

# AIIMS B.Sc Nursing Biology

## Sample Paper – 11

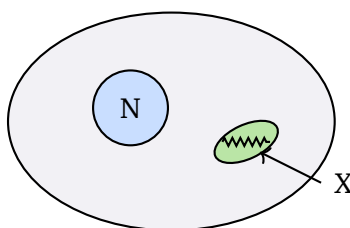
Duration: 36 Minutes

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 an animal cell. The labelled organelle **X** is the site of aerobic respiration and ATP synthesis. Identify **X**.



- (A) Ribosome
- (B) Mitochondrion
- (C) Lysosome
- (D) Golgi apparatus

**Q2.** In the five-kingdom system of classification proposed by R. H. Whittaker, bacteria are placed in which kingdom?

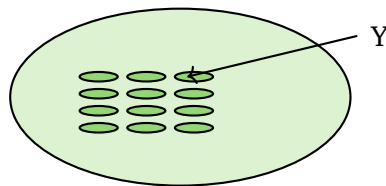


- (A) Protista
- (B) Fungi
- (C) Plantae
- (D) Monera

**Q3.** Which of the following structures is **absent** in a prokaryotic cell?

- (A) Membrane-bound nucleus
- (B) Cell membrane
- (C) Ribosomes
- (D) Cytoplasm

**Q4.** The diagram represents a chloroplast. The flattened membranous sacs labelled Y, stacked into grana, contain chlorophyll and carry out the light reactions. What are these sacs called?



- (A) Stroma lamellae
- (B) Cristae
- (C) Thylakoids
- (D) Matrix vesicles

**Q5.** During aerobic respiration in plants, the complete oxidation of one molecule of glucose yields a net total of approximately how many ATP molecules?

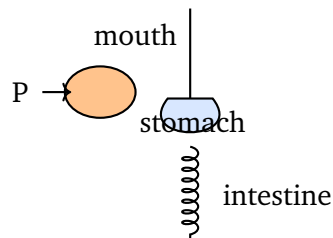
- (A) 2
- (B) 4
- (C) 36
- (D) 12



**Q6.** The upward movement of water and minerals from the roots to the leaves in a tall tree occurs mainly through which tissue?

- (A) Phloem
- (B) Cambium
- (C) Cortex
- (D) Xylem

**Q7.** The figure is a simplified outline of the human digestive tract. The labelled organ **P**, the largest gland in the body, secretes bile. Identify **P**.



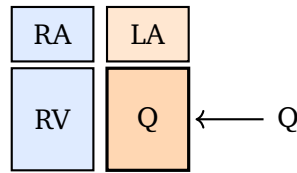
- (A) Liver
- (B) Pancreas
- (C) Spleen
- (D) Salivary gland

**Q8.** The exchange of respiratory gases between the air and the blood in human lungs takes place across the walls of the:

- (A) Trachea
- (B) Bronchi
- (C) Alveoli
- (D) Larynx

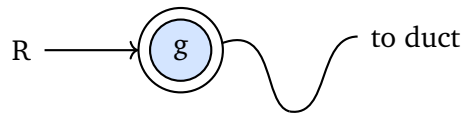
**Q9.** The sketch shows the four chambers of the human heart. The chamber **Q**, which pumps oxygenated blood into the aorta to the whole body, has the thickest muscular wall. Identify **Q**.





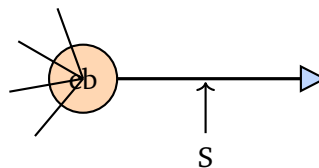
- (A) Right atrium
- (B) Left ventricle
- (C) Right ventricle
- (D) Left atrium

**Q10.** The figure is an outline of a nephron. The cup-shaped structure **R** surrounding the glomerulus, where ultrafiltration of blood begins, is called:



- (A) Loop of Henle
- (B) Collecting duct
- (C) Proximal tubule
- (D) Bowman's capsule

**Q11.** The figure shows a neuron. The long single process labelled **S**, which carries impulses away from the cell body, is the:



- (A) Dendrite
- (B) Synapse
- (C) Myelin sheath
- (D) Axon

**Q12.** Which hormone, secreted by the beta cells of the islets of Langerhans in the pancreas, lowers blood glucose levels?



