NIOS PYQ's SOLUTIONS

PREVIOUS YEARS' QUESTIONS & ANSWERS

APRIL-2024

Your Path to Success

SECTION - A

Q1. Name of the technique used for detecting genetic disorders in a foetus is:

(A) amniocentesis **(B) ultrasound**

(C) X-ray **(D) MRI**

Answer - (A) amniocentesis

Q2. Which of the following makes up the final trophic level in a food chain?

(A) Parasite **(B) Producer**

(C) Decomposer **(D) Carnivore**

Answer - (C) Decomposer

OR

What does the following sequence represent?

Blue-green algae → Crustose lichens → Foliose lichens → Mosses → Shrubs → Dicotyledonous trees

(A) Genetic drift **(B) Ecological succession**

(C) A food pyramid **(D) Phylogenetic trend**

Answer - (B) Ecological succession

Q3. The largest lymphoid organ in the human body is:

(A) bone marrow **(B) thymus**

(C) adrenal **(D) spleen**

Answer - (D) spleen

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OR

The condition caused due to oversecretion of thyroxine is:

(A) goitre **(B) hyperthyroidism**

(C) cretenism **(D) myxoedema**

Answer - (B) hyperthyroidism

Q4. Cephalothorax is a characteristic feature present in the phylum:

(A) Echinodermata **(B) Mollusca**

(C) Arthropoda **(D) Annelida**

Answer - (C) Arthropoda

OR

Heart is three-chambered in reptiles. But a partially divided ventricle (i.e., four-chambered heart) is present in:

(A) salamander **(B) frog**

(C) snake **(D) crocodile**

Answer - (D) crocodile

Q5. When both male and female flowers are present on the same plant, the plant is said to be:

(A) unisexual **(B) monoecious**

(C) dioecious **(D) bisexual**

Answer - (B) monoecious

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Q6. Excessive intake of iron in diet causes:

(A) scurvy

(B) hypervitaminosis

(C) anaemia

(D) hemosiderosis

Answer - (D) hemosiderosis

Q7. A broad-spectrum antibiotic, used against pathogenic bacteria, is:

(A) penicillin

(B) paracetamol

(C) erythromycin

(D) streptomycin

Answer - (D) streptomycin

Q8. A cross between the F_1 progeny and the homozygous recessive parent is known as:

(A) test cross

(B) dihybrid cross

(C) reciprocal cross

(D) monohybrid cross

Answer - (A) test cross

OR

The phenotypic ratio, in case of incomplete dominance in Mirabilis jalapa, is:

(A) 9 : 3 : 3 : 1

(B) 3 : 1

(C) 1 : 4 : 6 : 4 : 1

(D) 1 : 2 : 1

Answer - (D) 1 : 2 : 1

Q9. Pick the odd one out.

(A) UGA

(B) AUG

(C) UAG

(D) UAA

Answer - (B) AUG

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OR

Pick the mRNA codon which will pair with the anticodon UCA of tRNA.

(A) GAU **(B) AGU**

(C) AUG **(D) TGT**

Answer - (B) AGU

Q10. Which of the following bacteria helps to set milk into yoghurt?

(A) Mycobacterium **(B) Lactobacillus**

(C) Azotobacter **(D) Pneumococcus**

Answer - (B) Lactobacillus

OR

Which of the following is not a product of fermentation?

(A) Bread **(B) Acetic acid**

(C) Butanol **(D) Ligase**

Answer - (D) Ligase

Q11. The special protein present in the root nodules of legume which helps in nitrogen fixation is:

(A) leghaemoglobin **(B) nitrogenase**

(C) chlorophyll **(D) haemoglobin**

Answer - (A) leghaemoglobin

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Q12. Which of the following is an example of an oviparous mammal?

(A) Kangaroo **(B) Duck-billed platypus**

(C) Whale **(D) Bat**

Answer - (B) Duck-billed platypus

OR

Endoparasitic flatworm found in the human intestine of an infected person is:

(A) millipede **(B) ascaris**

(C) tapeworm **(D) liver fluke**

Answer - (C) tapeworm

Q13. Which of the following is a contractile protein?

(A) Keratin **(B) Collagen**

(C) Trypsin **(D) Myosin**

Answer - (D) Myosin

Q14. In C_4 plants, the initial acceptor of CO_2 is:

(A) Ribulose bisphosphate (RuBP) **(B) Phosphoenolpyruvic acid (PEP)**

(C) Oxaloacetic acid (OAA) **(D) Phosphoglyceric acid (PGA)**

Answer - (B) Phosphoenolpyruvic acid (PEP)

Q15.The disease for which bio-engineered vaccine has already been developed is:

(A) smallpox **(B) tetanus**

(C) hepatitis B **(D) pertussis**

Answer - (C) hepatitis B

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Q16. The edible part of the coconut is:

(A) fleshy thalamus **(B) mesocarp**

(C) pericarp **(D) endosperm**

Answer - (D) endosperm

OR

The example of hypanthodium is:

(A) Tulsi **(B) Peepal**

(C) Sunflower **(D) Euphorbia**

Answer - (B) Peepal

SECTION - B

Q17. Fill in the blanks (attempt any two from A to D):

The flowchart given below is a diagrammatic representation of trophic levels in a (A) in an ecosystem:

Fourth trophic level

D

↑

Third trophic level

(Carnivore)

↑

Second trophic level

C

↑

First trophic level

B

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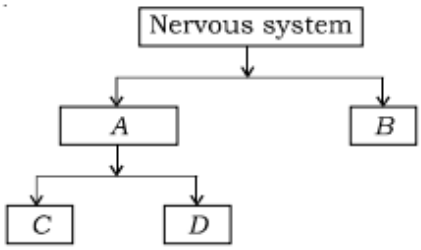
Answer – (A) Food Chain

(B) Producers

(C) Herbivores (Primary Consumers)

(D) Top Carnivores (Tertiary Consumer)

Q18. Complete the flowchart with the basic components of the nervous system (attempt any two from A to D):



Answer – (A) Central Nervous System (CNS)

(B) Peripheral Nervous System (PNS)

(C) Brain

(D) Spinal cord

Q19. Choose the odd one in each of the following :

(a) Ovary → Fallopian tube → Ureter → Vagina

(b) Graafian follicle → Leydig cells → Corpus luteum

Answer - (a) Ureter (others belong to female reproductive system)

(b) Leydig cells (others are related to ovary)

Q20. Draw the diagram as given below in your answer-book and label the parts marked A and B in the following diagram:

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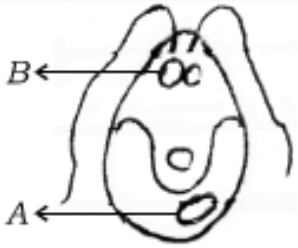

Answer – (A) Micropyle

(B) Antipodal Cells

Q21. Match the items in Column-I with the suitable items in Column-II:

Column-I	Column-II
(a) Brush bordered epithelium	**(i) Lining of air sacs in lungs**
(b) Squamous epithelium	**(ii) Lining of trachea**
	(iii) Lining of stomach
	(iv) Lining of intestine

Answer - (a) → (iv) Lining of intestine

(b) → (i) Lining of air sacs in lungs

Q22. Fill in the blanks (attempt any two from A to D):

__(A)__ and __(B)__ are two adaptations to promote cross-pollination in flowers; while __(C)__ and __(D)__ are two devices to ensure self-pollination.

