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TS-B3

SEAT NUMBER



IIT INSPIRE
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XI & XII Science (CBSE/state)
IIT- JEE (Mains + Advance)

NEET, MH-CET , NDA

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Branches : Chhatrapati Sq., Mangalmurti Sq.

4

(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) In ovule, meiosis occurs in

Ans:

d) megaspore mother cell

(1)

2) The role of Sertoli cells is

Ans:

a) nourishment of sperms

(1)

3) Chromosome synapse during

Ans:

c) meiosis

(1)

4) In *Pisum sativum*, which of the following traits is dominant?

Ans:

d) Inflated pods

(1)

5) If the codon on mRNA is AUG, the compatible anticodon on tRNA is _____.

Ans:

b) UAC

(1)

6) Movement of genes into or out of a population is called _____.

Ans:

b) Gene flow

(1)

7) Water absorption takes place through.

Ans:

c) root hair

(1)

8) Gibberellins were obtained from _____ by Kurosawa.

Ans:

a) Gibberella fujikuroi

(1)

9) The duration of joint diastole is

Ans:

c) 0.8 sec

(1)

10) _____ is also known as prosencephalon.

Ans:

a) Forebrain

(1)

Q.2 Answer the following questions in one sentence:

[8]

(1) **What is apomixis and what is its importance?**

(1)

Ans:

Embryo(s) are formed through asexual method of reproduction without gamete formation thereby producing genetically identical plants rapidly and effectively by apomixis.

(2) **Describe the type of sex determination in Honey bee.**

(1)

Ans:

In honey bees sex is normally determined by the fertilization or non-fertilization of egg, rather than the presence or absence of sex chromosomes. In haplodiploid systems male progeny normally develops from unfertilized eggs, which are haploid and have just one set of chromosomes.

(3) **Define autosomal inheritance.**

(1)

Ans:

Autosomal inheritance of a gene means that the gene is located on one of the autosomes. This means that males and females are equally likely to inherit the genes.

(4) **Define gene pool.**

(1)

Ans:

The sum total of genes of all individuals of interbreeding population or Mendelian population is called gene pool.

(5) **Define tachycardia.**

(1)

Ans:

Higher heart rate over 100 beats per minute is called tachycardia.

(6) **Define synaptic fatigue.**

(1)

Ans:

The synaptic fatigue is the time lag or halting of the transmission of nerve impulse, temporarily at synapse due to exhaustion of its neurotransmitter.

(7) **State any two examples of microbial pesticides used in organic farming.**

(1)

Ans:

1) *Bacillus thuringiensis*, 2) *Trichoderma*

(8) **Which species are included under biodiversity?**

(1)

Ans:

Biodiversity refers to the variety of living species on earth including plants, animals, bacteria and fungi.

SECTION-B

Attempt any eight of the following questions:

[16]

Q.3 Write a short note on pollen viability.

(2)

Ans:

It is the ability of pollen grain to germinate and develop male gametophyte.

1. Depends on environmental factors – Temperature and humidity.

2. It lasts from few minutes (Grasses, Wheat, Rice) to some months (Members of Rosaceae, Solanaceae, Fabaceae, Leguminosae)

Q.4 Write a note syphilis.

(2)

Ans:

1. Syphilis is a sexually transmitted venereal disease caused by a Spirochaete bacterium *Treponema pallidum*.
2. The site of infection is the mucous membrane in genital, rectal and oral region.
3. Symptoms of syphilis:
 - a) Primary lesion known as chancre at the site of infection.
 - b) They are seen on the external genitalia in males and inside the vagina in females.
 - c) Skin rashes accompanied by fever, inflamed joints and loss of hair.
 - d) Paralysis
 - e) Degenerative changes in the heart and brain.

Q.5 Define a test cross.

(2)

Ans:

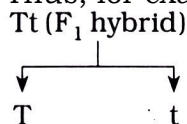
The cross of F_1 progeny with homozygous recessive parent is called a test cross.

Q.6 Why is law of segregation is also called the law of purity gametes?

