AIIMS B.Sc Nursing Biology

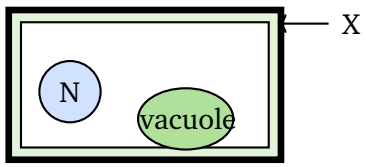
Sample Paper – 12

Duration: 36 Minutes **Maximum Marks: 30**

Instructions

- This paper contains **30** Multiple Choice Questions (Single Correct Answer), modelled on the Biology section of the **AIIMS B.Sc Nursing (Hons)** entrance.
- Each correct answer carries **+1 mark**. **1/3 mark** is deducted for every incorrect answer. Unattempted questions carry **no penalty**.
- Syllabus level: **Class 11–12 (NCERT)** Biology.
- Only **one** option is correct. Choose carefully.
- The actual exam is conducted as a **computer-based test (CBT)**.
- Use of mobile phones, calculators, or other electronic gadgets is strictly prohibited.

Q1. The figure shows a plant cell. The rigid outermost layer **X**, made mainly of cellulose and giving the cell its shape, is the:



(A) Cell membrane

(B) Nuclear envelope

(C) Cell wall

(D) Tonoplast

Q2. In the binomial name *Mangifera indica* for the mango, the word *Mangifera* denotes the:

(A) Genus

(B) Species

(C) Family

(D) Order

Q3. The type of cell division that produces four haploid daughter cells and occurs during the formation of gametes is called:

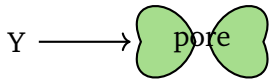
(A) Mitosis

(B) Meiosis

(C) Binary fission

(D) Budding

Q4. The figure shows a stoma on the lower surface of a leaf. The two bean-shaped cells labelled **Y** that open and close the pore to control water loss are the:



(A) Epidermal cells

(B) Mesophyll cells

(C) Companion cells

(D) Guard cells

Q5. During photosynthesis, green plants use carbon dioxide and water in the presence of sunlight to produce glucose and release:

(A) Oxygen

(B) Nitrogen

(C) Carbon dioxide

(D) Hydrogen

Q6. Which plant hormone is mainly responsible for cell elongation and the bending of shoots towards light (phototropism)?

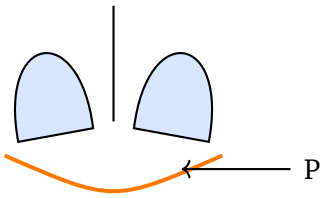
(A) Abscisic acid

(B) Ethylene

(C) Auxin

(D) Cytokinin

Q7. The figure shows the human lungs and the dome-shaped muscle **P** below them. When **P** contracts and flattens, the chest volume increases and air is drawn in. Identify **P**.



(A) Pleura

(B) Diaphragm

(C) Epiglottis

(D) Bronchiole

Q8. Which component of human blood is mainly responsible for carrying oxygen from the lungs to the body tissues?

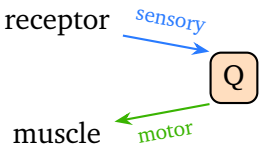
(A) White blood cells

(B) Platelets

(C) Plasma proteins

(D) Red blood cells

Q9. The figure outlines a reflex arc. The structure **Q**, the central coordinating organ that processes the signal and triggers a quick response without conscious thought, is the:



(A) Cerebellum

(B) Heart

(C) Skin

(D) Spinal cord

Q10. In the human urinary system, urine formed in the kidneys is carried to the urinary bladder through the:

(A) Urethra

(B) Renal artery

(C) Ureters

(D) Renal vein

Q11. Which gland, often called the “master gland”, controls the activity of many other endocrine glands in the body?

(A) Thyroid gland

(B) Pituitary gland

(C) Adrenal gland

(D) Pancreas

Q12. The type of muscle that makes up the heart, works continuously throughout life, and is involuntary and striated, is called:

(A) Cardiac muscle

(B) Smooth muscle

(C) Visceral muscle

(D) Skeletal muscle

Q13. Most of the absorption of digested food in the human alimentary canal takes place in the:

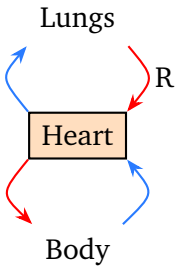
(A) Small intestine

(B) Stomach

(C) Large intestine

(D) Oesophagus

Q14. The figure is a simple sketch of double circulation. The loop **R**, in which blood is sent from the heart to the lungs and back to pick up oxygen, is called:



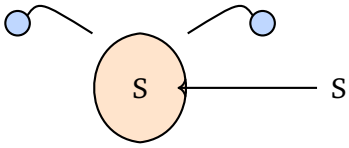
(A) Systemic circulation

(B) Pulmonary circulation

(C) Portal circulation

(D) Coronary circulation

Q15. The figure shows the human female reproductive system. The hollow muscular organ **S**, in which the embryo develops during pregnancy, is the:



(A) Ovary

(B) Fallopian tube

(C) Uterus

(D) Cervix

Q16. The transfer of pollen grains from the anther of a flower to the stigma of a **different** flower of the same species is called:

(A) Self-pollination

(B) Fertilisation

(C) Germination

(D) Cross-pollination

Q17. During pregnancy, the structure that connects the developing foetus to the wall of the mother's uterus and supplies it with nutrients and oxygen is the:

(A) Placenta

(B) Amnion

(C) Corpus luteum

(D) Yolk sac

Q18. In a seed, the part of the embryo that grows downward to form the future root is the:

(A) Plumule

(B) Cotyledon

(C) Radicle

(D) Testa

Q19. Mendel's law which states that the two alleles of a gene separate during gamete formation, so each gamete receives only one allele, is the law of:

(A) Dominance

(B) Segregation

(C) Independent assortment

(D) Linkage

Q20. The flow of genetic information shown by the arrows below represents the central dogma. The process labelled **Z**, by which information in mRNA is used to build a protein, is called:

$$\text{DNA} \xrightarrow{\text{transcription}} \text{mRNA} \xrightarrow{Z} \text{Protein}$$

(A) Replication

(B) Transcription

(C) Mutation

(D) Translation

Q21. The forelimbs of a human, a whale and a bat have the same basic bone structure but perform different functions. Such structures are called:

(A) Homologous organs

(B) Analogous organs

(C) Vestigial organs

(D) Acquired characters

Q22. Haemophilia, a disorder in which blood fails to clot properly, is an example of a:

(A) Bacterial disease

(B) Deficiency disease

(C) Sex-linked genetic disorder

(D) Contagious disease

Q23. A vaccine protects the body against a disease by stimulating it to produce:

(A) More red blood cells

(B) Specific antibodies (memory cells)

(C) Digestive enzymes

(D) Hormones

Q24. Which disease is caused by a deficiency of **vitamin C** in the diet?

(A) Rickets

(B) Night blindness

(C) Goitre

(D) Scurvy

Q25. The first antibiotic, **penicillin**, which is used to treat bacterial infections, was obtained from a:

(A) Fungus (*Penicillium*)

(B) Virus

(C) Green alga

(D) Protozoan

Q26. Tuberculosis (TB), a disease that mainly affects the lungs, is caused by a:

(A) Bacterium

(B) Protozoan

(C) Virus

(D) Fungus

Q27. The technique used in biotechnology to make millions of copies of a specific DNA segment in a test tube is called:

(A) Electrophoresis

(B) Polymerase chain reaction (PCR)

(C) Centrifugation

(D) Chromatography

Q28. Human insulin used by diabetic patients is now produced on a large scale by inserting the human insulin gene into:

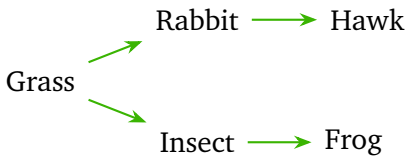
(A) Sheep

(B) Yeast spores only

(C) Plant leaves

(D) Bacteria (*E. coli*)

Q29. In the simple food web shown, which organism is the **producer** that supports all the others?



(A) Rabbit

(B) Frog

(C) Grass

(D) Hawk

Q30. The gradual increase in the Earth's average temperature, caused mainly by the build-up of carbon dioxide and other greenhouse gases, is known as:

(A) Eutrophication

(B) Global warming

(C) Biomagnification

(D) Acid rain

Detailed Solutions

Q1.

Solution

Concept — Plant cell features: A plant cell has a rigid cell wall outside its cell membrane.

Explanation: The thick, rigid outer layer X, made mainly of cellulose and giving the plant cell shape and support, is the **cell wall**.

Why other options are wrong:

- The cell membrane lies just inside the wall and is thin and flexible; the nuclear envelope surrounds the nucleus; the tonoplast is the membrane around the vacuole.

Final Answer: X is the cell wall $\Rightarrow$ C

Answer: (C) Go Back to Q1

Q2.

