CUET UG (Biology) - 20 May 2025 Shift 2

Question1

A transcription unit in DNA is primarily comprised of:

(A) A Promoter

(B) Origin of replication

(C) The Structural gene

(D) A terminator

Choose the correct answer from the options given below:

1. **(A), (B) and (D) only**
2. **(B), (C) and (D) only**
3. **(A), (B), (C) and (D)**
4. **(A), (C) and (D) only**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: D

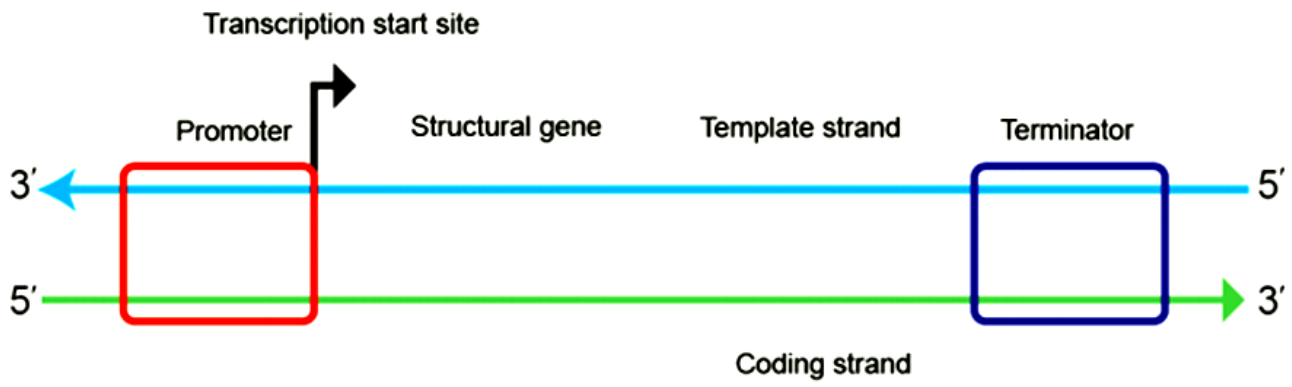
Solution:

1. **Correct Option: (4) (A), (C) and (D) only**

A **transcription unit** in DNA comprises:

- **Promoter (A):** Site where RNA polymerase binds and initiates transcription.
- **Structural gene (C):** DNA sequence that gets transcribed into RNA.
- **Terminator (D):** Region that stops transcription.

Note: Origin of replication (B), is involved in **DNA replication**, not transcription.



Schematic structure of a transcription unit

Question2

Health is a state of :

1. **Economical fitness**
2. **Physical, mental and social well-being**
3. **Absence of disease**
4. **Longevity**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: B

Solution:

According to **WHO (World Health Organization)**, **health** is a **state of complete physical, mental, and social well-being**, not merely the absence of disease. It emphasizes overall balance in body and mind.

Why Other Options Are Wrong:

(1) Economical fitness: Economic condition isn't a direct measure of health.

(3) Absence of disease: Too narrow — health means more than just being disease-free.

(4) Longevity: Living long doesn't guarantee being healthy; quality of life matters more.

Question3

Which one of the followings is not the male sex accessory duct?

1. **Rete testis**

2. **Infundibulum**

3. **Epididymis**

4. **Vas deferens**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: B

Solution:

The **male sex accessory ducts** include **Rete testis**, **Epididymis**, **Vas deferens**.

- Whereas, **Infundibulum is** part of **female reproductive system**, connects ovary to fallopian tube.

Why Other Options Are Wrong:

(1) Rete testis: Part of the male duct system inside the testis.

(3) Epididymis: Male accessory duct for sperm storage and maturation.

(4) Vas deferens: Male accessory duct carrying sperm from epididymis to urethra.

Question4

The correct sequence of the formation of pollen grains is -

(A) Sporogenous tissue
(B) Formation of microspore
(C) Microspore tetrad formed by meiotic divisions
(D) Pollen grains develop from microspores

Choose the correct answer from the options given below:

1. **(A), (B), (C), (D)**
2. **(A), (C), (B), (D)**
3. **(B), (A), (D), (C)**
4. **(C), (B), (D), (A)**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: B

Solution:

The **correct sequence of formation of pollen grains** is:

Sporogenous tissue (Microspore mother cell) → **Microspore tetrad** → **Microspore** → **Pollen grains** (male gametophyte)

Question5

The microbe involved in the production of citric acid is -

1. Acetobacter aceti

2. Lactobacillus

3. Aspergillus niger

4. Clostridium butylicum

Options:

A.

1

B.

2

C.

3

D.

4

Answer: C

Solution:

Aspergillus niger (a fungus) is used industrially to produce **citric acid**.

Why Other Options Are Wrong:

***Acetobacter aceti*:**	used for **acetic acid** production
***Lactobacillus*:**	Used for **lactic acid** formation in curd/yogurt
Clostridium butylicum	Produces **butyric acid**, not citric acid

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Question6

Arrange the given organs in correct sequence which are involved in life cycle of *Plasmodium*.

(A) Gut of mosquito
(B) Salivary gland of mosquito
(C) Liver of man
(D) Blood of man

Choose the correct answer from the options given below:

1. (A), (B), (C), (D)

2. (D), (C), (A), (B)

3. (A), (D), (B), (C)

4. (B), (C), (D), (A)

Options:

A.

1

B.

2

C.