Answer – (A) Dichogamy

(B) Herkogamy

(C) Cleistogamy

(D) Homogamy

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Q23. Match the items in Column-I with the suitable items in Column-II:

Column-I	Column-II
(a) Stilt root	**(i) Turnip**
(b) Fusiform root	**(ii) Banyan**
	(iii) Sugarcane
	(iv) Radish

Answer - (a) → (iii) Sugarcane

(b) → (iv) Radish

Q24. Fill in the blanks with suitable words (attempt any two from A to D):

Many organisms with separate sexes have a pair of specific type of chromosomes called sex chromosomes. In humans, ___(A)___ are responsible for homogametic female, and ____(B)____ are responsible for heterogametic male.

In birds, it is __(C)__ for females and __(D)__ for male chromosomes.

Answer – (A) XX

(B) XY

(C) ZW

(D) ZZ

Q25. Fill in the blanks with suitable words (attempt any two from A to D):

The secretion of milk from the mammary glands is called __(A)__. The first secretion that comes from the mammary glands of the mother is called __(B)__. The synthesis of milk from the mammary glands is stimulated by the hormone __(C)__ which is secreted by the anterior lobe of the pituitary gland. Another hormone __(D)__ is secreted by the posterior lobe of the pituitary gland, which stimulates the release of milk from the mammary glands.

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Answer – (A) Lactation

(B) Colostrum

(C) Prolactin

(D) Oxytocin

Q26. In the Column-I of the following table, recipient blood groups are given. For safe transfusion, fill in the boxes of Column-II with the correct donor in each case (attempt any two from (a) to (d)) :

Column–I (Those who can safely receive blood of donor)	*Column–II* (Donor)
(i) B; AB	*(a)* _____
(ii) AB; A	*(b)* _____
(iii) AB	*(c)* _____
(iv) O; A; B; AB	*(d)* _____

Answer –

Column – I (Those who can safely receive blood of donor)	**Column – II (Donor)**
(i) B; AB	(a) B
(ii) AB; A	(b) A
(iii) AB (Universal Receiver)	(c) A; B; O; AB
(iv) O; A; B; AB	(d) O (Universal Donor)

Q27. Given below are the interactions between two species. Identify the two wrong statements for interactions from the following :

(a) Both the species cannot survive without the other is called mutualism.

(b) Penicillium secretes antibiotics which inhibit the growth of bacteria. This interaction is known as predation.

(c) When one species is benefitted and the other is harmed, is known as parasitism.

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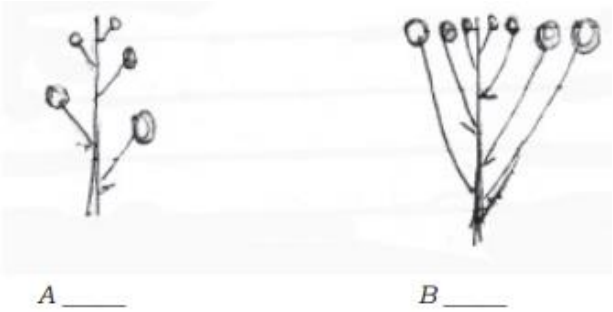
(d) One species is benefitted and the other is unharmed or neutral. This interaction is known as commensalism.

Answer - The two wrong statements are : **(a)** and **(b)**

Explanation :

- (a) is incorrect because mutualism does not necessarily mean that both species cannot survive without each other (that condition is called obligate mutualism).
- (b) is incorrect because the interaction between Penicillium and bacteria is **antibiosis (amensalism)**, not predation.

Q28. Identify the type of inflorescence of the diagram given below :



Answer – (A) Racemose inflorescence

(B) Cymose inflorescence

SECTION - C

Q29. Write the main functions of B-cells and T-cells in the immune system.

Answer –

(a) Functions of B-cells :

- Produce antibodies.
- Provide humoral immunity.

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(b) Functions of T-cells :

- Provide cell-mediated immunity.
- Destroy infected or abnormal cells.

OR

Differentiate actively acquired immunity from passively acquired immunity.

Answer –

(a) Active immunity :

- Produced by own immune system.
- Long-lasting.
- Example: Vaccination.

(b) Passive immunity :

- Antibodies received from outside.
- Short-lived.

Q30. Name the two diseases caused by the deficiency of protein or carbohydrate or both in the diet of a child. Also list any two characteristic symptoms of any one deficiency disease.

Answer –

(a) Diseases :

- Kwashiorkor
- Marasmus

(b) Symptoms of Kwashiorkor :

- Swollen abdomen
- Stunted growth

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Q31. What are meristems? Write the location of the following meristems in the plant :

(a) Apical meristem

(b) Lateral meristem

Answer – **Meristems :** Actively dividing plant tissues.

(a) Apical meristem – At root and shoot tips.

(b) Lateral meristem – Along sides of stem and root.

OR

What are the main functions of the muscular tissue? Where are the following muscles located?

(a) Striated muscles

(b) Unstriated muscles

Answer – **Functions of muscular tissue :**

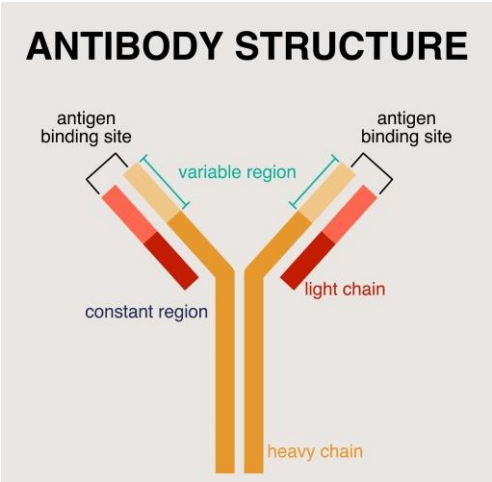
- Movement
- Locomotion

(a) Striated – Attached to bones.

(b) Unstriated – In walls of internal organs.

Q32. Draw a diagrammatic structure of an antibody, and label the specific antigen-binding site.

Answer –



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Q33. Write any four functions of proteins in our body.

Answer – Functions of proteins :

- Enzymes
- Structural support
- Hormones
- Antibodies

OR

What are vitamins? Vitamins are grouped into two classes. Name them and give one example of each.

Answer – Vitamins : Organic micronutrients required in small amounts.

Classes :

- Fat-soluble (Vitamin A, Vitamin D)
- Water-soluble (Vitamin B, Vitamin C)

Q34. (a) What types of roots are found in plants growing in marshy areas?