- (A) Glucagon
- (B) Thyroxine
- (C) Insulin
- (D) Adrenaline

**Q13.** The point of contact between two bones that allows movement, such as at the knee or elbow, is called a:

- (A) Ligament
- (B) Joint
- (C) Tendon
- (D) Cartilage plate

**Q14.** The enzyme **ptyalin (salivary amylase)** present in human saliva begins the digestion of:

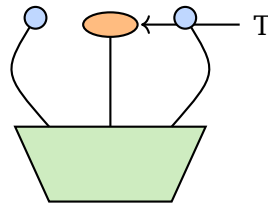
- (A) Proteins
- (B) Fats
- (C) Nucleic acids
- (D) Starch

**Q15.** In the human male, sperms are produced in the **seminiferous tubules** of the:

- (A) Testes
- (B) Prostate gland
- (C) Epididymis
- (D) Vas deferens

**Q16.** The figure shows a longitudinal section of a flower. The labelled part **T**, which receives pollen grains during pollination, is the:





- (A) Anther
- (B) Ovary
- (C) Stigma
- (D) Filament

**Q17.** The process by which a haploid sperm fuses with a haploid egg to form a diploid zygote is called:

- (A) Cleavage
- (B) Fertilisation
- (C) Implantation
- (D) Gastrulation

**Q18.** In angiosperms, the triploid endosperm that nourishes the developing embryo is formed by the fusion of one male gamete with:

- (A) The egg cell
- (B) A synergid
- (C) The antipodal cells
- (D) The two polar nuclei

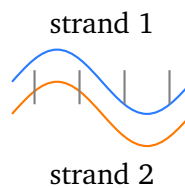
**Q19.** A Punnett square for a monohybrid cross between two heterozygous tall pea plants ( $Tt \times Tt$ ) is shown. What is the phenotypic ratio of tall to dwarf in the offspring?

	T	t
T	TT	Tt
t	Tt	tt



- (A) 3 : 1
- (B) 1 : 1
- (C) 1 : 2 : 1
- (D) 9 : 7

**Q20.** In the DNA double helix shown schematically, adenine (A) on one strand always pairs with which base on the complementary strand?



- (A) Guanine
  - (B) Cytosine
  - (C) Thymine
  - (D) Uracil
- Q21.** The wings of a bird and the wings of an insect perform a similar function but have different evolutionary origins. Such structures are described as:
- (A) Homologous organs
  - (B) Analogous organs
  - (C) Vestigial organs
  - (D) Fossil organs
- Q22.** In humans, the sex of a child is determined by the sex chromosome contributed by the:
- (A) Mother's egg only
  - (B) Both parents equally for the X
  - (C) Either parent at random
  - (D) Father's sperm



- Q23.** Malaria in humans is caused by a protozoan parasite of the genus **Plasmodium**, which is transmitted by the bite of the:
- (A) Housefly
  - (B) Female Aedes mosquito
  - (C) Female Anopheles mosquito
  - (D) Sandfly
- Q24.** The type of immunity a newborn baby receives from its mother through breast milk (antibodies) is an example of:
- (A) Passive natural immunity
  - (B) Active artificial immunity
  - (C) Active natural immunity
  - (D) Innate immunity
- Q25.** Curd is formed from milk by the action of which group of microorganisms?
- (A) Yeasts
  - (B) Lactic acid bacteria
  - (C) Moulds
  - (D) Viruses
- Q26.** Which of the following diseases is caused by a **virus**?
- (A) Typhoid
  - (B) AIDS
  - (C) Cholera
  - (D) Tuberculosis
- Q27.** The “molecular scissors” used in genetic engineering to cut DNA at specific recognition sequences are:



- (A) Restriction endonucleases
- (B) DNA ligases
- (C) DNA polymerases
- (D) Helicases

