



LOGIC BLOOM · NEET BIOLOGY · CLASS 11

Structural Organisation in Animals

Animal Tissues · Frog · Cockroach · **Most repeated PYQs**

A small chapter that gives away marks if you have met the exact line before.

Tissues carry roughly half the questions, so they get the most room here, and the whole thing closes with the twenty question patterns NEET keeps coming back to.

8 Sections

10 Diagrams

20 Repeated PYQs

Syllabus Checked

Fact Sheet

Contents

1	Levels of Organisation	<i>cell to tissue to organ to system</i>
2	Epithelial Tissue	<i>simple, compound, and the junctions</i>
3	Connective Tissue	<i>loose, dense, and specialised</i>
4	Muscular Tissue	<i>three types, three sets of properties</i>
5	Neural Tissue	<i>the neuron and neuroglia</i>
6	The Frog	<i>the animal the syllabus names</i>
7	Cockroach and Earthworm	<i>still asked, and the comparison table</i>
8	Most Repeated PYQs	<i>20 patterns NEET returns to</i>
★	One-Page Fact Sheet	<i>every fact for revision day</i>

What the Syllabus Actually Says

Read this first, because this chapter is the one students most often over-study. The NMC notified the finalised NEET syllabus in December 2025, and for this unit it lists exactly one line:

★ THE OFFICIAL WORDING

"Animal tissues; Morphology, anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of an insect (Frog). (Brief account only)"



THINK IT
THROUGH

THREE THINGS FOLLOW FROM THAT ONE SENTENCE

Animal tissues come first and are named on their own, which matches what the papers show: roughly half the questions from this chapter are tissue questions. **Frog is named explicitly**, so it is certainly examinable. **Earthworm does not appear at all**. And the phrase **an insect (Frog)** is a drafting error, since a frog is not an insect, which is exactly why most teachers keep cockroach in the syllabus too.



TRAP ALERT

△ HOW TO SPEND YOUR TIME HERE

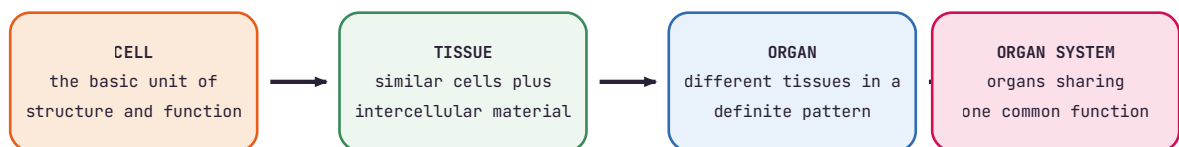
Tissues are worth the most and are the safest. Frog is named and must be done. Cockroach is worth keeping because of that stray word **insect** and because it has a long PYQ history. Earthworm is off the current list, so learn it only if everything else is finished, and mainly so that older question papers do not confuse you.

1 Levels of Organisation

IN THE NEET SYLLABUS

The chapter opens with a hierarchy, and NEET does ask definitional questions straight off it.

CELL → TISSUE → ORGAN → ORGAN SYSTEM: division of labour at every step



All complex animals have only FOUR tissue types: epithelial, connective, muscular, neural. The heart has all four.

Each level does a share of the work. This is division of labour, and it is the phrase the textbook uses.

Tissue	a group of similar cells along with intercellular substances, performing a specific function
Organ	different tissues arranged in a definite pattern, such as the stomach or the lung
Organ system	two or more organs working together on one function, such as digestion
The heart	quoted in the textbook as containing all four basic tissue types



▶ PLAY

TISSUES BLURRING TOGETHER?

Sort them yourself instead of re-reading the list.

The tissue game deals you slides and asks you to place each one. Getting it wrong once fixes it far better than reading the table a fourth time. logicbloom.co.in/download · Free to start.



SCAN

IN THE NEET SYLLABUS

Epithelium covers and lines. Every epithelium sits on a **basement membrane**, and its cells are packed with very little material between them, which is the opposite of connective tissue.