(b) Write the name of the tissue present in the aerial roots of epiphytes, which help in the absorption of moisture from the atmosphere.

Answer –

a) Plants growing in marshy areas have pneumatophores (breathing roots).
These roots grow upward from the soil and help in gaseous exchange in waterlogged, oxygen-deficient soil.
Example: Mangroves.

(b) The tissue present in the aerial roots of epiphytes that helps in absorption of atmospheric moisture is velamen.
It is a spongy, multilayered epidermis found in aerial roots of orchids.

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OR

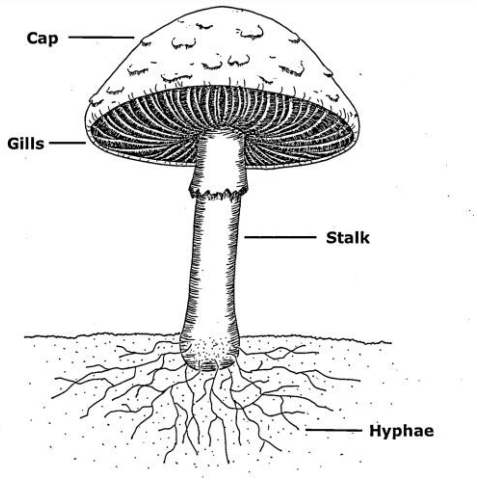
How will you distinguish between the vascular bundles of a dicot root and a dicot stem?

Answer –

Feature	Dicot Root	Dicot Stem
Arrangement	Radial (xylem and phloem arranged alternately)	Conjoint, collateral (xylem and phloem on same radius)
Number of bundles	Usually 2–6 (diarch to hexarch)	Usually arranged in a ring
Pith	Small or absent	Large and well-developed

Q35. Draw a neat and labelled diagram of a mushroom.

Answer –



Q36. With the help of a suitable example, explain the alternation of generations in bryophytes.

Answer - Alternation of generations is the life cycle in which two different multicellular phases alternate with each other — one haploid (gametophyte) and one diploid (sporophyte).

Example: Funaria (a moss)

1. Gametophyte (n) – Dominant Phase

- The main green, leafy plant body is the gametophyte.
- It produces male (antheridia) and female (archegonia) sex organs.
- Gametes are formed by mitosis.

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After fertilization, **a diploid zygote (2n)** is formed.

2. Sporophyte (2n) – Dependent Phase

- The zygote develops into a sporophyte (foot, seta, capsule).
- It remains attached to and dependent on the gametophyte.
- Inside the capsule, meiosis occurs to produce haploid spores.

These spores germinate to form a new **gametophyte**, completing the cycle.

Q37. Define the following terms :

(a) Population

(b) Adaptation

Answer –

Population – Group of individuals of same species in an area.

Adaptation – Structural or functional change for survival.

SECTION - D

Q38. With the help of diagrams, briefly explain the following types of placentations found in the angiosperms. Give one suitable example in each case:

(a) Marginal

(b) Axile

(c) Parietal

Answer –

(a) Marginal Placentation

Ovules are borne along the ventral suture of a monocarpellary ovary.

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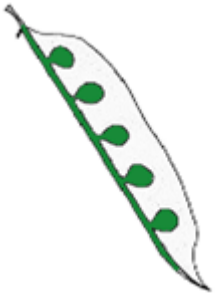
Example : Pea.



(b) Axile Placentation

Ovules are attached to a central axis in a multilocular ovary.

Example : Hibiscus, Lemon.

(c) Parietal Placentation

Ovules are attached to the inner wall of the ovary.

Example : Mustard.

OR

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With the help of diagrams, briefly explain the three types of cymose inflorescence, with one suitable example in each case.

Answer – Types of Cymose Inflorescence :

1. Uniparous (Monochasial) – Only one lateral branch develops.

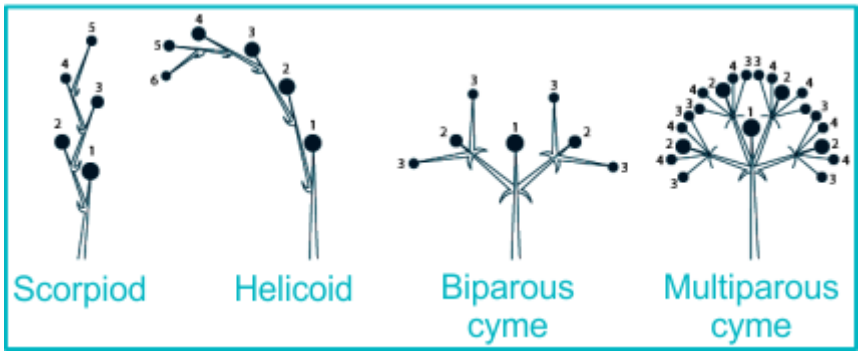
Example : Heliotropium.

2. Biparous (Dichasial) – Two lateral branches develop.

Example : Jasmine.

3. Multiparous (Polychasial) – More than two branches develop.

Example : Calotropis.



Q39. What do you understand by the term 'double fertilization'? Briefly explain the process and the end products formed.

Answer - Double fertilization is a characteristic feature of angiosperms.

Process :

1. One male gamete fuses with egg → forms zygote (syngamy).

2. Second male gamete fuses with two polar nuclei → forms triploid endosperm (triple fusion).

End products :

1. Zygote (2n)

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2. Endosperm (3n)

Q40. A cross was made between a tall pea plant with red flowers (TTRR) and a dwarf pea plant with white flowers (ttrr). Work out the cross up to F_2 generation. Write the phenotypic ratio of F_2 generation.

Answer –

P Generation :

TTRR × ttrr

Gametes: TR and tr

F_1 Generation :

All TtRr (Tall Red)

F_2 Generation :

TtRr × TtRr

Phenotypic Ratio (Dihybrid cross) :

9 Tall Red : 3 Tall White : 3 Dwarf Red : 1 Dwarf White

Q41. (a) Write the differences between blood and lymph.

(b) With the help of flowchart, only show the route of blood flow and lymph flow in the human body.

Answer –

(a) Blood vs Lymph

Blood	Lymph
Red in colour	Colourless
Contains RBCs, WBCs, platelets	Mostly WBCs

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Flows in arteries and veins	Flows in lymph vessels

(b) Flowchart

Blood flow :

Heart → Arteries → Capillaries → Veins → Heart

Lymph flow :

Tissue fluid → Lymph vessels → Lymph nodes → Venous blood

OR

(a) Write the names of any two immunodeficiency disorders and give the cause of the disease.

(b) Name the two major types of lymphocytes. State where they develop and mature.

Answer -

(a) Immunodeficiency disorders :

- AIDS – Caused by HIV
- SCID – Genetic defect

(b) Lymphocytes :

- B-cells – Develop & mature in bone marrow
- T-cells – Develop in bone marrow, mature in thymus

SECTION - E

Q42. (a) Draw a neat diagram of a double-helical structure of DNA and label the main components.

