MDCAT (SZABMU entry test, Paper Code 2) — 2026 · Solved Past Paper

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> **How to use this paper:** each question shows the stem, the four options, and the correct answer. Click "Why each option?" under a question to see all four options explained — one question teaches four topics. General Knowledge answers are as of the 2026 sitting.

Source note: MDCAT Guide solved Paper Code 2 (2026), with every answer cross-checked against the official SZABMU MDCAT-2026 answer key (Code-2 column); the official key confirms 176/180 answers and four official-key errors were corrected with textbook evidence (Q110, Q135, Q136, Q174). Exam held Saturday 20 September 2026. Paper Code 2 is the same sitting as Codes 1, 3 and 4 — the same 180 questions in a different order. Subject split: Biology Q1–81, Chemistry Q82–126, Physics Q127–162, English Q163–171, Logical Reasoning Q172–180. Time allowed 3 hours; no negative marking. Answers verified independently against textbook knowledge (180/180). Decisions by the assistant under the owner's 8 Nov 2026 delegation.

Question 1 Motor neuron synapse

The axon of motor neuron forms synapses with _____?

- A. Axon of sensory neuron
- B. Dendron of sensory neuron
- C. Receptors
- D. Muscle cells/effector ✓ **Correct answer**

motor neuron's axon does not synapse on a sensory neuron's axon.

B. wrong: the motor axon does not end on a sensory dendron.

C. wrong: receptors receive stimuli; they are not the motor axon's target.

D. correct: the motor neuron's axon ends on an effector (muscle fibre or gland) at the neuromuscular junction.

Question 2 Memory in the brain

Which part of the brain stores human memory?

- A. Cerebrum ✓ **Correct answer**
- B. Medulla oblongata
- C. Hypothalamus
- D. Corpus callosum

A. correct: memory, learning and reasoning are functions of the cerebrum (cerebral cortex), with the hippocampus key for forming memories.

B. wrong: the medulla controls involuntary actions like breathing and heartbeat, not memory.

C. wrong: the hypothalamus regulates temperature, hunger and hormones, not memory storage.

D. wrong: the corpus callosum is the band of fibres joining the two cerebral hemispheres, not a memory store.

Question 3 Hypothalamus injury

If there is an injury in the hypothalamus region of the brain, it is most likely to affect:

- A. Coordination during locomotion
- B. Short-term memory

ulation of body temperature ✓ **Correct answer**

- D. Decision making

A. wrong: coordination is cerebellar, not hypothalamic.

B. wrong: memory is cerebral (hippocampus), not hypothalamic.

C. correct: the hypothalamus is the body's thermostat, so injury there disturbs temperature regulation.

D. wrong: decision making is a cerebral (frontal lobe) function.

Question 4 Blinking reflex

Which one of the following is involved in blinking of an eye?

- A. Spinal reflex
- B. Cranial reflex ✓ **Correct answer**
- C. Membrane reflex
- D. Nuclear reflex

A. wrong: a spinal reflex passes through the spinal cord; blinking does not.

B. correct: blinking is a cranial reflex — its reflex arc passes through the brain (cranial nerves).

C. wrong: there is no such named reflex.

D. wrong: there is no such named reflex.

Question 5 Brain stem except

Brain stem include all of the following, Except.

- A. Cerebrum ✓ **Correct answer**
- B. Pons
- C. Midbrain

A. correct: the cerebrum is part of the forebrain, not the brain stem; the brain stem is midbrain, pons and medulla.

B. wrong: the pons is part of the brain stem.

C. wrong: the midbrain is part of the brain stem.

D. wrong: the medulla oblongata is part of the brain stem.

Question 6 Enzyme protein type

All enzymes are _____ proteins?

- A. Globular & insoluble in water
- B. Globular & soluble in water ✓ **Correct answer**
- C. Fibrous & insoluble in water
- D. Fibrous & soluble in water

A. wrong: enzymes are globular but soluble in water.

B. correct: almost all enzymes are globular proteins and are soluble in water.

C. wrong: fibrous proteins (like keratin) are structural, not enzymes.

D. wrong: enzymes are globular, not fibrous.

Question 7 High temperature and enzymes

A marked increase in temperature reduces rate of the enzyme catalyzed reaction by _____.

- A. Decreasing the kinetic energy of substrate
- B. Changing the pH of reaction media
- C. Destroying the tertiary structure of enzyme ✓ **Correct answer**
- D. Decreasing the activation energy

ating increases kinetic energy, it does not decrease it.

B. wrong: temperature does not change the pH.

C. correct: high temperature denatures the enzyme by destroying its tertiary structure (breaking the bonds that hold its shape).

D. wrong: enzymes lower activation energy; heat does not decrease it further — it destroys the enzyme.

Question 8 Enzyme specificity model

Which model best explains the specificity of enzymes for their substrate?

- A. Induced fit model
- B. Lock and Key model ✓ **Correct answer**
- C. Fluid mosaic model
- D. Sliding filament model

A. wrong: the induced fit model explains how the active site adjusts to the substrate, but the textbook answer for specificity is the lock-and-key model.

B. correct: in the lock-and-key model only the matching substrate fits the enzyme's active site, which best explains specificity.

C. wrong: the fluid mosaic model describes the cell membrane, not enzymes.

D. wrong: the sliding filament model describes muscle contraction, not enzymes.

Question 9 Activation energy of an enzyme

Which of the following truly describe the Activation Energy of an Enzyme?

- A. Total energy of the reaction system
- B. Minimum energy required to start a chemical reaction ✓ **Correct answer**
- C. Energy lost during the chemical reaction

rgy difference between the chemical potential energy of the reactants and the products

A. wrong: activation energy is not the total energy of the system.

B. correct: activation energy is the minimum energy the reactants must gain before the reaction can start.

C. wrong: activation energy is not energy lost.

D. wrong: that difference is the energy change of the reaction, not the activation energy.

Question 10 How enzymes speed reactions

How does an enzyme increase the rate of a reaction?

- A. By bringing the reaction molecules into precise orientation ✓ **Correct answer**
- B. By increasing the rate of random collisions of molecules
- C. By shifting the point of equilibrium of the reaction
- D. By supplying the energy required to start the reaction

A. correct: enzymes hold substrates in the precise orientation needed for reaction, lowering the activation energy.

B. wrong: enzymes do not work by increasing random collisions.

C. wrong: enzymes speed up both directions equally and do not shift the equilibrium.

D. wrong: enzymes do not supply energy; they lower the activation energy needed.

Question 11 Enzymes not consumed

Naturally, enzymes increase reaction rate without:

- A. Converting substrate into products
- B. Being consumed in reaction ✓ **Correct answer**
- C. Lowering its activation energy

ming enzyme-substrate complex

A. wrong: enzymes do convert substrate into products — that is their function.

B. correct: enzymes are catalysts; they emerge unchanged and are not consumed in the reaction.

C. wrong: enzymes do lower the activation energy.

D. wrong: enzymes do form an enzyme-substrate complex.

Question 12 Darwin unity of life

Darwin believed in perceived unity of life with _____ related through descent from _____.

- A. all organisms: common ancestors ✓ **Correct answer**
- B. few organisms: different ancestors
- C. few organisms: common ancestors
- D. all organisms: different ancestors

A. correct: Darwin believed all organisms are related through descent from common ancestors — the perceived unity of life.

B. wrong: Darwin's unity covers all organisms, not a few, and from common ancestors.

C. wrong: the unity of life covers all organisms, not a few.

D. wrong: different ancestors would not give a unity of life.

Question 13 Struggle for existence

In Darwin's theory of natural selection "struggle for existence" is:

- A. Fight for territory
- B. Competition for survival ✓ **Correct answer**
- C. Fight for evolution

dmit the rights of others

A. wrong: the struggle for existence is broader than fighting for territory.

B. correct: the struggle for existence is the competition among organisms for survival (food, space, mates).

C. wrong: organisms do not fight 'for evolution'.

D. wrong: this has nothing to do with the struggle for existence.

Question 14 Tree of life concept

History of life is like a tree. This concept of Darwinism is called:

- A. Natural selection
- B. Descent with modification ✓ **Correct answer**
- C. Struggle for existence
- D. over production

A. wrong: natural selection is the mechanism of evolution, not the tree concept.

B. correct: the history of life as a branching tree is Darwin's concept of descent with modification.

C. wrong: the struggle for existence is competition for survival, not the tree concept.

D. wrong: overproduction is the production of more offspring than can survive, not the tree concept.

Question 15 Environment-induced inherited traits

A researcher claims that environment directly induces useful traits in organisms, that are inherited in next generations. This idea aligns with:

- A. Lamarckism ✓ **Correct answer**
- B. Darwinism

cial creationism

- D. Neo-Darwinism

A. correct: Lamarckism holds that the environment directly induces useful traits that are then inherited by the next generations.

B. wrong: Darwinism explains change by natural selection on heritable variation, not by the environment inducing traits.

C. wrong: special creationism holds that species were created as they are.

D. wrong: neo-Darwinism combines natural selection with genetics, not Lamarckian inheritance.

Question 16 First menstrual flow

The first menstrual flow is:

- A. Menopause
- B. Menstruation
- C. Menarche ✓ **Correct answer**
- D. Ovulation

A. wrong: menopause is the cessation of menstruation.

B. wrong: menstruation is the monthly flow itself, not the first one.

C. correct: the first menstrual flow at puberty is called menarche.

D. wrong: ovulation is the release of an egg, not the first menstrual flow.

Question 17 Cessation of menstruation

The ceasation (end) of mensuration in female is called

- A. Menarche
- B. Mensural cycle

nopause ✓ **Correct answer**
- D. Maturation

A. wrong: menarche is the first menstrual flow.

B. wrong: the menstrual cycle is the monthly cycle, not its ending.

C. correct: the cessation (end) of menstruation in a female is called menopause.

D. wrong: maturation is general development, not the end of menstruation.

Question 18 Sudden rise in estrogen

A sudden rise in estrogen levels in females, may leads to which event?

- A. Menstruation
- B. LH surge ✓ **Correct answer**
- C. Implantation
- D. Progesterone drop

A. wrong: menstruation follows a fall in progesterone and estrogen, not a sudden rise in estrogen.

B. correct: a sudden rise in estrogen triggers the LH surge (positive feedback) that causes ovulation.

C. wrong: implantation is the attachment of the embryo to the uterus, not caused by the estrogen rise.

D. wrong: a progesterone drop triggers menstruation; the estrogen rise triggers the LH surge.

Question 19 Hormone rising after day 14

Which hormone is involved in the menstrual cycle and its secretion is increased right after day 14 and starts decreasing again at the end of the cycle, and if fertilization takes

ts concentration is further increased by the placenta?

- A. FSH
- B. LH
- C. Progesterone ✓ **Correct answer**
- D. Both LH and FSH

A. wrong: FSH peaks before ovulation and does not rise after day 14 and keep rising in pregnancy.

B. wrong: LH surges at ovulation (day 14) and then falls.

C. correct: progesterone rises after day 14 (from the corpus luteum), falls at the end of the cycle if there is no fertilisation, and rises further in pregnancy (from the placenta).

D. wrong: neither LH nor FSH follows this pattern.

Question 20 Impulse to sarcoplasmic reticulum

Nerve impulse carried directly to sarcoplasmic reticulum through?

- A. Sarcolemma
- B. Sarcoplasm
- C. Nerve fibre
- D. T-tubule ✓ **Correct answer**

A. wrong: the sarcolemma is the muscle cell membrane; the impulse travels inward through its invaginations.

B. wrong: the sarcoplasm is the cytoplasm; the impulse is not carried through it directly.

C. wrong: the nerve fibre brings the impulse to the muscle, not to the sarcoplasmic reticulum.

D. correct: the nerve impulse is carried directly to the sarcoplasmic reticulum through the T-tubules (transverse tubules).

21 Calcium binds troponin

During muscle contraction, after calcium binds to troponin, the binding sites on which protein become exposed?

- A. Actin ✓ **Correct answer**
- B. Myosin
- C. Myoglobin
- D. Tropomyosin

A. correct: when calcium binds troponin, tropomyosin shifts and the binding sites on actin are exposed for myosin.

B. wrong: myosin is the protein that binds to actin; its sites are not the ones exposed.

C. wrong: myoglobin stores oxygen in muscle; it has no binding sites exposed here.

D. wrong: tropomyosin is the protein that moves away; the exposed sites are on actin.

Question 22 Osteoarthritis joints

Osteoarthritis indicates inflammation in the joints of _____.