3

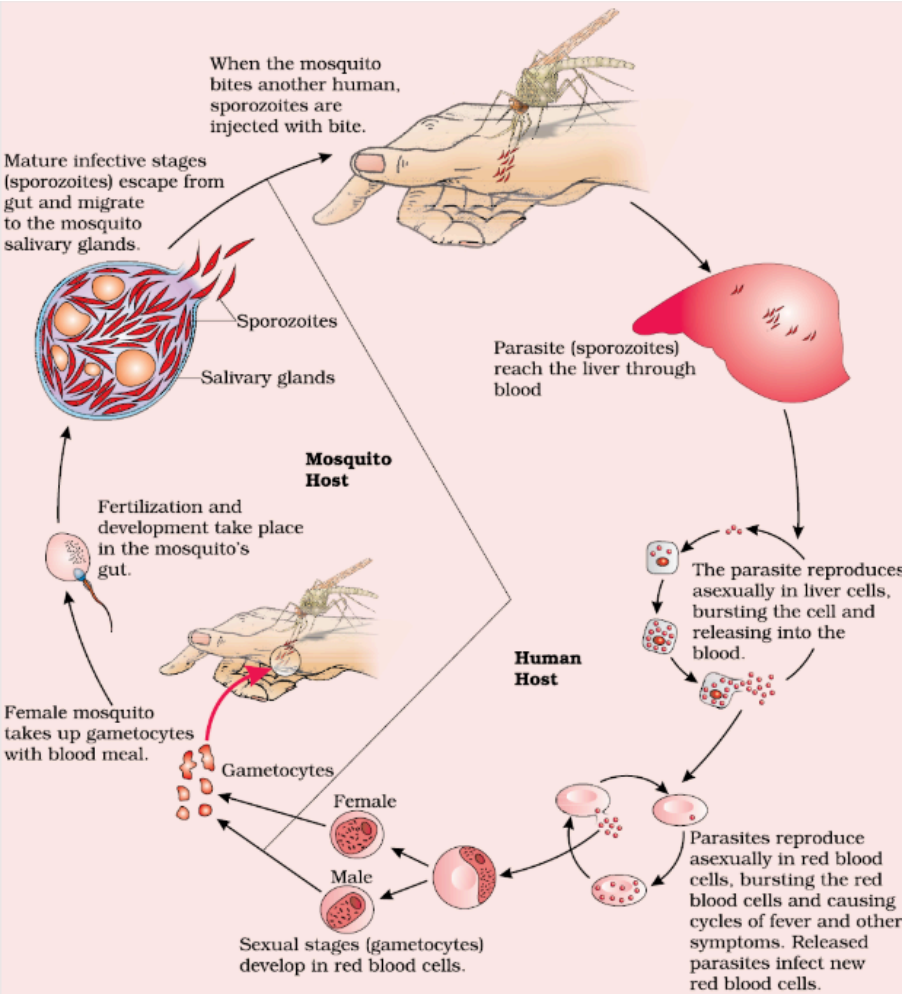
D.

4

Answer: D

Solution:

The **sporozoites** of *plasmodium* are stored in salivary glands of mosquito and when the mosquito bites a person, these **sporozoites** reach the **liver** through blood. Further, these enter **red blood cells**, multiply and burst the RBCs. Some parasites develop into **gametocytes**, which enter the **mosquito's gut** during a bite. There, the **fertilization** of gametocytes takes place and develop into **sporozoites** that move to the **salivary glands.**



Question7

The unequivocal proof that DNA is the genetic material came from the experiments of -

1. Colin MacLeod and Maclyn McCarty

2. Frederick Griffith

3. Matthew Meselson and Franklin Stahl

4. Alfred Hershey and Martha Chase

Options:

A. 1

B. 2

C. 3

D. 4

Answer: D

Solution:

Hershey–Chase experiment (1952) used **radioactive labeling** of DNA and protein in bacteriophages → showed **only DNA enters bacteria and directs viral reproduction**, proving DNA is the genetic material.

Why Others Are Wrong:

- **Option 1:** Colin MacLeod and Maclyn McCarty → showed DNA from *Streptococcus* could transform bacteria, **important but not unequivocal proof**.
- **Option 2:** Frederick Griffith → discovered **"transforming principle"**, but **didn't identify DNA as material**.
- **Option 3:** Matthew Meselson and Franklin Stahl → **proved semi-conservative replication of DNA**, not its genetic role.

Question8

RNA polymerase III is responsible for the transcription of -

1. rRNA

2. hnRNA

3. snRNA

4. Triple stranded tRNA

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

RNA polymerase III transcribes **small RNAs**, including **tRNA, 5S rRNA, and snRNA** (small nuclear RNA).

Why Others Are Wrong:

- **Option 1: rRNA** → mostly transcribed by **RNA polymerase I** (except 5S rRNA).
- **Option 2: hnRNA** → transcribed by **RNA polymerase II**.
- **Option 4: Triple stranded tRNA** → doesn't exist; tRNA is single-stranded, transcribed by **RNA polymerase III**.

Question9

Sequentially arrange the evolutionary stages of humans from the given options.

(A) ***Australopithecines***
(B) ***Homo habilis***
(C) ***Dryopithecus***
(D) ***Homo erectus***

Choose the correct answer from the options given below:

1. (A), (B), (C), (D)

2. (C), (A), (B), (D)

3. (B), (A), (D), (C)

4. (C), (B), (D), (A)

Options:

A. 1

B. 2

C. 3

D. 4

Answer: B

Solution:

1. ***Dryopithecus*** **(C)** → early ape, ~12–8 mya, first stage of human lineage.
2. ***Australopithecines*** **(A)** → bipedal hominins, ~4–2 mya.
3. ***Homo habilis*** **(B)** → first tool users, ~2.4–1.4 mya.
4. ***Homo erectus*** **(D)** → fully upright, controlled fire, ~1.9 mya–100 kya.

Question10

Pleiotropic genes are:

1. Polygenes

2. Complementary genes

3. Genes with multiple phenotypic expression

4. Genes with single phenotypic expression

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

- **Pleiotropy** occurs when **one gene influences multiple, seemingly unrelated traits** (e.g., sickle cell gene affects blood shape, anemia, and resistance to malaria).

Why Others Are Wrong:

- **Option 1: Polygenes** → many genes contribute to a single trait (opposite of pleiotropy).
- **Option 2: Complementary genes** → two genes work together to produce a trait.
- **Option 4: Genes with single phenotypic expression** → opposite of pleiotropic genes.

Question11

Point out the technique, which is not useful for the detection of cancer of internal organs.

1. X-rays

2. DNA fingerprinting

3. Computed tomography

4. Magnetic resonance imaging

Options:

A. 1

B. 2

C. 3

D. 4

Answer: B

Solution:

- **DNA fingerprinting** identifies individual genetic profiles; it **cannot detect tumors or internal organ cancers**.

Why Others Are Wrong:

- **Option 1: X-rays** → can detect abnormal masses or tumors.
- **Option 3: Computed tomography (CT)** → provides detailed images of internal organs, useful for cancer detection.
- **Option 4: Magnetic resonance imaging (MRI)** → excellent for soft tissue imaging, helps detect internal cancers.

Question12

Match List-I with List-II

List-I	**List-II**
Terms	**Examples/Explanations**
(A) Homology	(I) Forelimbs of mammals

(B) Analogy	(II) Wings of birds and butterfly
(C) Convergent evolution	(III) Common habitat and function
(D) Divergent evolution	(IV) Common ancestry of structure

Choose the correct answer from the options given below:

1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

2. (A) - (IV), (B) - (III), (C) - (II), (D) - (I)

3. (A) - (II), (B) - (I), (C) - (IV), (D) - (III)

4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Options:

A.