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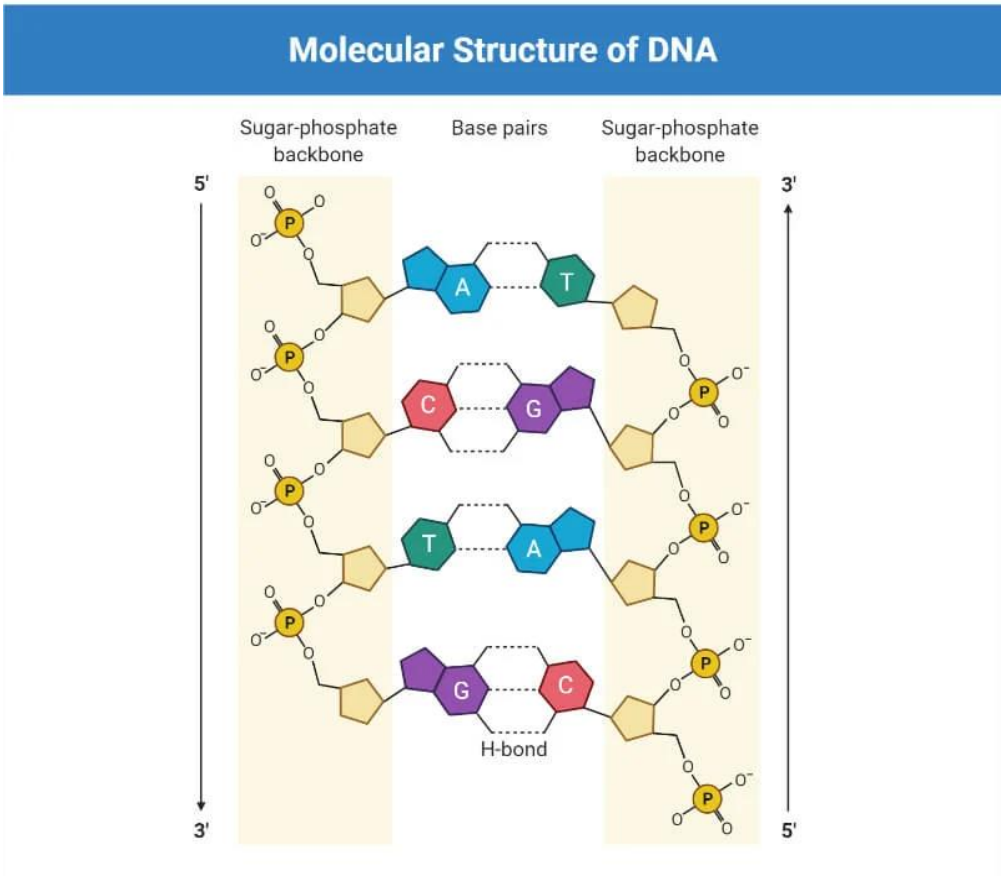
(b) Distinguish between nucleoside and nucleotide.

Answer –

(a) Structure of DNA

DNA is a double helix made of two antiparallel strands.



Main components to label in diagram:

- Sugar (Deoxyribose)
- Phosphate group
- Nitrogen bases (A, T, G, C)
- Hydrogen bonds
- Base pairs (A–T, G–C)

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DNA has a sugar-phosphate backbone and complementary base pairing.

(b) Difference between Nucleoside and Nucleotide

Nucleoside	Nucleotide
Sugar + Nitrogen base	Sugar + Nitrogen base + Phosphate
No phosphate group	Contains phosphate group

OR

(a) Fertilization, ovulation and implantation are the technical terms used to describe the reproductive events in a human female.

(i) Place them in correct sequence.

(ii) Define each of them.

(b) Describe the surgical methods of birth control in human males and females.

Answer -

(a) Correct Sequence :

Ovulation → Fertilization → Implantation

Ovulation : Release of ovum from ovary.

Fertilization : Fusion of sperm and ovum to form zygote.

Implantation : Attachment of embryo to uterine wall.

(b) Surgical Methods of Birth Control

In Males : Vasectomy

- Vas deferens is cut and tied.

In Females : Tubectomy

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- Fallopian tubes are cut and tied

Q43. (a) Mention the end products of the light reaction in photosynthesis.

(b) Draw the diagrammatic representation of the Calvin cycle.

(c) What is photorespiration?

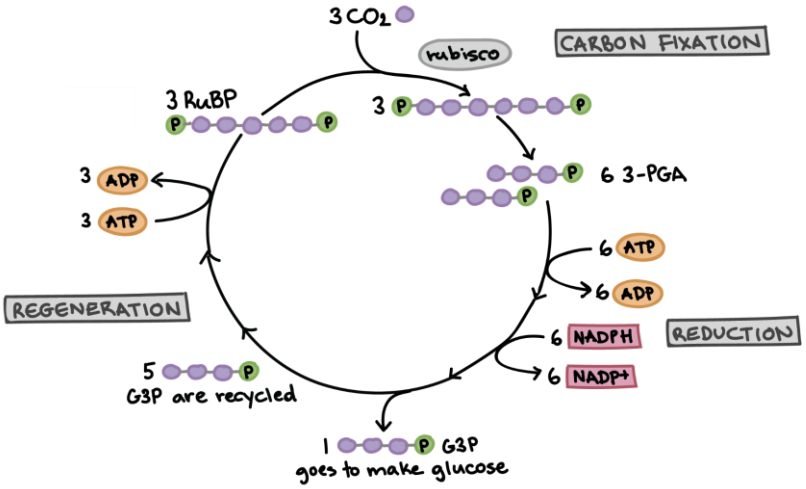
Answer –

(a) End Products of Light Reaction :

- ATP
- NADPH
- Oxygen (O_2)

(b) Calvin Cycle (Main Steps) :

1. Carbon fixation (CO_2 + RuBP)
2. Reduction (Formation of PGAL using ATP & NADPH)
3. Regeneration of RuBP



(c) Photorespiration :

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It is the process in which RuBP reacts with oxygen instead of CO_2, leading to loss of energy and reduced photosynthetic efficiency.

OR

(a) What is a reflex action?

(b) Write one suitable example of each of the following:

(i) Simple reflex action

(ii) Conditioned reflex action

(c) With the help of a neat and labelled diagram, show the nerve pathways involved in a simple reflex action.

Answer -

(a) Reflex Action :

A quick, automatic and involuntary response to a stimulus.

(b) Examples :

(i) Simple reflex – Withdrawal of hand from hot object.

(ii) Conditioned reflex – Salivation on hearing school bell (learned response).