- A. Toes
- B. Neck
- C. Knee ✓ **Correct answer**
- D. Wrist

A. wrong: osteoarthritis most typically affects weight-bearing joints, and the textbook example here is the knee.

B. wrong: the textbook example for osteoarthritis here is the knee.

C. correct: osteoarthritis (inflammation/degeneration of joints) most commonly affects the knee.

D. wrong: the textbook example for osteoarthritis here is the knee.

23 Skeletal muscle contraction

Which of the following changes occur when skeletal muscles contract?

- A. The A- bands shorten
- B. The I- Bands shorten ✓ **Correct answer**
- C. The Z- lines move further apart
- D. The H- zone becomes more visible

A. wrong: the A-band (thick filament length) stays the same during contraction.

B. correct: during contraction the I-bands (and H-zone) shorten as the filaments slide past each other, while the A-band stays constant.

C. wrong: the Z-lines move closer together as the sarcomere shortens.

D. wrong: the H-zone narrows and may disappear during contraction.

Question 24 Troponin correct statement

Which one of the following statements is correct for troponin?

- A. It is an ATPase
- B. It binds to actin only
- C. It consists of three polypeptide chains ✓ **Correct answer**
- D. It has greater affinity with Calcium ions than myosin

A. wrong: the ATPase activity belongs to myosin, not troponin.

B. wrong: troponin binds calcium, tropomyosin and actin as part of the regulatory complex.

C. correct: troponin is made of three subunits (TnC, TnI, TnT) — three polypeptide chains.

D. wrong: troponin does bind calcium, but the 'three chains' statement is the textbook defining fact; myosin's calcium affinity is not the comparison made.

25 Bone dissolving cells

_____ are the bone dissolving cells.

- A. Osteoclasts ✓ **Correct answer**
- B. Osteocytes
- C. Osteoblasts
- D. All of these are correct

A. correct: osteoclasts are the bone-dissolving (bone-resorbing) cells.

B. wrong: osteocytes are mature bone cells that maintain bone, not dissolve it.

C. wrong: osteoblasts build bone (deposit bone matrix).

D. wrong: only osteoclasts dissolve bone.

Question 26 Cartilaginous joints NOT a feature

Which of the following is NOT a feature of cartilaginous joints?

- A. Slight mobility
- B. Absence of synovial fluid
- C. Presence of cartilage
- D. Presence of joint cavity ✓ **Correct answer**

A. wrong: slight mobility is a feature of cartilaginous joints.

B. wrong: cartilaginous joints have no synovial fluid — that is a feature.

C. wrong: cartilage is present in cartilaginous joints — that is a feature.

D. correct: cartilaginous joints have NO joint cavity (that belongs to synovial joints), so this is not a feature of them.

27 RR x rr F1 genotype

When male parent (RR) has a cross with female parent (rr), then according to Law of segregation all F1 offspring appears with a genotype:

- A. RR
- B. Rr ✓ **Correct answer**
- C. rr
- D. Rrr

A. wrong: the F1 cannot be RR since the rr parent gives only r.

B. correct: RR × rr gives all Rr offspring (each gets R from one parent and r from the other).

C. wrong: the F1 cannot be rr since the RR parent gives only R.

D. wrong: Rrr is not a normal diploid genotype.

Question 28 Bleeding disease disorder

Which of the following genetic disorder causes bleeding disease?

- A. Sickle Cell anemia
- B. Hemophilia ✓ **Correct answer**
- C. Thalassemia
- D. Cystic fibrosis

A. wrong: sickle cell anaemia is a blood disorder of red cells, not a bleeding disease.

B. correct: haemophilia is the genetic disorder that causes a bleeding disease (blood fails to clot).

C. wrong: thalassaemia is a disorder of haemoglobin production, not a bleeding disease.

D. wrong: cystic fibrosis affects mucus and the lungs, not blood clotting.

29 Y-linked traits passed to

Y- linked traits are always passed from father to the:

- A. Sons only ✓ **Correct answer**
- B. Daughters only
- C. 50% sons and 50% Daughters
- D. 75% sons and 25% daughter

A. correct: Y-linked traits pass from father to sons only, since only sons receive the Y chromosome.

B. wrong: daughters receive the father's X chromosome, not his Y.

C. wrong: Y-linked traits never pass to daughters.

D. wrong: all sons receive the father's Y, no daughters do.

Question 30 Genotypes for round yellow peas

How many different genotypes are required for producing a pea plant with round and yellow seeds phenotype?

- A. 1
- B. 2
- C. 4 ✓ **Correct answer**
- D. 8

A. wrong: more than one genotype gives round yellow seeds.

B. wrong: there are four genotypes that give round yellow seeds.

C. correct: round yellow peas (R_Y_) arise from four genotypes: RRYY, RRYy, RrYY and RrYy.

D. wrong: only four genotypes produce the round yellow phenotype.

31 Crossing over phase

In which of the following phases of cell cycle, gene crossing over occurs?

- A. Telophase
- B. Prophase I ✓ **Correct answer**
- C. Metaphase I
- D. Prophase II

A. wrong: crossing over happens in prophase I, long before telophase.

B. correct: crossing over (exchange of segments between homologous chromosomes) occurs during prophase I of meiosis.

C. wrong: in metaphase I the bivalents align on the equator; crossing over has already happened.

D. wrong: there is no crossing over in prophase II.

Question 32 Independent assortment

Which of the following best describes the production of different combinations of alleles in daughter cells, as a result of the random alignment of bivalents on the equator of the spindle during metaphase I of meiosis?

- A. Segregation
- B. Sex Linkage
- C. Crossing Over
- D. Independent Assortment ✓ **Correct answer**

A. wrong: segregation is the separation of alleles of one gene, not the random alignment of bivalents.

B. wrong: sex linkage concerns genes on sex chromosomes.

C. wrong: crossing over is the exchange of segments between chromatids, not the

nment of bivalents.

D. correct: the random alignment of bivalents on the metaphase I equator produces different allele combinations — independent assortment.

Question 33 Carrier female to sons only

A genetic disease is transferred from a phenotypically normal but carrier female to only some of male progeny. The disease is:

- A. Autosomal dominant
- B. Autosomal recessive
- C. Sex-linked dominant
- D. Sex-linked recessive ✓ **Correct answer**

A. wrong: an autosomal dominant disease would appear in both sexes and in the carrier herself.

B. wrong: an autosomal recessive disease would affect sons and daughters alike.

C. wrong: a sex-linked dominant disease would affect the carrier female herself.

D. correct: a sex-linked recessive disease is carried silently by a female and passed to some of her sons (who get her X chromosome).

Question 34 Chamber pumping to lungs

Which chamber of the heart pumps blood to the lungs?

- A. Right Atrium
- B. Right Ventricle ✓ **Correct answer**
- C. Left Atrium
- D. Left Ventricle

A. wrong: the right atrium receives blood from the body; it does not pump to the lungs.

The right ventricle pumps deoxygenated blood to the lungs through the pulmonary artery.

C. wrong: the left atrium receives oxygenated blood from the lungs.

D. wrong: the left ventricle pumps blood to the body, not to the lungs.

Question 35 Incorrect statement on circulation

Which one of the following statements is incorrect about circulatory system?

- A. All arteries carry blood away from the heart.
- B. All veins carry blood towards the heart.
- C. All arteries carry oxygenated blood. ✓ **Correct answer**
- D. All veins carry blood at low pressure.

A. wrong: this statement is correct — all arteries carry blood away from the heart.

B. wrong: this statement is correct — all veins carry blood towards the heart.

C. correct: this is the incorrect statement — the pulmonary artery carries deoxygenated blood.

D. wrong: this statement is correct — veins carry blood at low pressure.

Question 36 Valves into ventricles

Which of the following valves control the entry of blood into the ventricles of a heart?

- A. Artioventricular valves ✓ **Correct answer**
- B. Semilunar valves
- C. Pulmonary valves
- D. Aortic valves

A. correct: the atrioventricular (AV) valves — tricuspid and bicuspid — control the entry of blood from the atria into the ventricles.

semilunar valves guard the exit of blood from the ventricles into the arteries.

C. wrong: the pulmonary (semilunar) valve guards the exit from the right ventricle.

D. wrong: the aortic (semilunar) valve guards the exit from the left ventricle.

Question 37 Valve carrying only oxygenated blood

The valve of heart through which only oxygenated blood move is _____.

- A. Tricuspid
- B. Bicuspid ✓ **Correct answer**
- C. Pulmonary semilunar
- D. Bicuspid and Tricuspid

A. wrong: the tricuspid valve is on the right (deoxygenated) side of the heart.

B. correct: the bicuspid (mitral) valve is on the left side, so only oxygenated blood passes through it.

C. wrong: the pulmonary valve carries deoxygenated blood to the lungs.

D. wrong: the tricuspid valve carries deoxygenated blood.

Question 38 Bicuspid valve guards

Bicuspid valve guards the opening between ___ in a heart.

- A. Stomach and Intestine
- B. Pulmonary Vein and Left Atrium
- C. Right Atrium and Right Ventricle
- D. Left Atrium and Left Ventricle ✓ **Correct answer**

A. wrong: no heart valve guards the stomach and intestine.

B. wrong: no valve guards the pulmonary vein and left atrium.

The tricuspid valve guards the right atrium and right ventricle.

D. correct: the bicuspid (mitral) valve guards the opening between the left atrium and the left ventricle.

Question 39 Antigens

What are antigens, in the context of immune recognition?

- A. Hormone released during infection
- B. Self-identifying lipids in plasma
- C. Cell surface proteins and Oligosaccharides ✓ **Correct answer**
- D. Enzymes released by B-cells

A. wrong: antigens are not hormones.

B. wrong: antigens are not self-identifying plasma lipids.

C. correct: antigens are usually cell-surface proteins and oligosaccharides (polysaccharides) that the immune system recognises as foreign.

D. wrong: B-cells release antibodies, not antigens.

Question 40 Antigens bind with

Antigens bind with:

- A. C-Region of antibody
- B. V- Region of antigens
- C. C- Region of antigens
- D. V- Region of antibody ✓ **Correct answer**

A. wrong: the constant (C) region does not bind antigen.

B. wrong: antigens do not have a V-region that binds antibody.

C. wrong: there is no C-region of the antigen involved in binding.

antigens bind to the variable (V) region of the antibody (the antigen-binding site).

Question 41 Antibody constant region

Constant region of a specific type of antibody is made up of ..... type of amino acids.

- A. Same ✓ **Correct answer**
- B. Different
- C. Variable
- D. Hydrophobic

A. correct: the constant region of a given type of antibody is made of the same type of amino acids (it is constant, unlike the variable region).

B. wrong: different amino acids characterise the variable region, not the constant region.

C. wrong: 'variable' describes the V-region, not the constant region.

D. wrong: the constant region is not defined by being hydrophobic.

Question 42 Primary immune response

Primary immune response is characterized by:

- A. Rapid antibody production
- B. Slow and low antibody production ✓ **Correct answer**
- C. No antibody formation
- D. Immediate and strong immunity

A. wrong: rapid, strong antibody production characterises the secondary response.

B. correct: the primary immune response is slow and produces a low level of antibodies.

C. wrong: antibodies are formed, just slowly and in low amounts.

immediate and strong immunity is the secondary response.

Question 43 Breathing also named

Breathing is also named as?

- A. Internal respiration
- B. Cellular respiration
- C. Inspiration
- D. Ventilation ✓ **Correct answer**

A. wrong: internal respiration is gas exchange between blood and tissues.

B. wrong: cellular respiration is the release of energy from glucose inside cells.

C. wrong: inspiration is only the intake of air, one half of breathing.

D. correct: breathing (the movement of air in and out of the lungs) is also called ventilation.

Question 44 Warming air in nasal cavity

Warming up of the air in nasal cavity occurs with the help of blood capillaries, located _____:

- A. Underneath mucous membrane ✓ **Correct answer**
- B. Surrounding the cilia
- C. Surrounding cartilages
- D. In the nasopharynx

A. correct: the air is warmed by the rich network of blood capillaries underneath the mucous membrane of the nasal cavity.

B. wrong: the capillaries lie under the mucous membrane, not around the cilia.

C. wrong: the warming capillaries are not around the cartilages.

e warming happens in the nasal cavity, not the nasopharynx.

Question 45 Intercostal muscles

Intercostal muscles are _____?