Solution

Concept — Binomial nomenclature: Each scientific name has two parts: genus (first) and species (second).

Explanation: In *Mangifera indica*, the first word *Mangifera* is the **genus** name; *indica* is the species name.

Why other options are wrong:

- The second word is the species; family and order are higher categories and are not part of the two-word name.

Final Answer: *Mangifera* is the genus $\Rightarrow$ A

Answer: (A) Go Back to Q2

Q3.

Solution

Concept — Cell division: Meiosis halves the chromosome number to form gametes.

Explanation: Meiosis produces four haploid daughter cells and takes place during gamete formation, so that fertilisation restores the diploid number.

Why other options are wrong:

- Mitosis makes two identical diploid cells; binary fission and budding are forms of asexual reproduction, not gamete-forming division.

Final Answer: It is meiosis $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q3

Q4.

Solution

Concept — Stomata: A stoma is a pore flanked by two special cells that control its opening.

Explanation: The two bean-shaped cells Y that swell and shrink to open and close the stomatal pore are the **guard cells**.

Why other options are wrong:

- Ordinary epidermal cells do not control the pore; mesophyll cells do photosynthesis; companion cells belong to the phloem.

Final Answer: Y are guard cells $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q4

Q5.

Solution

Concept — Photosynthesis: Plants make food using light, and a gas is released as a by-product.

Explanation: In photosynthesis, $6CO_2 + 6H_2O \xrightarrow{\text{light}} C_6H_{12}O_6 + 6O_2$, so the gas released is **oxygen**.

Why other options are wrong:

- Carbon dioxide is taken in, not released; nitrogen and hydrogen are not products of photosynthesis.

Final Answer: Oxygen is released $\Rightarrow$ A

Answer: (A) Go Back to Q5

Q6.

Solution

Concept — Plant hormones: Auxin controls growth towards light.

Explanation: **Auxin** causes cell elongation and gathers on the shaded side of a shoot, making it bend towards light (phototropism).

Why other options are wrong:

- Abscisic acid promotes dormancy; ethylene ripens fruits; cytokinin promotes cell division, not phototropic bending.

Final Answer: The hormone is auxin $\Rightarrow$ C

Answer: (C) Go Back to Q6

Q7.

Solution

Concept — Mechanism of breathing: A dome-shaped muscle below the lungs drives inhalation.

Explanation: Muscle P below the lungs is the **diaphragm**. When it contracts and flattens, the chest cavity enlarges and air rushes into the lungs.

Why other options are wrong:

- The pleura is a membrane around the lungs; the epiglottis guards the windpipe during swallowing; a bronchiole is a small air tube.

Final Answer: P is the diaphragm $\Rightarrow$ B

Answer: (B) Go Back to Q7

Q8.

Solution

Concept — Functions of blood cells: Red blood cells carry oxygen using haemoglobin.

Explanation: Red blood cells contain haemoglobin, which binds oxygen in the lungs and releases it to the tissues.

Why other options are wrong:

- White blood cells fight infection; platelets help clotting; plasma proteins do many jobs but do not carry the bulk of oxygen.

Final Answer: Red blood cells carry oxygen $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q8

Q9.

Solution

Concept — Reflex arc: A reflex action is coordinated by the spinal cord, not the brain, for speed.

Explanation: Structure Q, which receives the sensory signal and at once sends out a motor signal to the muscle, is the **spinal cord**. This gives a quick, automatic response.

Why other options are wrong:

- The cerebellum controls balance; the heart and skin are not the coordinating centre of a reflex arc.

Final Answer: Q is the spinal cord $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q9

Q10.

Solution

Concept — Urinary pathway: Urine travels kidney → ureter → bladder → urethra.

Explanation: Urine made in the kidneys is carried to the urinary bladder by the **ureters**.

Why other options are wrong:

- The urethra carries urine out of the body from the bladder; the renal artery and renal vein carry blood, not urine.

Final Answer: The ureters carry urine to the bladder ⇒ C

Answer: (C) Go Back to Q10

Q11.

Solution

Concept — Endocrine control: The pituitary directs many other glands.

Explanation: The **pituitary gland** is called the master gland because its hormones control the thyroid, adrenals, gonads and more.

Why other options are wrong:

- The thyroid, adrenal and pancreas are themselves controlled (directly or indirectly) by the pituitary.

Final Answer: The master gland is the pituitary ⇒ B

Answer: (B) Go Back to Q11

Q12.

Solution

Concept — Types of muscle: The heart is made of a special involuntary striated muscle.