**Q28.** In recombinant DNA technology, a **plasmid** is most commonly used as a:

- (A) Restriction enzyme
- (B) Target gene
- (C) Cloning vector
- (D) Selectable marker dye

**Q29.** In the food chain shown by the arrows below, the snake occupies the trophic level of a:

Grass → Grasshopper → Frog → Snake

- (A) Producer
- (B) Tertiary consumer
- (C) Primary consumer
- (D) Decomposer

**Q30.** According to the “10 per cent law” of energy flow in an ecosystem, the amount of energy that passes from one trophic level to the next is about:

- (A) 100% of the energy
- (B) 50% of the energy
- (C) 90% of the energy
- (D) 10% of the energy



**Detailed Solutions**

Q1.

**Solution**

**Concept — Cell organelles:** Each organelle has a specific job; the mitochondrion is the “power house” of the cell.

**Explanation:** Aerobic respiration and the bulk of ATP synthesis occur inside the **mitochondrion**, on the folds (cristae) of its inner membrane. Organelle X in the figure, drawn with internal folds, is the mitochondrion.

**Why other options are wrong:**

- A ribosome builds proteins; a lysosome digests waste; the Golgi apparatus packages and sorts materials.

**Final Answer:** X is the mitochondrion ⇒

**Answer: (B)** [Go Back to Q1](#)

Q2.

**Solution**

**Concept — Five-kingdom classification:** Whittaker grouped all prokaryotes (organisms without a true nucleus) into a single kingdom.

**Explanation:** Bacteria are prokaryotic, so they belong to kingdom **Monera**.

**Why other options are wrong:**

- Protista holds single-celled eukaryotes; Fungi and Plantae are eukaryotic multicellular kingdoms.

**Final Answer:** Bacteria belong to Monera ⇒

**Answer: (D)** [Go Back to Q2](#)



Q3.

**Solution**

**Concept — Prokaryote vs eukaryote:** Prokaryotic cells lack membrane-bound organelles.

**Explanation:** A prokaryotic cell has no **membrane-bound nucleus**; its genetic material lies free in the cytoplasm as a nucleoid.

**Why other options are wrong:**

- A cell membrane, ribosomes and cytoplasm are all present in prokaryotes.

**Final Answer:** The membrane-bound nucleus is absent ⇒

[Go Back to Q3](#)

Q4.

**Solution**

**Concept — Chloroplast structure:** The light reactions of photosynthesis occur on green membranous sacs inside the chloroplast.

**Explanation:** The flat sacs Y, stacked into grana and holding chlorophyll, are **thylakoids**. The light reactions happen on their membranes.

**Why other options are wrong:**

- Stroma lamellae connect grana but are not the stacked sacs; cristae belong to the mitochondrion, not the chloroplast; “matrix vesicles” is not a real chloroplast term.

**Final Answer:** The sacs are thylakoids ⇒

[Go Back to Q4](#)

Q5.

**Solution**

**Concept — ATP yield of respiration:** Complete aerobic breakdown of glucose (glycolysis + Krebs cycle + electron transport) releases a large amount of ATP.

**Explanation:** The standard NCERT figure for the net ATP yield from one glucose molecule is about **36 ATP**.

**Why other options are wrong:**



- 2 ATP is only the net yield of glycolysis (anaerobic part); 4 and 12 are far too low for full aerobic respiration.

**Final Answer:** About 36 ATP  $\Rightarrow$

**Answer: (C)** [Go Back to Q5](#)

Q6.

### Solution

**Concept — Plant transport tissues:** Xylem carries water upward; phloem carries food.

**Explanation:** Water and dissolved minerals move from roots to leaves through the **xylem**, driven mainly by transpiration pull.

**Why other options are wrong:**

- Phloem transports food (sugars); cambium is a growth tissue; cortex is a storage/packing tissue.

**Final Answer:** Water rises through xylem  $\Rightarrow$

**Answer: (D)** [Go Back to Q6](#)

Q7.

### Solution

**Concept — Accessory digestive glands:** The liver is the largest gland and secretes bile, which helps digest fats.

**Explanation:** Organ P, lying near the stomach and the largest gland in the body, is the **liver**. Its bile is stored in the gall bladder and released into the small intestine.