(c) Reflex Arc Pathway :

Receptor → Sensory neuron → Spinal cord → Motor neuron → Effector

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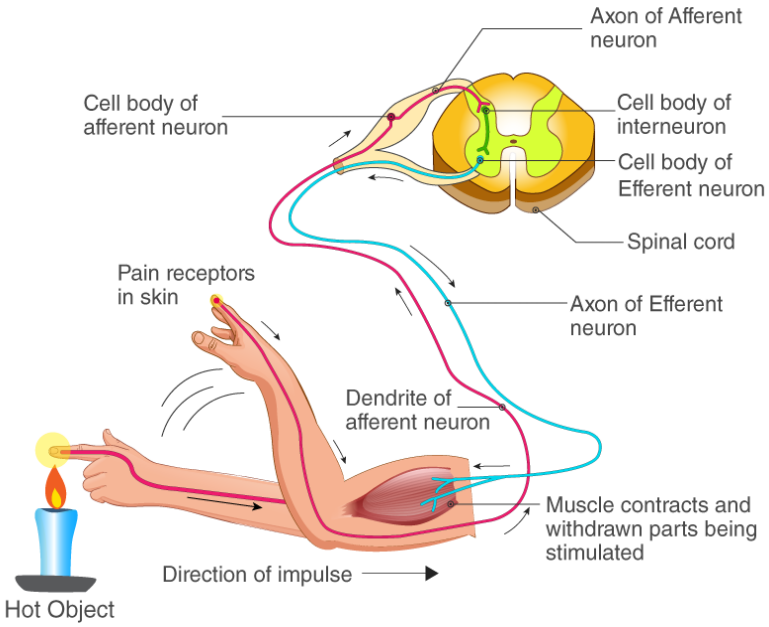

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NIOS PYQ's SOLUTIONS

PREVIOUS YEARS' QUESTIONS & ANSWERS

OCTOBER-2024

Your Path to Success

SECTION - A

Q1. The bacteria that help in the fixation of atmospheric nitrogen :

(A) Rhizobium

(B) Streptomyces

(C) Salmonella

(D) Lactobacillus

Answer - (A) Rhizobium

Q2. Which one of the following represent the gametophyte of fern ?

(A) Indusium

(B) Sorus

(C) Prothallus

(D) Frond

Answer - (C) Prothallus

Q3. Which one of the following is the living part of xylem ?

(A) Tracheid

(B) Vessel

(C) Xylem Fibre

(D) Xylem Parenchyma

Answer - (D) Xylem Parenchyma

Q4. Name the cells that are seen in the lymph nodes and attack bacteria :

(A) Lymphocytes

(B) Monocytes

(C) Granulocytes

(D) Erythrocytes

Answer - (A) Lymphocytes

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Q5. The blood protein that provides factors for clotting is :

(A) Albumin

(B) Fibrinogen

(C) Globulin

(D) Thrombin

Answer - (B) Fibrinogen

Q6. Identify "A" in the given diagram :

(A) Cerebellum

(B) Cerebrum

(C) Medulla oblongata

(D) Pons

Answer - (A) Cerebellum

Q7. Which one of the following is not produced due to under secretion of thyroxine ?

(A) Goitre

(B) Cretinism

(C) Myxoedema

(D) Rickets

Answer - (D) Rickets

Q8. Which one of the following adaptations is seen in plants to promote self-pollination ?

(A) Cleistogamy

(B) Dichogamy

(C) Unisexuality

(D) Self-sterility

Answer - (A) Cleistogamy

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Q9. Corpus luteum produces :

(A) Oestrogen

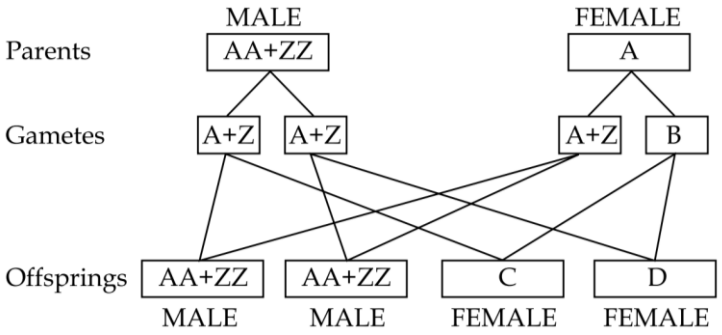
(B) Androgens

(C) Progesterone

(D) Prolactin

Answer - (C) Progesterone

Q10. In the following flow chart A, B, C and D represents :



(A) A-AA+ZW, B-A+W, C-AA+ZW, D-AA+ZW

(B) A-AA+ZZ, B-A+W, C-AA+ZW, D-AA+ZW

(C) A-AA+ZW, B-A+Z, C-AA+ZW, D-AA+ZW

(D) A-AA+ZW, B-A+W, C-AA+ZW, D-AA+ZZ

Answer - (A) A-AA+ZW, B-A+W, C-AA+ZW, D-AA+ZW

Q11. The formation of RNA from DNA is known as :

(A) Translation

(B) Transcription

(C) Transformation

(D) Transduction

Answer - (B) Transcription

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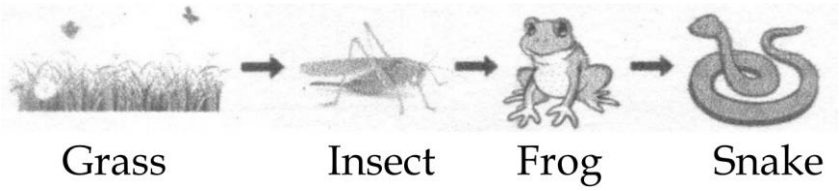
Q12. In the given food chain identify the trophic level of frog.



(A) First trophic level

(B) Second trophic level

(C) Third trophic level

(D) Tertiary trophic level

Answer - (C) Third trophic level

Q13. The biological community in an area or ecosystem is a complex network of interactions. Interactions may be of various types. In commensalism type :

(A) One species gets benefitted and the other species is neither harmed nor benefitted.

(B) One species is inhibited and the other is unaffected.

(C) One species is benefitted and the other is harmed and inhibited.

(D) Both the species are benefitted.

Answer - (A) One species gets benefitted and the other species is neither harmed nor benefitted.

Q14. Biotechnology helps in synthesizing enzymes from cloned genes. Your friend wants to manufacture meat tenderisers. Which enzyme would you recommend to him ?

(A) Lipases

(B) Proteases

(C) Amylases

(D) Glucoisomerases

Answer - (B) Proteases

Q15. Which one of the following is not the step of microinjection process in biotechnology ?

(A) Collection and In-vitro maturation of oocytes

(B) In-vitro fertilization with male semen

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(C) Microinjection of "input DNA" into male pronuclei

(D) Infection of pre-implantation embryos with retroviruses carrying foreign DNA

Answer - (D) Infection of pre-implantation embryos with retroviruses carrying foreign DNA

Q16. Identify the immunoglobulin found in highest concentration in our body :

(A) IgD **(B) IgA**

(C) IgG **(D) IgM**

Answer - (C) IgG

SECTION - B

Q17. Name the following :

(i) Excretory organs of earthworm - _____

(ii) Naked seeds are the characteristic feature of this group of plants - _____

Answer – (i) Nephridia

(ii) Gymnosperms

Q18. Match Column-I with the functions given in Column-II.

