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BIO · BIOLOGY

13. Chemical Coordination

Official PMDC Solved Past Paper Topical Booklet · High-Yield Examination Series

50 Solved Questions

2014 to 2024 Archive

Boards: BUMHS, DUHS, KMU, MDCAT, NUMS, PMDC

Weightage: 34% of MDCAT (68 MCQs)

Curated by Ibrahim for fellow bees. Every question in this chapter has been verified against official UHS, NUMS, SZABMU, DUHS, and KMU answer keys. Propolis cognitive autopsies are provided at the end of this booklet to explain core concepts and break down common distractor traps.

OFFICIAL SOLVED EDITION**Q1.**

SZABMU 2024

Which of the following gland/s is/are mostly responsible for releasing stress hormones?

- (A) Adrenal glands
- (B) Thyroid gland
- (C) Pituitary gland
- (D) Thymus gland

Q2.

SZABMU 2024

Which pathway will be followed by water soluble hormone for crossing plasma membrane?

- (A) Receptor → 2nd messenger → Activation of energy
- (B) 2nd messenger → Receptor → Activation of energy
- (C) Activation of energy → Receptor → 2nd messenger
- (D) Receptor → Activation of energy → 2nd messenger

Q3.

SZABMU 2024

Which is a steroid hormone?

- (A) Cortisone
- (B) Adrenaline
- (C) Insulin
- (D) Thyroxin

Q4.

UHS 2024

Posterior lobe of pituitary produce:

- (A) Antidiuretic Hormone (ADH)
- (B) Thyroid Stimulating Hormone (TSH)
- (C) Adreno Corticotrophic Hormone (ACTH)
- (D) Follicle Stimulating Hormone (FSH)

Q5.

UHS 2024

Insulin converts glucose into:

- (A) Vitamins
- (B) Minerals
- (C) Lipids
- (D) Cortisone

Q6.

SZABMU 2024

Which of the following hormone has the greater influence on peripheral vasoconstriction?

- (A) Nor-epinephrine
- (B) Parathormone
- (C) Epinephrine
- (D) Corticosteroids

Q7.

NUMS 2024

Which disorder would be diagnosed by a doctor on seeing a patient with thick and dry skin, puffy eyes and low metabolic rate?

- (A) Myxedema
- (B) Cretinism
- (C) Cushing's disease
- (D) Addison's disease

Q8.

NUMS 2024

Choose the one NOT related to hyperparathyroidism:

- (A) Kidney stones
- (B) Hypercalcemia
- (C) Weakness of muscles
- (D) Tetany

Q9.

NUMS 2024

Which of the following is an example of negative feedback mechanism?

- (A) Control of body temperature
- (B) Aggregation of platelets during wound healing
- (C) Labor contraction
- (D) Milk secretion during suckling

Q10.

NUMS 2024

A desert mammal faces severe dehydration in hot sunny day. Which internal condition would lead to secretion of ADH?

- (A) High osmotic pressure of blood
- (B) High blood pressure
- (C) Low osmotic pressure of blood
- (D) Low solute potential of blood

Q11.

SZABMU 2024

The neurosecretory cells are found in the:

- (A) Hypothalamus
- (B) Pineal gland
- (C) Pituitary gland
- (D) Thalamus

Q12.

SZABMU 2024

When a person intakes excess sugar diet his/her insulin level rises to:

- (A) Increase permeability of surface membrane
- (B) Increase blood glucose level
- (C) Deactivates enzymes in cells
- (D) Converts glycogen to glucose

Q13.

SZABMU 2024

Which body function is controlled through positive feedback mechanism?

- (A) Labor contractions
- (B) Body temperature
- (C) Insulin production
- (D) Thyroxin release

Q14.

UHS 2023

What is true about Oxytocin?

- (A) Acts on kidney tubules
- (B) Stimulates ICSH
- (C) Perform cellular fun
- (D) Dilate milk ducts of mammary glands

Q15.

SZABMU 2023

Hormone released during child birth and in nursing women is:

- (A) Estrogen
- (B) Progesterone
- (C) Calcitonin
- (D) Oxytocin

Q16.

SZABMU 2023

Which is not a function of testosterone?

- (A) Limit spermatogenesis
- (B) Sperm production
- (C) Inhibition of LH
- (D) Inhibition of FSH

Q17.

KMU 2023

FSH stimulates spermatogenesis by stimulating ____ cells to complete the development of sperms.

- (A) Sertoli
- (B) Inhibin
- (C) Leydig
- (D) TSH

Q18.

NUMS 2023

Hormone secreted in bulk due to decreased water content of blood is:

- (A) ADH
- (B) Oxytocin
- (C) Glucagon
- (D) Thyroxin

Q19.

KMU 2023

The term polydipsia refers to:

- (A) A condition in which abnormally large volume of urine is produced
- (B) A condition of excessive thirst
- (C) condition of excessive hunger
- (D) A condition in which the concentration of blood decreases in the body

Q20.

NUMS 2023

Endorphins are produced in:

- (A) Brain
- (B) Adrenal gland
- (C) Stomach
- (D) Thymus

Q21.

NUMS 2023

The hormone responsible for production of sperm cells and male secondary sexual characteristics is:

- (A) Estrogen
- (B) Progesterone
- (C) Testosterone
- (D) Thyroxin

Q22.