**Why other options are wrong:**

- The pancreas secretes digestive enzymes and insulin, not bile; the spleen is not a digestive gland; salivary glands secrete saliva in the mouth.

**Final Answer:** P is the liver  $\Rightarrow$

**Answer: (A)** [Go Back to Q7](#)



Q8.

**Solution**

**Concept — Gas exchange:** Gases are exchanged where the respiratory surface is thin and richly supplied with blood.

**Explanation:** Exchange of oxygen and carbon dioxide occurs across the thin walls of the **alveoli**, the tiny air sacs of the lungs.

**Why other options are wrong:**

- The trachea, bronchi and larynx are conducting passages; they only carry air, they do not exchange gases.

**Final Answer:** Exchange occurs at the alveoli ⇒ **C**

**Answer: (C)** [Go Back to Q8](#)

Q9.

**Solution**

**Concept — Heart chambers:** The left ventricle pumps blood to the entire body, so it needs the thickest wall.

**Explanation:** Chamber Q pushes oxygenated blood into the aorta at high pressure, so it is the **left ventricle**, which has the thickest muscular wall.

**Why other options are wrong:**

- The atria (RA, LA) only push blood into the ventricles; the right ventricle pumps to the lungs at lower pressure, so its wall is thinner.

**Final Answer:** Q is the left ventricle ⇒ **B**

**Answer: (B)** [Go Back to Q9](#)



Q10.

**Solution**

**Concept — Nephron structure:** The nephron is the functional unit of the kidney; filtration starts at the glomerulus.

**Explanation:** The cup-shaped structure R that surrounds the glomerulus and collects the filtrate is the **Bowman's capsule**. Together they form the malpighian body where ultrafiltration occurs.

**Why other options are wrong:**

- The loop of Henle and proximal tubule come later in the tubule; the collecting duct carries the final urine away.

**Final Answer:** R is the Bowman's capsule  $\Rightarrow$

[Go Back to Q10](#)

Q11.

**Solution**

**Concept — Neuron structure:** A neuron has dendrites (receive signals) and one axon (sends signals).

**Explanation:** The long single fibre S carrying impulses away from the cell body is the **axon**.

**Why other options are wrong:**

- Dendrites are the short branches that receive impulses; a synapse is the gap between two neurons; the myelin sheath is the covering, not the fibre itself.

**Final Answer:** S is the axon  $\Rightarrow$

[Go Back to Q11](#)



Q12.

**Solution**

**Concept — Pancreatic hormones:** The islets of Langerhans control blood sugar with two opposing hormones.

**Explanation:** Beta cells secrete **insulin**, which lowers blood glucose by helping cells take up glucose.

**Why other options are wrong:**

- Glucagon (from alpha cells) raises blood glucose; thyroxine controls metabolism; adrenaline is a stress hormone from the adrenal gland.

**Final Answer:** The hormone is insulin ⇒

[Go Back to Q12](#)

Q13.

**Solution**

**Concept — Skeletal connections:** Different structures connect bones and muscles.

**Explanation:** The place where two bones meet and allow movement is a **joint**, for example the knee or elbow.

**Why other options are wrong:**

- Ligaments connect bone to bone; tendons connect muscle to bone; cartilage is a soft connective tissue, not the meeting point itself.

**Final Answer:** It is a joint ⇒

[Go Back to Q13](#)

Q14.

**Solution**

**Concept — Digestion in the mouth:** Salivary amylase acts on carbohydrates.

**Explanation:** Ptyalin (salivary amylase) begins the digestion of **starch**, breaking it into maltose in the mouth.

**Why other options are wrong:**



- Proteins are digested by pepsin and trypsin; fats by lipase; nucleic acids by nucleases, none of which act in saliva.

**Final Answer:** Ptyalin digests starch ⇒  D

**Answer:** (D) [Go Back to Q14](#)

Q15.