(2)

Ans:

1. Mendel's law of segregation is also called Law of purity of gametes because, during formation of gametes, the alleles separate/ segregate from each other and only one allele enters a gamete.
2. The separation of one allele does not affect other. Since single allele enters a gamete means gametes will be pure for a trait.
E.g., The contrasting characters such as tall (T) and dwarf (t) present in F_1 hybrid (Tt) segregate during the formation of gametes.
3. Owing to this, two types of gametes i.e., T and t are formed which are pure for the characters which they carry.
4. Thus, for example:



Q.7 Why is HGP important?

(2)

Ans:

- 1) HGP is associated with rapid development of Bioinformatics.
- 2) Knowledge gained about the functions of genes and proteins has a major impact in the fields like Medicine, Biotechnology and the Life sciences.
- 3) It has helped in identifying the genes that are associated with genetic characteristics.
- 4) The genetic basis of many hereditary diseases can be understood.
- 5) HGP also involves organisms. This will be useful for comparative studies of gene functions in these organisms.
- 6) It has increased the understanding of gene structure and function in other species. As human being has many of the genes same as those of flies, roundworms and mice, such studies will enhance understanding of human evolution.

Q.8 Define the terms Natural selection and Genetic recombination.

(2)

Ans:

Natural selection: natural selection is the process by which better adapted organisms grow and produce more number of offsprings in the population.

Genetic recombination: Crossing over in sexually reproducing organisms cause variations, during gamete formation. Crossing over also create recombination.

Q.9 Describe the structure of root hair.

(2)

Ans:

- 1) Water from soil is absorbed by plants with the help of root hairs.
- 2) Root hairs are present in zone of absorption.
- 3) Epidermal cells form unicellular extensions which are short lived (ephemeral) structures i.e., root hairs.
- 4) Root hairs are nothing but cytoplasmic extensions of epiblema cell.
- 5) Root hairs are long tube-like structures of about 1 to 10 mm.
- 6) They are colourless, unbranched and very delicate structures.
- 7) A large vacuole is surrounded by thin layer of cytoplasm, plasma membrane and outer cell wall.
- 8) The cell wall of root hair is thin and double layered with outer layer of pectin and inner layer of cellulose which is freely permeable.

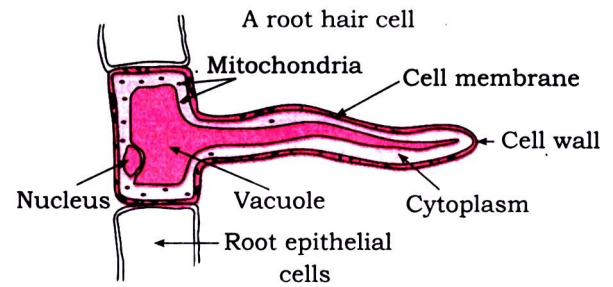


Fig. Structure of root hair

Q.10 Write a short note on midbrain.

(2)

Ans:

1. Structure of midbrain:

- a. Midbrain is the middle part of the brain situated between the forebrain and the hindbrain. It is present between the pons varolii and diencephalon.
- b. It has two distinct regions: Corpora quadrigemina and crura cerebri.
- c. Corpora quadrigemina consists of two pairs of lobes, viz., superior colliculi and inferior colliculi. These are located in the thick wall of midbrain.
- d. Crura cerebri are thick bands of longitudinal nerve fibers, present on the floor of midbrain.

2. Functions of midbrain:

- a. Inferior colliculi control and coordinate auditor reflexes.
- b. Superior colliculi control head and eye movements.
- c. Crura cerebri connect the cerebrum to cerebellum and spinal cord.

Q.11 Name any four restriction enzymes and their host organisms.

(2)

Ans:

1. Different restriction enzymes commonly used in r-DNA technology are Alu I, Bam HI, Eco RI, Hind II, Hind III, Pst I, Sal I, Taq I, Mbo II, Hpa I, Bgl I, Not I, Kpn I, etc.
2. They are the molecular scissors which recognize and cut the phosphodiester back bone of DNA on both strands, at highly specific sequences.
3. The sites recognized by them are called recognition sequences or recognition sites.
4. Different restriction enzymes found in different organisms recognise different nucleotide sequences and therefore cut DNA at different sites.
5. Restriction cutting may result in DNA fragments with blunt ends or cohesive or sticky ends or staggered ends (having short, single stranded projections).
6. Restriction endonucleases like Bam HI and Eco RI produce fragments with sticky ends.
7. Restriction endonucleases like Alu I, Hind III produce fragments with blunt ends.
8. Type I restriction endonucleases function simultaneously as endonuclease and methylase e.g., Eco K.
9. Type II restriction endonucleases have separate cleaving and methylation activities. They are more stable and are used in r-DNA technology e.g., Eco RI, BglII. They cut DNA at specific sites within the palindrome.
10. Type III restriction endonucleases cut DNA at specific non-palindromic sequences e.g., HpaI, MboII.