1

B.

2

C.

3

D.

4

Answer: B

Solution:

- **Homology (A)** → similarity due to **common ancestry** → forelimbs of mammals (IV).
- **Analogy (B)** → similarity due to **common function/habitat, not ancestry** → wings of birds & butterflies (III).
- **Convergent evolution (C)** → unrelated organisms evolve **similar traits** → wings of birds and butterflies (II).
- **Divergent evolution (D)** → organisms from **common ancestor evolve different traits** → forelimbs of mammals (I).

Question13

Which one of the mentioned reasons does not cause the loss of biodiversity?

1. Habitat loss and fragmentation

2. Alien species invasions

3. Aforestation

4. Co-extinctions

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

- **Aforestation** (planting trees in barren areas) **increases biodiversity**, does not cause its loss.

Why Others Are Wrong:

- **Option 1: Habitat loss and fragmentation** → destroys ecosystems → reduces biodiversity.
- **Option 2: Alien species invasions** → outcompete native species → loss of biodiversity.
- **Option 4: Co-extinctions** → extinction of one species causes dependent species to go extinct → reduces biodiversity.

Question14

The components of the ecosystem are seen to function as a unit when you consider the following aspects -

(A) Productivity
(B) Decomposition
(C) Energy flow
(D) Nutrient cycling

Choose the correct answer from the options given below:

1. (A), (B) and (C) only

2. (A), (B) and (D) only

3. (A), (B), (C) and (D)

4. (B), (C) and (D) only

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

- All these aspects show ecosystem components **function together as a unit**:
  - **Productivity (A):** energy capture by producers.
  - **Decomposition (B):** breaks down organic matter.
  - **Energy flow (C):** transfers energy through trophic levels.
  - **Nutrient cycling (D):** recycling of elements like C, N, P.

Question15

Typical embryo sac at maturity is:

1. 7 nucleate, 8 celled structure

2. 8 nucleate, 7 celled structure

3. 4 nucleate, 6 celled structure

4. 8 nucleate, 6 celled structure

Options:

A.

1

B.

2

C.

3

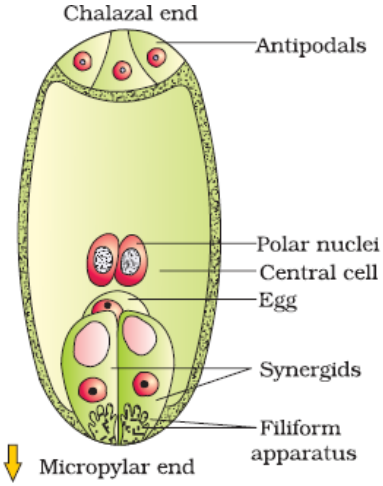
D.

4

Answer: B

Solution:

Mature **embryo sac (female gametophyte)** of angiosperms has **8 nuclei** arranged in **7 cells**.



Question16

Match List-I with List-II

List-I	List-II
Diseases	**Causative organisms**
(A) Pneumonia	(I) *Microsporum*
(B) Ringworms	(II) *Wuchereria bancrofti*
(C) Elephantiasis	(III) *Entamoeba histolytica*
(D) Amoebiasis	(IV) *Haemophilus influenzae*

Choose the correct answer from the options given below:

1. (A) – (I), (B) – (II), (C) – (III), (D) – (IV)

2. (A) – (IV), (B) – (III), (C) – (II), (D) – (I)

3. (A) – (II), (B) – (I), (C) – (IV), (D) – (III)

4. (A) – (IV), (B) – (I), (C) – (II), (D) – (III)

Options:

A.

1

B.

2

C.

3

D.

4

Answer: D

Solution:

- **Pneumonia (A)** → caused by ***Haemophilus influenzae*** **(IV)**
- **Ringworms (B)** → caused by ***Microsporum (*****I)** (fungal infection)
- **Elephantiasis (C)** → caused by ***Wuchereria bancrofti*** **(II)** (filarial worm)
- **Amoebiasis (D)** → caused by ***Entamoeba histolytica*** **(III)**

Question17

Identify, which is not the sexually transmitted infection?

1. Chlamydiasis

2. Trichomoniasis

3. Rheumatoid arthritis

4. Syphilis

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

- **Rheumatoid arthritis** is an **autoimmune disease**, **not sexually transmitted**.

Why Others Are Wrong:

- **Option 1: Chlamydiasis** → caused by *Chlamydia trachomatis*, sexually transmitted.
- **Option 2: Trichomoniasis** → caused by *Trichomonas vaginalis*, sexually transmitted.

Option 4: Syphilis → caused by *Treponema pallidum*, sexually transmitted.

Question18

The disease phenylketonuria is caused by mutation in the gene that codes for -

1. Phenylalanine dehydrogenase

2. Phenylalanine carboxylase

3. Phenylalanine hydroxylase

4. Phenylalanine hydrogenase

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

- **Phenylketonuria (PKU)** is caused by **mutation in the PAH gene**, which codes for **phenylalanine hydroxylase**, leading to **accumulation of phenylalanine** and mental retardation if untreated.

Why Others Are Wrong:

- **Option 1: Phenylalanine dehydrogenase** → enzyme does not exist in this pathway.
- **Option 2: Phenylalanine carboxylase** → incorrect enzyme.
- **Option 4: Phenylalanine hydrogenase** → wrong; not involved in phenylalanine metabolism.

Question19

Which of the following free living soil microorganisms are used as biofertilisers?

(A) ***Anabaena***
(B) ***Azospirillum***
(C) ***Rhizobium***
(D) ***Azotobacter***

Choose the correct answer from the options given below:

1. (B) and (C) only

2. (A) and (B) only

3. (C) and (D) only

4. (B) and (D) only

Options:

A. 1

B. 2

C. 3

D. 4

Answer: D

Solution:

- ***Azospirillum* (B)** and ***Azotobacter* (D)** are **free-living nitrogen-fixing soil bacteria**, used as **biofertilisers** to enrich soil nitrogen.
- *Rhizobium* is **symbiotic**, not free-living.
- *Anabaena* is mostly **aquatic**, not typical soil biofertiliser.

