling occurs to maintain a smooth blood flow.

(4) Veins, on the other hand, have thinner walls and larger lumen-veins have no need for thick walls as they need not have to withstand high pressure like arteries.

(5) Moreover, as veins transport relatively low pressure blood, they are commonly equipped with valves to promote the unidirectional flow of blood towards the heart. ■

(b) Walls of left ventricle are thicker than those of the other chambers of heart.

(1) Left ventricle pumps oxygenated blood to all parts of the body. Therefore, there is greater pressure from the blood in left ventricle.

(2) Right ventricle sends deoxygenated blood to lungs for oxygenation. This does not put more pressure and lungs are in vicinity of the heart.

(3) Due to these functional differences between the two ventricles, left ventricle has thicker wall than that of the right ventricle. ■

Q.11 Distinguish between Active immunity and Passive immunity. **(2)**

Ans:

Ans. Active immunity	Passive immunity
1. Active immunity is produced in response to entry of pathogens and their antigenic stimuli.	1. Passive immunity is produced due to antibodies that are transferred to the body.
2. Active immunity is the long lasting immunity.	2. Passive immunity is short-lived immunity.
3. In active immunity, the body produces its own antibodies.	3. In passive immunity, antibodies are given to the body from outside.
4. Natural acquired active immunity is obtained due to infections caused by pathogens.	4. Natural acquired passive immunity is obtained through antibodies of mother transmitted to baby by placenta or colostrum.
5. Artificial acquired active immunity is obtained through vaccinations. These vaccines contain dead or live but attenuated pathogens.	5. Artificial acquired passive immunity is also obtained through vaccinations, but here the vaccines contain the readymade antibodies which are prepared with the help of other animals such as horses.

Q.12 While holding a cup of tea, Mr. Kothari's hand rattle. Which disorder may he suffering from and what is the reason for the same? **(2)**

Ans:

(1) This condition is due to Parkinson's disease.

(2) It is due to degeneration of dopamine-producing neurons in the CNS.

(3) 80% of the patients develop this condition along with stiffness, difficulty in walking, balance and coordination.

Q.13 Explain the concept of biofortification with suitable example. **(2)**

Ans:

1. Biofortification is a method of developing crops for having higher quantity and quality of vitamins, minerals and fats, to overcome problem of malnutrition.

2. Objectives of biofortification :

(1) Improvement in protein content and quality

(2) Improvement in oil content and quality

(3) Improvement in vitamin content

(4) Improvement in micronutrient content and quality

3. Methods of development of biofortified varieties : Conventional selective – breeding practices and r-DNA technology.

4. Some examples of biofortification :

(1) Fortified Maize (Twice the amount of amino acids – lysine and tryptophan)

(2) Wheat – Atlas 66 (High protein content)

(3) Rice (Has 5 times more iron)

(4) Carrot and spinach (Enriched with vitamin A and minerals)

(5) Bittergourd, tomato (Enriched with vitamin C developed by IARI)

Q.14 Explain the properties of a good cloning vector for rDNA technology. **(2)**

Ans:

(1) Isolation of DNA (gene) from the donor organism.

(2) Insertion of desired foreign gene into a cloning vector (vehicle DNA).

(3) Transfer of r-DNA into suitable competent host or cloning organism.

(4) Selection of the transformed host cell.

(5) Multiplication of transformed host cell.

(6) Expression of the gene to obtain desired product.