Q.12 Enlist the names of transgenic animals. (2)

Ans:

Transgenic animals: Transgenic animals are the animals in which there has been a deliberate modification of the genome and such animals are used in various field such as medical research, toxicology, molecular biology. Pharmaceutical industry biotechnology, etc.

Q.13 Explain how crow and cuckoo exhibit brood parasitism. (2)

Ans:

1. Brood parasitism is a type of parasitic behaviour shown by Asian Koel lays its egg in the nest of crow.
2. Crow acts as a host bird and incubate the egg of koel.
3. The eggs of koel show resemblance to the host's egg in size and colour. This reduces the chances of the crow detecting Koel's eggs and ejecting them from the nest.
4. Eggs of koel hatch before the host's eggs and hence parasitic bird is in advantage.

Q.14 What is biodiversity? (2)

Ans:

Biodiversity is the part of nature which includes the differences in the genes among the individuals of all plants and animal species at different scales in a space – local region, country and the world; both terrestrial and aquatic, within a defined area.

SECTION-C

Attempt any eight of the following questions:

[24]

Q.15 What is dihybrid cross? Explain with suitable example and checkerboard method. (3)

Ans:

- 1) A cross which involves two pairs of alleles is called a dihybrid cross. A phenotypic ratio 9:3:3:1 obtained in the F_2 generation of a dihybrid cross is called a dihybrid ratio.
- 2) Thus, for example, when we cross a true breeding pea plant bearing round yellow seeds with a true breeding pea plant bearing wrinkled and green seeds we get pea plants bearing round and yellow seeds in the F_1 generation.
- 3) When F_1 plants are selfed, we get a ratio of 9:3:3:1 in the F_2 generation, where 9 plants bear yellow round seeds, 3 plants bear yellow wrinkled seeds, 3 plants bear green round seeds and 1 plant bears green wrinkled seeds.

4) Parents (P_1) : RRYY × rryy

Gametes of P_1 : RY and ry

F_1 generation : RrYy (Yellow round)

On selfing F_1 : RrYy × RrYy

Gametes of F_1 : RY, Ry, rY, ry

P_2 generation:

	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
Ry	RrYy	Rryy	rrYy	rryy

Round Yellow : 9, Round green : 3

Wrinkled yellow : 3, Wrinkled green : 1

Phenotypic ratio : 9:3:3:1

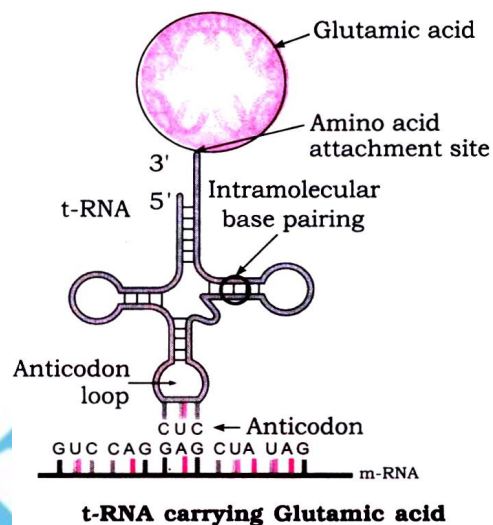
Genotypic ratio: 1:2:1:2:4:2:1:2:1

Q.16 Write a short note on tRNA and draw a diagram of a tRNA.

(3)

Ans:

- 1) As t-RNA can read the codon and also can bind with the amino acid, t-RNA is considered as an adapter molecule.
- 2) Clover leaf structure (2 dimensional) of t-RNA:
 - t-RNA has four arms – DHU arm (has amino acyl binding loop). Middle arm (has anticodon loop), T ϕ C arm (has ribosome binding loop) and variable arm.
 - It has G nucleotide at 5' end.
- 3) There is specific t-RNA for every amino acid.
- 4) Initiator t-RNA is specific for methionine.
- 5) There are no t-RNAs for stop codons.
- 6) In the actual structure, the t-RNA molecule looks like inverted L (3-dimensional structure).