- A. Skeletal muscles ✓ **Correct answer**
- B. Involuntary smooth muscles
- C. Voluntary smooth muscles
- D. Cardiac muscles

A. correct: intercostal muscles are skeletal (striated, voluntary) muscles between the ribs.

B. wrong: intercostal muscles are not smooth muscle.

C. wrong: smooth muscles are involuntary; intercostal muscles are skeletal.

D. wrong: cardiac muscle is found only in the heart.

Question 46 Lung expansion and contraction

Expansion and contraction of the lungs is accomplished by

- A. Smooth muscles in bronchioles
- B. Smooth muscles in alveoli
- C. Intercostal muscles
- D. Diaphragm & intercostal muscles ✓ **Correct answer**

A. wrong: bronchiole smooth muscle does not expand and contract the lungs.

B. wrong: alveoli have no smooth muscle.

C. wrong: intercostal muscles alone are not the whole mechanism — the diaphragm is the main muscle.

D. correct: expansion and contraction of the lungs is accomplished by the diaphragm and the intercostal muscles together.

47 Membranes crossed by oxygen

During gaseous exchange in human, how many times, cells membranes of different cells are crossed by oxygen molecule from alveolar air to reach in the RBC in alveolar capillaries

- A. 2
- B. 3
- C. 4
- D. 5 ✓ **Correct answer**

A. wrong: oxygen crosses more than two membranes to reach the red cell.

B. wrong: oxygen crosses five membranes in total.

C. wrong: oxygen crosses five membranes in total.

D. correct: oxygen crosses the alveolar epithelium (in and out = 2), the capillary endothelium (in and out = 2) and the red cell membrane (1) — five membranes in all.

Question 48 Pepsin activation

The pepsin is converted into active form by the action of:

- A. Trypsin
- B. Chymotrypsin
- C. Acidic medium ✓ **Correct answer**
- D. Alkaline medium

A. wrong: trypsin activates other pancreatic enzymes, not pepsin.

B. wrong: chymotrypsin is activated by trypsin; it does not activate pepsin.

C. correct: pepsinogen is converted to active pepsin by the acidic medium (HCl) of the stomach.

D. wrong: pepsin is activated by acid, not alkali.

49 Acid reflux burning

The back flush of acidic chyme from stomach to esophagus lead to burning sensation in the chest known as

- A. Pyrosis ✓ **Correct answer**
- B. Cirrhosis
- C. Segmentation
- D. Peristalsis

A. correct: the backflow of acidic chyme into the oesophagus causing a burning sensation in the chest is called pyrosis (heartburn).

B. wrong: cirrhosis is a liver disease.

C. wrong: segmentation is the mixing movement of the intestine.

D. wrong: peristalsis is the wave of contraction moving food along the gut.

Question 50 Bile component causing gall stones

Which component of bile produced by liver may cause gall stones?

- A. Iron
- B. Bilirubin
- C. Cholesterol ✓ **Correct answer**
- D. Lipase

A. wrong: iron does not cause gall stones.

B. wrong: bilirubin forms pigment stones only rarely; the usual culprit is cholesterol.

C. correct: excess cholesterol in bile crystallises to form gall stones.

D. wrong: lipase is a fat-digesting enzyme, not a bile component that forms stones.

51 Chymotrypsin function

Chymotrypsin present in pancreatic juice is responsible for _____.

- A. Digestion of lipids to glycerol and fatty acids
- B. Digestion of DNA and RNA into nucleotides
- C. Digestion of proteins into smaller peptides ✓ **Correct answer**
- D. Digestion of polysaccharides into maltose or glucose

A. wrong: that is the work of lipase.

B. wrong: that is the work of nucleases.

C. correct: chymotrypsin (a pancreatic protease) digests proteins into smaller peptides.

D. wrong: that is the work of amylase.

Question 52 Pancreatic amylase

How does pancreatic amylase digests carbohydrates?

- A. Digests polysaccharides into maltose ✓ **Correct answer**
- B. Digests polysaccharides into sucrose
- C. Digests polysaccharides into lactose
- D. Digests polysaccharides into galactose

A. correct: pancreatic amylase digests polysaccharides (starch) into maltose.

B. wrong: amylase produces maltose, not sucrose.

C. wrong: amylase produces maltose, not lactose.

D. wrong: amylase produces maltose, not galactose.

Question 53 Hunger pangs when fasting

Which of the following event would likely to produce hunger pangs in your stomach,

re fasting.

- A. Low sodium level in blood
- B. Antiperistalsis of alimentary canal
- C. Low blood glucose ✓ **Correct answer**
- D. Dehydration in body

A. wrong: low sodium does not cause hunger pangs.

B. wrong: antiperistalsis moves food backwards; hunger pangs come from stomach contractions when blood glucose is low.

C. correct: low blood glucose during fasting triggers hunger pangs (stomach contractions).

D. wrong: dehydration causes thirst, not hunger pangs.

Question 54 Kidney process depending on hydrostatic pressure

Which process directly depends on hydrostatic pressure in the kidney functioning?

- A. Pressure Filtration ✓ **Correct answer**
- B. Selective Reabsorption
- C. Tubular Secretion
- D. Osmoregulation

A. correct: pressure filtration (glomerular filtration) is driven directly by the hydrostatic pressure of the blood in the glomerulus.

B. wrong: selective reabsorption depends on active transport and osmosis, not directly on hydrostatic pressure.

C. wrong: tubular secretion is active transport of wastes into the tubule.

D. wrong: osmoregulation is the overall regulation of water balance, not the pressure-driven step.

55 Hypercalcemia and kidney stones

Hypercalcemia & Hypercalciuria are responsible for kidney stones and are due to condition:

- A. Hypothyroidism
- B. Hyperthyroidism
- C. Hypoparathyroidism
- D. Hyperparathyroidism ✓ **Correct answer**

A. wrong: hypothyroidism does not cause hypercalcaemia.

B. wrong: hyperthyroidism does not cause hypercalcaemia and hypercalciuria.

C. wrong: hypoparathyroidism causes low blood calcium, not high.

D. correct: excess parathyroid hormone raises blood calcium (hypercalcaemia) and urinary calcium (hypercalciuria), causing kidney stones.

Question 56 Kidneys in dehydration

In situation of dehydration, human kidneys respond by:

- A. Decreasing blood pressure
- B. Decreasing ADH secretion
- C. Increasing water reabsorption ✓ **Correct answer**
- D. Increasing urine output

A. wrong: the kidneys respond to dehydration by conserving water, not by lowering blood pressure.

B. wrong: dehydration increases ADH secretion, which increases water reabsorption.

C. correct: in dehydration the kidneys increase water reabsorption (under ADH) to conserve water.

D. wrong: dehydration decreases urine output.

57 Not a function of kidney

Which of the following is not the function of kidney?

- A. Ion regulation
- B. Water regulation
- C. Temperature regulation ✓ **Correct answer**
- D. Waste removal

A. wrong: ion regulation is a kidney function.

B. wrong: water regulation (osmoregulation) is a kidney function.

C. correct: temperature regulation is not a kidney function (it is done by the skin and hypothalamus).

D. wrong: waste removal is a kidney function.

Question 58 Increased aldosterone

An increased aldosterone secretion results in _____.

- A. Loss of Na ions
- B. Retention of Na ions ✓ **Correct answer**
- C. Increased glucose
- D. Reduced urine

A. wrong: aldosterone causes sodium to be retained, not lost.

B. correct: increased aldosterone secretion results in retention of sodium ions (and water) by the kidney.

C. wrong: aldosterone does not raise blood glucose.

D. wrong: reduced urine volume is a consequence of water retention, but the direct effect named is sodium retention.

59 Monoclonal antibodies with fluorescent labels

When monoclonal antibodies are combined with fluorescent labels, this technique is known as:

- A. Fluorescence microscopy ✓ **Correct answer**
- B. Fluorescence crystallography
- C. Fluorescence therapy
- D. Fluorescence biography

A. correct: monoclonal antibodies combined with fluorescent labels are used in fluorescence microscopy (immunofluorescence) to locate structures.

B. wrong: there is no such technique by this name.

C. wrong: fluorescently labelled antibodies are a detection technique, not a therapy.

D. wrong: there is no such technique.

Question 60 Enzyme joining DNA pieces

The enzyme which joins two pieces of DNA is:

- A. DNA Polymerase I
- B. DNA Polymerase III
- C. DNA Ligase ✓ **Correct answer**
- D. Restriction Endonuclease

A. wrong: DNA polymerase I removes primers and fills gaps; it does not join DNA pieces.

B. wrong: DNA polymerase III synthesises new DNA strands; it does not join pieces.

C. correct: DNA ligase joins two pieces of DNA (seals the sugar-phosphate backbone).

D. wrong: restriction endonucleases cut DNA, not join it.

61 DNA probes

DNA probes are best described as:

- A. Enzymes that cut DNA
- B. Short, single-stranded DNA sequences complementary to target DNA ✓ **Correct answer**
- C. Double-stranded RNA molecules
- D. Antibodies that bind proteins

A. wrong: enzymes that cut DNA are restriction endonucleases, not probes.

B. correct: a DNA probe is a short single-stranded DNA sequence that is complementary to (and so binds) the target DNA.

C. wrong: probes are single-stranded DNA, not double-stranded RNA.

D. wrong: antibodies bind proteins; DNA probes bind DNA.

Question 62 Bacteriophage shape

The shape of a bacteriophage is:

- A. Spherical
- B. Helical
- C. Tadpole like ✓ **Correct answer**
- D. Comma like

A. wrong: a bacteriophage is not spherical.

B. wrong: helical describes the symmetry of some viruses (like TMV), not a bacteriophage.

C. correct: a bacteriophage has a tadpole-like shape (icosahedral head and tail).

D. wrong: comma-like describes Vibrio bacteria, not bacteriophages.

63 Viral RNA to cDNA

In the host Helper-T lymphocytes, the viral RNA is converted into cDNA by _____.

- A. Transcriptase
- B. RNA polymerase
- C. DNA polymerase
- D. Reverse transcriptase ✓ **Correct answer**

A. wrong: transcriptase is not the enzyme that makes DNA from RNA.

B. wrong: RNA polymerase makes RNA from DNA, the opposite direction.

C. wrong: DNA polymerase makes DNA from a DNA template, not from RNA.

D. correct: in HIV-infected helper-T lymphocytes, reverse transcriptase converts the viral RNA into cDNA.

Question 64 AIDS virus classification

The virus is responsible for AIDS is classified as:

- A. DNA virus
- B. Retrovirus ✓ **Correct answer**
- C. Viroid
- D. Bacteriophage

A. wrong: HIV carries RNA, not DNA.

B. correct: HIV, the virus responsible for AIDS, is a retrovirus (an RNA virus that uses reverse transcriptase).

C. wrong: viroids are small infectious RNAs of plants, not HIV.

D. wrong: bacteriophages infect bacteria, not humans.

65 Oxidation definition

Which of the following best defines the removal of electrons from a substance by the addition of oxygen or removal of hydrogen.

- A. Oxidation ✓ **Correct answer**
- B. Reduction
- C. Phosphorylation
- D. Dephosphorylation

A. correct: oxidation is the removal of electrons from a substance, by the addition of oxygen or the removal of hydrogen.

B. wrong: reduction is the gain of electrons (addition of hydrogen or removal of oxygen).

C. wrong: phosphorylation is the addition of a phosphate group.

D. wrong: dephosphorylation is the removal of a phosphate group.

Question 66 Anaerobic respiration benefit

Which of the following is a major benefit of anaerobic respiration during exercise in humans?

- A. Glucose molecules are fully oxidised during anaerobic respiration.
- B. Anaerobic respiration can supply ATP very rapidly for a short period of time. ✓ **Correct answer**
- C. It produces useful byproducts.
- D. Anaerobic respiration can supply ATP indefinitely.

A. wrong: glucose is only partly oxidised in anaerobic respiration.

B. correct: anaerobic respiration supplies ATP very rapidly for a short period — its major benefit during exercise.

C. wrong: its byproduct (lactic acid) causes fatigue; it is not a benefit.

aerobic respiration cannot supply ATP indefinitely — it yields little ATP and builds up lactic acid.

Question 67 Pyruvate to acetyl Co-A

Oxidation, decarboxylation and addition of coenzyme A to pyruvate results into the production of

- A. Acetyl Co-A ✓ **Correct answer**
- B. Phosphoenolpyruvate
- C. Glucose 6-phosphate
- D. Citrate

A. correct: oxidation, decarboxylation and addition of coenzyme A to pyruvate produces acetyl Co-A (the link reaction).

B. wrong: phosphoenolpyruvate is an intermediate of glycolysis, not the product of this step.

C. wrong: glucose 6-phosphate is the first product of glycolysis.

D. wrong: citrate is formed later, when acetyl Co-A joins oxaloacetate in the Krebs cycle.

Question 68 Disaccharide from starch digestion

The disaccharide formed during digestion of starch is:

- A. Sucrose
- B. Cellobiose
- C. Lactose
- D. Maltose ✓ **Correct answer**

A. wrong: sucrose is glucose + fructose, not the product of starch digestion.

B. wrong: cellobiose comes from cellulose, not starch.

:tose is the sugar of milk.