SECTION-C

Attempt any eight of the following questions:
[24]

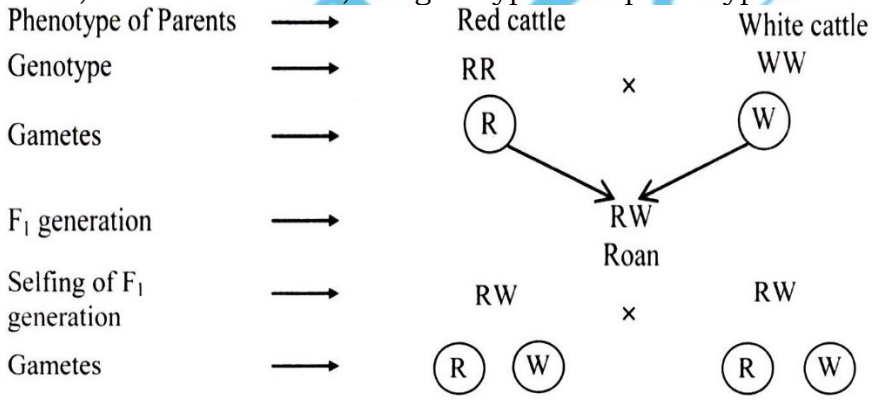
Q.15 With the help of a graphical representation explain co-dominance. Also mention the phenotypic ratio and genotypic ration. (3)

Ans:

Co-dominance: In co-dominance, both the alleles (genes) of an allelomorphic pair express themselves equally in F_1 hybrids. Such alleles which are able to express themselves equally independently in hybrids, are called co-dominant alleles.

Explanation:

1. Classic example of co-dominance is coat colour in cattle.
2. There are two types one with red coat (with red colour hair) and other with white coat (with white hair).
3. When red cattle (RR) are crossed with white cattle (WW), F_1 hybrids (RW) are roan. Roans have the mixture of red and white colour hair.
4. Thus, both the traits are expressed equally. In F_2 generation red (RR), roans (RW) and white (WW) are produced in the ratio 1:2:1.
5. Thus, in Co-dominance, the genotypic and phenotypic ratios are identical.



♀ \ ♂	R	W
R	RR Red	RW Roan
W	RW Roan	WW White

Q.16 Describe the process of transcription in protein synthesis. (3)

Ans:

The process of copying of genetic information from one (template) strand of DNA into a single stranded RNA transcript is called as transcription.

The process of transcription is as follows:

i. For transcription, promoter, structural gene and terminator (together called transcription unit) are required.
ii. The DNA strand used for synthesis of RNA is called antisense or template strand which is oriented in 3′ → 5′ direction, while the other strand not involved in RNA synthesis is called coding strand. It is oriented in 5′ → 3′ direction.
iii. A small DNA sequence which provides binding site for RNA polymerase is called promoter which is present towards 5′ end/upstream, while a small DNA sequence which terminates the transcription process called terminator is present towards 3′ end/downstream.
iv. The process of transcription, in both prokaryotes and eukaryotes, involves three stages viz. Initiation, Elongation and Termination.
v. During initiation, RNA polymerase binds to promoter and moves along the DNA and causes local unwinding of DNA duplex into two chains in the region of the gene.
vi. Exposed ATCG bases project into nucleoplasm.
vii. Only one strand functions as template (antisense strand) and the other strand is complementary which is actually a coding strand (sense strand).
viii. During elongation, the ribonucleoside triphosphates join bases of DNA template chain.
ix. As transcription proceeds, the hybrid DNA-RNA molecule dissociates and makes mRNA molecule free.
x. When RNA polymerase reaches the terminator signal on the DNA, it leaves DNA and fully formed mRNA (primary transcript) is released. The process of transcription is completed.

Q.17 What are nucleoside and nucleotide? Describe with structures. (3)

Ans:

Nucleoside:

a. The nitrogen base combined with pentose sugar is called nucleoside.
b. A nucleoside is formed by attaching a nitrogen base at 1st carbon atom of a pentose sugar.
c. Nitrogen base is attached to the pentose sugar by glycosidic bond.
d. The nitrogen base may be a purine or pyrimidine.
e. Nucleoside is basic in nature.
f. Nucleoside = Pentose sugar + Nitrogen base

Nucleotide:

Each nucleotide has the following three components:

Sugar:

a. It is a pentose sugar called deoxyribose ($C_5H_{10}O_4$) or ribose ($C_5H_{10}O_5$).
b. It is a five-carbon compound and has pentagonal ring structure.