NUMS 2023

Which hormone is chemically steroid?

- (A) ADH
- (B) Thyroxin
- (C) Cortisone
- (D) Insulin

Q23.

UHS 2023

Production of Follicle-stimulating hormone and Luteinizing hormone from the pituitary gland of female is controlled by:

- (A) Ovary
- (B) Uterus
- (C) Stimulated follicles
- (D) Hypothalamus

Q24.

SZABMU 2023

Which body function is controlled through positive feed-back mechanism?

- (A) Labor pains
- (B) Body temperature
- (C) Insulin production
- (D) Thyroxin release

Q25.

NUMS 2023

Under activity of parathyroid glands causes a drop in blood of:

- (A) Mg^{2+}
- (B) Na^{+}
- (C) K^{+}
- (D) Ca^{2+}

Q26.

SZABMU 2023

Follicle Stimulating hormones (FSH) is secreted by:

- (A) Pituitary gland
- (B) Ovary
- (C) Adrenal gland
- (D) Testes

Q27.

KMU 2023

Which of the following hormone is released by the posterior lobe of pituitary gland?

- (A) Antidiuretic hormone
- (B) Growth hormone
- (C) Estrogen
- (D) Prolactin

Q28.

KMU 2023

The hormone "calcitonin" is secreted by:

- (A) Thyroid gland
- (B) Parathyroid gland
- (C) Pancreas
- (D) Adrenal gland

Q29.

KMU 2023

In breast feeding mother, which hormone would be at an increased level?

- (A) Prolactin
- (B) Thyroxine
- (C) Aldosterone
- (D) Insulin

Q30.

UHS 2022

Hormone produced by placenta is:

- (A) Follicle stimulating hormone (FSH)
- (B) Luteinizing hormone (LH)
- (C) Progesterone
- (D) Testosterone

Q31.

SZABMU 2022

Vasopressin is an example of:

- (A) Steroid hormone
- (B) Catecholamine
- (C) Peptide hormone
- (D) Glycoprotein

Q32.

KMU 2022

Hormone are usually:

- (A) Genetical messengers
- (B) Physical messengers
- (C) Chemical messengers
- (D) Biological catalyst

Q33.

UHS 2022

A hormone that plays a major role in social bonding, childbirth, milk ejection and sexual reproduction is:

- (A) Oxytocin
- (B) Estrogen
- (C) Prolactin
- (D) Secretin

Q34.

SZABMU 2022

Posterior lobe of pituitary gland produces:

- (A) Oxytocin
- (B) Thyroid stimulating hormone
- (C) Adrenocorticotrophic hormone
- (D) Follicle stimulating hormone

Q35.

SZABMU 2022

Tetany is caused by _ in blood.

- (A) Low Ca^{2+}
- (B) High Ca^{2+}
- (C) Low Mg^{2+}
- (D) High Mg^{2+}

Q36.

KMU 2022

Which of the following lobes of the pituitary gland is known as master gland of the body?

- (A) Anterior gland
- (B) Posterior gland
- (C) Intermediate gland
- (D) Anterio-posterial gland

Q37.

BUMHS 2022

Acromegaly is caused due to over secretion of:

- (A) STH
- (B) TSH
- (C) ICSH
- (D) FSH

Q38.

DUHS 2022

It has neurosecretory cells that secrete releasing and inhibiting hormone:

- (A) Hypothalamus
- (B) Thyroid gland
- (C) Adrenal gland
- (D) Pituitary gland

Q39.

PMDC 2020

Which of the following neurotransmitters function, both as neurotransmitter and hormones, decreasing our perception of pain?

- (A) Epinephrine
- (B) Dopamine
- (C) Serotonin
- (D) Endorphins

Q40.

PMDC 2020

Which body function is controlled through positive feedback mechanism?

- (A) Labour contractions
- (B) Insulin production
- (C) Body temperature
- (D) Thyroxin release

Q41.

KMU 2019

Chemically hormones are:

- (A) Carbohydrates
- (B) Proteins
- (C) Steroids
- (D) Both Proteins and Steroids

Q42.

SZABMU 2019

When secretion of ADH is increased, the amount of water reabsorbed is:

- (A) Increased
- (B) Maintained
- (C) Decreased
- (D) Has no effect on reabsorption

Q43.

KMU 2019

In male luteinizing hormone is also known as:

- (A) ACTH
- (B) ICSH
- (C) TRF
- (D) MSH

Q44.

KMU 2019

The deficiency of which micro-nutrient causes goiter formation?

- (A) Iron
- (B) Zinc
- (C) Iodine
- (D) Sodium

Q45.

KMU 2019

A man has to face interview, but during his first five minutes before the interview he experiences sweating, increased heart rate and respiration. Which hormone is responsible for his restlessness?

- (A) Epinephrine and nor-epinephrine
- (B) Insulin and glucagon
- (C) Adrenocorticotrophic hormone
- (D) Aldosterone

Q46.

PMDC 2018

Pituitary gland releases *hormone and hormone* while ovaries produce _ and progesterone.

- (A) FSH, LH and estrogen
- (B) Estrogen, FSH and LH
- (C) LH, estrogen and FSH
- (D) FSH, estrogen and LH

Q47.