Column-I	**Column-II**
(i) Pneumatophores	**(a) Roots with chlorophyll and manufacture food**
(ii) Haustoria	**(b) Roots developing from nodes and provide anchorage**
	(c) Roots which grow vertically up in the air and help in respiration
	(d) Roots which penetrate the host plant and suck food from host

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Answer – (i) Pneumatophores – (c) Respiratory roots

(ii) Haustoria – (d)Parasitic roots

Q19. Observe the diagrams given below and assign the correct name from the list supplied. (Attempt any two parts from A-D)

(Rhizome, Tuber, Corm, Bulb)

A B C D

Answer -

(A) Rhizome

(B) Corm

(C) Bulb

(D) Tuber

Q20. Photosynthesis occurs in green parts of the plants mostly the leaves which have chloroplasts. The thylakoids of chloroplast contain pigments which absorb light of different wavelengths and carry out the photochemical reactions. These pigments are packed into functional clusters called photosystems-PS-I and PS-II.

(a) Name the pigments that constitute the photosystems.

(b) What is the function of Photosystems ?

Answer –

(a) Chlorophyll a, Chlorophyll b, Carotenoids

(b) Absorption of light energy and transfer of electrons

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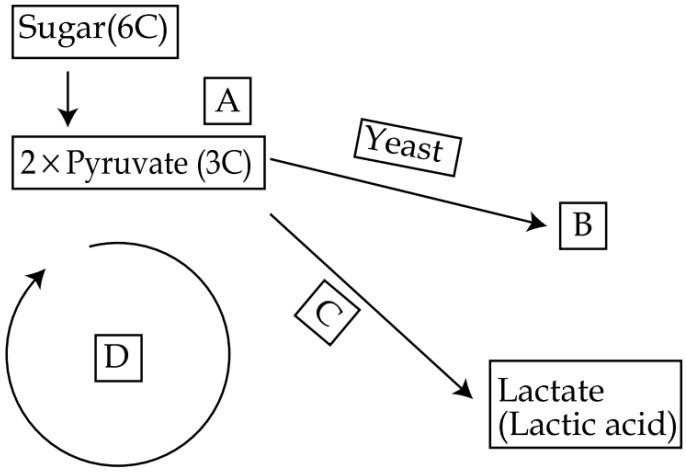
Q21. Study the flow chart and complete it by substituting A-D with suitable words. (Attempt any two parts from A-D).



Answer –

(A) Glycolysis

(B) Ethanol

(C) Muscle cells

(D) Krebs cycle

Q22. Supply the technical term for the following :

(a) Division of other cells in embryo sac like synergids or antipodal cells to give rise to additional embryos.

(b) The process in which the zygote may divide to give rise to two or more cells each of which develops into a separate embryo.

Answer –

(a) Polyembryony (from embryo sac cells / apogamy type)

(b) Cleavage polyembryony

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Q23. Match the statement given in Column-I with the right option in Column-II :

Column-I	Column-II
(a) Copper-T	**(i) Interfere with the ovulation process and prevent fertilization**
(b) Condoms	**(ii) Prevent sperms from meeting the ovulated egg**
	(iii) Implantation is not possible
	(iv) Permanently prevent fertilization

Answer - (a) Copper-T → (iii) Implantation is not possible

(b) Condoms → (ii) Prevent sperms from meeting the ovulated egg

Q24. Read the following passage and fill in the blanks with appropriate words.

(Attempt any two parts A-D)

Criss Cross inheritance in humans

__A__ and __B__ are examples of sex-linked inheritance in humans. The defective gene is located on __C__ chromosome. Thus a single defective gene causes disease in males while two defective genes (__D__ condition) only can cause the disease in females.

Answer – (A) Haemophilia

(B) Colour blindness

(C) X chromosome

(D) Homozygous condition

Q25. Aquatic ecosystems are classified on the basis of salinity into two types-Fresh water and Marine. The common flora and fauna found in fresh water bodies like rivers, lake include phytoplanktons, water hyacinth, water lily and zooplankton, crab and fishes respectively. Wet lands are between aquatic and terrestrial ecosystem. They show an edge effect and form an ecotone.

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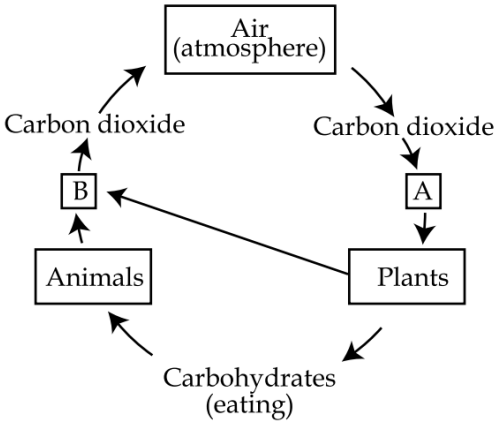
(a) What is the study of fresh water ecosystem known as ?

(b) Define ecotone.

Answer – (A) Limnology

(B) Ecotone is the transitional zone between two different ecosystems.

Q26. Study the diagram given below carefully and answer the question that follow :



Answer – (A) Photosynthesis

(B) Respiration

Q27. Given below is the list of vitamins with their functions. Choose the incorrect pairs of vitamins with reference to their function.

(a) Vitamin A : Maintenance of vision

(b) Vitamin C : Formation of blood

(c) Vitamin D : Healthy bones and teeth

(d) Vitamin K : antioxidant : ageing vitamin

Answer – Incorrect pairs :

(b) Vitamin C : Formation of blood

(d) Vitamin K : antioxidant : ageing vitamin

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Q28. Fill in the spaces A and B in the sentences given below :

(a) Cell mediated immune response is mediated by ____A____.

(b) Humoral immune responses is mediated by ___B___.

Answer – (a) T-lymphocytes

(b) B-lymphocytes

SECTION - C

Q29. What are the four nutritional categories found in bacteria ?

Answer – Bacteria show four nutritional categories: photoautotrophs use sunlight and CO_2, chemoautotrophs use chemical energy and CO_2, photoheterotrophs use light but organic carbon, and chemoheterotrophs use organic compounds for both energy and carbon.

Q30. Analyse the differences between striated muscles and unstriated muscles with reference to their shape.

Answer – **Striated muscles –** Long, cylindrical, unbranched

Unstriated muscles – Spindle-shaped

Q31. (a) Name the two biochemical reactions for biosynthesis of amino acids in plants.

Answer – Transamination and Reductive amination

OR

(b) Name the two proteins found in root nodules and helps in nitrogen fixation.