Phosphate group:

a. It is derived from phosphoric acid (H_3PO_4).
b. It helps to link the nucleotides during strand formation.
c. The phosphate group is attached to the 5th carbon of the sugar molecule by means of a sugar-phosphate bond.

Nitrogen bases:

a. These are cyclic compounds made up of carbon, hydrogen, oxygen and nitrogen atoms.
b. The bases are named adenine (A), thymine (T), cytosine (C), guanine (G) and uracil (U).
c. These are further divided into two groups – Purines and Pyrimidines.
d. Purines are double ring compounds, having 5 carbon atoms and 4 nitrogen atoms.
e. Purines are of two types:
   1. Adenine (A) 2. Guanine (G)
f. Pyrimidines are single ring compounds, having 4 carbon atoms and 2 nitrogen atoms.
g. Pyrimidines are of three types:
   1. Cytosine (C) 2. Thymine (T) 3. Uracil (U)

Q.18 Explain any three biologically important properties of water. (3)

Ans:

(1) Water is a compound and it is in liquid state at room temperature.

(2) It is an inert inorganic compound with neutral pH.

(3) It has high specific heat, high heat of vapourization, high heat of fusion.

(4) It has high surface tension.

(5) Water molecule has good adhesive and cohesive forces of attraction.

(6) The various properties of water are result of weak hydrogen bonding between the water molecules.

Q.19 Give the precursor, chemical composition and any two applications of Gibberellins.

Ans:

i. Gibberellin is a growth promoting hormone.
It shows non-polar transport through vascular tissue.

ii. It is synthesized in young leaves, seeds, roots and stem tips. It is abundant in root tip and developing seeds.

iii. Gibberellins are synthesized from mevalonic acid.
More than 150 chemical types of gibberellins are known so far. However, GA_3 is the most common and biologically active form of gibberellin.
Chemically it contains a gibbane ring - a cyclic diterpene with four isoprene units.

physiological effects and applications of gibberellins

i. Dormancy of bud can be broken by gibberellin treatment.

ii. It can promote seed germination in cereals like barley and wheat by synthesizing hydrolysing enzyme amylase to produce sugar.

iii. Gibberellin causes elongation of stem where internodes increase in length.

iv. It also promotes bolting i.e. elongation of internodes just prior to flowering in plants with rosette habit e.g. beet, cabbage.

v. It causes parthenocarpy in tomato, apple and pear, and flowering in long day plants.

vi. It is used to increase the fruit size and bunch length of grapes.

vii. When gibberellins are applied on genetically dwarf plants like maize, the stem rapidly elongates and acquires the height of normal tall varieties of maize.

viii. Application of gibberellins overcomes the requirement of vernalization.

ix. Usually, it inhibits growth of root, delays senescence and prevents abscission.

x. It also breaks dormancy of seed and hastens germination.

xi. Application of gibberellin causes production of male flowers on female plant.

Q.20 What is the role of papillary muscles and chordae tendinea in human heart? (3)

Ans:

(1) Papillary muscles are large and well-developed muscular ridges present along the inner surface of the ventricles.

(2) Bicuspid and tricuspid valves are attached to papillary muscles of ventricles by chordae tendinae.

(3) Chordae tendinae are inelastic fibres present in the lumen of ventricles.

(4) The chordae tendinae prevent the valves from turning back into the atria during the contraction of ventricles and regulate the opening and closing of bicuspid and tricuspid valves.

Q.21 Name the secretions of alpha, beta and delta cells of islet of Langerhans. Explain their role. (3)

Ans:

Endocrine cells of pancreas form groups of cells called **Islets of Langerhans.** There are four kinds of cells in Islets of Langerhans which secrete hormones.

(1) **Alpha (α) cells :** They are 20% and secrete glucagon. Glucagon is a hyperglycemic hormone. It stimulates liver for glucogenolysis and increases the blood glucose level.