SIMPLE EPITHELIUM: one layer, always resting on a basement membrane

SIMPLE SQUAMOUS



flat: diffusion
alveoli, blood vessels

SIMPLE CUBOIDAL



cube: secretion, absorption
kidney tubules, ducts

SIMPLE COLUMNAR



tall: secretion + absorption
stomach, intestine

CILIATED COLUMNAR



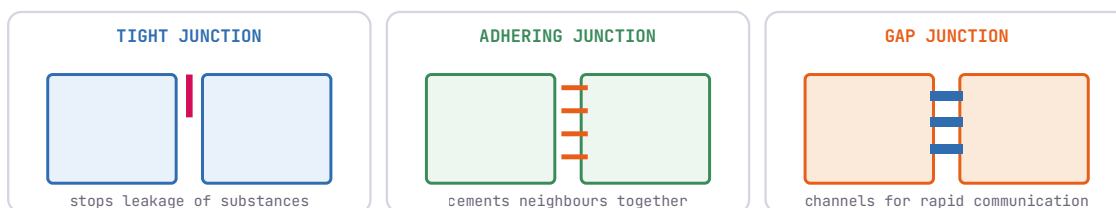
moves mucus and particles
trachea, bronchioles, oviduct

COMPOUND (stratified) epithelium is many-layered and protective: skin, buccal cavity, pharynx, salivary ducts. It has a limited role in secretion and absorption, because only the deepest layer touches the basement membrane.

Name the shape and you have named the function. Flat for diffusion, cube for secretion and absorption, tall for both, ciliated for moving things along.

Simple squamous	thin and flat, for diffusion and filtration: alveoli, walls of blood vessels
Simple cuboidal	cube shaped, for secretion and absorption: kidney tubules, ducts of glands
Simple columnar	tall with elongated nuclei, for secretion and absorption: stomach and intestine
Ciliated	columnar or cuboidal cells carrying cilia that move particles or mucus in one direction
Glandular	columnar cells modified to secrete; unicellular such as goblet cells, or multicellular such as salivary glands
Compound	two or more layers, mainly protective: skin, buccal cavity, pharynx

CELL JUNCTIONS: the three that NEET keeps asking about



Junctions are commonest in EPITHELIAL tissue, which is why that is the answer when a paper asks where they occur.

The three junctions. Tight seals, adhering cements, gap communicates.



TRAP ALERT

△ TWO TRAPS THAT APPEAR AGAIN AND AGAIN

Ciliated epithelium is asked as **where would you find cells that move particles or mucus**, and the answer is the respiratory tract and the fallopian tube, not the stomach. And when a paper asks in which preparation you would meet cell junctions most often, the answer is an **epithelium**, because epithelial cells are the most tightly packed.

IN THE NEET SYLLABUS

The most abundant and most widely distributed tissue. Everything about it is decided by the **matrix** the cells sit in.

CONNECTIVE TISSUE: cells scattered in an abundant MATRIX

The defining feature is the matrix. The more matrix and the harder it is, the more specialised the tissue.

LOOSE

AREOLAR: fills spaces under skin, has fibroblasts, macrophages, mast cells

ADIPOSE: stores fat found beneath the skin matrix is soft and jelly-like

DENSE

Fibres and fibroblasts packed tightly.

REGULAR: tendon joins muscle to bone; ligament joins bone to bone
IRREGULAR: in the skin

SPECIALISED

CARTILAGE: pliable, cells sit in spaces called lacunae

BONE: hard calcium matrix

BLOOD: fluid matrix, plasma the only fluid connective tissue

Tendon joins **MUSCLE** to **BONE**. Ligament joins **BONE** to **BONE**. Swapping the two is the commonest error in the chapter.

Elastic cartilage: external ear (pinna) and tip of the nose. Hyaline cartilage: the joints and the trachea.

Soft matrix gives loose tissue, fibrous matrix gives dense tissue, hard or fluid matrix gives the specialised ones.

Areolar	fills the space inside organs, supports epithelium; contains fibroblasts, macrophages and mast cells
Adipose	stores fat, located mainly beneath the skin
Dense regular	fibres in one direction: tendon joins muscle to bone, ligament joins bone to bone
Cartilage	solid but pliable, cells sit in spaces called lacunae ; the pinna and nose tip are elastic cartilage
Bone	hard matrix rich in calcium salts, gives shape and supports the body
Blood	the only fluid connective tissue, matrix is plasma, and it is the main circulating tissue



MYTH

Blood is not a tissue, it is just a fluid that carries things around.

THE SCIENCE

Blood is a **connective tissue**, and it is the standard example of one with a fluid matrix. Its cells are the red cells, white cells and platelets, and its matrix is plasma. Questions asking you to pick the connective tissue from a list very often put blood or bone among muscle and nerve.



▶ PLAY

CONNECTIVE TISSUES ALL SOUND ALIKE?

Match the matrix to the tissue and it separates instantly.

The matching game pairs each tissue with its matrix and location, which is exactly the form NEET asks it in. Two rounds and the tendon versus ligament confusion goes away. logicbloom.co.in/download · Free to start.



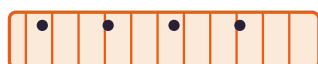
SCAN

IN THE NEET SYLLABUS

Three types, and questions are almost always a matter of matching a property to the right one.