### Solution

**Concept — Male reproductive system:** Sperm production (spermatogenesis) occurs in the testes.

**Explanation:** Sperms are produced in the **seminiferous tubules** of the **testes**.

**Why other options are wrong:**

- The prostate adds fluid to semen; the epididymis stores and matures sperm; the vas deferens carries sperm onward.

**Final Answer:** Sperms form in the testes ⇒  A

**Answer:** (A) [Go Back to Q15](#)

Q16.

### Solution

**Concept — Flower structure:** The carpel has stigma (top), style (stalk) and ovary (base).

**Explanation:** Part T at the top of the central carpel, which receives pollen, is the **stigma**.

**Why other options are wrong:**

- The anther (on the stamens at the sides) makes pollen; the ovary is at the base; the filament is the stalk of the stamen.

**Final Answer:** T is the stigma ⇒  C

**Answer:** (C) [Go Back to Q16](#)



Q17.

**Solution**

**Concept — Fertilisation:** The fusion of male and female gametes restores the diploid number.

**Explanation:** The fusion of a haploid sperm with a haploid egg to form a diploid zygote is **fertilisation**.

**Why other options are wrong:**

- Cleavage and gastrulation are later embryo-development stages; implantation is the attachment of the embryo to the uterus.

**Final Answer:** It is fertilisation  $\Rightarrow$

[Go Back to Q17](#)

Q18.

**Solution**

**Concept — Double fertilisation:** In angiosperms, one male gamete fertilises the egg and the other forms the endosperm.

**Explanation:** The triploid ( $3n$ ) endosperm forms when one male gamete fuses with **the two polar nuclei** of the central cell (triple fusion).

**Why other options are wrong:**

- Fusion with the egg gives the diploid zygote, not the endosperm; synergids and antipodal cells degenerate.

**Final Answer:** It fuses with the two polar nuclei  $\Rightarrow$

[Go Back to Q18](#)



Q19.

**Solution**

**Concept — Monohybrid cross:** A  $Tt \times Tt$  cross gives a fixed genotype and phenotype ratio.

**Explanation:** The Punnett square gives genotypes  $TT, Tt, Tt, tt$ . Since  $T$  (tall) is dominant,  $TT, Tt$  and  $Tt$  are tall (3) and only  $tt$  is dwarf (1). So the phenotypic ratio is **3 : 1**.

**Why other options are wrong:**

- 1 : 1 is a test-cross ratio; 1 : 2 : 1 is the genotypic (not phenotypic) ratio; 9 : 7 belongs to a dihybrid case.

**Final Answer:** Tall : dwarf = 3 : 1  $\Rightarrow$

[Go Back to Q19](#)

Q20.

**Solution**

**Concept — Base pairing in DNA:** The two strands of DNA are joined by complementary base pairs.

**Explanation:** Adenine always pairs with **thymine** (A–T) by two hydrogen bonds, while guanine pairs with cytosine (G–C).

**Why other options are wrong:**

- Guanine and cytosine pair with each other; uracil replaces thymine in RNA, not in DNA.

**Final Answer:** A pairs with thymine  $\Rightarrow$

[Go Back to Q20](#)



Q21.

**Solution**

**Concept — Homology vs analogy:** Same function but different origin means analogous; same origin but different function means homologous.

**Explanation:** Bird wings and insect wings do the same job (flight) but evolved separately, so they are **analogous organs** (convergent evolution).

**Why other options are wrong:**

- Homologous organs share a common origin; vestigial organs are reduced and functionless; “fossil organs” is not a category.

**Final Answer:** They are analogous organs  $\Rightarrow$  **B**

**Answer: (B)** [Go Back to Q21](#)

Q22.

**Solution**

**Concept — Human sex determination:** The mother always gives an X; the father gives either X or Y.

**Explanation:** The sex of the child depends on the **father's sperm**: an X-bearing sperm gives a girl (XX), a Y-bearing sperm gives a boy (XY).

**Why other options are wrong:**

- The mother's egg always carries X, so it cannot decide the sex; the determining chromosome comes from the father.

**Final Answer:** The father's sperm decides sex  $\Rightarrow$  **D**

**Answer: (D)** [Go Back to Q22](#)

Q23.