Answer – Nitrogenase and Leghemoglobin

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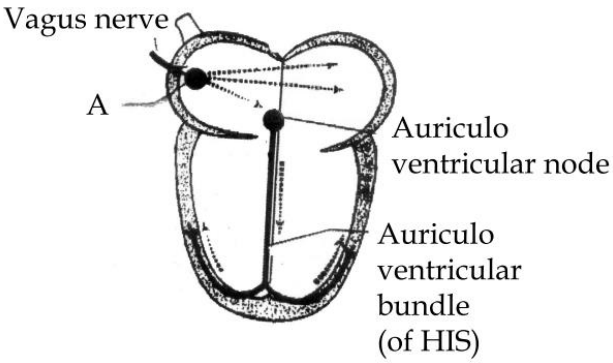
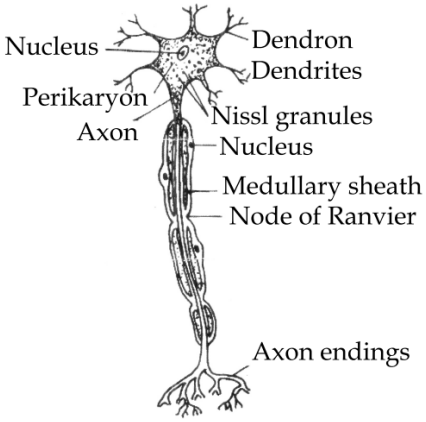
Q32. Identify A in the diagram given below and state its function :



Answer – A is Sinoatrial Node (SAN) of the human heart.

Function: It acts as the natural pacemaker of the heart and initiates the heartbeat by generating electrical impulses.

Q33. Identify the type of neuron given in the diagram and state the function of axon



Answer – It is a Unipolar (single axon) neuron.

Function of axon – Carries nerve impulses away from cell body

Q34. (a) Why is the process of fertilization in flowering plants said to be double fertilization ?

Answer – It is called double fertilization because two fusion events occur in the embryo sac. One male gamete fuses with the egg to form a zygote (syngamy), and the other fuses with two polar nuclei to form endosperm (triple fusion).

OR

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(b) What is the function of Endosperm in the flowering plants ? Write the names of any 2 types of endosperms.

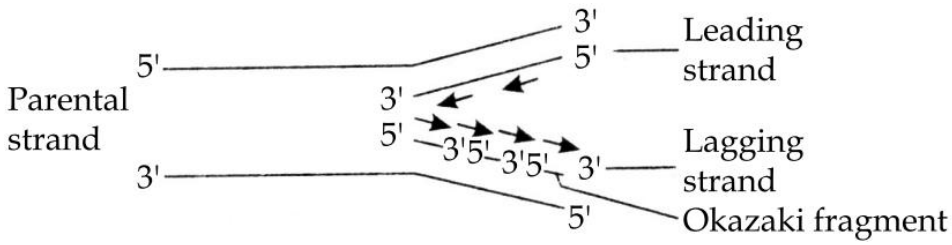
Answer – **Function :** Endosperm provides nourishment to the developing embryo.

Types : Nuclear endosperm and Cellular endosperm.

Q35. Observe the given diagram and answer the questions that follow :

(a) Direction of DNA polymerase activity?

(b) Which enzyme joins Okazaki fragments?



Answer – (a) 5′ → 3′ direction

(b) DNA ligase

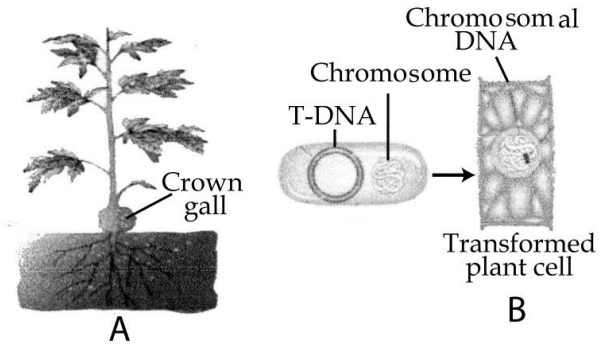
Q36. A group of food items is given in the table. Categorize them into energy providing foods and body building foods.

Cereals, legumes, meat, sugar, oil, fish, egg, jaggery

Answer - Energy giving foods : Cereals, Sugar, Oil, Jaggery

Body building foods : Legumes, Meat, Fish, Egg

Q37. (a) Following is the representation of how a plasmid isolated from bacterium that causes galls in several plants is used to produce transgenic plants.



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(i) Name the bacterium that causes galls in plants.

(ii) Name the plasmid used to transmit the desired genes.

Answer – (i) Agrobacterium tumefaciens

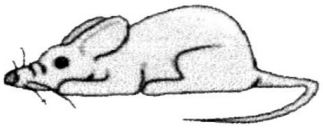
(ii) Ti plasmid

OR

(b) Given below is the picture of a normal mouse (A) and a transgenic mouse (B).

A

B



Why is there an increase in the size of mouse (B).

Answer – Due to insertion of growth hormone gene

SECTION - D

Q38. (a) Define obesity.

(b) List any two causes of obesity.

(c) State two Harmful effects of obesity

Answer – (a) Obesity is excessive accumulation of fat in the body.

(b) Overeating and lack of physical activity.

(c) Diabetes and hypertension.

Q39. (I) Illustrate the 3 major phases in glycolysis

Answer - The three phases of glycolysis are :

1. Preparatory (Energy investment) phase – Glucose is phosphorylated and converted into fructose-1,6-bisphosphate using ATP.

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2. Cleavage phase – The six-carbon compound splits into two three-carbon molecules (PGAL).

3. Energy payoff phase – ATP and NADH are produced and pyruvic acid is formed.

OR

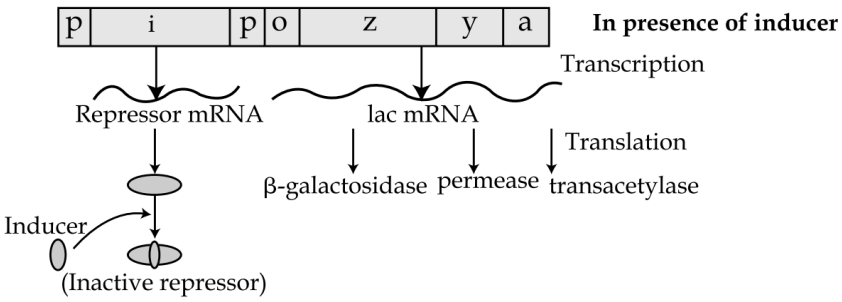
(II) Distinguish between C_3 and C_4 plants with reference to the following characteristics.

Features	**C_3 Plants**	**C_4 Plants**
(a) Carbon di-oxide acceptor		
(b) Carbon di-oxide fixing enzymes		
(c) First products of photosynthesis		

Answer –

Features	**C_3 Plants**	**C_4 Plants**
(a) Carbon di-oxide acceptor	Ribulose bisphosphate (RuBP)	Phosphoenolpyruvate (PEP)
(b) Carbon di-oxide fixing enzymes	RuBisCO	PEP carboxylase
(c) First products of photosynthesis	3-phosphoglyceric acid (3-PGA)	Oxaloacetic acid (OAA)

Q40. (I) Observe the Lac operon diagram given below and answer the questions that follows.