MDCAT 2016

_____ hormone is antagonistic to insulin and causes increase in blood glucose level.

- (A) Glucagon
- (B) Calcitonin
- (C) Nor-epinephrine
- (D) Thyroxin

Q48.

MDCAT 2015

α -cells of pancreas secrete a hormone known as:

- (A) Glucagon
- (B) Gastrin
- (C) Insulin
- (D) Rennin

Q49.

PMDC 2014

Destruction of all beta cells in the pancreas would cause:

- (A) Insulin secretion to stop and an increase in blood glucose
- (B) Glucagon secretion to stop and a decrease in blood glucose
- (C) Glucagon secretion to stop and an increase in blood glucose
- (D) Insulin secretion to stop and a decrease in blood glucose

Q50.

MDCAT 2014

Which one of the following is a steroid hormone?

- (A) Glucagon
- (B) Epinephrine
- (C) Thyroxin
- (D) Estrogen

RAPID 5–COLUMN ANSWER KEY

Official PMDC verified answer keys for 13. Chemical Coordination.

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Q#	KEY	BOARD	Q#	KEY	BOARD	Q#	KEY	BOARD	Q#	KEY	BOARD	Q#	KEY	BOARD
1	A	SZABMU 2024	11	A	SZABMU 2024	21	C	NUMS 2023	31	C	SZABMU 2022	41	D	KMU 2019
2	A	SZABMU 2024	12	A	SZABMU 2024	22	C	NUMS 2023	32	C	KMU 2022	42	A	SZABMU 2019
3	A	SZABMU 2024	13	A	SZABMU 2024	23	D	UHS 2023	33	A	UHS 2022	43	B	KMU 2019
4	A	UHS 2024	14	D	UHS 2023	24	A	SZABMU 2023	34	A	SZABMU 2022	44	C	KMU 2019
5	C	UHS 2024	15	D	SZABMU 2023	25	D	NUMS 2023	35	A	SZABMU 2022	45	A	KMU 2019
6	A	SZABMU 2024	16	A	SZABMU 2023	26	A	SZABMU 2023	36	A	KMU 2022	46	A	PMDC 2018
7	A	NUMS 2024	17	A	KMU 2023	27	A	KMU 2023	37	A	BUMHS 2022	47	A	MDCAT 2016
8	D	NUMS 2024	18	A	NUMS 2023	28	A	KMU 2023	38	A	DUHS 2022	48	A	MDCAT 2015
9	A	NUMS 2024	19	B	KMU 2023	29	A	KMU 2023	39	D	PMDC 2020	49	A	PMDC 2014
10	A	NUMS 2024	20	A	NUMS 2023	30	C	UHS 2022	40	A	PMDC 2020	50	D	MDCAT 2014

TOTAL
MCQS

50

CORRECT

INCORRECT

BLANK

ACCURACY

%

Scan the booklet QR code to enter answers in
BeambePrep Grind Mode for automated error
autopsies.

PROPOLIS COGNITIVE ERROR AUTOPSIES

Step-by-step conceptual derivations, formula working, and distractor autopsies for every question.

Question #1 Key: (A)

SZABMU 2024

Which of the following gland/s is/are mostly responsible for releasing stress hormones?

CORE CONCEPT AND DERIVATION

The human body relies on a specialized pair of glands situated atop the kidneys to manage both acute and chronic stress.

Solution:

- The **adrenal glands** are structurally divided into two parts that both handle stress:
- The inner medulla releases epinephrine (adrenaline) to handle immediate, life-threatening "fight-or-flight" stress.
- The outer cortex releases cortisol (a glucocorticoid) to manage long-term, chronic stress.

Why other options are incorrect:

The pituitary commands the adrenals but doesn't release the final stress effectors. The thyroid controls basal metabolism.

Question #2 Key: (A)

SZABMU 2024

Which pathway will be followed by water soluble hormone for crossing plasma membrane?

CORE CONCEPT AND DERIVATION

Hormone signaling mechanisms depend entirely on whether the hormone is lipid-soluble (can penetrate membranes) or water-soluble (cannot penetrate).

Solution:

- Because water-soluble (peptide) hormones cannot push through the hydrophobic lipid bilayer, they must bind to a surface **Receptor**.
- This binding activates an intracellular **2nd messenger** molecule (like cyclic AMP).
- The 2nd messenger then cascades through the cytoplasm, resulting in the **Activation of cellular enzymes/energy** to alter the cell's function.

Why other options are incorrect:

The order is strictly chronological: outside receptor first, inside messenger second, physiological change last.

Question #3 Key: (A)

SZABMU 2024

Which is a steroid hormone?

CORE CONCEPT AND DERIVATION

Steroid hormones are synthesized exclusively by the gonads, placenta, and adrenal cortex.

Solution:

- **Cortisone** is a powerful glucocorticoid produced in the adrenal cortex.
- Because its chemical backbone is constructed from cholesterol, it falls squarely into the steroid classification.

Why other options are incorrect:

Insulin is a large protein. Adrenaline and thyroxine are modified amino acids (amines). None of these share the 4-ring cholesterol structure of a steroid.

Question #4 Key: (A)

UHS 2024

Posterior lobe of pituitary produce:

CORE CONCEPT AND DERIVATION

The neurohypophysis acts as a storage reservoir rather than a true secretory factory.