Question20

Match List-I with List-II

List-I (Enzymes/bioactive molecule)	List-II (Actions)
(A) Pectinases and proteases	(I) Removing oily stains
(B) Streptokinase	(II) Immunosuppressive agent
(C) Lipases	(III) Clear bottled juices
(D) Cyclosporin A	(IV) Clot buster

Choose the correct answer from the options given below:

1. (A) – (I), (B) – (III), (C) – (II), (D) – (IV)

2. (A) – (III), (B) – (IV), (C) – (I), (D) – (II)

3. (A) – (I), (B) – (II), (C) – (IV), (D) – (III)

4. (A) – (III), (B) – (II), (C) – (I), (D) – (IV)

Options:

A.

1

B.

2

C.

3

D.

4

Answer: B

Solution:

- **Pectinases and proteases (A)** → used to **clarify bottled juices (III)**
- **Streptokinase (B)** → acts as a **clot buster (IV)**
- **Lipases (C)** → used for **removing oily stains (I)**
- **Cyclosporin A (D)** → **immunosuppressive agent (II)**

Question21

Arrange the given structures formed during spermatogenesis in correct sequence.

(A) Spermatozoa
(B) Secondary spermatocytes
(C) Spermatids
(D) Spermatogonia

Choose the correct answer from the options given below:

1. (D), (B), (C), (A)

3. (A), (B), (C), (D)

3. (B), (A), (D), (C)

4. (D), (C), (B), (A)

Options:

A. 1

B. 2

C. 3

D. 4

Answer: A

Solution:

- **Spermatogenesis sequence:**
  1. **Spermatogonia (D)** → mitotic division
  2. **Secondary spermatocytes (B)** → after meiosis I
  3. **Spermatids (C)** → after meiosis II
  4. **Spermatozoa (A)** → mature, motile sperm

Question22

Groups of individuals in a well-defined geographical area, sharing or competing for similar resources, having the potential to interbreed, are the characteristics of :

1.Biomass

2. Communities

3. Populations

4. Organisms

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

- A **population** is a group of individuals of the same species in a defined area, **sharing resources and capable of interbreeding**.

Why Others Are Wrong:

- **Option 1: Biomass** → total mass of living matter, not a group of interbreeding individuals.
- **Option 2: Communities** → all populations of different species in an area.
- **Option 4: Organisms** → refers to single individuals, not a group.

Question23

Which one of the given sacred groves is not found in Madhya Pradesh?

1. Sarguja

2. Jaintia hills

3. Chanda

4. Bastar

Options:

A. 1

B. 2

C. 3

D. 4

Answer: B

Solution:

- **Jaintia Hills** are located in **Meghalaya**, not Madhya Pradesh.

Why Others Are Wrong:

- **Option 1: Sarguja** → in Chhattisgarh (close to MP), considered part of central India sacred groves.
- **Option 3: Chanda** → in Maharashtra/central India region.

Option 4: Bastar → in Chhattisgarh, central India sacred groves region.

Question24

Arrange the given stages of menstrual cycle in correct sequence.

(A) Luteal phase
(B) Follicular phase
(C) Menstruation
(D) Next cycle begins

Choose the correct answer from the options given below:

1. (A), (B), (C), (D)

2. (B), (A), (D), (C)

3. (C), (B), (A), (D)

4. (D), (C), (A), (B)

Options:

A.

1

B.

2

C.

3

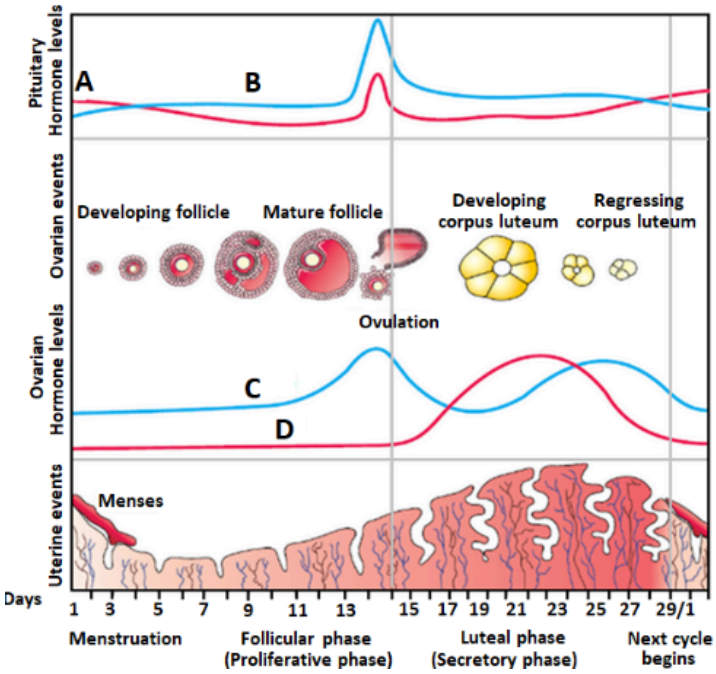
D.

4

Answer: C

Solution:

- **Menstrual cycle sequence:**
  1. **Menstruation (C)** → shedding of endometrium
  2. **Follicular phase (B)** → follicle maturation, estrogen secretion
  3. **Luteal phase (A)** → corpus luteum formation, progesterone secretion
  4. **Next cycle begins (D)** → if no fertilization, cycle restarts



Question25

Which one of the following features of pea plant is not suitable for genetical studies?

1. Stem height

2. Flower position

3. Pod colour

4. Stem tendril

Options:

A. 1

B. 2

C. 3

D. 4

Answer: D

Solution:

- **Stem tendril** shows **continuous variation** influenced by environment → **not ideal for Mendelian/genetic studies**, which require discrete traits.

Why Others Are Wrong:

- **Option 1: Stem height** → Mendel used it as a **discrete trait (tall/dwarf)**.
- **Option 2: Flower position** → discrete trait (axial/terminal).
- **Option 3: Pod colour** → discrete trait (green/yellow).

Question26

During sewage treatment, the anaerobic sludge digesters produce the biogas. The components of biogas are -

1. H_2, H_2S and CO_2

2. CH_4, H_2S and CO_2

3. CH_4, H_2S and O_2

4. CH_4, SO_2 and CO_2

Options:

A. 1

B. 2

C. 3

D. 4

Answer: B

Solution:

- In **anaerobic sludge digesters**, **methanogenic bacteria** produce **biogas** containing **methane (CH_4)**, **hydrogen sulphide (H_2S)**, and **carbon dioxide (CO_2)**.