(2) **Beta (β) cells :** They are 70% and secrete insulin. Insulin is a hypoglycemic hormone. It stimulates liver and muscles for glycogenesis. This lowers blood glucose level.

(3) **Delta (δ) cells :** They are 5% and secrete somatostatin. Somatostatin inhibits the secretion of glucagon and insulin. It also decreases the gastric secretions, motility and absorption in digestive tract. In general it is a growth inhibiting factor.

(4) **PP cells or F cells :** They form 5%. They secrete pancreatic polypeptide (PP) which inhibits the release of pancreatic juice.

Q.22 Explain restriction enzymes giving two examples. **(3)**

Ans:

(1) Type I – They function simultaneously as endonuclease and methylase e.g. Eco K.

(2) Type II – They exhibit separate cleaving and methylation activities. They are more stable and are used in r-DNA technology e.g. Eco RI, BgII. They cut DNA at specific sites within the palindrome. Thousands of type II restriction enzymes have been discovered.

(3) Type. III – They cut DNA at specific non-palindromic sequences e.g. HpaI, MboII.

Q.23 What are A, B and C in the table given below.

1) Fungus - _____ - Penicillin **(1)**

2) _____ - *Aspergillus niger* – Citric acid **(1)**

3) _____ - *Bacillus licheniformis* – Bacitracin **(1)**

Ans:

1) Penicillium chrysogenum
2) Fungi
3) Bacteria

Q.24 Explain with one example each the desert adaptations in animals and plants. **(3)**

Ans:

Adaptations in animals:

(1) Animals which are well-adapted to live in deserts are called xerocoles. These animals show adaptations for water conservation or heat tolerance.

(2) These animals show low basal metabolic rate. They obtain moisture from succulent plants and rarely drink water. E.g Gazelle and Oryx.

(3) Desert animals like camel produce concentrated urine and dry dung.

(4) Many other hot desert animals are nocturnal, seeking out shade during the day or dwelling underground in burrows.

(5) Smaller animals from desert, emerge from their burrows at night.

(6) Mammals living in cold deserts have developed greater insulation through warmer body fur and insulating layers of fat beneath the skin.

(7) Few adaptations to desert life are unable to cool themselves by sweating so they shelter during the heat of the day. Many desert reptiles are ambush predators and often bury themselves in the sand, waiting for prey to come within range.

(8) Other animals have bodies designed to save water. Scorpions and wolf spiders have a thick outer covering which reduces moisture loss. The kidneys of desert animals concentrate urine, so that they excrete less water.

Adaptations in plants:

(1) Thick cuticle on their leaf surfaces.

(2) Stomata of desert plants is sunken that is it is in deep pits to minimize loss of water through transpiration.

(3) Desert plants also have a special photosynthetic pathway (CAM – Crassulacean acid metabolism) that enables their stomata to remain closed during daytime.

(4) Some desert plants like *Opuntia*, have their leaves reduced or they are modified to spines. Loss of leaf surface helps in prevention of transpiration.

(5) Photosynthetic function is taken over by the flattened stems called a phylloclade.

Q.25 Name the type of association

1) Clown fish and sea anemone **(1)**

2) Crow feeding the hatching of Koel **(1)**

3) Hummingbird and host flowering plant **(1)**

Ans:

1) Mutualism

2) Brood parasitism

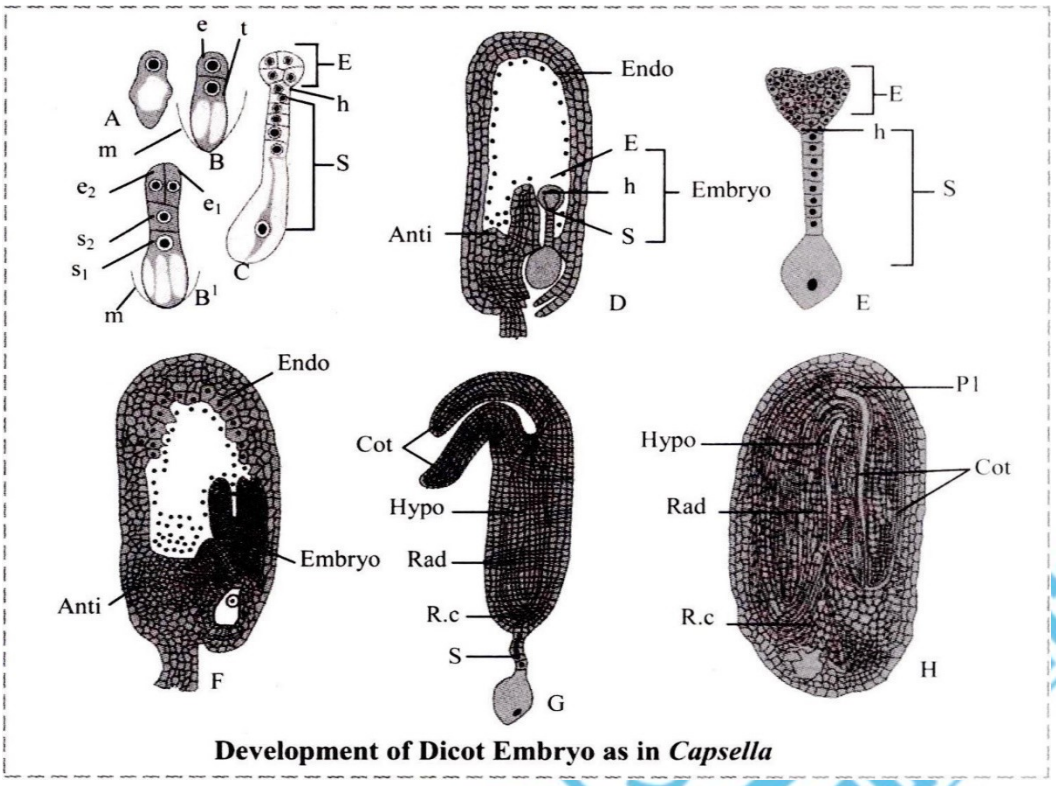
3) Mutualism

SECTION-D

Attempt any three of the following question: **[12]**

Q.27 Explain the development of dicot embryo. **(4)**

Ans:



Development of Dicot Embryo as in *Capsella*

A: Oospore.
B: Two celled proembryo.
e: embryonal initial;
t: suspensor initial;
m: Embryo sac membrane.
B^1: 4-celled I-shaped proembryo;
e_1, e_2: embryonal initial; s_1, s_2: suspensor initial.
C: Further development of embryo.
S: Suspensor, h: Hypophysis; E: Embryonal mass
D: L. S. of ovule
Endo: Endosperm in free nuclear stage.
Anti: Antipodal tissue.
Embryo: Developing embryo
E: Embryo showing further development of embryonic octants and hypophysis.
F: L. S. of ovule. Endosperm becoming cellular.
G: Embryo; Cot: Cotyledons; Hypo: Hypocotyl; Rad: Radicle; R.c.: Root-cap;
H: Mature seed; Pl: Plumule. Endosperm has been consumed almost completely.

Development of dicot embryo:

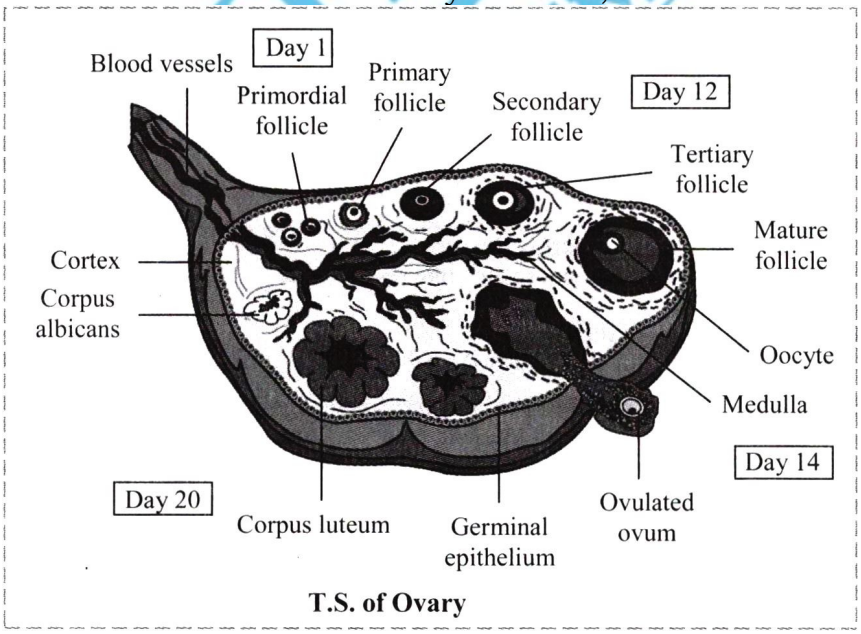
1. The zygote divides to form two- celled proembryo.
2. The larger cell towards the micropyle is called basal or suspensor initial cell and smaller cell towards chalaza is called terminal or embryonal initial cell.
3. The suspensor cell divides transversely in one plane to produce filamentous suspensor of 6-10 cells.
4. The first cell of the suspensor towards the micropylar end becomes swollen and function as a haustorium.
5. The lowermost cell of suspensor is known as hypophysis.
6. The suspensor helps in pushing the embryo in the endosperm.
7. The embryonal initial undergoes three successive mitotic divisions to form octant.
8. The planes of divisions are at right angles to each other.
9. The lower tier of four cells of octant give rise to hypocotyl and radicle whereas four cells of upper tier form the plumule and the one or two cotyledons.
10. The hypophysis by further division gives rise to the part of radicle and root cap.

11. Subsequently, the cells in the upper tier of octant divide in several planes so as to become heart shaped which then forms two lateral cotyledons and a terminal plumule.
12. Further enlargement of hypocotyl and cotyledons result in a curvature of embryo and it appears horse-shoe shaped.

Q.28 Explain the histological structure of ovary with the help of a diagram. (4)

Ans:

1. Each ovary is a compact structure differentiated into a central part called medulla and the outer part called cortex. The cortex is covered externally by a layer of germinal epithelium.
2. The stroma or loose connective tissue of the medulla has blood vessels, lymph vessels, and nerve fibres.
3. The outer cortex is more compact and granular.
4. It shows large number of tiny masses of cells called ovarian follicles. These are collectively formed from the immature ova originating from cells of the dorsal endoderm of the yolk sac.
5. The cells migrate to the gonadal ridge during embryonic development and divide mitotically. Now these cells are called oogonia.
6. As the oogonia continue to grow in size they are surrounded by a layer of granulosa cells and form the rudiments of the ovarian follicles.
7. The process of oogenesis starts much before the birth of the female baby and by the end of twelve weeks the ovary is fully formed. It has more than two million primordial follicles in it.
8. The cells of germinal epithelium give rise to groups of oogonia projecting into the cortex in the form of cords called egg tubes of Pfluger.
9. Each cord at its end has a round mass of oogonial cells called egg nests, from which the primordial ovarian follicles develop.
10. Each primordial follicle has, at its center a large primary oocyte (2n) surrounded by a single layer of flat follicular cells.
11. The primary oocyte starts with its meiotic division but gets arrested it at meiosis I.
12. Of the two million primordial follicles embedded in the foetal ovary only about one million remain at birth and only about 40,000 remain at the time of puberty.