Solution:

- While technically synthesized by hypothalamic nuclei, **Antidiuretic Hormone (ADH)** travels down axonal tracts and is released into the systemic circulation exclusively by the posterior lobe of the pituitary.

Why other options are incorrect:

TSH, ACTH, and FSH are exclusively synthesized and secreted by the anterior lobe (adenohypophysis).

Question #5 Key: (C)

UHS 2024

*Insulin converts glucose into:***CORE CONCEPT AND DERIVATION**

Insulin is the primary anabolic hormone of the body, designed to lock away excess energy when food is abundant.

Solution:

- When blood glucose is high, insulin first drives the liver and muscles to convert glucose into glycogen.
- Once glycogen stores are full, insulin forces the liver to convert all remaining excess glucose into fatty acids, which are stored in adipose tissue as triglycerides (**lipids**).

Why other options are incorrect:

The human body cannot synthesize minerals, and it only synthesizes a few vitamins (not from glucose). Glucose is not converted into cortisone.

Question #6 Key: (A)

SZABMU 2024

*Which of the following hormone has the greater influence on peripheral vasoconstriction?***CORE CONCEPT AND DERIVATION**

Blood pressure regulation during shock or stress relies on the constriction of peripheral blood vessels to shunt blood to vital organs.

Solution:

- While adrenaline (epinephrine) dilates vessels in skeletal muscle, **Norepinephrine** (noradrenaline) has an incredibly high affinity for alpha-1 adrenergic receptors located on the smooth muscle of peripheral blood vessels.
- This causes profound and widespread **peripheral vasoconstriction**, dramatically spiking blood pressure.

Why other options are incorrect:

Epinephrine has mixed dilatory and constrictive effects. Parathormone regulates calcium. Corticosteroids manage long-term stress and metabolism.

Question #7 Key: (A)

NUMS 2024

*Which disorder would be diagnosed by a doctor on seeing a patient with thick and dry skin, puffy eyes and low ...***CORE CONCEPT AND DERIVATION**

Thyroid hormones are the body's metabolic engine. A lack of these hormones drastically slows down all cellular processes.

Solution:

- Severe hypothyroidism in an adult is clinically termed **Myxedema**.
- Without thyroxine, the metabolic rate crashes. The body accumulates mucopolysaccharides under the skin, which trap water and create a distinct puffy appearance (especially around the eyes), accompanied by lethargy and dry skin.

Why other options are incorrect:

Cretinism is hypothyroidism in *infants* (causing dwarfism and retardation). Cushing's and Addison's relate to adrenal cortisol imbalances, not primary metabolic crash.

Question #8 Key: (D)

NUMS 2024

*Choose the one NOT related to hyperparathyroidism:***CORE CONCEPT AND DERIVATION**

Symptoms of parathyroid hormone dysfunction.

Solution: Hyperparathyroidism leads to hypercalcemia, muscle weakness, and kidney stones. **Tetany** is caused by hypocalcemia (hypoparathyroidism), making it unrelated to hyperparathyroidism.

Question #9 Key: (A)

NUMS 2024

Which of the following is an example of negative feedback mechanism?

CORE CONCEPT AND DERIVATION

Biological negative feedback serves to maintain homeostasis by reversing any deviation from an ideal set-point.

Solution:

- If a person steps into a freezing environment, core temperature drops. The hypothalamus detects this and triggers shivering to generate heat.
- Once the body warms back up to 37°C, the shivering stops. Because the response (heat) turned off the initial stimulus (cold), the **control of body temperature** is a perfect negative feedback loop.

Why other options are incorrect:

Platelet aggregation, labor contractions, and milk let-down are all classic examples of *positive* feedback, where the body amplifies the response until a final event occurs.

Question #10 Key: (A)

NUMS 2024

A desert mammal faces severe dehydration in hot sunny day. Which internal condition would lead to secretion of...

CORE CONCEPT AND DERIVATION

Osmotic pressure refers to how "salty" or concentrated a solution is. Water loss drives this pressure up.

Solution:

- As the mammal sweats and exhales water vapor in the hot desert, it loses pure water from its plasma, leaving the salts behind.
- This thickens the blood, resulting in a dangerously **high osmotic pressure**. Osmoreceptors in the hypothalamus shrink in response to this hypertonic blood and fire signals to release ADH to save whatever water is left in the kidneys.

Why other options are incorrect:

Dehydration causes *low* blood pressure. Low osmotic pressure would mean the blood is too watery, which would inhibit ADH, not stimulate it.

Question #11 Key: (A)

SZABMU 2024

The neurosecretory cells are found in the:

CORE CONCEPT AND DERIVATION

The integration of the nervous system and the endocrine system occurs at a specific anatomical bridge in the brain.

Solution:

- The **hypothalamus** bridges these systems using neurosecretory cells—specialized neurons that conduct action potentials but release hormones (like ADH, oxytocin, and releasing factors) into the blood instead of neurotransmitters into a synapse.

Why other options are incorrect:

The pituitary gland is comprised of classical glandular tissue and axon terminals, but the actual cell bodies of the neurosecretory neurons reside firmly inside the hypothalamus.

Question #12 Key: (A)

SZABMU 2024

When a person intakes excess sugar diet his/her insulin level rises to:

CORE CONCEPT AND DERIVATION

Glucose cannot passively diffuse into most mammalian cells; it requires a transport protein.