Explanation: Cardiac muscle forms the heart wall, is striated, involuntary, and contracts rhythmically without tiring throughout life.

Why other options are wrong:

- Skeletal muscle is voluntary; smooth (visceral) muscle is involuntary but not striated and is not found in the heart wall.

Final Answer: It is cardiac muscle $\Rightarrow$ A

Answer: (A) Go Back to Q12

Q13.

Solution

Concept — Absorption of food: The small intestine, with its villi, is the main absorbing region.

Explanation: Most digested food is absorbed in the **small intestine**, whose inner lining has finger-like villi that greatly increase the surface area.

Why other options are wrong:

- The stomach mainly digests; the large intestine absorbs water; the oesophagus only carries food down.

Final Answer: Absorption occurs in the small intestine $\Rightarrow$ A

Answer: (A) Go Back to Q13

Q14.

Solution

Concept — Double circulation: Blood passes through the heart twice, in a pulmonary loop and a systemic loop.

Explanation: Loop R, which carries blood from the heart to the lungs and back, is the **pulmonary circulation**, where blood picks up oxygen.

Why other options are wrong:

- Systemic circulation supplies the body; portal circulation links the gut to the liver; coronary circulation supplies the heart muscle itself.

Final Answer: R is the pulmonary circulation $\Rightarrow$ B

Answer: (B) Go Back to Q14

Q15.

Solution

Concept — Female reproductive system: The embryo develops inside the uterus (womb).

Explanation: The hollow, muscular organ S in which the embryo implants and develops during pregnancy is the **uterus**.

Why other options are wrong:

- The ovaries (shown at the sides) make eggs; the fallopian tubes carry the egg; the cervix is the narrow lower opening of the uterus.

Final Answer: S is the uterus $\Rightarrow$ C

Answer: (C) Go Back to Q15

Q16.

Solution

Concept — Pollination types: Pollen reaching a different plant of the same kind is cross-pollination.

Explanation: Transfer of pollen from the anther of one flower to the stigma of a different flower of the same species is **cross-pollination**.

Why other options are wrong:

- Self-pollination stays within the same flower; fertilisation is the fusion of gametes; germination is the sprouting of a seed.

Final Answer: It is cross-pollination $\Rightarrow$ D

Answer: (D) Go Back to Q16

Q17.

Solution

Concept — Support of the foetus: The placenta links the foetus to the mother.

Explanation: The **placenta** connects the foetus to the uterine wall and supplies it with nutrients and oxygen while removing wastes.

Why other options are wrong:

- The amnion is the fluid-filled protective sac; the corpus luteum is an ovarian structure; the yolk sac is a minor early structure in humans.

Final Answer: It is the placenta ⇒ A

Answer: (A) Go Back to Q17

Q18.

Solution

Concept — Parts of the embryo in a seed: The radicle becomes the root and the plumule becomes the shoot.

Explanation: The part of the embryo that grows downward into the soil to form the root is the **radicle**.

Why other options are wrong:

- The plumule forms the shoot; the cotyledon stores food; the testa is the protective seed coat.

Final Answer: The radicle forms the root ⇒ C

Answer: (C) Go Back to Q18

Q19.

Solution

Concept — Mendel's laws: The law of segregation deals with the separation of paired alleles.

Explanation: The **law of segregation** states that the two alleles of a gene separate during gamete formation, so each gamete carries only one allele.

Why other options are wrong:

- The law of dominance is about one allele masking another; independent assortment concerns two different genes; linkage is not a Mendelian law.

Final Answer: It is the law of segregation ⇒ B

Answer: (B) Go Back to Q19

Q20.

Solution

Concept — Central dogma: DNA → RNA (transcription) → protein (translation).

Explanation: Process Z, in which the information in mRNA is read to build a protein at the ribosome, is **translation**.

Why other options are wrong:

- Replication copies DNA; transcription makes mRNA from DNA; a mutation is a change in the DNA sequence, not a normal step of protein synthesis.

Final Answer: Z is translation ⇒ D

Answer: (D) Go Back to Q20

Q21.

Solution

Concept — Homologous organs: Same basic structure but different functions points to a common ancestor.

Explanation: The forelimbs of human, whale and bat share the same bone plan but do different jobs, so they are **homologous organs** (evidence of common ancestry).

Why other options are wrong:

- Analogous organs have different structure but same function; vestigial organs are reduced; acquired characters are not inherited.

Final Answer: They are homologous organs ⇒ A

Answer: (A) Go Back to Q21

Q22.