Q.17 Explain the structure of transcription unit.

(3)

Ans:

Transcription Unit: Transcription unit (each transcribed segment of DNA) consists of the promoter, the structural gene and the terminator.

1. The promoter:

- Located towards 5' end of structural gene, i.e., upstream.
- Provides binding site for enzyme RNA polymerase.

2. Structural gene:

- **Template strand:** DNA strand having 3' → 5' polarity. It is also called as antisense strand.
- **Sense strand:** The other strand of DNA having 5' → 3' polarity. It is also called as coding strand.

3. The terminator:

- Located at 3' end of coding strand, i.e., downstream.
- Defines the end of the transcription process.

Q.18 Write about the discovery of cytokinin. Add a note on natural and synthetic cytokinin.

(3)

Ans:

Discovery of cytokinin:

- 1) Cytokinins are growth promoting hormones that stimulate cell division.
- 2) Skoog and Miller discovered first cytokinin when they were investigating nutritional requirements of tobacco callus culture.
- 3) It was observed that the callus proliferated when there was addition of coconut milk as supplement.
- 4) The degraded sample of herring (fish) sperm DNA also showed similar growth of tobacco callus. They named the substance as kinetin.

Natural and synthetic cytokinin:

- 1) Cytokinins are growth promoting hormone that promotes cell division. Kinetin, zeatin are examples of cytokinin.
- 2) They promote cell division as well as cell enlargement.
- 3) High cytokinin promotes shoot development.
- 4) Growth of lateral buds is promoted by cytokinins. Thus it controls apical dominance.
- 5) It promotes formation of interfascicular cambium.
- 6) It has a role in breaking seed dormancy and promotes seed germination.
- 7) Cytokinins induce RNA synthesis.

- 8) Cytokinin and auxin ratio and their interactions control morphogenesis and cell differentiation.

Q.19 Give a brief account on arterial blood pressure.

(3)

Ans:

- 1) The pressure exerted by blood on the wall of blood vessels is called blood pressure. Pressure exerted by blood on the wall of arterial wall is arterial blood pressure. Blood pressure is described in two terms viz. systolic blood pressure and diastolic blood pressure.
- 2) Systolic blood pressure is the pressure exerted on atrial wall during ventricular contraction (systole). For a normal healthy adult, the average value is 120 mm Hg.
- 3) Diastolic blood pressure is the pressure on arterial wall during ventricular relaxation (diastole). For a normal healthy adult, it is 80 mm Hg.
- 4) B.P.= SP/DP = 120/80 mmHg. Blood pressure is normally written as 120/80 mmHg. Difference between systolic and diastolic pressure is called pulse pressure. Normally, it is 40 mm Hg.

Q.20 Describe the T.S of spinal cord.

(3)

Ans:

T.S. of spinal cord:

1. The spinal cord has a deep, narrow dorsal fissure and a broad ventral fissure.
2. The inner grey matter is H-shaped and the outer white matter surrounds it.
3. Grey matter is divisible into six horns, namely dorsal, lateral and ventral horns.
4. The white matter is divisible into 6 columns or funiculi, namely dorsal, lateral and ventral funiculi.
5. The dorsal and ventral horns extend out of the spinal cord as dorsal root and ventral root.
6. The dorsal root has dorsal root ganglion which is a collection of unipolar sensory neurons. No such ganglia on ventral root.
7. The adjustor/association or inter-neurons lie inside the grey matter.
8. The white matter consists mainly of bundles of myelinated nerve fiber called ascending and descending tracts.

Q.21 Explain the life cycle of malaria parasite.

(3)

Ans:

1. Diagnosis:

Malaria can be diagnosed by microscopic study of blood smear. Besides, other rapid diagnostic tests based on nucleic acid amplification techniques are also used.

2. Treatment:

Treatment of malaria includes Artemisinin based combination therapies (ACTs). WHO has recommended 5 different ACTs which includes various combinations of artesunate, sulfadoxine, pyrimethamine, etc. In addition, quinine is also used.

3. Prevention and Control:

- a) Prevention of mosquito bite by using mosquito nets and insect repellents.
- b) Spraying insecticides and draining stagnant water where mosquito lays eggs.
- c) Mosquito larve can be controlled by using *Gambusia* fresh water fish (biocontrol).