D. correct: starch digestion produces the disaccharide maltose (two glucose units).

Question 69 Nucleotide composition

Which of the following is correct about a nucleotide?

- A. It may consist of one to five nitrogenous bases
- B. It may consist of one or two pentose sugar units
- C. It may consist of one to three phosphate groups ✓ **Correct answer**
- D. It may consist of a pentose or hexose sugar

A. wrong: a nucleotide has exactly one nitrogenous base.

B. wrong: a nucleotide has exactly one pentose sugar.

C. correct: a nucleotide may have one, two or three phosphate groups (e.g. AMP, ADP, ATP).

D. wrong: a nucleotide's sugar is always a pentose.

Question 70 Two-ringed nucleotides

Which of the two nucleotides have 2 ringed structures?

- A. Adenine and Guanine ✓ **Correct answer**
- B. Cytosine and Thymine
- C. Adenine and Thymine
- D. Cytosine and Guanine

A. correct: adenine and guanine are purines — two-ringed (double-ring) nitrogenous bases.

B. wrong: cytosine and thymine are pyrimidines — single-ringed bases.

C. wrong: thymine is a single-ringed pyrimidine.

tosine is a single-ringed pyrimidine.

Question 71 Water and biological molecules

Water maintains the shape and structure of large biological molecules mainly through:

- A. Covalent bonding
- B. Hydrogen bonding and hydrophobic interactions ✓ **Correct answer**
- C. Ionic interactions
- D. Disulfide bridges

A. wrong: water maintains the shape of large molecules mainly through hydrogen bonds and hydrophobic interactions, not covalent bonds.

B. correct: water maintains the shape and structure of large biological molecules mainly through hydrogen bonding and hydrophobic interactions.

C. wrong: ionic interactions are not water's main role in maintaining molecular shape.

D. wrong: disulfide bridges are covalent links within proteins, not water's contribution.

Question 72 Common features of cells

The common feature(s) of prokaryotic and eukaryotic cells is/are _____.

- A. Presence of plasma membrane only
- B. Presence of ribosomes only
- C. Presence of genetic material only
- D. Presence of plasma membrane, ribosomes & genetic material ✓ **Correct answer**

A. wrong: both cell types share more than just the plasma membrane.

B. wrong: both cell types share more than just ribosomes.

C. wrong: both cell types share more than just genetic material.

D. correct: prokaryotic and eukaryotic cells all have a plasma membrane, ribosomes and

Question 73 Biopolymer

Which of the following is biopolymer?

- A. Water
- B. Phospholipids
- C. Histone ✓ **Correct answer**
- D. Waxes

A. wrong: water is not a polymer at all.

B. wrong: phospholipids are lipids, not polymers.

C. correct: histone is a protein (a polymer of amino acids), so it is a biopolymer.

D. wrong: waxes are lipids, not polymers.

Question 74 Information on body processes

Information regarding living organism's body processes from construction of body structure to flow of information from nucleus are provided by:

- A. Biogenic elements
- B. Biological molecules ✓ **Correct answer**
- C. Inorganic molecules
- D. Organic molecules

A. wrong: biogenic elements are the chemical elements of life, not the information source.

B. correct: biological molecules (proteins, nucleic acids, etc.) carry the information for body structure and for the flow of information from the nucleus.

C. wrong: inorganic molecules do not carry this information.

D. wrong: 'organic molecules' is too broad, the information is carried specifically by

Question 75 Peptide bond formed between

Peptide bond is formed between.

- A. C-terminal and C-terminal
- B. N-terminal and C-terminal ✓ **Correct answer**
- C. N-terminal and N-terminal
- D. C-terminal and OH-terminal

A. wrong: a peptide bond does not join two C-terminals.

B. correct: a peptide bond forms between the N-terminal (amino group) of one amino acid and the C-terminal (carboxyl group) of another.

C. wrong: a peptide bond does not join two N-terminals.

D. wrong: there is no 'OH-terminal' in this sense.

Question 76 Transcription organelle

In which of the following organelles, the process of Transcription takes place?

- A. Ribosomes
- B. Golgi complex
- C. Lysosomes
- D. Nucleus ✓ **Correct answer**

A. wrong: ribosomes are the site of translation, not transcription.

B. wrong: the Golgi complex modifies and packages proteins.

C. wrong: lysosomes digest waste.

D. correct: transcription (DNA to mRNA) takes place in the nucleus.

77 Chromatin supercoiling diameter

The approximate diameter of chromatin at the level of supercoiling is

- A. 250nm
- B. 300nm ✓ **Correct answer**
- C. 350nm
- D. 400nm

A. wrong: the supercoiled chromatin fibre is about 300 nm, not 250 nm.

B. correct: at the level of supercoiling, chromatin forms a fibre about 300 nm in diameter.

C. wrong: the supercoiled chromatin fibre is about 300 nm, not 350 nm.

D. wrong: the supercoiled chromatin fibre is about 300 nm, not 400 nm.

Question 78 Organelle producing ATP

Which of the following organelles predominantly produces Adenosine Triphosphate (ATP) in the cell?

- A. Nucleus
- B. Ribosome
- C. Mitochondria ✓ **Correct answer**
- D. Endosome

A. wrong: the nucleus stores genetic information; it does not produce ATP.

B. wrong: ribosomes synthesise proteins; they do not produce ATP.

C. correct: mitochondria predominantly produce ATP in the cell (aerobic respiration).

D. wrong: endosomes are vesicles of the endocytic pathway; they do not produce ATP.

79 F-1 particles location

In mitochondria, small knob like structures called F-1 particles are found in _____.

- A. Outer membrane
- B. inner membrane ✓ **Correct answer**
- C. Outer component
- D. inner component

A. wrong: F-1 particles are found on the inner membrane of mitochondria.

B. correct: the small knob-like F-1 particles (ATP synthase) are found on the inner membrane of mitochondria.

C. wrong: F-1 particles are on the inner membrane, not an outer component.

D. wrong: F-1 particles are on the inner membrane itself, not in an 'inner component'.

Question 80 Organelle abundant in secretory cells

Which organelle is in abundance in secretory cells?

- A. Mitochondria
- B. Golgi complex ✓ **Correct answer**
- C. Nuclei
- D. Nucleoli

A. wrong: mitochondria are abundant in energy-demanding cells, not specifically secretory cells.

B. correct: the Golgi complex (which packages secretions) is abundant in secretory cells.

C. wrong: secretory cells do not have abundant nuclei.

D. wrong: nucleoli make ribosomes; they are not the organelle abundant in secretory cells.

81 Olfactory bulb present in

Olfactory bulb is present in:

- A. Nose
- B. Nasal Cavity
- C. Throat
- D. Brain ✓ **Correct answer**

A. wrong: the olfactory bulb is not in the nose itself.

B. wrong: the olfactory bulb sits above the nasal cavity, in the brain.

C. wrong: the olfactory bulb is not in the throat.

D. correct: the olfactory bulb is present in the brain (forebrain), receiving smell signals from the nose.

Question 82 Gas temperature doubled

If the temperature of a gas is doubled at constant pressure, what will be its volume:

- A. Halved
- B. Doubled ✓ **Correct answer**
- C. Remains constant
- D. Quadrupled

A. wrong: at constant pressure, doubling the temperature doubles the volume (Charles's law), it does not halve it.

B. correct: by Charles's law ($V \propto T$ at constant pressure), doubling the absolute temperature doubles the volume.

C. wrong: the volume changes with temperature at constant pressure.

D. wrong: the volume doubles, it does not quadruple.

83 Pair forming hydrogen bond

Which pair of compounds form hydrogen bond?

- A. Water and acetaldehyde
- B. Formic acid and acetic acid ✓ **Correct answer**
- C. Ethyl acetate and acetic acid
- D. Acetone and water

A. wrong: acetaldehyde has no O–H group to donate a hydrogen bond.

B. correct: both formic acid and acetic acid have O–H groups and form hydrogen bonds with each other.

C. wrong: ethyl acetate cannot donate a hydrogen bond.

D. wrong: acetone has no O–H group, so the pair does not form hydrogen bonds in the sense asked (the textbook pair is the two carboxylic acids).

Question 84 Body-centred crystal central ion

In body centered crystal system the central ion is attach with,

- A. 1 unit cell ✓ **Correct answer**
- B. 4 unit cell
- C. 6 unit cell
- D. 10 unit cell

A. correct: in a body-centred cubic system the central ion belongs to (is attached to) 1 unit cell, while each corner ion is shared by 8 cells.

B. wrong: the central ion is not shared by 4 unit cells.

C. wrong: the central ion is not shared by 6 unit cells.

D. wrong: the central ion is not shared by 10 unit cells.

85 Endothermic reaction yield

For an endothermic reversible reaction, the yield will increase if

- A. Temperature increased ✓ **Correct answer**
- B. Temperature decreased
- C. Catalyst added
- D. Reactants removed

A. correct: for an endothermic reaction, raising the temperature shifts the equilibrium towards the products, increasing the yield.

B. wrong: lowering the temperature favours the exothermic (reverse) direction.

C. wrong: a catalyst speeds up both directions equally and does not change the yield.

D. wrong: removing reactants shifts the equilibrium backwards, decreasing the yield.

Question 86 Methanol equilibrium yield

Methanol is manufactured by reacting carbon dioxide and hydrogen. $CO_2(g) + 3H_2(g) \rightleftharpoons CH_3OH(g) + H_2O(g)$ $\Delta H = -49$ KJ/mol What would increase the equilibrium yield of methanol in this process.

- A. Adding methanol
- B. Adding an excess of steam.
- C. Decreasing the pressure.
- D. Decreasing the temperature. ✓ **Correct answer**

A. wrong: adding a product shifts the equilibrium backwards.

B. wrong: steam (water) is a product; adding it shifts the equilibrium backwards.

C. wrong: the reaction goes from 4 moles of gas to 2, so decreasing the pressure shifts it backwards.

D. correct: the reaction is exothermic ($\Delta H = -49$ kJ/mol), so lowering the temperature

uilibrium forwards, increasing the methanol yield.

Question 87 Order of elementary reaction

The order of reaction of an elementary reaction is:

- A. Equal to molecularity ✓ **Correct answer**
- B. Depend on temperature
- C. Can't predicted
- D. Depends on concentration

A. correct: for an elementary reaction the order of reaction equals its molecularity.

B. wrong: the order does not depend on temperature.

C. wrong: for an elementary reaction the order can be predicted — it equals the molecularity.

D. wrong: the order does not depend on concentration.

Question 88 Rate when concentration is unity

The rate of reaction when concentration becomes unity is called

- A. Average rate
- B. Instantaneous rate
- C. Rate constant ✓ **Correct answer**
- D. Rate of reaction

A. wrong: the average rate is the change in concentration over a time interval.

B. wrong: the instantaneous rate is the rate at a particular instant.

C. correct: when the concentration is unity (1 mol dm^{-3}), the rate of reaction equals the rate constant (rate = $k[conc]^n = k$).

D. wrong: the rate itself is not called the rate constant.

89 Negative enthalpy, temperature increased

If enthalpy change of a reaction is negative, then by increasing temperature reaction will move in which direction?

- A. Forward
- B. Reverse ✓ **Correct answer**
- C. No change
- D. First reverse then forward

A. wrong: for an exothermic reaction (ΔH negative), raising the temperature shifts the equilibrium backwards.

B. correct: the reaction is exothermic, so increasing the temperature shifts the equilibrium in the reverse (endothermic) direction.

C. wrong: temperature does shift the equilibrium.

D. wrong: the shift is simply to the reverse direction.

Question 90 Element oxidised preferably

Which element will undergo oxidation preferably:

- A. With low reduction potential ✓ **Correct answer**
- B. With high reduction potential
- C. With low oxidation potential
- D. Cannot be predicted

A. correct: an element with a low (more negative) reduction potential is readily oxidised (it loses electrons easily).

B. wrong: a high reduction potential means the element is readily reduced, not oxidised.

C. wrong: a low oxidation potential means the element is not readily oxidised.

D. wrong: it can be predicted from the reduction potential.

91 Reducing agent

In a redox reaction, the reducing agent is the species that:

- A. Gains electrons
- B. Loses electrons ✓ **Correct answer**
- C. Remains unchanged
- D. decrease in its oxidation state

A. wrong: gaining electrons is reduction — the oxidising agent gains electrons.

B. correct: the reducing agent is the species that loses electrons (it is itself oxidised).

C. wrong: the reducing agent changes (it is oxidised).

D. wrong: the reducing agent's oxidation state increases, since it loses electrons.

Question 92 Methane flows on Triton

The surface of Triton, a moon of Neptune, contains condensed methane that flows rapidly. Which statement explains why condensed methane flow rapidly?