Solution:

- A massive sugar spike triggers the pancreas to release large volumes of insulin.
- Insulin binds to tyrosine-kinase receptors on muscle and fat cells, signaling vesicles packed with GLUT4 transporter proteins to fuse with the cell membrane.
- This physically **increases the permeability of the surface membrane** to glucose, allowing it to rush out of the blood and into the cells for energy or storage.

Why other options are incorrect:

Insulin decreases (not increases) blood glucose. It activates (not deactivates) glycogen synthesis enzymes, and it converts glucose to glycogen, not the reverse.

Question #13 Key: (A)

SZABMU 2024

Which body function is controlled through positive feedback mechanism?

CORE CONCEPT AND DERIVATION

Positive feedback systems are highly unstable and are only utilized when the body needs a rapid, explosive conclusion to a biological event.

Solution:

- **Labor contractions** are driven by the hormone oxytocin. As the baby's head presses on the cervix, it sends nerve impulses to the brain to release oxytocin, which makes the uterus contract harder, pushing the baby further down, triggering even more oxytocin.
- This self-amplifying loop only terminates once the physical stretch is removed (i.e., the baby is born).

Why other options are incorrect:

Every other biological variable listed (temperature, glucose, metabolic rate) must be strictly maintained at a constant level, which is exclusively achieved via negative feedback.

Question #14 Key: (D)

UHS 2023

What is true about Oxytocin?

CORE CONCEPT AND DERIVATION

Oxytocin targets specific smooth muscle tissues in the female reproductive system.

Solution:

- In lactating mothers, suckling triggers the release of oxytocin from the posterior pituitary.
- Oxytocin reaches the mammary glands via the blood and binds to myoepithelial cells, causing them to contract and **dilate the milk ducts**, forcefully ejecting the milk (let-down reflex).

Why other options are incorrect:

ADH (not oxytocin) acts on kidney tubules. GnRH stimulates ICSH. It has no generalized "cellular fun" role.

Question #15 Key: (D)

SZABMU 2023

Hormone released during child birth and in nursing women is:

CORE CONCEPT AND DERIVATION

A single hormone coordinates both the delivery of a newborn and its subsequent nourishment.

Solution:

- **Oxytocin** is massively released during childbirth to force the uterus to contract.
- Immediately following birth, the same hormone is utilized during nursing to squeeze milk out of the alveolar ducts in the breast.

Why other options are incorrect:

Progesterone levels actually plummet right before childbirth. Calcitonin is for bone mineralization.

Question #16 Key: (A)

SZABMU 2023

Which is not a function of testosterone?

CORE CONCEPT AND DERIVATION

Testosterone is a critical androgen responsible for male sexual development and continuous sperm generation.

Solution:

- Testosterone works synergistically with FSH to actively promote and sustain high rates of sperm production (spermatogenesis).
- It does **NOT** limit spermatogenesis. High systemic levels of testosterone will inhibit pituitary LH via negative feedback, but locally in the testes, it is an absolute requirement for making sperm.

Why other options are incorrect:

Because testosterone supports sperm production and negatively inhibits LH/FSH, options B, C, and D are true physiological functions, making A the false statement.

Question #17 Key: (A)

KMU 2023

FSH stimulates spermatogenesis by stimulating _____ cells to complete the development of sperms.

CORE CONCEPT AND DERIVATION

In the testes, different pituitary hormones target very specific somatic cells to orchestrate reproduction.

Solution:

- Follicle Stimulating Hormone (FSH) acts directly on the **Sertoli cells** (often called nurse cells) located inside the seminiferous tubules.
- Sertoli cells respond by producing androgen-binding protein (ABP) and providing the necessary nutrients and environment for spermatids to mature into fully developed spermatozoa.

Why other options are incorrect:

LH targets Leydig cells to make testosterone. Inhibin is a hormone secreted by Sertoli cells, not a cell type itself.

Question #18 Key: (A)

NUMS 2023

Hormone secreted in bulk due to decreased water content of blood is:

CORE CONCEPT AND DERIVATION

The body must continuously balance water intake and output. Dehydration shrinks blood volume and concentrates solutes.

Solution:

- When blood water content drops, osmolarity rises. Hypothalamic osmoreceptors detect this thick, salty blood.
- They trigger the posterior pituitary to secrete bulk quantities of **Antidiuretic Hormone (ADH)**. ADH forces the kidneys to reabsorb water, pulling it back into the blood to prevent fatal dehydration.

Why other options are incorrect:

Glucagon and thyroxin deal with metabolic energy, not osmoregulation. Oxytocin is for reproduction.

Question #19 Key: (B)

KMU 2023

The term polydipsia refers to:

CORE CONCEPT AND DERIVATION

Medical terminology for diabetic symptoms relates to three classic "poly" signs: polyuria, polydipsia, and polyphagia.

Solution:

- Due to massive fluid loss from frequent urination (polyuria), patients with uncontrolled diabetes become severely dehydrated.
- This dehydration triggers an unquenchable, relentless desire to drink water, a clinical symptom known as **polydipsia** (excessive thirst).

Why other options are incorrect:

Large urine volume is polyuria. Excessive hunger is polyphagia.