Q.22 Describe the production of alcoholic beverage.

(3)

Ans:

Alcoholic beverages are the product of alcoholic fermentation of specific substrates. They include liquors like wine, beer and whiskey.

1. **Wine:** Microbes such as *Saccharomyces cerevisiae* var. *ellipsoideus* to ferment different flavored fruits to produce wine.
2. **Beer:** Beer is another alcoholic beverage obtained from fermented grains, mostly barley. *S.cerevisiae* is used for this production. Steps such as malting, mashing and fermentation are used for the production of beer.

3. **Whiskey:** Whiskey is obtained by the fermentation of a mix of grains such as corn, wheat, barley etc. The product of this fermentation is then distilled.

Q.23 (i) What are palindromic sequences?

(ii) Which procedure is employed to separate the DNA fragments formed by restriction enzymes?

(iii) What is recombinant DNA?

(3)

Ans:

(i) What are palindromic sequences?

Palindrome is a DNA sequence which when read on opposite strand of DNA (3' to 5' or 5' to 3') it reads same. E.g. recognition sequence of Eco RI is a palindrome.

5' G-A-A-T-T-c 3'

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

(ii) Which procedure is employed to separate the DNA fragments formed by restriction enzymes?

Gel electrophoresis is a technique used to separate fragments of DNA which are cut by restriction enzymes.

(iii) What is recombinant DNA?

Manipulation of genes involve repairing of the defective genes or replacing of defective genes by healthy genes or normal genes; artificially synthesizing of a totally new gene; transfer of genes into a new location or into a new organism; introducing an altogether new gene; manipulation of genes for improvement of living organisms; combining of genes from two organisms, altering the genotype; gene cloning etc. Therefore, the genetic engineering is alternatively called recombinant DNA technology or gene cloning.

Q.24 Distinguish between habitat and niche.

(3)

Ans:

Ans.	Habitat	Niche
1.	Habitat is the place where a particular species lives.	1. Niche is the functional role played by the organisms.
2.	Factors such as sunlight, average rainfall, temperature, soil type, etc. decide the presence of organisms in a habitat.	2. Various aspects of life of an organism such as diet, shelter and its link with physical and biological environment are included in niche.
3.	Habitat can be compared to postal address.	3. Niche can be considered as a profession of an organism.

Q.25 Define commensalism. Explain it by giving at least two examples.

(3)

Ans:

1. Commensalism: Commensalism is the interaction between two species in which one species derives benefit and the other one is neither harmed nor benefited.

2. Examples of commensalism:

- Orchid grows as epiphyte on other big trees. The tree does not get any benefit but is neither harmed. But orchid gets support.
- Cattle egret is the insectivorous bird which forage close to cattle. When cattle move, the hidden insects in the grass are flushed out. These insects are then captured by egrets. Cattle do not get benefit but birds do.
- Sea anemone has stinging cells on the tentacles which offer protection to clown fish. Clown fish gets the protection from other predators, whereas, sea anemone does not derive any benefit from this association.

Q.26 Explain primary and secondary succession of aquatic habitat.

(3)

Ans:

Primary succession:

- 1) Primary succession means the initial development of life on barren piece of land.
- 2) Primary succession occurs on newly cooled lava, rocks and newly created pond or reservoir. In a newly formed volcanic island, the life starts and takes up millions of years to develop the whole biomass.
- 3) In the successive seral stages, there is a change in the diversity of species of organisms, increase in the number of species and organisms as well as an increase in the total biomass.
- 4) The establishment of a new biotic community is generally very slow and takes millions of years.
- 5) Primary succession depends on climatic condition, soil characteristics and natural processes.

Secondary succession:

- 1) Secondary succession begins in areas where previously natural biotic communities were present. But later were destroyed due to causes such as abandoned farm lands, burnt or cut forest, flooded lands, etc.
- 2) Secondary succession is faster than primary succession because already there is also change in the resident animals that depend for food and shelter.
- 3) Thus, with secondary succession, the numbers and types of animals and decomposers also change.
- 4) During succession, natural or human induced disturbances (fire, deforestation, etc.), can convert a particular seral stage of succession to an earlier previous/preceding stage.
- 5) Sometimes, disturbance like this can create new conditions that encourage some species and eliminate other species.