- A. Condensed methane has a metallic structure
- B. Methane molecules contain strong covalent bonds
- C. The intermolecular forces between methane molecules are weak ✓ **Correct answer**
- D. methane molecules have a tetrahedral shape

A. wrong: condensed methane does not have a metallic structure.

B. wrong: strong covalent bonds within the molecule do not explain why the liquid flows rapidly.

C. correct: methane molecules are held by weak van der Waals forces, so condensed methane flows rapidly.

D. wrong: the tetrahedral shape of methane does not explain its rapid flow.

93 Water 4°C to 0°C

Which of the following statement is true for water (temperature between 4° C to 0° C)

- A. The volume of water decreases on cooling
- B. The density of water increases on cooling
- C. The density of water decreases on cooling ✓ **Correct answer**
- D. The mass of decreases on cooling

A. wrong: between 4°C and 0°C water expands on cooling.

B. wrong: between 4°C and 0°C the density of water decreases on cooling.

C. correct: water has maximum density at 4°C, so cooling it from 4°C to 0°C decreases its density.

D. wrong: the mass of the water does not change on cooling.

Question 94 Sigma and pi bonds in acetylene

Number of sigma bond and pi bonds in acetylene are?

- A. 3 & 1
- B. 1 & 3
- C. 5 & 2
- D. 3 & 2 ✓ **Correct answer**

A. wrong: acetylene has 2 pi bonds, not 1.

B. wrong: acetylene has 3 sigma bonds and 2 pi bonds.

C. wrong: acetylene has 3 sigma bonds, not 5.

D. correct: acetylene (H–C≡C–H) has 3 sigma bonds (two C–H and one C–C) and 2 pi bonds (in the triple bond).

95 Maximum dipole moment

Which compound will have a maximum dipole moment?

- A. CH_4
- B. CCl_4
- C. CH_3Cl ✓ **Correct answer**
- D. C_2H_4

A. wrong: methane is symmetrical and non-polar (zero dipole moment).

B. wrong: carbon tetrachloride is symmetrical and non-polar.

C. correct: chloromethane is polar (the C–Cl bond is polar and the molecule is unsymmetrical), so it has the maximum dipole moment here.

D. wrong: ethene is symmetrical and non-polar.

Question 96 Lowest electronegativity

Which of the following elements has the lowest electronegativity value?

- A. Flourine
- B. Iodine
- C. Lithium
- D. Cesium ✓ **Correct answer**

A. wrong: fluorine has the highest electronegativity of all elements.

B. wrong: iodine's electronegativity is higher than caesium's.

C. wrong: lithium's electronegativity is higher than caesium's.

D. correct: caesium has the lowest electronegativity value among these elements (electronegativity decreases down a group and caesium is the lowest in its group).

97 Sodium with ice-cold water

Sodium metal reacts with Ice cold water to produce:

- A. NaOH ✓ **Correct answer**
- B. Na_2O
- C. Na_2O_2
- D. NaCl

A. correct: sodium reacts with ice-cold water to produce sodium hydroxide (NaOH) and hydrogen gas.

B. wrong: sodium oxide is not the product of sodium with water.

C. wrong: sodium peroxide is not the product of sodium with water.

D. wrong: sodium chloride is not formed here (no chlorine is present).

Question 98 Outer-transition elements

Outer-Transition elements are also called;

- A. s-block elements
- B. p-block elements
- C. d-block elements ✓ **Correct answer**
- D. f-block elements

A. wrong: s-block elements are groups 1–2.

B. wrong: p-block elements are groups 13–18.

C. correct: outer-transition elements are the d-block elements.

D. wrong: f-block elements are the inner-transition elements.

99 Chiral but not mirror images

Those molecules which have chiral center but not mirror image of one another is called

- A. Epimers
- B. Enantiomers
- C. Diastereomers ✓ **Correct answer**
- D. Anomers

A. wrong: epimers differ at only one chiral centre; the definition asked is diastereomers.

B. wrong: enantiomers are non-superimposable mirror images of each other.

C. correct: molecules with chiral centres that are not mirror images of one another are called diastereomers.

D. wrong: anomers are a specific type of epimer at the anomeric carbon of sugars.

Question 100 Initiation radical in methane halogenation

Select free radical involved in initiation of halogenation of methane

- A. Cl ✓ **Correct answer**
- B. CH_3
- C. CH_4
- D. CH_3Cl

A. correct: the free radical involved in the initiation step of methane halogenation is the chlorine radical (Cl·), formed when Cl_2 splits homolytically.

B. wrong: the methyl radical appears in the propagation step, not initiation.

C. wrong: methane is the starting material, not a free radical.

D. wrong: chloromethane is the product, not the initiating radical.

101 Alkenes less acidic than alkynes

Alkenes are less acidic than alkynes due to

- A. Higher s character
- B. Lesser s character ✓ **Correct answer**
- C. Stronger bonds
- D. Higher electronegativity

A. wrong: alkenes have lower s character in their C–H bonds than alkynes, which is why they are less acidic.

B. correct: alkenes are less acidic than alkynes because their C–H bonds have lesser s character (sp^2, 33%) than alkynes (sp, 50%) — more s character means the conjugate base is more stable.

C. wrong: bond strength is not the reason.

D. wrong: electronegativity is not the reason.

Question 102 1,3-Butadiene stability

1,3 Butadiene is more stable than 1-Butene, because it is a:

- A. Conjugated Alkene ✓ **Correct answer**
- B. Cumulenes
- C. Isolated diene
- D. Separated dienes

A. correct: 1,3-butadiene is more stable than 1-butene because it is a conjugated alkene (alternating double bonds allow delocalisation of pi electrons).

B. wrong: cumulenes have consecutive double bonds, not the conjugated system here.

C. wrong: 1,3-butadiene is a conjugated diene, not an isolated one.

D. wrong: separated (isolated) dienes lack the conjugation that stabilises 1,3-butadiene.

103 Name of $(C_2H_5)_4C$

Name of $(C_2H_5)_4C$

- A. Triethyl methane
- B. Tetramethyl methane
- C. Tetraethyl methane ✓ **Correct answer**
- D. Trimethyl ethane

A. wrong: the compound has four ethyl groups, not three.

B. wrong: the groups are ethyl, not methyl.

C. correct: $(C_2H_5)_4C$ is a central carbon with four ethyl groups — tetraethyl methane.

D. wrong: the compound is neither trimethyl nor an ethane.

Question 104 Free radicals produced by

Free radicals are produced by

- A. Homolytic cleavage ✓ **Correct answer**
- B. heterolytic cleavage
- C. reducing agents
- D. Oxidizing agents

A. correct: free radicals are produced by homolytic cleavage (equal splitting of a covalent bond, one electron to each fragment).

B. wrong: heterolytic cleavage produces ions, not free radicals.

C. wrong: reducing agents do not generally produce free radicals by cleavage.

D. wrong: oxidising agents do not produce free radicals by cleavage.

105 Nitration of toluene vs benzene

Compared to benzene, nitration of toluene takes place at?

- A. Same rate
- B. Slow rate
- C. Faster rate ✓ **Correct answer**
- D. Very slow rate

A. wrong: toluene nitrates faster than benzene.

B. wrong: the methyl group activates the ring, so nitration is faster.

C. correct: nitration of toluene is faster than that of benzene because the methyl group is electron-donating and activates the ring.

D. wrong: toluene nitrates faster, not slower.

Question 106 Markovnikov rule

During Hydro halogenation of asymmetric alkenes which rule favors formation of secondary carbocation over primary carbocation?

- A. Hydration rule
- B. Anti-Markovnikov’s rule
- C. Markovnikov’s rule ✓ **Correct answer**
- D. Polymeros’s rule

A. wrong: there is no 'hydration rule' for this.

B. wrong: anti-Markovnikov addition gives the less substituted product.

C. correct: Markovnikov's rule favours formation of the more stable (secondary over primary) carbocation in hydrohalogenation of asymmetric alkenes.

D. wrong: there is no such rule.

Question 107 Distinguish 1-butyne and 2-butyne

Which reagent is used to distinguish 1-butyne and 2-butyne

- A. water in the presence of mercuric sulphate and sulfuric acid
- B. ammonical silver nitrate ✓ **Correct answer**
- C. Acidified potassium manganate(VII)
- D. aqueous bromine

A. wrong: both alkynes react with this reagent.

B. correct: ammoniacal silver nitrate (Tollens' reagent) gives a white precipitate with the terminal alkyne 1-butyne (which has an acidic hydrogen) but not with 2-butyne.

C. wrong: both alkynes are oxidised by it.

D. wrong: both alkynes decolourise bromine water.

Question 108 Increase carbon atoms in alkyl halide

_____ can be added, to an alkyl halide to increase the no. of carbon atoms in the parent chain.

- A. HCN in ethanol
- B. KCN in ethanol ✓ **Correct answer**
- C. Iodoform
- D. Amine.

A. wrong: HCN is not the reagent used.

B. correct: KCN in ethanol adds a carbon atom (as –CN) to an alkyl halide, increasing the carbon chain by one (the nitrile can then be hydrolysed to a carboxylic acid).

C. wrong: iodoform is a test product, not a chain-lengthening reagent.

D. wrong: amines do not add a carbon atom to the parent chain.

109 White precipitate with phenol

Which reagent gives white precipitates when added to phenol

- A. aq bromine ✓ **Correct answer**
- B. aq Na_2CO_3
- C. aq NaOH
- D. aq NaOH and benzoyl chloride

A. correct: aqueous bromine gives a white precipitate of 2,4,6-tribromophenol with phenol.

B. wrong: phenol dissolves in sodium carbonate solution with effervescence, giving no white precipitate.

C. wrong: phenol dissolves in NaOH to form soluble sodium phenoxide.

D. wrong: this is the Schotten–Baumann reaction, which does not give a white precipitate with phenol.

Question 110 Most acidic phenol — official key error corrected

Which of the following is more acidic?

- A. Phenol
- B. o-methyl phenol
- C. o- nitro phenol ✓ **Correct answer**
- D. o-Aminophenol

A. wrong: phenol is less acidic than o-nitrophenol (the $–NO_2$ group stabilises the phenoxide ion).

B. wrong: the $–CH_3$ group is electron-donating, so o-cresol is less acidic than phenol.

C. correct: the $–NO_2$ group is strongly electron-withdrawing and stabilises the phenoxide ion, so o-nitrophenol is the most acidic here (pKa ≈ 7.2, against phenol ≈ 10.0). The official

sts D, which is wrong — the $-NH_2$ group is electron-donating and makes o-aminophenol less acidic than phenol.

D. wrong: the $-NH_2$ group donates electrons into the ring, destabilising the phenoxide ion, so o-aminophenol is less acidic than phenol — it cannot be the most acidic. (Official-key error: official Code-2 key D corrected to C on the textbook rule that electron-withdrawing groups increase phenol acidity; decided by assistant under owner's 8 Nov 2026 delegation.)

Question 111 Lucas reagent immediate reaction

Which of these compounds reacts immediately with Lucas reagent and forms an oily layer by turning the solution turbid?

- A. 2-butanol
- B. 2-methyl-2-butanol ✓ **Correct answer**
- C. 1-propanol
- D. 4-methylphenol (p-cresol)

A. wrong: 2-butanol is a secondary alcohol and reacts slowly with Lucas reagent.

B. correct: 2-methyl-2-butanol is a tertiary alcohol, which reacts immediately with Lucas reagent, turning the solution turbid with an oily layer.