(a) Which substance acts as inducer in this operon ?

(b) Where does RNA polymerase bind to initiate transcription ?

(c) What are the genes z, y, a called as ?

Answer – (a) Lactose (Allolactose)

(b) Promoter region

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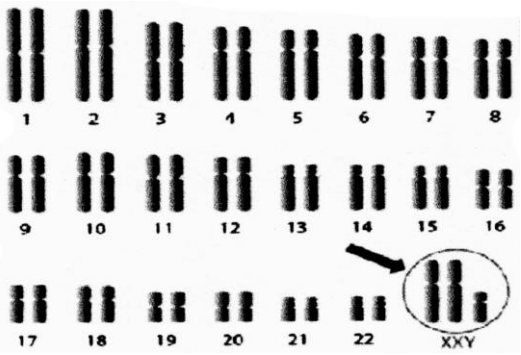
(c) Structural genes

OR

(II) Study the karyotype given below and answer the questions that follow :



(a) What is this disorder known as ?

(b) How many chromosomes are present in the individuals with this disorder ?

(c) State one typical feature of this syndrome.

Answer –

(a) Down's syndrome (Trisomy 21).

(b) 47 chromosomes.

(c) One typical feature is intellectual disability (mental retardation) or a broad, flat face with slanting eyes.

Q41. Deficiency in minerals in our food may lead to deficiency diseases. Name which mineral deficiency may lead to the following :

(a) Anaemia

(b) Osteomalacia

(c) Goitre

Answer – (a) Anaemia – Iron deficiency

(b) Osteomalacia – Calcium deficiency

(c) Goitre – Iodine deficiency

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SECTION - E

Q42. (a) A snapdragon plant with red flowers (RR) is crossed with a plant with white flowers (rr). Work out the cross upto F_2 generation. Find out the phenotypic and genotypic ratio.

Answer –

P_1 Cross : RR (Red) × rr (White)

Gametes : R and r

F_1 Generation : All Rr (Pink)

F_1 × F_1 Cross : Rr × Rr

Punnett combinations : RR, Rr, Rr, rr

Genotypic ratio (F_2) : 1 RR : 2 Rr : 1 rr

Phenotypic ratio (F_2) : 1 Red : 2 Pink : 1 White

(This shows incomplete dominance.)

OR

(b) A tall pea plant with red flowers (TTRR) is crossed with white dwarf plants (ttrr). Work out the phenotypic ratio in F_2 for this cross.

Answer -

P_1 Cross : TTRR × ttrr

Gametes : TR and tr

F_1 Generation : All TtRr (Tall, Red)

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F_1 × F_1 Cross : TtRr × TtRr

Phenotypic ratio in F_2 (Dihybrid cross) :

9 Tall Red : 3 Tall White : 3 Dwarf Red : 1 Dwarf White

Q43. (a) What is Chemosynthesis ? Write any four differences between chemosynthesis and photosynthesis.

Answer – Chemosynthesis is the process by which certain bacteria synthesize organic food from carbon dioxide using energy released from oxidation of inorganic substances, without the use of sunlight.

Differences between chemosynthesis and photosynthesis :

1. Source of energy :

Chemosynthesis – Chemical energy from oxidation reactions

Photosynthesis – Light energy from sunlight

2. Requirement of light :

Chemosynthesis – Does not require sunlight

Photosynthesis – Requires sunlight

3. Organisms involved :

Chemosynthesis – Performed by certain bacteria (e.g., Nitrosomonas)

Photosynthesis – Performed by green plants, algae and cyanobacteria

4. By-product :

Chemosynthesis – No oxygen released

Photosynthesis – Oxygen is released as a by-product

OR

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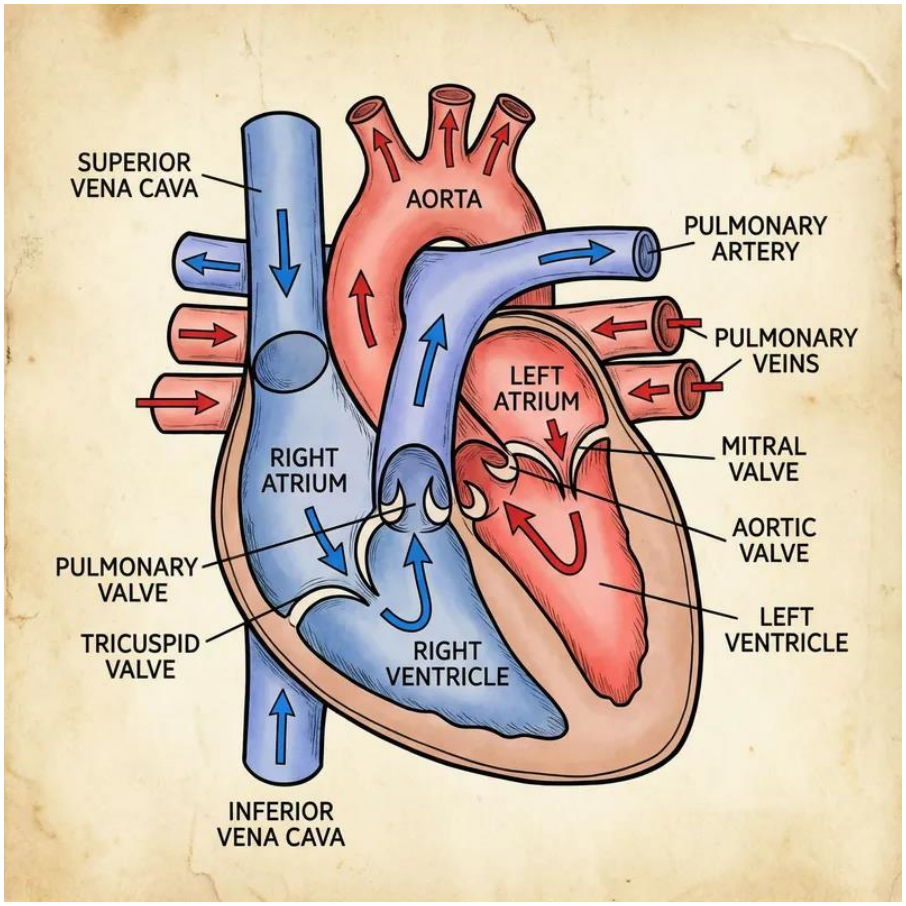
(b) With the help of a diagram explain the external structure of human heart.

Answer - The human heart is a cone-shaped muscular organ located in the thoracic cavity between the lungs. Externally, it shows four chambers: two atria (right and left) and two ventricles (right and left).

Major external features :

- **Apex –** pointed lower end formed by left ventricle
- **Base –** upper broad part
- **Coronary arteries –** supply blood to heart muscles
- **Superior and inferior vena cava –** open into right atrium
- **Pulmonary artery –** arises from right ventricle
- **Aorta –** arises from left ventricle
- **Pulmonary veins –** open into left atrium



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