Question27

Match List-I with List-II

List-I (Terms)	List-II (Relations/Features)
(A) Homologous organs	(I) Mutation caused speciation
(B) Analogous organs	(II) Retrogressive evolution
(C) Vestigial organs	(III) Convergent evolution
(D) Saltation	(IV) Divergent evolution

Choose the correct answer from the options given below:

1. (A) – (I), (B) – (II), (C) – (III), (D) – (IV)

2. (A) – (IV), (B) – (III), (C) – (II), (D) – (I)

3. (A) – (III), (B) – (II), (C) – (IV), (D) – (I)

4. (A) – (II), (B) – (I), (C) – (IV), (D) – (III)

Options:

A.

1

B.

2

C.

3

D.

4

Answer: B

Solution:

- **Homologous organs (A)** → show **divergent evolution (IV)** from a common ancestor.
- **Analogous organs (B)** → show **convergent evolution (III)** due to similar functions.
- **Vestigial organs (C)** → result of **retrogressive evolution (II)**, losing original function.
- **Saltation (D)** → **mutation-caused speciation (I)**, i.e., sudden evolutionary change.

Question28

A molecule that can act as the genetic material must fulfill all the mentioned criteria except one which is incorrect.

1. It should be able to generate its replica (replication).

2. It should be able to express itself in the form of Mendelian characters.

3. It should not provide the scope for slow changes (mutation) that are required for evolution.

4. It should be stable chemically and structurally.

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

Genetic material **must allow mutations** for evolution. Hence, saying it should *not* provide scope for mutations is incorrect.

Why Others Are Correct:
Option (1): Enables **replication**, essential for inheritance.
Option (2): Allows **expression** of traits (Mendelian characters).
Option (4): Ensures **chemical and structural stability** of genetic material.

Question29

In a typical microsporangium, the function of tapetum is -

1. Nourishment to developing ovules

2. Nourishment to developing stigma

3. Nourishment to developing pollen grains

4. Nourishment to developing thalamus

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

Tapetum is the **innermost nutritive layer** of the microsporangium. It supplies nutrients, enzymes, and materials required for the **development of microspores (pollen grains)**.

Why Others Are Wrong:
Option (1): Ovules are nourished by **nucellus and integuments**, not tapetum.
Option (2): Stigma receives pollen, not nourishment from tapetum.
Option (4): Thalamus supports floral whorls, unrelated to microsporangium nourishment.

Question30

Which one of the following approaches does not belong to ex situ conservation strategy?

1. Zoological parks

2. Wildlife sanctuaries

3. Botanical gardens

4. Wildlife safari parks

Options:

A. 1

B. 2

C. 3

D. 4

Answer: B

Solution:

Ex situ conservation involves **protecting threatened species outside their natural habitat**, e.g., in zoos, botanical gardens, or gene banks. **Wildlife sanctuaries** conserve species **within their natural habitats**, hence they are **in situ**, not ex situ.

Why Others Are Correct:
Option (1): *Zoological parks* → Ex situ; animals conserved outside natural habitat.
Option (3): *Botanical gardens* → Ex situ; plants grown and preserved under controlled conditions.
Option (4): *Wildlife safari parks* → Ex situ; animals kept in semi-natural conditions for protection and awareness

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Question31

The density of a population in a given habitat during a given period fluctuates due to changes in:

(A) Natality
(B) Emigration
(C) Immigration
(D) Mortality

Choose the correct answer from the options given below:

1. **(A), (B) and (C) only**
2. **(A), (B) and (D) only**
3. **(A), (B), (C), (D)**
4. **(B), (C) and (D) only**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

Population density changes due to **all four factors**:

- **Natality (A):** adds individuals.
- **Mortality (D):** removes individuals.
- **Immigration (C):** adds individuals from outside.
- **Emigration (B):** removes individuals moving out.

Question32

The female reproductive system consists of:

(A) Ovaries
(B) External genitalia
(C) Cervix and vagina
(D) Oviducts and uterus

Choose the most appropriate answer from the options given below:

1. **(A), (B), (C) and (D)**
2. **(A), (B) and (D) only**
3. **(A) and (D) only**
4. **(A), (C) and (D) only**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: A

Solution:

The female reproductive system includes:

- **Ovaries (A):** produce eggs and hormones.
- **External genitalia (B):** protect internal organs and facilitate copulation.
- **Cervix and vagina (C):** cervix connects uterus to vagina; vagina receives sperm and serves as birth canal.
- **Oviducts and uterus (D):** oviducts transport eggs; uterus supports embryo development.

Question33

Verhulst-Pearl logistic growth equation can be represented by -

1. **dt/dN = rN(K-N/K)**
2. **dN/dt = rK(K-N/K)**
3. **dN/dt = rN(K-N/K)**

4. **dN/dt = rN(N-K/N)**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

The **Verhulst-Pearl logistic growth equation** models population growth considering **carrying capacity (K)**:

$$\frac{dN}{dt} = rN(1 - \frac{N}{K})$$

- r = intrinsic growth rate
- N = population size
- K = maximum sustainable population

It shows that growth slows as N approaches K.

Question34

Identify the incorrect statement in reference to the latitudinal gradient in biodiversity.

1. **In general, species diversity decreases as we move away from the equator towards the poles.**
2. **The largely tropical Amazonian rain forest in South America has the greatest biodiversity on earth.**
3. **A forest in a tropical region like Equador has up to 10000 times as many species of vascular plants as a forest of equal area in a temperate region like the Midwest of the USA.**
4. **With very few exceptions, tropics harbor more species than temperate or polar areas.**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

The **latitudinal gradient** shows species diversity **decreases gradually** from equator to poles. The claim of **10,000 times more species** is **grossly exaggerated**; tropical forests are richer by 10 times.

Why Others Are Correct:
Option (1): True, diversity generally decreases from equator to poles.
Option (2): True, Amazon rainforest is the most biodiverse terrestrial ecosystem.
Option (4): True, tropics harbor far more species than temperate or polar regions, with few exceptions.

Question35

Medical termination of pregnancy is considered relatively safe -

1. Upto 24 weeks of pregnancy
2. Upto 18 weeks of pregnancy
3. Upto 12 weeks of pregnancy
4. Upto 30 weeks of pregnancy

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

Medical termination of pregnancy (MTP) using **drugs** is considered **relatively safe during the first trimester (up to 12 weeks)**. After this period, procedures become more complex and riskier.

Why Others Are Wrong:
Option (1): *Up to 24 weeks* → Beyond first trimester, surgical intervention is riskier; not "relatively safe" medically.
Option (2): *Up to 18 weeks* → Exceeds safe limit for standard medical abortion.
Option (4): *Up to 30 weeks* → Late pregnancy terminations are complex, unsafe, and usually surgical only.