C. wrong: 1-propanol is a primary alcohol and does not react readily with Lucas reagent.

D. wrong: p-cresol is a phenol, not an alcohol that gives the Lucas test.

Question 112 Silver mirror test

Which of the following gives positive silver mirror test:

- A. CH_3CH_2OH
- B. CH_3CHO ✓ **Correct answer**
- C. CH_3COOH

$COCH_3$

A. wrong: ethanol does not give the silver mirror test.

B. correct: ethanal (acetaldehyde) is an aldehyde and gives a positive silver mirror test (Tollens' reagent).

C. wrong: ethanoic acid does not give the silver mirror test.

D. wrong: propanone (a ketone) does not give the silver mirror test.

Question 113 Acid-catalysed addition to carbonyl

Select the acid catalyzed addition reactions of carboxyl compounds from the following:

- A. Addition of Grignard reaction
- B. Addition of sodium bisulphite
- C. Addition of alcohols ✓ **Correct answer**
- D. Addition of hydrogen cyanide

A. wrong: Grignard addition is not acid-catalysed.

B. wrong: bisulphite addition is not the acid-catalysed addition asked for.

C. correct: addition of alcohols to carbonyl compounds (forming acetals) is an acid-catalysed addition reaction.

D. wrong: HCN addition is base-catalysed, not acid-catalysed.

Question 114 $LiAlH_4$ reduction of aldehyde/ketone

When an aldehyde or ketone is reduced using $LiAlH_4$ followed by hydrolysis, the resultant would be

- A. 1° alcohol from both aldehyde and ketone.
- B. 1° alcohol from aldehyde and 2° alcohol from ketone. ✓ **Correct answer**
- C. 2° alcohol from both aldehyde and ketone.

alcohol from aldehyde and 3° alcohol from ketone.

A. wrong: a ketone gives a secondary alcohol, not a primary one.

B. correct: $LiAlH_4$ reduces an aldehyde to a primary (1°) alcohol and a ketone to a secondary (2°) alcohol.

C. wrong: an aldehyde gives a primary alcohol.

D. wrong: neither product is as stated.

Question 115 Acetic acid + ethanol

Acetic acid and ethanol reacts to produce

- A. Aldehyde
- B. Ethyl acetate ✓ **Correct answer**
- C. Nitrile
- D. Ketone

A. wrong: esterification does not produce an aldehyde.

B. correct: acetic acid and ethanol react (esterification) to produce ethyl acetate (ethyl ethanoate) and water.

C. wrong: no nitrile is formed here.

D. wrong: esterification does not produce a ketone.

Question 116 Prosthetic groups in protein

Prosthetic groups are part of the following _____ protein

- A. Derived
- B. Conjugated ✓ **Correct answer**
- C. Simple
- D. Non-derived

osthetic groups are not a feature of derived proteins.

B. correct: prosthetic groups (non-protein parts) are part of conjugated proteins.

C. wrong: simple proteins contain only amino acids, with no prosthetic group.

D. wrong: this is not the class of protein that carries prosthetic groups.

Question 117 Acrylate base polymers

Acrylate base polymers are:

- A. Drying adhesives
- B. Pressure sensitive adhesives ✓ **Correct answer**
- C. Contact adhesives
- D. Hot adhesives

A. wrong: acrylate polymers are not drying adhesives.

B. correct: acrylate base polymers are used as pressure-sensitive adhesives (they stick on light pressure).

C. wrong: acrylate polymers are not contact adhesives.

D. wrong: acrylate polymers are not hot-melt adhesives.

Question 118 Symbol Δ in equation

What does the symbol (Δ) in a chemical equation represent?

- A. Density
- B. Direction
- C. Heat ✓ **Correct answer**
- D. Pressure

A. wrong: density is not represented by Δ.

does not represent direction.

C. correct: the symbol Δ (delta) in a chemical equation represents heat (the reaction is carried out by heating).

D. wrong: pressure is not represented by Δ.

Question 119 Molecules in 244 g benzoic acid

Calculate the number of molecules in 244g of Benzoic acid? ($C_7H_6O_2$)

- A. 12×10^{23}
- B. 1.2×10^{24} ✓ **Correct answer**
- C. 0.12×10^{31}
- D. 12×10^{24}

A. wrong: 244 g is 2 moles, which is 1.2×10^{24} molecules, not 12×10^{23}.

B. correct: benzoic acid ($C_7H_6O_2$) has molar mass 122 g/mol, so 244 g = 2 mol = $2 \times 6.02 \times 10^{23} = 1.2 \times 10^{24}$ molecules.

C. wrong: this is far too large.

D. wrong: this is ten times too large.

Question 120 Electron spin probability

The probability of spin of an electron is supposed to be

- A. 30% clockwise & 70% counterclockwise
- B. 70% clockwise & 30% counterclockwise
- C. 50% clockwise & 50% counterclockwise ✓ **Correct answer**
- D. 90% clockwise & 10% counterclockwise

A. wrong: the two spin states are equally probable.

B. wrong: the two spin states are equally probable.

n electron is equally likely (50/50) to have clockwise or counterclockwise spin.

D. wrong: the two spin states are equally probable.

Question 121 Period and group of X^{3-}

An ion with a trinegative charge (-3) has valence shell electronic configuration of $1s^2 2s^2 2p^6 3s^2 3p^6$. To which period and group of the periodic table does the given element belong?

- A. Period III and Group IIIA
- B. Period III and Group VA ✓ **Correct answer**
- C. Period V and Group IIIA
- D. Period V and Group VA

A. wrong: the neutral atom has $3s^2 3p^3$, which is group VA, not IIIA.

B. correct: the ion X^{3-} has configuration $...3s^2 3p^6$, so the neutral atom is $...3s^2 3p^3$ — period 3 (n = 3) and group VA (5 valence electrons).

C. wrong: the highest shell is n = 3, so it is period III, not V.

D. wrong: the highest shell is n = 3, so it is period III, not V.

Question 122 Largest m for n = 4

For an element "X", If the value of Principle quantum number (n) = 4, the largest value of magnetic quantum number "m" can be:

- A. 1
- B. 2
- C. 3 ✓ **Correct answer**
- D. 4

A. wrong: for n = 4 the largest magnetic quantum number is 3, not 1.

- n = 4 the largest magnetic quantum number is 3, not 2.

C. correct: for n = 4, l can be at most 3, so m can range from −3 to +3 and its largest value is 3.

D. wrong: m can never exceed l, which is at most n − 1 = 3.

Question 123 Photon frequency from wavenumber

A photon is moving with wave number 1.5×10^{10} m^{-1}. its frequency is

- A. 4.5×10^{18} ✓ **Correct answer**
- B. 3.0×10^{18}
- C. 4.5×10^{-18}
- D. 3.0×10^{-18}

A. correct: frequency ν = c × wavenumber = $(3 \times 10^{8}$ m/s$)(1.5 \times 10^{10}$ $m^{-1}) = 4.5 \times 10^{18}$ Hz.

B. wrong: the calculation gives 4.5×10^{18} Hz.

C. wrong: the exponent is +18, not −18.

D. wrong: both the value and the exponent are wrong.

Question 124 Ideal gas equation for one mole H_2

Ideal gas equation for one mole of H_2 is

- A. PV = nRT
- B. $P_1V_1/T_1 = P_2V_2/T_2$
- C. PV/RT = 1 ✓ **Correct answer**
- D. $P_1V_2T_2 = P_2V_1T_1$

A. wrong: for one mole (n = 1) the equation reduces to PV = RT, i.e. PV/RT = 1.

B. wrong: this is the combined gas law, not the one-mole ideal gas equation in the form asked.

r one mole of gas PV = RT, so PV/RT = 1.

D. wrong: this is not a valid gas-law form.

Question 125 Concentration of 1 mol ideal gas at STP

Value of concentration for 1 mol of an ideal gas at STP will be:

- A. 0.04 ✓ **Correct answer**
- B. 0.4
- C. 4.4
- D. 4

A. correct: at STP one mole occupies 22.4 dm^3, so the concentration is 1/22.4 ≈ 0.045 ≈ 0.04 mol dm^{-3}.

B. wrong: 0.4 mol dm^{-3} is ten times too large.

C. wrong: 4.4 mol dm^{-3} is far too large.

D. wrong: 4 mol dm^{-3} is far too large.

Question 126 Ideal gas equation combination

The ideal gas equation is a combination of _____ laws.

- A. Charles's, Boyle's
- B. Charles's, Avogadro's
- C. Boyle's, Avogadro's
- D. Charles's, Boyle's, Avogadro's ✓ **Correct answer**

A. wrong: the ideal gas equation also needs Avogadro's law.

B. wrong: the ideal gas equation also needs Boyle's law.

C. wrong: the ideal gas equation also needs Charles's law.

The ideal gas equation (PV = nRT) combines Charles's, Boyle's and Avogadro's laws.

Question 127 SHM maximum displacement

In SHM the maximum displacement covered by the Particle from mean position is

- A. 2A
- B. 4A ✓ **Correct answer**
- C. 6A
- D. 8A

A. wrong: in one complete oscillation the particle covers 4A, not 2A.

B. correct: in one complete oscillation of SHM the particle travels 4A (amplitude out, back to mean, amplitude out the other way, and back) — the total distance covered in one cycle.

C. wrong: the distance covered in one complete oscillation is 4A, not 6A.

D. wrong: the distance covered in one complete oscillation is 4A, not 8A. (Note: the stem's wording is loose — the amplitude itself is A; the keyed 4A is the distance covered in one full oscillation.)

Question 128 Velocity doubled, kinetic energy

If the velocity is doubled then the K.E of the body will be:

- A. Double
- B. Three times
- C. Four times ✓ **Correct answer**
- D. Remains constant

A. wrong: kinetic energy depends on the square of velocity, so it more than doubles.

B. wrong: kinetic energy becomes four times, not three.

E. = ½mv², so doubling v makes the kinetic energy $(2)^2$ = 4 times as large.

D. wrong: kinetic energy changes with velocity.

Question 129 Force parallel to motion

When a force is parallel to the direction of motion of the body, work done on the body is:

- A. Zero
- B. minimum
- C. maximum ✓ **Correct answer**
- D. Infinite

A. wrong: work is zero only when the force is perpendicular to the motion.

B. wrong: work is maximum when the force is parallel to the motion.

C. correct: work W = Fd cos θ is maximum when θ = 0°, i.e. when the force is parallel to the direction of motion.

D. wrong: the work is finite and maximum, not infinite.

Question 130 Angular velocity direction

The wheel of a vehicle is spinning in the anticlockwise direction, with a constant rate. The direction of its angular velocity will be:

- A. clockwise
- B. anticlockwise
- C. perpendicular to the plane of rotation ✓ **Correct answer**
- D. along the plane of rotation

A. wrong: the angular velocity is not along the clockwise direction of rotation.

B. wrong: the angular velocity is not along the anticlockwise direction of rotation.

C. correct: by the right-hand rule, the angular velocity of a wheel spinning anticlockwise

ndicular to the plane of rotation (out of the plane).

D. wrong: angular velocity is perpendicular to the plane of rotation, not along it.

Question 131 v/ω ratio on rotating disk

A point P is on a disk rotating with constant angular velocity. If the distance from the center is tripled, what happens to the ratio of linear velocity and angular velocity (v/ω)?

- A. It remains the same
- B. It triples ✓ **Correct answer**
- C. It is reduced to one-third
- D. It increases by factor 9

A. wrong: v/ω = r, and r changes when the distance is tripled.

B. correct: v = ωr, so v/ω = r; tripling the distance from the centre triples the ratio.

C. wrong: the ratio increases with r, it does not decrease.

D. wrong: the ratio is r, so it triples — it does not increase ninefold.

Question 132 Pressure × volume in Bernoulli

In deriving Bernoulli's equation, the quantity ' pressure x volume' represents:

- A. density
- B. kinetic energy
- C. potential energy
- D. work done ✓ **Correct answer**

A. wrong: pressure × volume is not density.

B. wrong: kinetic energy per unit volume is ½ρv², not pressure × volume.

C. wrong: potential energy per unit volume is ρgh, not pressure × volume.

Bernoulli's equation, pressure × volume represents work done (pressure energy) — the work done in pushing the fluid.

Question 133 Drag force on sphere

Drag force on a spherical object moving through a fluid depends on

- A. velocity of the object
- B. viscosity of the medium
- C. shape and size of the object
- D. all of the above ✓ **Correct answer**

A. wrong: drag depends on velocity, but also on the viscosity and the shape/size — this option alone is incomplete.

B. wrong: drag depends on viscosity, but also on velocity and shape/size.

C. wrong: drag depends on shape and size, but also on velocity and viscosity.

D. correct: the drag force on a spherical object depends on the velocity of the object, the viscosity of the medium, and the shape and size of the object.

Question 134 Incorrect assumption, continuity equation

Which of the following assumptions is INCORRECT about the fluid that follows equation of continuity?

- A. It is a non-viscous fluid
- B. It moves in a steady flow
- C. It moves in a turbulent flow ✓ **Correct answer**
- D. It is an incompressible fluid

A. wrong: the fluid is assumed non-viscous — that is a correct assumption.

B. wrong: steady flow is a correct assumption.

e equation of continuity assumes steady (streamline) flow, not turbulent flow — so this is the incorrect assumption.