Solution

Concept — Genetic disorders: Haemophilia is inherited and carried on the X chromosome.

Explanation: Haemophilia is a **sex-linked genetic disorder**: the faulty clotting gene lies on the X chromosome, so it affects males more often.

Why other options are wrong:

- It is not caused by bacteria, is not due to a dietary deficiency, and is not contagious; it is inherited.

Final Answer: It is a sex-linked genetic disorder ⇒ C

Answer: (C) Go Back to Q22

Q23.

Solution

Concept — How vaccines work: A vaccine trains the immune system in advance.

Explanation: A vaccine makes the body produce **specific antibodies and memory cells**, so it can fight the real pathogen quickly later.

Why other options are wrong:

- Vaccines do not work by making red blood cells, digestive enzymes or hormones.

Final Answer: It produces specific antibodies ⇒ B

Answer: (B) Go Back to Q23

Q24.

Solution

Concept — Vitamin deficiency diseases: Each vitamin lack causes a specific disease.

Explanation: A deficiency of **vitamin C** causes **scurvy**, marked by bleeding gums and slow wound healing.

Why other options are wrong:

- Rickets is from vitamin D lack; night blindness from vitamin A lack; goitre from iodine lack.

Final Answer: Vitamin C deficiency causes scurvy ⇒ D

Answer: (D) Go Back to Q24

Q25.

Solution

Concept — Source of antibiotics: Many antibiotics come from microbes, especially fungi.

Explanation: Penicillin, the first antibiotic discovered by Alexander Fleming, comes from the **fungus *Penicillium***.

Why other options are wrong:

- It is not obtained from a virus, a green alga or a protozoan.

Final Answer: Penicillin comes from a fungus $\Rightarrow$ A

Answer: (A) Go Back to Q25

Q26.

Solution

Concept — Cause of TB: Tuberculosis is a bacterial disease of the lungs.

Explanation: Tuberculosis is caused by a **bacterium**, *Mycobacterium tuberculosis*.

Why other options are wrong:

- It is not caused by a virus, a protozoan or a fungus.

Final Answer: TB is caused by a bacterium $\Rightarrow$ A

Answer: (A) Go Back to Q26

Q27.

Solution

Concept — Amplifying DNA: PCR copies a chosen DNA segment many times.

Explanation: The **polymerase chain reaction (PCR)** makes millions of copies of a specific DNA segment in a test tube using a DNA polymerase and repeated heating-cooling cycles.

Why other options are wrong:

- Electrophoresis separates DNA by size; centrifugation separates by density; chromatography separates mixtures, none of which copy DNA.

Final Answer: The technique is PCR $\Rightarrow$ B

Answer: (B) Go Back to Q27

Q28.

Solution

Concept — Genetically engineered insulin: The human insulin gene is put into bacteria to mass-produce insulin.

Explanation: Human insulin is produced by inserting the human insulin gene into **bacteria (*E. coli*)**, which then make the hormone in large amounts.

Why other options are wrong:

- Sheep, plant leaves and yeast spores "only" are not the standard industrial host; *E. coli* is the classic example.

Final Answer: The gene is inserted into bacteria $\Rightarrow$ D

Answer: (D) Go Back to Q28

Q29.

Solution

Concept — Producers in a food web: Producers are green plants that make their own food and start every chain.

Explanation: In the web, **grass** is the producer; arrows from grass feed the rabbit and the insect, which in turn support the frog and hawk.

Why other options are wrong:

- The rabbit and frog are consumers; the hawk is a top consumer; none of them make their own food.

Final Answer: Grass is the producer $\Rightarrow$ C

Answer: (C) Go Back to Q29

Q30.

Solution

Concept — Greenhouse effect: Build-up of greenhouse gases traps heat and warms the planet.

Explanation: The steady rise in Earth's average temperature due to carbon dioxide and other greenhouse gases is called **global warming**.

Why other options are wrong:

- Eutrophication is nutrient enrichment of water; biomagnification is the build-up of toxins along a food chain; acid rain is rain made acidic by pollutant gases.

Final Answer: It is global warming $\Rightarrow$ B

Answer: (B) Go Back to Q30

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	C	2	A	3	B	4	D	5	A
6	C	7	B	8	D	9	D	10	C
11	B	12	A	13	A	14	B	15	C
16	D	17	A	18	C	19	B	20	D
21	A	22	C	23	B	24	D	25	A
26	A	27	B	28	D	29	C	30	B