Question36

The rate of production of organic matter during photosynthesis is defined as -

1. Quaternary productivity
2. Secondary productivity
3. Net primary productivity
4. Gross primary productivity

Options:

A. 1

B. 2

C. 3

D. 4

Answer: D

Solution:

Gross primary productivity (GPP) is the **total rate of production of organic matter** by plants through photosynthesis in a given time.

Why Others Are Wrong:
Option (1): *Quaternary productivity* → Refers to energy transfer in the **4th trophic level**, not photosynthesis.
Option (2): *Secondary productivity* → Production of **organic matter by consumers**, not producers.
Option (3): *Net primary productivity* → **GPP minus plant respiration**; represents energy available to consumers, not total production.

Question37

As a biocontrol agents, the ladybird and dragonflies are useful to get rid of -

1. **Wasp and cockroach, respectively**
2. **Housefly and ants, respectively**
3. **Mosquitoes and aphids, respectively**
4. **Aphids and mosquitoes, respectively**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: D

Solution:

- **Ladybird beetles** feed on **aphids**, controlling their population in crops.
- **Dragonflies** are predators of **mosquitoes**, reducing their numbers naturally.

Why Others Are Wrong:
Option (1): Ladybirds don't feed on wasps; dragonflies don't specialize in cockroaches.
Option (2): Ladybirds don't eat houseflies; dragonflies may eat flies but not specifically ants.
Option (3): Incorrect order; ladybirds → aphids, dragonflies → mosquitoes.

Question38

Match List-I with List-II

List-I (Contraceptive methods)	List-II (Examples)
(A) Barrier method	(I) LNG-20
(B) Oral method	(II) Multiload 375
(C) Copper releasing IUDs	(III) Vaults
(D) Hormone releasing IUDs	(IV) Saheli

Choose the correct answer from the options given below:

1. **(A) – (I), (B) – (II), (C) – (III), (D) – (IV)**
2. **(A) – (III), (B) – (IV), (C) – (I), (D) – (II)**
3. **(A) – (III), (B) – (IV), (C) – (II), (D) – (I)**
4. **(A) – (IV), (B) – (I), (C) – (II), (D) – (III)**

Options:

A.

1

B.

2

C.

3

D.

4

Answer: C

Solution:

- **Barrier method (A) → Vaults (III):** Condoms and vaults prevent sperm from reaching ovum.
- **Oral method (B) → Saheli (IV):** Saheli is a **non-hormonal oral contraceptive**.
- **Copper IUD (C) → Multiload 375 (II):** Copper-releasing IUD used for long-term contraception.
- **Hormone-releasing IUD (D) → LNG-20 (I):** Levonorgestrel-releasing IUD releases hormones to prevent pregnancy.

Question39

Decomposers break down complex organic matter into -

1. **Inorganic substances like O_2, H_2O and CO_2**
2. **Inorganic substances like CO_2, H_2O and nutrients**
3. **Inorganic substances like O_2, H_2S and nutrients**
4. **Inorganic substances like N_2, H_2O and CO_2**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: B

Solution:

Decomposers (bacteria and fungi) break down dead organic matter into **simple inorganic compounds** like **carbon dioxide, water, and mineral nutrients**, making them available for plants.

Why Others Are Wrong:
Option (1): O_2 is not a product of decomposition; it is consumed.
Option (3): H_2S is produced only in anaerobic decomposition of sulfur-containing compounds, not general.
Option (4): N_2 is generally not released; nitrogen is mineralized to ammonium or nitrates.

Question40

The sedative & painkiller drug useful for the patients who have undergone surgery is-

1. **Barbiturates**
2. **Morphine**
3. **Amphitamines**
4. **Cocaine**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: B

Solution:

Morphine is a potent **opioid analgesic** used to relieve **severe pain** and has sedative properties, making it useful for **post-surgical patients**.

Why Others Are Wrong:
Option (1): *Barbiturates* → Mainly **sedatives/hypnotics**, not strong painkillers.
Option (3): *Amphetamines* → Stimulants; increase alertness, not for pain relief.
Option (4): *Cocaine* → Local anesthetic; rarely used systemically for post-surgery pain due to toxicity.

Question41

Read the Passage carefully and answer the the questions

The DNA fragments can be separated by a technique known as gel electrophoresis. Since DNA fragments are negatively charged molecules, they can be separated by forcing them to move towards the anode under an electric field through a medium/matrix. The separated DNA fragments can be visualised only after staining the DNA with a compound known as ethidium bromide followed by exposure to UV radiation. The repeated amplification of DNA is achieved by the use of a thermostable DNA polymerase (isolated from a bacterium, *Thermus aquaticus*). After completion of the biosynthetic stage, the product has to be subjected through a series of processes before it is ready for marketing as a finished product. The downstream processing and quality control testing vary from product to product. The convention for naming restriction enzymes is the first letter of the name comes from the genus and the second two letters come from the species of the prokaryotic cell from which they were isolated.

The downstream processing does not include -

1. **Separation and purification**
2. **Product formulation with preservatives**
3. **No clinical trials in case of drugs**
4. **Strict quality control testing**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

Downstream processing involves **separation, purification, formulation, and quality control** of a product after production. **Clinical trials** are part of **drug development**, not downstream processing.

Why Others Are Wrong:
Option (1): *Separation and purification* → Core part of downstream processing.
Option (2): *Product formulation with preservatives* → Done during downstream processing for stability.
Option (4): *Strict quality control testing* → Essential to ensure product safety and efficacy.

Question42

Read the Passage carefully and answer the the questions

The DNA fragments can be separated by a technique known as gel electrophoresis. Since DNA fragments are negatively charged molecules, they can be separated by forcing them to move towards the anode under an electric field through a medium/matrix. The separated DNA fragments can be visualised only after staining the DNA with a compound known as ethidium bromide followed by exposure to UV radiation. The repeated amplification of DNA is achieved by the use of a thermostable DNA polymerase (isolated from a bacterium, *Thermus aquaticus*). After completion of the biosynthetic stage, the product has to be subjected through a series of processes before it is ready for marketing as a finished product. The downstream processing and quality control testing vary from product to product. The convention for naming restriction enzymes is the first letter of the name comes from the genus and the second two letters come from the species of the prokaryotic cell from which they were isolated.

In agarose gel electrophoresis, the DNA fragments can be visualised only after staining the DNA with a compound known as -

1. **Ethidium bromate**
2. **Ethidium chloride**
3. **Ethidium bromide**
4. **Ethidium bromine**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

Ethidium bromide (EtBr) intercalates between DNA bases and **fluoresces under UV light**, allowing DNA fragments to be visualized in agarose gel electrophoresis.