D. wrong: the fluid is assumed incompressible — that is a correct assumption.

Question 135 Ripple tank frequency — official key error corrected

In a ripple tank 50 waves having wavelength 5cm pass through a certain point with a speed of 2m/s. The frequency of waves is:

- A. 5 Hz
- B. 10 Hz
- C. 40 Hz ✓ **Correct answer**
- D. 50 Hz

A. wrong: the frequency is v/λ = 2 ÷ 0.05 = 40 Hz, not 5 Hz. The official Code-2 key lists A, which is wrong.

B. wrong: the frequency is 40 Hz, not 10 Hz.

C. correct: f = v/λ = 2 m/s ÷ 0.05 m = 40 Hz (the '50 waves' in the stem is a distractor — the wavelength is already given as 5 cm).

D. wrong: the frequency is 40 Hz, not 50 Hz. (Official-key error: official Code-2 key A corrected to C by the calculation f = v/λ; decided by assistant under owner's 8 Nov 2026 delegation.)

Question 136 Mechanical waves require — official key error corrected

Unlike electromagnetic waves mechanical waves require:

- A. source of energy
- B. medium for propagation ✓ **Correct answer**

rce of disturbance
- D. periodic motion

A. wrong: a source of energy is needed to produce any wave, but it is not what distinguishes mechanical from electromagnetic waves.

B. correct: unlike electromagnetic waves, mechanical waves require a material medium for propagation (they cannot travel through a vacuum). The official Code-2 key lists D, which is wrong.

C. wrong: a disturbance starts any wave; it is not the distinguishing requirement.

D. wrong: periodic motion is a property of the wave, not the requirement that distinguishes mechanical waves from electromagnetic waves. (Official-key error: official Code-2 key D corrected to B; decided by assistant under owner's 8 Nov 2026 delegation.)

Question 137 Sound in tube closed at one end

A sound wave is set up in a long tube, closed at one end. The length of the tube is adjusted until the sound from the tube is loudest. What is the nature of the sound wave in the tube?

- A. longitudinal and progressive
- B. longitudinal and stationary ✓ **Correct answer**
- C. transverse and progressive
- D. transverse and stationary

A. wrong: the loudest sound is a standing wave, not a progressive one.

B. correct: sound is a longitudinal wave, and at resonance in the tube it forms a stationary (standing) wave.

C. wrong: sound waves are longitudinal, not transverse.

D. wrong: sound waves are longitudinal, not transverse.

138 Ideal gas heated at constant volume

An ideal gas is heated at constant volume. It absorbs 200 J of heat. The work done by the gas is:

- A. 200 J
- B. 0 J ✓ **Correct answer**
- C. -200 J
- D. Varies with pressure

A. wrong: at constant volume no work is done.

B. correct: at constant volume $\Delta V = 0$, so the work done by the gas $W = P\Delta V = 0$ J (all 200 J goes into internal energy).

C. wrong: the work done is zero, not -200 J.

D. wrong: the work done is zero regardless of pressure.

Question 139 W = Q process

If "Q" heat and "W" is work done then "W=Q" represents.

- A. Isothermal process ✓ **Correct answer**
- B. Adiabatic process
- C. Isochoric process
- D. Isobaric process

A. correct: in an isothermal process $\Delta U = 0$, so by the first law $Q = W$ — the heat supplied equals the work done.

B. wrong: in an adiabatic process $Q = 0$, so $W = -\Delta U$.

C. wrong: in an isochoric process $W = 0$, so $Q = \Delta U$.

D. wrong: in an isobaric process $W \neq Q$ in general.

140 Mega ohm × pico farad

1 mega ohm x 1 pico farad =

- A. second
- B. milli second
- C. micro second ✓ **Correct answer**
- D. mega second

A. wrong: $10^{6} \times 10^{-12} = 10^{-6}$ s, a microsecond, not a second.

B. wrong: 10^{-6} s is a microsecond, not a millisecond.

C. correct: 1 MΩ × 1 pF = 10^{6} Ω × 10^{-12} F = 10^{-6} s = 1 microsecond.

D. wrong: 10^{-6} s is a microsecond, not a megasecond.

Question 141 Force in dielectric medium removed

If "F" is the force between two points charges submerged in a medium of dielectric constant "M", then on withdrawing the medium, the force between them becomes:

- A. F √M
- B. F M ✓ **Correct answer**
- C. F/M
- D. M/F

A. wrong: removing the medium multiplies the force by M, not √M.

B. correct: in a medium the force is $F = F_0/M$, so with the medium withdrawn the force becomes $F_0 = F \times M$.

C. wrong: removing the medium increases the force, it does not divide it by M.

D. wrong: M/F is not a force.

142 Unit of resistivity

Unit of resistivity i.e. specific resistance is:

- A. Ω m ✓ **Correct answer**
- B. Ω
- C. $\Omega^{-1}m^{-1}$
- D. Ω m^2

A. correct: resistivity ρ = RA/L, so its unit is ohm-metre (Ω m).

B. wrong: ohm is the unit of resistance, not resistivity.

C. wrong: $\Omega^{-1}m^{-1}$ is the unit of conductivity.

D. wrong: resistivity is Ω m, not Ω m^2.

Question 143 Diameter doubled, resistivity

If diameter of a wire is doubled, its resistivity will:

- A. become half
- B. decrease by four times
- C. increases by four times
- D. remain constant ✓ **Correct answer**

A. wrong: resistivity is a property of the material; it does not change with diameter.

B. wrong: resistivity does not depend on the wire's dimensions.

C. wrong: resistivity does not depend on the wire's dimensions.

D. correct: resistivity depends only on the material and temperature, not on the diameter — so it remains constant.

144 Lighter particle in magnetic field

Two particles with same charge and different masses enters perpendicularly in a uniform magnetic field with same speed, the lighter one will move in:

- A. Straight path
- B. Spiral path
- C. Large circular path
- D. Small circular path ✓ **Correct answer**

A. wrong: a charged particle entering perpendicular to a magnetic field moves in a circle.

B. wrong: with velocity perpendicular to the field the path is circular, not spiral.

C. wrong: the radius r = mv/qB is smaller for the lighter particle.

D. correct: the radius r = mv/qB is proportional to mass, so the lighter particle moves in a smaller circular path.

Question 145 Vector quantity

Which quantity is a vector?

- A. pressure
- B. temperature
- C. weight ✓ **Correct answer**
- D. work

A. wrong: pressure is a scalar quantity.

B. wrong: temperature is a scalar quantity.

C. correct: weight is a force (W = mg), so it is a vector quantity.

D. wrong: work is a scalar quantity.

146 Cross product $v = \omega \times r$

During uniform circular motion, if "v" is tangential velocity, "ω" is angular velocity and "r" is radius. Then which of the following represents cross product correctly

- A. ω = v × r
- B. r = ω × v
- C. v = r × ω
- D. v = ω × r ✓ **Correct answer**

A. wrong: the correct relation is v = ω × r.

B. wrong: the correct relation is v = ω × r.

C. wrong: r × ω = −(ω × r), so this has the wrong sign.

D. correct: the tangential velocity is the cross product of angular velocity and radius, v = ω × r.

Question 147 Cross product of parallel vectors

Cross product of two parallel vectors has a magnitude:

- A. A
- B. Acosθ
- C. zero ✓ **Correct answer**
- D. null vector

A. wrong: the magnitude is zero, not A.

B. wrong: the magnitude is AB sin θ, which is zero for parallel vectors.

C. correct: the cross product of two parallel vectors has magnitude AB sin 0° = zero.

D. wrong: the cross product is indeed a null vector, but the question asks for its magnitude, which is zero.

148 Projectile motion

Projectile motion is best described as:

- A. One-dimensional motion
- B. Variable accelerated motion
- C. Constant acceleration due to gravity ✓ **Correct answer**
- D. Velocity becomes zero at maximum height

A. wrong: projectile motion is two-dimensional.

B. wrong: the acceleration is constant (g) throughout.

C. correct: projectile motion is motion under constant acceleration due to gravity (g).

D. wrong: only the vertical component becomes zero at maximum height; the horizontal velocity remains.

Question 149 Force from momentum change

A body of mass 5kg is moving with speed 10 m/s. A constant force acts on it for 5 seconds and brings it speed to 5 m/s. The magnitude of force is:

- A. 3 N
- B. 5 N ✓ **Correct answer**
- C. 15 N
- D. 30 N

A. wrong: $F = m\Delta v/t = 5 \times 5/5 = 5$ N, not 3 N.

B. correct: $F = m(v - u)/t = 5 \times (10 - 5)/5 = 5$ N.

C. wrong: the calculation gives 5 N.

D. wrong: the calculation gives 5 N.

150 Passenger falls forward in bus

A passenger standing in a bus falls forward when the bus suddenly stops. This is due to:

- A. Newton's first law ✓ **Correct answer**
- B. Newton's second law
- C. Newton's third law
- D. Law of gravitation

A. correct: the passenger falls forward because of inertia (Newton's first law) — the body tends to continue moving when the bus stops.

B. wrong: the second law relates force and acceleration; the fall is due to inertia.

C. wrong: the third law is about action and reaction.

D. wrong: gravitation does not explain the forward fall.

Question 151 Stone thrown horizontally, time to fall

A stone is thrown horizontally with a velocity of 12 m/s from the top of a vertical cliff. How long stone takes to reach the ground 45 m below? Take g =10 m/s^2

- A. 2 s
- B. 3 s ✓ **Correct answer**
- C. 4 s
- D. 5 s

A. wrong: the fall time is 3 s.

B. correct: $h = \frac{1}{2}gt^2$ gives $45 = \frac{1}{2} \times 10 \times t^2$, so $t^2 = 9$ and t = 3 s (horizontal velocity does not affect the fall time).

C. wrong: the fall time is 3 s.

D. wrong: the fall time is 3 s.

152 Force and velocity same direction, power

If the force applied on an object and its velocity are in the same direction, the power delivered to the object is:

- A. Zero
- B. Positive ✓ **Correct answer**
- C. Negative
- D. Infinite

A. wrong: power is zero only when force is perpendicular to velocity.

B. correct: P = F·v is positive when force and velocity are in the same direction.

C. wrong: power is negative when force opposes velocity.

D. wrong: the power is finite and positive.

Question 153 Magnetic flux scalar

Magnetic flux has unit but no direction because

- A. of scalar product ✓ **Correct answer**
- B. of cross product
- C. of sum of two vectors
- D. of product of two scalars

A. correct: magnetic flux Φ = B·A is a scalar product of two vectors, so it has magnitude but no direction.

B. wrong: flux is a scalar product, not a cross product.

C. wrong: flux is not a sum of vectors.

D. wrong: flux is the scalar product of two vectors (B and A).

154 Faraday's law, induced emf

According to the Faraday's law of electromagnetic induction, the magnitude of induced emf depends upon:

- A. magnetic flux
- B. magnetic induction
- C. change in magnetic flux
- D. rate of change in magnetic flux ✓ **Correct answer**

A. wrong: the induced emf depends on the rate of change of flux, not the flux itself.

B. wrong: the induced emf depends on the rate of change of flux.

C. wrong: the induced emf depends on the rate of change, not just the change.

D. correct: by Faraday's law, the magnitude of the induced emf equals the rate of change of magnetic flux.

Question 155 Lenz's law direction

Lenz's law primarily refers to the direction of:

- A. Voltage
- B. Induced current ✓ **Correct answer**
- C. Power
- D. Energy

A. wrong: Lenz's law is about the direction of the induced current.

B. correct: Lenz's law states that the induced current flows in a direction that opposes the change producing it.

C. wrong: Lenz's law does not refer to power.

D. wrong: Lenz's law does not refer to energy.

156 Capacitor in AC circuit

When a capacitor is connected to an alternating power source,

- A. the voltage leads the current by 90°
- B. the voltage lags the current by 90° ✓ **Correct answer**
- C. the voltage leads the current by 180°
- D. the voltage lags the current by 180°

A. wrong: in a capacitor the current leads the voltage.

B. correct: in a capacitor connected to AC, the voltage lags the current by 90° (current leads voltage).

C. wrong: the phase difference is 90°, not 180°.

D. wrong: the phase difference is 90°, not 180°.

Question 157 Pure inductive circuit at low frequency

In a pure inductive AC circuit at low frequency the inductive reactance will be

- A. remain same
- B. increase
- C. decrease ✓ **Correct answer**
- D. zero

A. wrong: inductive reactance $X_L = 2\pi fL$ depends on frequency.

B. wrong: at low frequency the reactance is low — it decreases as frequency falls.

C. correct: inductive reactance $X_L = 2\pi fL$ is proportional to frequency, so at low frequency it decreases.

D. wrong: the reactance is small at low frequency but not zero (unless f = 0).

158 Very high resistance of PN junction

Which type of biasing results in a very high resistance of PN junction diode?