T.S. of Ovary

13. The histological structure of the ovary shows the different stages of development of the oocyte in the ovary.
14. These changes are cyclic and occur during each menstrual cycle.
15. This development involves maturation of the primordial follicles into primary, secondary and Graafian follicles.
16. Each primary follicle has multi-layered cuboidal follicular cells.

17. The stroma cells add theca over the follicle. It now changes into a secondary follicle.
18. There is growth of the oocyte and the granulosa cells increase in number. They start producing the hormone estrogen.
19. The secondary follicle grows into the Graafian follicle by addition of more follicular cells.
20. As this process of maturation of follicles takes place, they begin to move towards the surface of ovary.
21. The Graafian follicle presses against the thin wall of the ovary giving it a blistered appearance.
22. The egg is released from the Graafian follicle during ovulation and the remaining part of the follicle changes into a temporary endocrine gland called corpus luteum.
23. If fertilization does not take place the corpus luteum degenerates into a white scar called corpus albicans.

Q.29 Enlist the steps in DNA finger printing giving its applications. (4)

Ans:

1. **Isolation of DNA:** The DNA must be recovered from the cells or tissues of the body (host). Only small amount of tissue like blood, hair roots, skin, etc. is required.
2. **Restriction digestion:** The isolated DNA is treated with restriction enzymes. The restriction enzymes cut the DNA into small fragments having variable lengths. This phenomenon is called Restriction Fragment Length Polymorphism (RFLP).
3. **Gel electrophoresis:** The DNA samples are loaded for agarose gel electrophoresis under an electric influence. The DNA fragments, which are negatively charged move to the positive pole. The movement of these fragments depends on length of the fragments. This results in formation of bands. dsDNA splits into ssDNA by alkali treatment.
4. **Southern blotting:** The separated DNA fragments are transferred to a nylon membrane or a nitrocellulose filter paper by placing it over the gel and soaking them with filter paper overnight.
5. **Selection of DNA probe:** A known sequence of single- stranded DNA is prepared. It is called DNA Probe. DNA Probe is obtained from organisms or prepared by cDNA preparation method. The DNA probe is labelled with radioactive isotopes.
6. **Hybridization:** Probe DNA is added to the nitrocellulose filter paper containing host DNA. The single-stranded DNA probe pairs with the complementary base sequence of the host DNA strand. As a result, DNA-DNA hybrids are formed on the nitrocellulose filter paper. Remaining single stranded DNA probe fragments are washed off.
7. **Photography:** The nitrocellulose filter paper is photographed on an X-ray film by autoradiography. The film is analysed to determine the presence of hybrid DNA.

The applications in DNA fingerprinting:

1. In forensic science, DNA finger printing is used to solve problems of rape and some complicated murder cases.
2. DNA finger printing is used to find out the biological father or mother or both, of the child, in case of disputed parentage.
3. DNA finger printing is used in pedigree analysis in cats, dogs, horses and humans.

Q.30 A man's pulse is 68 and cardiac output is 5440 cm^3. Find the stroke volume. (4)

Ans:

Cardiac output = Stroke volume × Heart rate

∴ 5440 = Stroke volume × 68

Stroke volume = 5440/ 68

= 80 mL

Q.31 What is adenohypophysis? Name the hormone secreted by adenohypophysis. (4)

Ans:

Adenohypophysis: It is an outgrowth from the roof of buccal cavity. This outgrowth is called Rathke's pouch. It grows upwards towards the brain. It is the larger lobe of pituitary gland. It is a highly cellular and vascular part of pituitary gland. It contains various types of epitheloid secretory cells, acidophils, basophils, chromatophores.

It is further divided into three parts - Pars distalis, pars tuberalis and pars intermedia. **Pars intermedia** is poorly developed in human beings. It is a small reduced part lying in the cleft between the anterior and posterior lobe. It secretes Melanocyte Stimulating Hormone (MSH) in some lower vertebrates.

MSH stimulates the dispersion of melanin granules in melanocytes and is responsible for skin pigmentation.