Question43

Read the Passage carefully and answer the the questions

The DNA fragments can be separated by a technique known as gel electrophoresis. Since DNA fragments are negatively charged molecules, they can be separated by forcing them to move towards the anode under an electric field through a medium/matrix. The separated DNA fragments can be visualised only after staining the DNA with a compound known as ethidium bromide followed by exposure to UV radiation. The repeated amplification of DNA is achieved by the use of a thermostable DNA polymerase (isolated from a bacterium, *Thermus aquaticus*). After completion of the biosynthetic stage, the product has to be subjected through a series of processes before it is ready for marketing as a finished product. The downstream processing and quality control testing vary from product to product. The convention for naming restriction enzymes is the first letter of the name comes from the genus and the second two letters come from the species of the prokaryotic cell from which they were isolated.

In the nomenclature of restriction enzymes -

1. **The first letter of the name from the species and the second two letters from the different species of the prokaryotic cell**
2. **The first two letter of the name from the genus and the third letter from the species of the prokaryotic cell**

3. **The first letter of the name from the species and the second two letters from the genus of the prokaryotic cell**
4. **The first letter of the name from the genus and the second two letters from the species of the prokaryotic cell**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: D

Solution:

Restriction enzymes are named based on their **source organism**:

- **First letter:** Genus
- **Next two letters:** Species
- Followed by strain designation and Roman numeral if multiple enzymes exist.
  Example: **EcoRI** → *E* from *Escherichia*, *co* from *coli*, *R* is strain, *I* is first enzyme discovered.

Question44

Read the Passage carefully and answer the the questions

The DNA fragments can be separated by a technique known as gel electrophoresis. Since DNA fragments are negatively charged molecules, they can be separated by forcing them to move towards the anode under an electric field through a medium/matrix. The separated DNA fragments can be visualised only after staining the DNA with a compound known as ethidium bromide followed by exposure to UV radiation. The repeated amplification of DNA is achieved by the use of a thermostable DNA polymerase (isolated from a bacterium, *Thermus aquaticus*). After completion of the biosynthetic stage, the product has to be subjected through a series of processes before it is ready for marketing as a finished product. The downstream processing and quality control testing vary from product to product. The convention for naming restriction enzymes is the first letter of the name comes from the genus and the second two letters come from the species of the prokaryotic cell from which they were isolated.

The thermostable DNA polymerase is isolated from -

1. ***Thermus aquaticas***
2. ***Thermus acquaticus***
3. ***Thermus aquaticus***
4. ***Thermas aquaticus***

Options:

A. 1

B. 2

C. 3

D. 4

Answer: C

Solution:

Taq polymerase, a thermostable DNA polymerase used in **PCR**, is isolated from the bacterium **Thermus aquaticus**, which thrives in **hot springs**.

Question45

Read the Passage carefully and answer the the questions

The DNA fragments can be separated by a technique known as gel electrophoresis. Since DNA fragments are negatively charged molecules, they can be separated by forcing them to move towards the anode under an electric field through a medium/matrix. The separated DNA fragments can be visualised only after staining the DNA with a compound known as ethidium bromide followed by exposure to UV radiation. The repeated amplification of DNA is achieved by the use of a thermostable DNA polymerase (isolated from a bacterium, *Thermus aquaticus*). After completion of the biosynthetic stage, the product has to be subjected through a series of processes before it is ready for marketing as a finished product. The downstream processing and quality control testing vary from product to product. The convention for naming restriction enzymes is the first letter of the name comes from the genus and the second two letters come from the species of the prokaryotic cell from which they were isolated.

In agarose gel electrophoresis, DNA fragments move towards _____ under an electric field through a medium.

1. **Cathode**
2. **Anode**
3. **Matrix**
4. **Buffer**

Options:

A. 1

B. 2

C. 3

D. 4

Answer: B

Solution:

DNA is **negatively charged** due to its phosphate backbone. In **agarose gel electrophoresis**, DNA fragments **migrate towards the positively charged anode** under an electric field.

Why Others Are Wrong:
Option (1): *Cathode* → Negatively charged; DNA moves **away** from cathode.
Option (3): *Matrix* → The agarose **matrix supports migration**, but DNA doesn't move "towards" it.
Option (4): *Buffer* → Provides ionic environment, not a direction for DNA migration.

Question46

Read the Passage carefully and answer the the questions.

Insulin consists of two short polypeptide chains: chain A and chain B, that are linked together by disulphide bridges. The first clinical gene therapy was given in 1990 to a 4-year old girl with adenosine deaminase (ADA) deficiency. This enzyme is crucial for the immune system to function. Recombinant DNA technology, Polymerase Chain Reaction (PCR) and Enzyme Linked Immuno-sorbent Assay (ELISA) are some of the techniques that serve the purpose of early diagnosis of diseases. Transgenic animals that produce useful biological products can be created by the introduction of the portion of DNA (or genes) which codes for a particular product such as human protein (α-1-antitrypsin) used to treat emphysema. Biopiracy is the term used to refer to the use of bio-resources by multinational companies and other organisations without proper authorisation from the countries and people concerned without compensatory payment.

Deficiency of adenosine deaminase (ADA) can be permanently cured by -

1. **Gene therapy**
2. **Bone marrow transplantation**

3. **Periodic infusion of genetically engineered lymphocytes.**
4. **Enzyme replacement therapy**

Options:

A.

1

B.

2

C.

3

D.

4

Answer: A

Solution:

Adenosine deaminase (ADA) deficiency causes **SCID (Severe Combined Immunodeficiency)**. **Gene therapy** introduces a functional **ADA gene** into patient's cells, providing a **permanent cure** by restoring enzyme production.

Why Others Are Wrong:
Option (2): *Bone marrow transplantation* → Can restore immunity but depends on a suitable donor; not always permanent.
Option (3): *Periodic infusion of genetically engineered lymphocytes* → Temporary relief; requires repeated treatments.
Option (4): *Enzyme replacement therapy* → Provides ADA temporarily; not a permanent cure.

Question47

Read the Passage carefully and answer the the questions.