SECTION-D

Attempt any three of the following question:

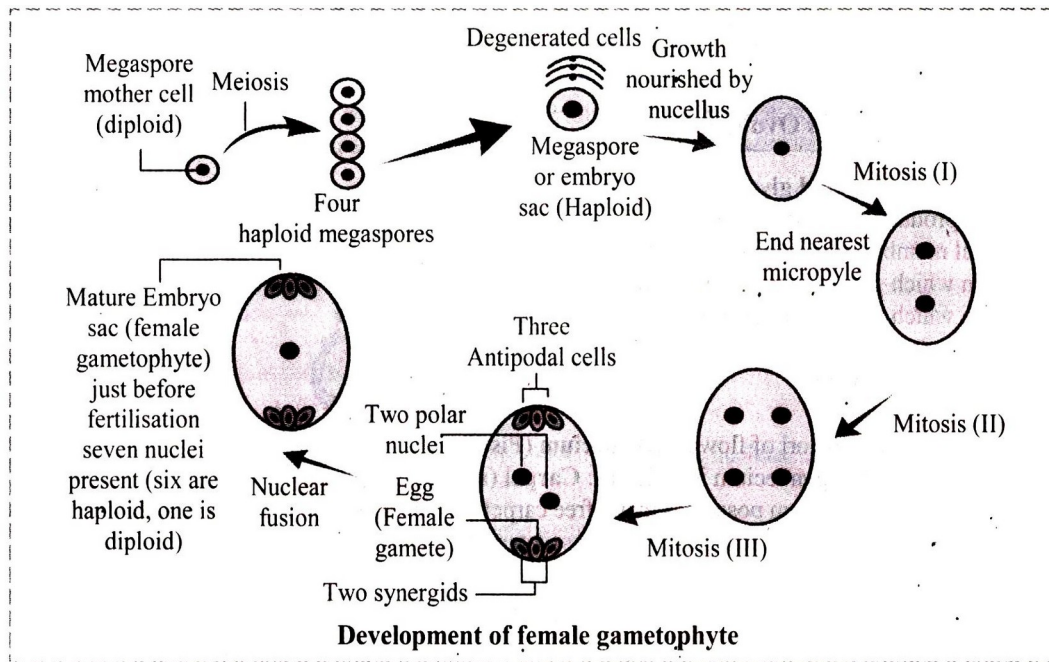
[12]

Q.27 With the help of neat and labelled diagram explain the development of female gametophyte.

(4)

Ans:

1. The diploid **Megaspore mother cell** undergoes meiosis to form linear tetrad of haploid cells i.e., **megaspore**.
2. Upper three megaspores degenerate and lowest one toward centre of nucellus remains functional. It acts as the first cell of female gametophyte.
3. The functional megaspore undergoes three successive, free nuclear mitotic divisions.
4. Thus, total eight nuclei are formed, four of which are located at each pole.
5. One nucleus from each pole migrates towards the centre and are called polar nuclei.
6. Three nuclei towards micropylar end constitute egg apparatus.
7. Egg apparatus consist of large central, haploid egg cell and two supporting haploid synergid cells.
8. Synergid show hair like projections called filiform apparatus, which guide the pollen tube toward the egg.
9. Antipodal cells are group of three cells present at the chalazal end.
10. The two haploid polar nuclei of large central cell fuse to form dipole secondary nucleus or definitive nucleus, just prior to fertilization.
11. This seven celled and eight nucleated structure is called an embryo sac.
12. Since embryo sac develops from a single megaspore, it is described as monosporic development.
13. In angiosperms, the development of female gametophyte is endosporous i.e., within the megaspore.
14. Female gametophyte is colourless, endosporic and is concealed in the ovule enclosed by ovary.



Q.28 What is menstrual cycle? Which hormones regulate menstrual cycle? (4)

Ans:

- 1) Menstrual cycle involves a series of cyclic change in the ovary and the female reproductive tract, mainly in the uterus.
- 2) These changes take place under the effect of gonadotropins and the ovarian hormones respectively.
- 3) Menstrual cycle is repeated with a periodicity of approximately 28 days.
- 4) An egg (secondary oocyte) is released mid-cycle, alternately from one of the two ovaries.
- 5) The main hormones that regulate the menstrual cycle are progesterone, estrogen, LH (Luteinizing hormone) and FSH (Follicle Stimulating Hormone).