THREE MUSCLES, THREE SETS OF PROPERTIES

SKELETAL (striated)



cylindrical, unbranched
MANY nuclei, at the edge
 voluntary, tires quickly
 attached to the skeleton

SMOOTH (unstriated)



spindle-shaped, tapering
ONE central nucleus
 involuntary, does not tire
 stomach, intestine, blood vessels

CARDIAC



branched and striated
INTERCALATED DISCS (blue)
 involuntary, never tires
 found only in the heart

Intercalated discs are unique to cardiac muscle. They are junctions between cells that let the impulse pass instantly, so the heart contracts as one. Any question mentioning them is a cardiac muscle question.

Skeletal is striated, multinucleate and voluntary. Smooth is spindle-shaped with one nucleus. Cardiac is branched, striated and carries intercalated discs.

Skeletal (striated)

cylindrical and unbranched, many nuclei placed at the edge, voluntary, attached to bones, and it tires

Smooth (unstriated)

spindle shaped with a single central nucleus, involuntary, found in the stomach, intestine and blood vessels

Cardiac

branched and striated with intercalated discs, involuntary, found only in the heart, and it never tires



TRAP ALERT

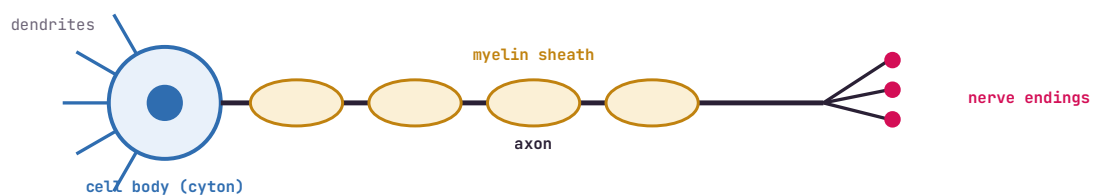
▲ **INTERCALATED DISCS GIVE THE ANSWER AWAY**

Intercalated discs are found **only** in cardiac muscle. They are junctions between neighbouring cells that let the impulse pass instantly, so the heart contracts as a single unit. If a question mentions them at all, it is a cardiac muscle question.

IN THE NEET SYLLABUS

Short section, and the facts asked from it are few and predictable.

THE NEURON: excitable, and the longest cell in the body



Neural tissue does not divide. Neuroglia support the neurons and make up more than half the volume of neural tissue.

A neuron: dendrites collect, the cell body integrates, the axon carries the impulse away to the nerve endings.

Neurons	excitable cells, they respond to stimuli and conduct the impulse
Neuroglia	support cells that make up more than half the volume of neural tissue
Key property	neural tissue does not divide, so damaged neurons are generally not replaced

IN THE NEET SYLLABUS

The one animal the syllabus names, so treat this section as compulsory.

FROG (*Rana tigrina*): the animal the syllabus names

MORPHOLOGY

Body: head and trunk only, NO neck and no tail
 Skin: moist, smooth, never dry
 Poikilotherm (cold-blooded), shows camouflage
 Male has vocal sacs and a copulatory pad

RESPIRATION

On land: lungs (pulmonary)
 In water and on moist skin: cutaneous
 Also buccal. Skin works both in and out of water

CIRCULATION

Heart has THREE chambers: two atria, one ventricle
 Also sinus venosus and conus arteriosus
 Closed circulation. Portal systems: hepatic and renal

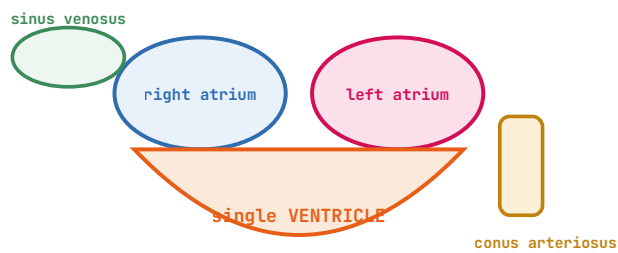
OTHER SYSTEMS

Excretion: ureotelic, a pair of kidneys (mesonephric)
 Nervous: 10 pairs of cranial nerves
 Reproduction: external fertilisation, 2500 to 3000 eggs

Frog at a glance. The syllabus asks for a brief account of the digestive, circulatory, respiratory, nervous and reproductive systems.