Insulin consists of two short polypeptide chains: chain A and chain B, that are linked together by disulphide bridges. The first clinical gene therapy was given in 1990 to a 4-year old girl with adenosine deaminase (ADA) deficiency. This enzyme is crucial for the immune system to function. Recombinant DNA technology, Polymerase Chain Reaction (PCR) and Enzyme Linked Immuno-sorbent Assay (ELISA) are some of the techniques that serve the purpose of early diagnosis of diseases. Transgenic animals that produce useful biological products can be created by the introduction of the portion of DNA (or genes) which codes for a particular product such as human protein (α-1-antitrypsin) used to treat emphysema. Biopiracy is the term used to refer to the use of bio-resources by multinational companies and other organisations without proper authorisation from the countries and people concerned without compensatory payment.

In early diagnosis of disease, the principle of antigen-antibody interaction operates in -

1. **Computed tomography**

2. **Recombinant DNA technology**
3. **Polymerase Chain Reaction**
4. **Enzyme Linked Immuno Sorbent Assay**

Options:

A.

1

B.

2

C.

3

D.

4

Answer: D

Solution:

ELISA is based on **specific antigen-antibody interactions** to detect **disease markers** early, making it a key diagnostic tool.

Why Others Are Wrong:
Option (1): *Computed tomography* → Imaging technique; does not use antigen-antibody reactions.
Option (2): *Recombinant DNA technology* → Involves gene manipulation, not direct antigen-antibody detection.
Option (3): *Polymerase Chain Reaction (PCR)* → Amplifies DNA; not based on antigen-antibody interactions.

Question48

Read the Passage carefully and answer the the questions.

Insulin consists of two short polypeptide chains: chain A and chain B, that are linked together by disulphide bridges. The first clinical gene therapy was given in 1990 to a 4-year old girl with adenosine deaminase (ADA) deficiency. This enzyme is crucial for the immune system to function. Recombinant DNA technology, Polymerase Chain Reaction (PCR) and Enzyme Linked Immuno-sorbent Assay (ELISA) are some of the techniques that serve the purpose of early diagnosis of diseases. Transgenic animals that produce useful biological products can be created by the introduction of the portion of DNA (or genes) which codes for a particular product such as human protein (α-1-antitrypsin) used to treat emphysema. Biopiracy is the term used to refer to the use of bio-resources by multinational companies and other organisations without proper authorisation from the countries and people concerned without compensatory payment.

Transgenic animals that produce useful biological products can be created by the introduction of the portion of DNA which codes for a particular product such as human protein (α-1-

antitrypsin) which is used to treat:

1. **Phenylketonuria**
2. **Emphysema**
3. **Cystic fibrosis**
4. **Adenosine deaminase deficiency**

Options:

A.

1

B.

2

C.

3

D.

4

Answer: B

Solution:

α-1-antitrypsin protects lung tissue from enzymatic damage. Its deficiency leads to **emphysema**. Transgenic animals producing human α-1-antitrypsin provide a **therapeutic source** for patients.

Why Others Are Wrong:
Option (1): *Phenylketonuria* → Treated by dietary management or enzyme therapy, not α-1-antitrypsin.
Option (3): *Cystic fibrosis* → Caused by CFTR gene mutation; α-1-antitrypsin is unrelated.
Option (4): *Adenosine deaminase deficiency* → Treated by enzyme replacement or gene therapy, not α-1-antitrypsin.

Question49

Read the Passage carefully and answer the the questions.

Insulin consists of two short polypeptide chains: chain A and chain B, that are linked together by disulphide bridges. The first clinical gene therapy was given in 1990 to a 4-year old girl with adenosine deaminase (ADA) deficiency. This enzyme is crucial for the immune system to function. Recombinant DNA technology, Polymerase Chain Reaction (PCR) and Enzyme Linked Immuno-sorbent Assay (ELISA) are some of the techniques that serve the purpose of early diagnosis of diseases. Transgenic animals that produce useful biological products can be created by the introduction of the portion of DNA (or genes) which codes for a particular product such as human protein (α-1-antitrypsin) used to treat emphysema. Biopiracy is the term used to refer to the use of bio-resources by multinational companies and other organisations without proper authorisation from the countries and people concerned without compensatory payment.

Insulin has 2 polypeptide chains linked together by _____ bridges.

1. **Dimethyl**
2. **Disulphide**
3. **Dipropyl**
4. **Diphosphate**

Options:

A.

1

B.

2

C.

3

D.

4

Answer: B

Solution:

Insulin consists of **two polypeptide chains (A and B)** linked by **two disulphide (–S–S–) bridges**, with an additional intrachain disulphide bond in the A chain. These bonds are crucial for its **structural stability and biological activity**.

Why Others Are Wrong:
Option (1): *Dimethyl* → Not involved in linking insulin chains.
Option (3): *Dipropyl* → Incorrect chemical; not present in proteins.
Option (4): *Diphosphate* → Phosphate groups are not responsible for linking insulin chains.

Question50

Read the Passage carefully and answer the the questions.

Insulin consists of two short polypeptide chains: chain A and chain B, that are linked together by disulphide bridges. The first clinical gene therapy was given in 1990 to a 4-year old girl with adenosine deaminase (ADA) deficiency. This enzyme is crucial for the immune system to function. Recombinant DNA technology, Polymerase Chain Reaction (PCR) and Enzyme Linked Immuno-sorbent Assay (ELISA) are some of the techniques that serve the purpose of early diagnosis of diseases. Transgenic animals that produce useful biological products can be created by the introduction of the portion of DNA (or genes) which codes for a particular product such as human protein (α-1-antitrypsin) used to treat emphysema. Biopiracy is the term used to refer to the use of bio-resources by multinational companies and other organisations without proper authorisation from the countries and people concerned without compensatory payment.

In 1997, an American company got patent rights on Basmati rice through the US Patent and Trademark Office. This allowed the company to sell a 'new' variety of bvasnmati, in the US and abroad. This 'new' variety of Basmati had actually been derived from Indian farmer's varieties.. Indiian Basmati was crossed with semi-dwarf varieties and claimed as an invention or a novelty. This is a case of:

1. **Competitive market**
2. **Bioresources**
3. **Biopiracy**
4. **Commercialization**

Options:

A.

1

B.

2

C.

3

D.

4

Answer: C

Solution:

Biopiracy occurs when **companies or individuals patent biological resources or traditional knowledge** from another country **without proper authorization or benefit sharing**. The Basmati rice case exemplifies this.

Why Others Are Wrong:
Option (1): *Competitive market* → Relates to business competition, not misuse of genetic resources.
Option (2): *Bioresources* → Refers to natural resources; does not imply exploitation.
Option (4): *Commercialization* → Selling or marketing a product; biopiracy is a legal/ethical issue, not just commercialization.