**Solution**

**Concept — Vector-borne disease:** Malaria is spread by a specific mosquito.

**Explanation:** The malarial parasite Plasmodium is transmitted by the bite of the **female Anopheles mosquito**.

**Why other options are wrong:**



- The housefly spreads typhoid/cholera; female Aedes spreads dengue; the sandfly spreads kala-azar.

**Final Answer:** The vector is the female Anopheles ⇒

**Answer: (C)** [Go Back to Q23](#)

Q24.

### Solution

**Concept — Types of immunity:** Receiving ready-made antibodies is passive immunity; making your own is active.

**Explanation:** Antibodies passed from mother to baby through breast milk are ready-made and received naturally, so this is **passive natural immunity**.

**Why other options are wrong:**

- Active immunity (natural or artificial) means the body makes its own antibodies; innate immunity is the inborn general defence, not antibody transfer.

**Final Answer:** It is passive natural immunity ⇒

**Answer: (A)** [Go Back to Q24](#)

Q25.

### Solution

**Concept — Useful microbes:** Specific bacteria ferment milk into curd.

**Explanation:** Curd is made from milk by **lactic acid bacteria** (such as *Lactobacillus*), which produce lactic acid and coagulate the milk protein.

**Why other options are wrong:**

- Yeasts are used in bread and alcohol; moulds make some cheeses but not curd; viruses do not ferment milk.

**Final Answer:** Lactic acid bacteria form curd ⇒

**Answer: (B)** [Go Back to Q25](#)



Q26.

**Solution**

**Concept — Disease-causing agents:** Knowing whether a disease is bacterial or viral matters for treatment.

**Explanation:** AIDS is caused by a virus (HIV).

**Why other options are wrong:**

- Typhoid (Salmonella), tuberculosis (Mycobacterium) and cholera (Vibrio) are all caused by bacteria.

**Final Answer:** AIDS is viral  $\Rightarrow$

[Go Back to Q26](#)

Q27.

**Solution**

**Concept — Tools of genetic engineering:** Different enzymes cut and join DNA.

**Explanation:** Restriction endonucleases act as molecular scissors, cutting DNA at specific recognition sequences.

**Why other options are wrong:**

- DNA ligase joins DNA pieces (molecular glue); DNA polymerase builds new strands; helicase unwinds the helix.

**Final Answer:** Restriction endonucleases cut DNA  $\Rightarrow$

[Go Back to Q27](#)

Q28.

**Solution**

**Concept — Cloning vectors:** A vector carries a foreign gene into a host cell.

**Explanation:** A plasmid is a small circular DNA that can replicate independently and is commonly used as a **cloning vector** to carry genes into bacteria.

**Why other options are wrong:**

- A plasmid is not an enzyme, not the target gene, and not a dye; it is the carrier.



**Final Answer:** A plasmid is a cloning vector  $\Rightarrow$

**Answer: (C)** [Go Back to Q28](#)

Q29.

### Solution

**Concept — Trophic levels:** Each step in a food chain is a trophic level; consumers are numbered by how far they are from the producer.

**Explanation:** Grass (producer)  $\rightarrow$  grasshopper (primary consumer)  $\rightarrow$  frog (secondary consumer)  $\rightarrow$  snake (**tertiary consumer**).

**Why other options are wrong:**

- The producer is grass; the primary consumer is the grasshopper; decomposers break down dead matter, not live prey.

**Final Answer:** The snake is a tertiary consumer  $\Rightarrow$

**Answer: (B)** [Go Back to Q29](#)

Q30.

### Solution

**Concept — 10 per cent law:** Most energy is lost as heat at each trophic level.

**Explanation:** Lindeman's 10 per cent law states that only about **10%** of the energy at one trophic level is passed on to the next.

**Why other options are wrong:**

- 100%, 90% and 50% are too high; about 90% of the energy is lost, leaving only 10% transferred.

**Final Answer:** About 10% is transferred  $\Rightarrow$

**Answer: (D)** [Go Back to Q30](#)



## Answer Key

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