Question #20 Key: (A)

NUMS 2023

Endorphins are produced in:

CORE CONCEPT AND DERIVATION

Endorphins are endogenous opioid neuropeptides that act as natural analgesics (painkillers).

Solution:

- Endorphins are primarily synthesized and stored within the central nervous system, specifically in the pituitary gland and the hypothalamus of the **brain**.
- They are released in response to pain, stress, or intense physical exercise (causing "runner's high").

Why other options are incorrect:

The adrenal gland handles adrenaline and cortisol. The thymus manages T-cell maturation, and the stomach secretes digestive juices.

Question #21 Key: (C)

NUMS 2023

The hormone responsible for production of sperm cells and male secondary sexual characteristics is:

CORE CONCEPT AND DERIVATION

Secondary sexual characteristics are the physical traits that distinguish biological males and females, manifesting at puberty.

Solution:

- **Testosterone**, an androgen produced by the testes, drives the entire physical masculinization of the body.
- It not only ensures the continued production of sperm but also deepens the voice, increases muscle mass, and promotes facial and body hair growth.

Why other options are incorrect:

Estrogen and progesterone dictate female reproductive cycles and characteristics.

Question #22 Key: (C)

NUMS 2023

Which hormone is chemically steroid?

CORE CONCEPT AND DERIVATION

Hormone chemical classification determines whether a hormone can pass through a lipid bilayer.

Solution:

- Any hormone secreted by the adrenal cortex or the gonads is generally a steroid.
- **Cortisone** is a glucocorticoid produced by the adrenal cortex. Because it is synthesized from cholesterol, it is a lipid-soluble steroid hormone.

Why other options are incorrect:

Insulin and ADH are water-soluble peptides. Thyroxine is an amine derived from tyrosine.

Question #23 Key: (D)

UHS 2023

Production of Follicle-stimulating hormone and Luteinizing hormone from the pituitary gland of female is contr...

CORE CONCEPT AND DERIVATION

The pituitary gland does not act autonomously; it requires clearance from a higher neural center to release its gonadotropins.

Solution:

- The master controller of the reproductive axis is the **hypothalamus**.
- It secretes Gonadotropin-Releasing Hormone (GnRH) into the portal circulation, which directly commands the anterior pituitary to synthesize and release FSH and LH into the general bloodstream.

Why other options are incorrect:

The ovary and stimulated follicles provide *feedback* to the hypothalamus and pituitary, but the actual direct stimulatory control of pituitary output comes from the hypothalamus.

Question #24 Key: (A)

SZABMU 2023

Which body function is controlled through positive feed-back mechanism?

CORE CONCEPT AND DERIVATION

Positive feedback mechanisms are rare in biology because they rapidly drive physiological variables to extremes.

Solution:

- **Labor pains (contractions)** represent one of the few essential positive feedback loops.
- The pain/stretch of the cervix causes a massive surge in oxytocin, which creates an even harder contraction, causing more stretch, more pain, and more oxytocin, ending only when the infant is expelled.

Why other options are incorrect:

Body temperature and metabolic hormone levels (insulin, thyroxine) must be kept strictly stable via negative feedback.

Question #25 Key: (D)

NUMS 2023

Under activity of parathyroid glands causes a drop in blood of:

CORE CONCEPT AND DERIVATION

The four tiny parathyroid glands on the back of the thyroid are the body's primary calcium regulators.

Solution:

- They secrete Parathyroid Hormone (PTH), which aggressively extracts calcium from the bones to raise blood calcium levels.
- If these glands are underactive (hypoparathyroidism), PTH is absent. The bones stop releasing calcium, and the kidneys excrete too much of it, resulting in a dangerous drop in blood **calcium ions** (Ca^{2+}).

Why other options are incorrect:

Sodium and potassium balance are regulated by aldosterone from the adrenal glands, not the parathyroids.

Question #26 Key: (A)

SZABMU 2023

Follicle Stimulating hormones (FSH) is secreted by:

CORE CONCEPT AND DERIVATION

Tropic hormones are signaling molecules that target other endocrine glands rather than direct physiological tissues.

Solution:

- FSH is a glycoprotein gonadotropin. It is synthesized by the gonadotropic cells situated in the anterior lobe of the **pituitary gland**.
- Once secreted, it travels to the gonads (ovaries or testes) to initiate gametogenesis.

Why other options are incorrect:

The ovaries and testes are the targets of FSH, not the source. The adrenal gland handles stress and mineral balance.

Question #27 Key: (A)

KMU 2023

Which of the following hormone is released by the posterior lobe of pituitary gland?

CORE CONCEPT AND DERIVATION

The posterior pituitary is essentially an extension of hypothalamic nervous tissue that stores two specific hormones.

Solution:

- The only two hormones released by the posterior pituitary are oxytocin and **Antidiuretic Hormone (ADH/Vasopressin)**.

Why other options are incorrect:

Growth hormone and prolactin are synthesized in the anterior pituitary. Estrogen is produced by the ovaries.

Question #28 Key: (A)

KMU 2023

The hormone "calcitonin" is secreted by:

CORE CONCEPT AND DERIVATION

Thyroid parafollicular cell endocrine output.

Solution: Calcitonin is synthesized and secreted by the parafollicular cells (C-cells) of the **Thyroid gland** to lower blood calcium levels.