- A. Forward biasing
- B. Reverse biasing ✓ **Correct answer**
- C. Unbiased
- D. Doping

A. wrong: forward biasing gives low resistance.

B. correct: reverse biasing gives a very high resistance in a PN junction diode (almost no current flows).

C. wrong: an unbiased junction does not show the very high resistance of reverse bias.

D. wrong: doping is the process of adding impurities, not a biasing condition.

Question 159 Energy difference per unit frequency

The energy difference per unit frequency between two consecutive quantum states is

- A. speed of light
- B. Frequency
- C. Planck's Constant ✓ **Correct answer**
- D. Mass

A. wrong: the energy difference per unit frequency is Planck's constant.

B. wrong: E = hf, so E/f = h, not frequency.

C. correct: from E = hf, the energy difference per unit frequency (ΔE/Δf) is Planck's constant h.

D. wrong: mass is not the energy difference per unit frequency.

160 Hydrogen line spectrum reason

What is the primary reason for color line spectrum of hydrogen gas?

- A. the heat energy inside gas
- B. Transition of electrons from lower to higher energy levels in gas atoms
- C. Transition of electrons from higher to lower energy levels in gas atoms ✓ **Correct answer**
- D. instability of gas atoms

A. wrong: heat energy does not produce the line spectrum.

B. wrong: absorption (lower to higher) does not produce the emission line spectrum.

C. correct: the colour line spectrum of hydrogen is produced when electrons fall from higher to lower energy levels, emitting light of specific wavelengths.

D. wrong: instability is not the reason for the line spectrum.

Question 161 Cobalt-60 decay rate under pressure

A sealed sample of Cobalt-60 is subjected to extremely high pressure in a laboratory. Its decay rate will:

- A. increase
- B. decrease
- C. remain unchanged ✓ **Correct answer**
- D. become infinite

A. wrong: pressure does not affect the decay rate.

B. wrong: pressure does not affect the decay rate.

C. correct: radioactive decay rate is a nuclear property, unaffected by pressure (or temperature or chemical state).

D. wrong: the decay rate does not become infinite.

162 Half-life 2 min, 1/8th remaining

Half-life of a radioactive element is 2 minutes. In how much time, one - eighth (1/8th) of this sample will decay?

- A. 2 minutes
- B. 4 minutes
- C. 6 minutes ✓ **Correct answer**
- D. 8 minutes

A. wrong: after 2 minutes (one half-life) half the sample remains, not one-eighth.

B. wrong: after 4 minutes (two half-lives) one-quarter remains.

C. correct: one-eighth remains after three half-lives (½ × ½ × ½ = ⅛), i.e. 3 × 2 = 6 minutes. (Note: the stem says 'one-eighth will decay' but the keyed reading is one-eighth remaining — three half-lives.)

D. wrong: after 8 minutes (four half-lives) one-sixteenth remains.

Question 163 Correct punctuation

Choose the sentence with correct punctuation:

- A. "It was a nice movie," said Kaleem. ✓ **Correct answer**
- B. "it was a nice movie, said Kaleem.
- C. "It was a nice, movie;" said Kaleem.
- D. "It was a nice movie, "said Kaleem".

A. correct: the comma goes inside the closing quotation mark and the sentence is correctly punctuated.

B. wrong: the sentence begins with a lowercase letter and the quotation is not closed.

C. wrong: the comma after 'nice' and the semicolon are misplaced.

D. wrong: the quotation marks are misplaced.

164 Preposition: walked ____ the park

"He walked _____ the park to reach school." Use correct preposition:

- A. across ✓ **Correct answer**
- B. at
- C. over
- D. on

A. correct: 'walked across the park' is the correct preposition for crossing from one side to the other.

B. wrong: 'walked at the park' is not correct here.

C. wrong: 'walked over the park' is not the natural preposition here.

D. wrong: 'walked on the park' is not correct here.

Question 165 Indirect form: Where do you live?

Choose the correct indirect form for the following sentence: "Where do you live?" he asked the old man.

- A. He asked the old man where he has lived.
- B. He asked the old man where do I live.
- C. He asked the old man where he lived. ✓ **Correct answer**
- D. He asked the old man where did he live.

A. wrong: the tense should shift to past ('lived'), not present perfect.

B. wrong: the question word order must change in indirect speech.

C. correct: in indirect speech 'Where do you live?' becomes 'where he lived' (past tense, statement word order).

D. wrong: 'did' is not used in indirect questions.

166 Infinitive after 'bade'

Complete the sentence with correct infinitive. He bade them _____ the house.

- A. For leaving
- B. Leave ✓ **Correct answer**
- C. leaving
- D. To leave

A. wrong: 'bade' does not take 'for leaving'.

B. correct: after 'bade' the bare infinitive is used — 'He bade them leave the house'.

C. wrong: the gerund is not used after 'bade'.

D. wrong: 'bade' takes the bare infinitive, not the to-infinitive.

Question 167 Correct spelling

Choose the option with correct spelling.

- A. Nusance
- B. Neusance
- C. Nuisance ✓ **Correct answer**
- D. Nuissance

A. wrong: 'Nusance' is misspelt.

B. wrong: 'Neusance' is misspelt.

C. correct: 'Nuisance' is the correct spelling.

D. wrong: 'Nuissance' is misspelt.

Question 168 Correctly structured sentence

Choose the correctly structured sentence.

e went on time, he will have caught the bus.

- B. If he had gone on time, he would have caught the bus. ✓ **Correct answer**
- C. If he had gone on time, he would catch the bus.
- D. If he has gone on time ,he would have caught the bus.

A. wrong: the tenses do not match (past + will have).

B. correct: this is the correct third conditional (past perfect + would have).

C. wrong: 'would catch' does not match 'had gone'.

D. wrong: 'has gone' does not match 'would have caught'.

Question 169 Students, along with their teacher, ___ leaving

"The students, along with their teacher, _____ leaving now." Choose the correct verb:

- A. is
- B. are ✓ **Correct answer**
- C. has
- D. was

A. wrong: the subject 'students' is plural, so the verb must be plural.

B. correct: 'The students ... are leaving now' — the verb agrees with 'students' (the phrase 'along with their teacher' does not change the number).

C. wrong: 'has' is singular and the wrong verb.

D. wrong: 'was' is singular and the wrong tense.

Question 170 Reluctance meaning

"Your reluctance to speak to the boss will create problems for you." What does "reluctance" mean in this context?

- A. Confidence

itation ✓ **Correct answer**

- C. Eagerness
- D. Competence

A. wrong: reluctance is the opposite of confidence.

B. correct: 'reluctance' means hesitation or unwillingness.

C. wrong: eagerness is the opposite of reluctance.

D. wrong: competence means ability, not reluctance.

Question 171 Silence tasted like stale bread

"The silence tasted like stale bread left too long in the cupboard" Which literary technique is most evident here?

- A. Metaphor
- B. Personification
- C. Simile ✓ **Correct answer**
- D. Alliteration

A. wrong: a metaphor says one thing IS another without 'like'; here 'like' is used.

B. wrong: silence is not given human qualities here.

C. correct: 'tasted like stale bread' compares silence to stale bread using 'like' — a simile.

D. wrong: alliteration is repetition of initial sounds, not a comparison.

Question 172 Liquid halves every hour

Initially, a quantity of the liquid is 160 ml and it reduces by half every hour. How much liquid remains after two hours?

- A. 20 ml
- B. 40 ml ✓ **Correct answer**

- D. 80 ml

A. wrong: after two hours 40 ml remains, not 20 ml.

B. correct: 160 ml → 80 ml after one hour → 40 ml after two hours.

C. wrong: the quantity halves each hour, giving 40 ml, not 60 ml.

D. wrong: 80 ml remains after one hour, not two.

Question 173 10% price increase on Rs. 2500

An item originally costs Rs. 2500. After a 10% price increase, what is the new price?

- A. Rs. 2250
- B. Rs. 2700
- C. Rs. 2750 ✓ **Correct answer**
- D. Rs. 2800

A. wrong: Rs. 2250 is a 10% decrease, not an increase.

B. wrong: 2500 + 200 = 2700 is an 8% increase, not 10%.

C. correct: 10% of 2500 is 250, so the new price is 2500 + 250 = Rs. 2750.

D. wrong: the new price is Rs. 2750, not Rs. 2800.

Question 174 Deduction from 'If you work hard, you will pass' — official key error corrected

If you work hard, you will pass the exam. Which of the following statements can be deduced from the above statement? I: If you don't work hard, you will not pass the exam. II: If you don't pass the exam, you have not worked hard.

- A. only I

/ II ✓ **Correct answer**

- C. both I and II
- D. neither I nor II

A. wrong: statement I is the inverse ('if not P then not Q'), which does not follow.

B. correct: 'If P then Q' is logically equivalent to its contrapositive 'if not Q then not P' (statement II), but not to the inverse (statement I). The official Code-2 key lists C, which is wrong.

C. wrong: only statement II follows; statement I (the inverse) does not follow from the conditional.

D. wrong: statement II (the contrapositive) does follow. (Official-key error: official Code-2 key C corrected to B on the contrapositive rule; decided by assistant under owner's 8 Nov 2026 delegation.)

Question 175 Square root of 30 − 5

If 5 is subtracted from 30, what will be the square root of remaining?

- A. 25
- B. 30
- C. 5 ✓ **Correct answer**
- D. 10

A. wrong: 30 − 5 = 25, but the question asks for its square root, which is 5.

B. wrong: the square root of 25 is 5, not 30.

C. correct: 30 − 5 = 25, and √25 = 5.

D. wrong: the square root of 25 is 5, not 10.

176 Course of action: staff shortage

Statement: A hospital staff shortage is causing long patient waiting times. Course of Action: I. Hire temporary staff and reschedule duties to manage the patient's workload. II. Close the hospital until full staffing is restored.

- A. Only I follows ✓ **Correct answer**
- B. Only II follows
- C. Both I and II follows
- D. Neither follows

A. correct: hiring temporary staff and rescheduling duties (I) is a practical course of action; closing the hospital (II) is not.

B. wrong: closing the hospital is not a sensible course of action.

C. wrong: only I follows.

D. wrong: course of action I does follow.

Question 177 Realistic course of action

What makes a course of action realistic and executable?

- A. Minimal risk
- B. Attainable goals, detailed steps, and availability of appropriate resources ✓ **Correct answer**
- C. High expenses
- D. Unclear execution plans

A. wrong: minimal risk alone does not make a course of action realistic and executable.

B. correct: a course of action is realistic and executable when its goals are attainable, its steps are detailed, and the needed resources are available.

C. wrong: high expenses do not make a course of action realistic.

unclear plans make a course of action unrealistic.

Question 178 Positive thinking and social behaviour

How does positive thinking influence social behavior?

- A. It encourages social conflicts among the people.
- B. It encourages mutual respect among the people. ✓ **Correct answer**
- C. It develops self-centeredness among the people.
- D. It encourages isolation among the people.

A. wrong: positive thinking reduces conflict, it does not encourage it.

B. correct: positive thinking encourages mutual respect among people.

C. wrong: positive thinking does not develop self-centredness.

D. wrong: positive thinking encourages engagement, not isolation.

Question 179 Four persons in a line, B first, D third

In how many way(s), four persons A, B, C and D can stand in a line, if B must be at first and D is at third position?

- A. 1
- B. 2 ✓ **Correct answer**
- C. 3
- D. 4

A. wrong: there are 2 ways, not 1.

B. correct: B is fixed first and D is fixed third, leaving A and C to fill positions 2 and 4 in 2! = 2 ways.

C. wrong: there are 2 ways, not 3.

D. wrong: there are 2 ways, not 4.

180 Eman, Ayesha and Khadijah books

Eman has 4 times as many books as Ayesha and 5 times as many as Khadijah. If Khadijah has more than 40 books, what is the least number of books that Eman could have?

- A. 200
- B. 205
- C. 210
- D. 220 ✓ **Correct answer**

A. wrong: 200 would mean Khadijah has 40 books, but she has more than 40.

B. wrong: Eman's books must be a multiple of both 4 and 5.

C. wrong: 210 is not divisible by 4.

D. correct: Eman has 5 times Khadijah's books and 4 times Ayesha's, so her total is a multiple of 20; with Khadijah above 40, the smallest such total is 220 (Khadijah 44, Ayesha 55).

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