Q.29 Write the physiological effects and applications of gibberellins. (4)

Ans:

Physiological effects and applications of Gibberellins:

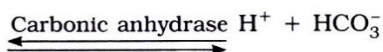
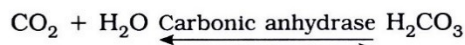
1. Breaking of bud dormancy, seed dormancy.
2. By promoting synthesis of amylase in cereals, their seed germination can be stimulated e.g., wheat, barley.
3. Increase in length of internodes thereby elongation of stem.
4. Bolting in rosette plants – elongation of internodes before flowering e.g., Cabbage, beet.
5. Parthenocarpy in tomato, apple, pear.
6. Stimulates flowering in long day plants.
7. Increase in fruits size and bunch length e.g., grapes.
8. Overcomes effects of vernalization.
9. Inhibition of root growth, delay senescence and abscission.
10. Production of male flowers on female plants.
11. They convert genetically dwarf plants to phenotypically tall plants e.g., maize.

Q.30 Explain in detail the transport of CO_2 . (4)

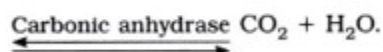
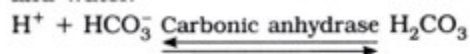
Ans:

Transport of CO_2 : Carbon dioxide is transported by RBCs and plasma in three different forms.

- 1) By plasma in solution form (7%): About 7% of CO_2 is transported in a dissolved form as carbonic acid (Which can be broken down into CO_2 and H_2O). $CO_2 + H_2O = H_2CO_3$.
- 2) By bicarbonate ions (70%): Nearly 70% of carbon dioxide is transported in the form sodium bicarbonate/potassium bicarbonate in the plasma.
- 3) RBCs contains an enzyme, carbonic anhydrase. In the presence of this enzyme CO_2 combines with water to form carbonic acid.
- 4) Carbonic anhydrase also brings about dissociation of carbonic acid immediately tending to large accumulation of HCO_3^- ions inside the RBCs.



- 5) The bicarbonate ions move out of RBCs and this would bring about imbalance of the charge inside the RBCs.
- 6) To maintain the ionic balance, Cl^- ions diffuse from plasma into the RBCs. This movement of chloride ions is known as chloride shift or Hamburger's phenomenon.
- 7) H^+ is taken up by haemoglobin to form Reduced Hb (HHb).
- 8) At the level of the lungs due to the low partial pressure of the alveolar air, hydrogen ion and bicarbonate ions recombine to form carbonic acid and in presence of carbonic anhydrase it again yields carbon dioxide and water.



Q.31 Explain the mechanism of hormone action.

(4)

Ans:

Hormones are released in vary minuet quantities. They produce their effect on the target cells by binding to hormone receptors. The hormone receptors are present on the cell membrane (i.e., membrane receptors) or may be intracellular receptors.

Mode of hormone action through membrane receptors:

- a. Hormones like catecholamines, peptide and polypeptide hormones are not lipid soluble and they cannot enter their target cell through plasma membrane. These non-steroid water-soluble hormones interact with surface receptor and initiate metabolic activity.
- b. Molecules of amino acid derivatives, peptide hormones bind to specific receptor molecule located on the plasma membrane.
- c. The hormone receptor complex causes the release of an enzyme adenylate cyclase from the receptor site. This enzyme from cyclic AMP from ATP of the cell.
- d. cAMP activates enzymatic actions. The hormones act as the first messenger and the cAMP acts as the second messenger.
- e. Some other secondary messengers are Ca^{++} , cGMP and IP_3 (inositol triphosphate), etc.

Mode of action through intracellular receptors:

- a. Steroid and thyroid hormones are lipid soluble and cart easily pass through plasma membrane of the target cell into the cytoplasm.
- b. In the cytoplasm, they bind to specific intracellular receptors proteins forming a hormone – receptors complex that enters the nucleus.
- c. The hormone receptor complex binds to a specific regulatory site of DNA, in the nucleus.
- d. The activated genes transcribe mRNA which directs proteins synthesis and enzyme in the cytoplasm.
- e. The action of lipid soluble hormones is slow but long lasting.