Question #29 Key: (A)

KMU 2023

In breast feeding mother, which hormone would be at an increased level?

CORE CONCEPT AND DERIVATION

Lactation requires sustained physiological changes to continuously produce nutrition for the newborn.

Solution:

- Suckling by the infant strongly inhibits dopamine release from the hypothalamus, which removes the brakes on the anterior pituitary.
- This causes a massive and sustained increase in **prolactin** levels, which commands the mammary alveolar cells to continuously synthesize milk.

Why other options are incorrect:

While oxytocin is also elevated for milk let-down, prolactin is the primary hormone driving the actual production process. Thyroxine, aldosterone, and insulin do not surge specifically for the mechanics of breastfeeding.

Question #30 Key: (C)

UHS 2022

*Hormone produced by placenta is:***CORE CONCEPT AND DERIVATION**

The placenta acts as a temporary, vital endocrine gland during pregnancy to support fetal development and maintain the uterine environment.

Solution:

- During pregnancy, the placenta secretes high levels of **progesterone**, estrogen, and human chorionic gonadotropin (hCG).
- Progesterone is absolutely critical for maintaining the thick endometrial lining and preventing premature uterine contractions.

Why other options are incorrect:

FSH and LH are secreted by the anterior pituitary gland, while testosterone is primarily produced by the Leydig cells in the testes.

Question #31 Key: (C)

SZABMU 2022

*Vasopressin is an example of:***CORE CONCEPT AND DERIVATION**

Vasopressin, also known as Antidiuretic Hormone (ADH), regulates water reabsorption in the kidneys.

Solution:

- Vasopressin is synthesized in the hypothalamus and consists of a short chain of exactly 9 amino acids.
- Because it is composed of a short amino acid chain, it is structurally classified as a **peptide hormone**.

Why other options are incorrect:

It is not a steroid (which is lipid-based), not a catecholamine (like adrenaline), and not a glycoprotein (which would have attached carbohydrate chains like FSH).

Question #32 Key: (C)

KMU 2022

*Hormone are usually:***CORE CONCEPT AND DERIVATION**

The endocrine system regulates the body through the secretion of highly specific molecules into the extracellular fluid.

Solution:

- Hormones act as **chemical messengers** that travel through the bloodstream to bind to specific receptors on distant target cells, eliciting a physiological response.

Why other options are incorrect:

Biological catalysts are enzymes, which speed up biochemical reactions but do not act as long-distance communicators. Hormones are chemical, not physical or strictly genetic messengers.

Question #33 Key: (A)

UHS 2022

*A hormone that plays a major role in social bonding, childbirth, milk ejection and sexual reproduction is:***CORE CONCEPT AND DERIVATION**

Oxytocin is a potent peptide hormone synthesized in the hypothalamus and released by the posterior pituitary gland.

Solution:

- Often referred to as the "bonding hormone", oxytocin is critical for uterine contractions during labor (positive feedback) and stimulates the myoepithelial cells in mammary glands to cause milk ejection (let-down reflex).
- It also plays a significant psychological role in social bonding and maternal behaviors.

Why other options are incorrect:

Prolactin stimulates milk *production* (not ejection). Estrogen develops female secondary sex characteristics, and secretin is a digestive hormone.

Question #34 Key: (A)

SZABMU 2022

Posterior lobe of pituitary gland produces:

CORE CONCEPT AND DERIVATION

The posterior lobe of the pituitary gland (neurohypophysis) does not synthesize its own hormones but stores and releases hormones produced by the hypothalamus.

Solution:

- The two hormones released by the posterior pituitary are Antidiuretic Hormone (ADH) and **Oxytocin**.

Why other options are incorrect:

TSH, ACTH, and FSH are all tropic hormones synthesized and secreted directly by the *anterior* lobe of the pituitary gland.

Question #35 Key: (A)

SZABMU 2022

Tetany is caused by _ in blood.

CORE CONCEPT AND DERIVATION

Calcium ions stabilize voltage-gated sodium channels in resting neurons. Proper calcium homeostasis is heavily regulated by the parathyroid gland.

Solution:

- When parathyroid hormone (PTH) levels drop, it leads to severe **hypocalcemia** (low blood calcium).
- Without enough extracellular calcium, sodium channels become overly permeable, causing neurons to depolarize spontaneously. This results in continuous, involuntary muscle spasms known as tetany.

Why other options are incorrect:

High calcium (hypercalcemia) causes sluggish reflexes and muscle weakness, not spasms. Magnesium imbalances also cause issues but are not the primary driver of classical tetany.

Question #36 Key: (A)

KMU 2022

Which of the following lobes of the pituitary gland is known as master gland of the body?

CORE CONCEPT AND DERIVATION

The pituitary gland is historically called the "master gland" because it exerts hierarchical control over many other endocrine structures.

Solution:

- Specifically, the **anterior lobe** (adenohypophysis) secretes numerous tropic hormones (TSH, ACTH, FSH, LH) that dictate the functions of the thyroid, adrenal cortex, and gonads.

Why other options are incorrect:

The posterior lobe only releases ADH and oxytocin. The intermediate lobe primarily secretes MSH in some species and is not considered the main orchestrator.