Body	head and trunk only; there is no neck and no tail in the adult
Skin	moist and smooth; it must stay moist because it is a respiratory surface
Respiration	lungs on land, and cutaneous through the skin both in and out of water
Circulation	closed, with a three-chambered heart, plus hepatic and renal portal systems
Excretion	ureotelic, through a pair of mesonephric kidneys
Nervous	10 pairs of cranial nerves
Reproduction	sexes separate, external fertilisation in water, 2500 to 3000 eggs at a time

THE FROG HEART: three chambers, and it beats on its own



Only ONE ventricle, so oxygenated and deoxygenated blood mix a little. This is incomplete double circulation.

The heart keeps beating after removal because it is MYOGENIC: the beat starts in the heart muscle itself, not in a nerve.

Three chambers, so some mixing of blood is unavoidable. The heart is myogenic, which is why it keeps beating after removal.

NOT NAMED, BUT STILL ASKED

Cockroach is not named in the syllabus, but the phrase **an insect** points straight at it and it has a long history in the papers. Earthworm is off the current list and appears here only so that older question papers make sense.

COCKROACH (*Periplaneta americana*): still worth knowing

KEY FACTS

3 pairs of legs, 2 pairs of wings on the thorax
 Compound eyes: about 2000 ommatidia, mosaic vision
 Excretion: uricotelic, by Malpighian tubules
 10 pairs of spiracles: 2 thoracic and 8 abdominal

MORE KEY FACTS

Blood is colourless haemolymph, open circulation
 Mouth parts: biting and chewing type
 Nerve cord: SOLID, DOUBLE and VENTRAL
 Male has anal styles; the female does not

Cockroach at a glance. Almost every question from it comes from this handful of facts.

THE COMPARISON TABLE THAT ANSWERS MOST PYQs

FEATURE	FROG	COCKROACH	EARTHWORM
Body plan	head + trunk, no neck	head, thorax, abdomen	100 to 120 segments
Circulation	CLOSED, 3-chambered heart	OPEN, haemolymph	CLOSED, with hearts
Respiration	skin, lungs, buccal cavity	tracheae, spiracles	moist skin only
Excretion	kidneys, UREOTELIC	Malpighian tubules, URICOTELIC	nephridia
Nerve cord	dorsal, hollow	ventral, solid, double	ventral, solid
Fertilisation	external, in water	internal	cross-fertilisation

Frog is named in the syllabus. Cockroach appears via the word insect. Earthworm is off the list, kept for older PYQs.

One table that answers most cross-animal questions. NEET loves asking which feature belongs to which animal.



TRAP ALERT

△ THE OPEN VERSUS CLOSED CIRCULATION TRAP

Cockroach has an **open** circulation with colourless haemolymph. Earthworm and frog both have **closed** circulation. Questions frequently pair the wrong animal with the wrong system, and this is the pairing they use most.

Twenty question patterns NEET keeps returning to in this chapter, grouped by topic. These are recurring **patterns** rather than one-off items, so recognising the shape is worth more than memorising any single wording. Cover the gold band and test yourself.

EPITHELIAL TISSUE AND JUNCTIONS

REPEAT 1

Ciliated epithelial cells are needed to move particles or mucus in a specific direction. In humans these are mainly present in:

The trachea, bronchioles and the fallopian tube (the respiratory tract and the reproductive tract)

Asked in several forms. The wrong options are almost always the stomach or intestine, which have columnar cells but no cilia.

REPEAT 2

In which of the following preparations are you most likely to come across cell junctions frequently?

Ciliated epithelium (any epithelium)

A genuine repeat, seen as far back as 2007. Epithelial cells are the most closely packed, so junctions are commonest there.

REPEAT 3

Which epithelium is involved in both secretion and absorption, and lines the stomach and intestine?

Simple columnar epithelium

The distractor is cuboidal, which also secretes and absorbs but lines kidney tubules and glandular ducts instead.

REPEAT 4

Which epithelium is adapted for diffusion and filtration, and is found in the walls of alveoli and blood vessels?

Simple squamous epithelium

Shape to function is the whole game: flat means thin means diffusion.

REPEAT 5

Which of the following is a connective tissue: smooth muscle, bone, stratified epithelium or nerve fibre?

Bone (a specialised connective tissue with a hard calcium-rich matrix)

The list always mixes the four tissue categories. Bone, cartilage and blood are the ones planted as connective.

REPEAT 6

Identify the connective tissue that stores fat.

Adipose tissue, located mainly beneath the skin

Straight recall, and it appears almost every other year in some form.

REPEAT 7

Which tissue joins muscle to bone, and which joins bone to bone?

Tendon joins muscle to bone; ligament joins bone to bone. Both are dense regular connective tissue.

The single most confused pair in the chapter. Examiners simply swap them and wait.

REPEAT 8

Elastic cartilage is found in which structures?

