VMC Vidyamandir Classes SINCE 1986
IIT JEE | MEDICAL | FOUNDATION

Section – A

1. **(i).(b)** Entry of potassium ions into guard cells

→ K^+ entry increases osmotic concentration, water enters, cells become turgid → stomata open.

(ii).(a) Only (2)

→ Tissue = group of similar cells performing a specific function.

(iii).(b) 12 pairs

→ Humans have 12 pairs of cranial nerves.

(iv).(d) Adaptation of eyes

→ The pupil will adjust with the intensity of light.

(v).(c) Hepatic portal vein

→ Carries nutrient-rich blood from intestine to liver.

(vi).(a) Both A and R are true and R correctly explains A

→ Ozone absorbs harmful UV rays → protects life.

(vii).(b) Urochrome

→Urochrome is the pigment responsible for pale yellow colour of normal human urine.

(viii).(c) Lens and Retina

→ Vitreous humour is present between lens and retina. It provides nutrition to eye.

(ix).(b) Splitting of water molecules

→ Light reaction causes photolysis of water.

(x).(c) Epididymis

→ Sperms gain motility and are stored here.

(xi).(d) Kinetochore

→ Spindle fibres attach at Kinetochore.

(xii)(c) Pancreas

→ Exocrine (enzymes) + Endocrine (insulin, glucagon).

(xiii).(c) Paper

→ Paper is biodegradable and compostable because it is derived from plant-based fibers like wood pulp

(xiv).(c) Glucagon

→ Alpha cell of islet of Langerhans in Pancreas secrete glucagon. It stimulates liver to convert glycogen into glucose.

(xv).(c) Corpus callosum

→ Connects two cerebral hemispheres in human brain.

2. **(i)** **(a)** Centrosome

(b) Haemophilia

(c) Cuticle

(d) Cretinism

(e) Luteinizing Hormone (LH)

(ii) **(a)** Fertilization → cleavage → implantation → gestation

(b) Ingestion → digestion → assimilation → egestion

(c) Pollination → fertilization → seed formation → fruit formation

(d) Stimulus → receptor → coordination → response

(e) Meiosis → gamete formation → fertilization → zygote formation

(iii) **(a)** Seminiferous tubules

(b) Epididymis

(c) Vas deferens (sperm duct)

(d) Fallopian tube (oviduct)

(e) Fertilization

(iv) **(a)** Bile – others are nitrogenous wastes

(b) Saliva – others are hormones

(c) Noise pollution – others are mutagens

(d) Pancreas – others are excretory organs

(e) Newspaper – others are non-biodegradable

(v) **(a)** Heart → (v) Circulation of blood

(b) Alveoli → (i) Exchange of gases

(c) Kidney → (ii) Purification of blood

(d) Nephron → (iv) Functional unit of kidney

(e) Small intestine → (iii) Absorption of Nutrients

Section – B

3. **(i)** A gene is a unit of heredity present on a chromosome which controls the expression of a specific character in an organism.

(ii)

Homologous chromosomes	Sister chromatids
One chromosome is from the father and the other from the mother	Both are identical copies of the same chromosome
They pair during meiosis	They separate during mitosis and meiosis II

(iii) Haemophilia is a sex-linked recessive genetic disorder in which blood fails to clot properly due to the absence of clotting factors.

Reasons why it is more common in males:

1. Males have only one X chromosome, so the recessive gene expresses easily.

2. Females have two X chromosomes, so the normal gene masks the defective one.

(iv) **1.** Meiosis reduces the chromosome number to half, maintaining chromosome number in the species.

2. It produces genetic variation, which is essential for evolution.

(v) Let the carrier mother be X^HX^h and the normal father be X^HY.

Parents	X^H	X^h
X^H	$X^H X^H$ (normal daughter)	$X^H X^h$ (carrier daughter)
Y	X^HY (normal son)	X^hY (haemophilic son)

Conclusion:

- 50% sons are haemophilic
- 50% daughters are carriers

4. **(i)** Medulla oblongata

(ii) **1.** It protects the brain and spinal cord from mechanical shocks.

2. It supplies nutrients and removes wastes from nervous tissue.

(iii)

Sensory neuron	Motor neuron
Carries impulses form receptors to CNS	Carries impulses from CNS to effectors
Cell body lies in dorsal root ganglion	Cell body lies in ventral horn of the spinal cord

(iv) **1.** Loss of balance and posture

2. Poor coordination of muscles

(v) **Reflex pathway:**

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

Reflex action is rapid and involuntary, helping the body avoid danger.

5. **(i)** Chlorophyll-a

(ii)

Light reaction	Dark reaction
Requires sunlight	Does not requires direct sunlight
Occurs in thylakoid	Occurs in stroma

(iii) **1.** Temperature

2. Humidity

(iv) **1.** Exchange of gases

2. Respiration

(v) When guard cells absorb water, they become turgid and stomata open.

When water is lost, guard cells become flaccid and stomata close.

This is controlled by osmotic movement of water.

6. **(i)** 46 chromosomes

(ii)

Mitosis	Meiosis
One division	Two divisions
Occurs in somatic cells	Occurs in germ cells

(iii) Cytokinesis is the division of cytoplasm after nuclear division.

Features in animal cells:

1. Occurs by cleavage furrow

2. Cell plate is absent

(iv) **1.** Radiation (X-rays, UV rays)

2. Chemicals

(v) Mitosis increases cell number during growth.

It replaces worn-out and damaged cells.

It maintains genetic stability by producing identical cells.

7. **(i)** Charles Darwin

(ii) **1.** Homologous organs

2. Analogous organs

(iii) Vestigial organs are reduced organs with no significant function.

Examples: appendix, wisdom teeth.

(iv) **1.** Depletion of natural resources

2. Increase in pollution

(v) According to Lamarck, characters acquired during lifetime are inherited.

Use of organs leads to development, disuse leads to degeneration.

Example: giraffe's neck became long due to continuous stretching for obtaining food.

8. **(i)** Urea

(ii) **1.** Excretion of nitrogenous wastes

2. Regulation of water and salts

(iii) Dialysis is the artificial purification of blood.

It is required during kidney failure.

(iv) **1.** Diabetes

2. High blood pressure

(v) **(a)** **Ultrafiltration:** Blood is filtered in the glomerulus under pressure.

(b) **Selective reabsorption:** Useful substances are reabsorbed in tubules.