The external ear (pinna) and the tip of the nose

The distractors are hyaline cartilage sites such as joints and the trachea.

REPEAT 9

Which is the only connective tissue with a fluid matrix, and what is that matrix called?

Blood; its matrix is plasma

Often set as an assertion-reason on whether blood counts as a tissue at all.

REPEAT 10

Which cells are characteristically found in areolar connective tissue?

Fibroblasts, macrophages and mast cells

A direct NCERT line, which is exactly why it repeats.

REPEAT 11

Which of the following correctly describes intercalated discs?

They are found in cardiac muscle and allow coordinated, synchronised contraction

The mention of intercalated discs is itself the giveaway. They exist nowhere else.

REPEAT 12

Which muscle is spindle-shaped, has a single central nucleus, and is involuntary?

Smooth (unstriated) muscle, found in the stomach, intestine and blood vessels

Usually set against skeletal muscle, which is cylindrical and has many nuclei at the edge.

REPEAT 13

Which muscle type is voluntary, striated, and attached to the skeleton?

Skeletal (striated) muscle, and it fatigues

The properties are asked in every possible combination, so learn the full row, not one feature.

REPEAT 14

What fraction of neural tissue is made up of supporting cells, and what are they called?

More than half the volume, and they are the neuroglia

A quiet NCERT sentence that turns up as a statement-based question.

FROG

REPEAT 15

A frog's heart continues to beat for some time after being taken out of the body. Select the correct explanation.

The heart is myogenic and autoexcitable, so the beat originates in the cardiac muscle itself

One of the most repeated items in the whole chapter. The trap options blame poikilothermy or the absence of coronary circulation.

REPEAT 16

How many chambers does the frog heart have, and what are they?

Three: two atria and a single ventricle, plus a sinus venosus and a conus arteriosus

The single ventricle is why frog circulation is called incomplete double circulation.

REPEAT 17

The frog's body is divisible into which regions?

Head and trunk only; there is no neck and no tail

Set as a match-the-animal question against cockroach, which does have three body divisions.

REPEAT 18

How many eggs does a female frog lay at a time, and where does fertilisation occur?

2500 to 3000 eggs, with external fertilisation in water

A pure number recall, and the distractors are always nearby values.

COCKROACH

REPEAT 19

Each compound eye of a cockroach is made of about 2000 units. What is each unit called, and what vision results?

Each unit is an ommatidium; together they produce mosaic vision

The distractors are rhabdom, corneal lens and crystalline cone, which are parts within an ommatidium.

REPEAT 20

In cockroach, what is the nitrogenous waste, which organs remove it, and how many spiracles are there?

Uricotelic (uric acid), removed by Malpighian tubules; 10 pairs of spiracles, 2 thoracic and 8 abdominal

These three facts are asked separately and together. The nerve cord being solid, double and ventral is the other standing favourite.

★ Structural Organisation in Animals • Fact Sheet

Every fact for revision day. Print this page alone.

FOUR TISSUES

Epithelial, connective,

muscular, neural.
The heart contains all four.

SQUAMOUS

**Flat: diffusion,
filtration**

Alveoli, blood vessel walls.

CUBOIDAL & COLUMNAR

**Cuboidal: kidney
tubules, ducts**

Columnar: stomach, intestine
Both secrete and absorb.

CILIATED

Trachea, bronchioles,

fallopian tube.
Moves mucus and particles.

JUNCTIONS

Tight: stops leakage

Adhering: cements cells
Gap: rapid communication.

TENDON VS LIGAMENT

Tendon: muscle to bone

Ligament: bone to bone
Both dense regular.

SPECIALISED CONNECTIVE

**Cartilage: lacunae,
pinna elastic**

Bone: hard calcium matrix
Blood: fluid matrix, plasma.

MUSCLE TABLE

**Skeletal: striated, many
nuclei**

Smooth: spindle, one nucleus
Cardiac: branched, discs.

NEURAL

Neurons are excitable.

Neuroglia are over half
the volume. No division.

FROG

Head + trunk, no neck

3-chambered myogenic heart
Ureotelic, 10 cranial nerve
pairs.

COCKROACH

**2000 ommatidia,
mosaic vision**

Uricotelic, Malpighian tubules
10 pairs spiracles (2 + 8).

SYLLABUS STATUS

**Tissues + Frog are
named.**

Cockroach kept for the word
insect.
Earthworm is off the list.



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★ TISSUES STILL RUNNING
TOGETHER?

Play it. Then practice it.

Open Structural Organisation in the Logic Bloom app: sort the tissues as a game, read the topic, then drill the repeated PYQ patterns until you recognise them on sight. Free to start.

SCAN → PLAY • READ • PRACTICE