Question #37 Key: (A)

BUMHS 2022

Acromegaly is caused due to over secretion of:

CORE CONCEPT AND DERIVATION

Somatotropic Hormone (STH), also known as Growth Hormone (GH), stimulates protein synthesis and bone growth.

Solution:

- If there is hypersecretion of STH *after* the epiphyseal plates of long bones have closed (i.e., in adulthood), the bones can no longer lengthen.
- Instead, bones in the hands, feet, jaw, and face become abnormally thick, a condition clinically termed **acromegaly**.

Why other options are incorrect:

Over-secretion of TSH causes hyperthyroidism. ICSH and FSH affect the gonads, not systemic skeletal thickening.

Question #38 Key: (A)

DUHS 2022

It has neurosecretory cells that secrete releasing and inhibiting hormone:

CORE CONCEPT AND DERIVATION

The neuroendocrine system connects neural activity directly to endocrine output.

Solution:

- The **hypothalamus** contains highly specialized neurons called neurosecretory cells.
- These cells synthesize releasing hormones (like TRH, CRH) and inhibiting hormones (like somatostatin) that travel via the hypophyseal portal system to regulate the anterior pituitary gland.

Why other options are incorrect:

The pituitary gland responds to these releasing factors but does not produce them. The thyroid and adrenal glands are purely classical endocrine targets.

Question #39 Key: (D)

PMDC 2020

Which of the following neurotransmitters function, both as neurotransmitter and hormones, decreasing our perce...

CORE CONCEPT AND DERIVATION

Certain molecules in the body serve dual roles, acting locally across synapses as neurotransmitters and systemically via blood as hormones.

Solution:

- **Endorphins** are endogenous opioid peptides produced mainly in the central nervous system and the pituitary gland.
- They bind to opiate receptors to naturally inhibit the transmission of pain signals and induce feelings of euphoria.

Why other options are incorrect:

Epinephrine is a stress hormone, dopamine is involved in reward pathways, and serotonin regulates mood. While they act as dual messengers, they are not primarily responsible for systemic pain reduction like endorphins.

Question #40 Key: (A)

PMDC 2020

Which body function is controlled through positive feedback mechanism?

CORE CONCEPT AND DERIVATION

A positive feedback loop amplifies the initial stimulus, pushing the physiological process further away from its starting state to achieve a definitive endpoint.

Solution:

- During childbirth, the baby's head pushes against the cervix. Stretch receptors signal the hypothalamus to release oxytocin.
- Oxytocin causes the uterus to contract violently, which pushes the baby harder against the cervix, triggering the release of even more oxytocin. This explosive cascade of **labor contractions** continues until the baby is delivered.

Why other options are incorrect:

Insulin, body temperature, and thyroxine release are all strictly regulated by negative feedback loops to maintain a steady baseline.

Question #41 Key: (D)

KMU 2019

Chemically hormones are:

CORE CONCEPT AND DERIVATION

Hormones are organic chemical messengers secreted by endocrine glands directly into the bloodstream to regulate specific target organs.

Solution:

- Hormones have diverse chemical structures but are generally classified into three main categories: peptides/proteins (e.g., insulin, glucagon), steroids (e.g., estrogen, testosterone), and amino acid derivatives (e.g., epinephrine).
- Therefore, hormones are chemically proteins and steroids.

Why other options are incorrect:

Carbohydrates (like glucose or glycogen) serve as primary energy sources or structural components, not as long-distance endocrine signaling molecules.

Question #42 Key: (A)

SZABMU 2019

When secretion of ADH is increased, the amount of water reabsorbed is:

CORE CONCEPT AND DERIVATION

Antidiuretic Hormone (ADH) maintains blood osmolarity by preventing excessive water loss in the urine.

Solution:

- ADH binds to receptors on the collecting ducts of the nephrons in the kidney.
- This triggers the insertion of aquaporin water channels into the cell membrane, which drastically **increases** the reabsorption of free water back into the bloodstream, producing highly concentrated urine.

Why other options are incorrect:

Decreased water reabsorption occurs when ADH levels drop, leading to dilute urine (as seen in diabetes insipidus).

Question #43 Key: (B)

KMU 2019

In male luteinizing hormone is also known as:

CORE CONCEPT AND DERIVATION

Hormones often have alternative names based on their specific physiological target in males versus females.

Solution:

- In females, LH triggers ovulation and luteinization.
- In males, the exact same molecule targets the interstitial cells (Leydig cells) in the testes to stimulate testosterone production. Hence, it is biologically referred to as **Interstitial Cell Stimulating Hormone (ICSH)**.

Why other options are incorrect:

ACTH targets the adrenal cortex. TRF (Thyrotropin-Releasing Factor) is from the hypothalamus. MSH affects melanocytes.

Question #44 Key: (C)

KMU 2019

The deficiency of which micro-nutrient causes goiter formation?

CORE CONCEPT AND DERIVATION

The thyroid gland relies heavily on specific trace minerals to construct its active hormones.

Solution:

- Thyroxine (T_4) and Triiodothyronine (T_3) absolutely require **iodine** molecules to be synthesized.
- Without sufficient dietary iodine, T_3 and T_4 levels fall, removing negative feedback on the pituitary. The pituitary furiously pumps out TSH, which overstimulates the thyroid gland, causing it to swell immensely into a condition known as a goiter.

Why other options are incorrect:

Iron deficiency causes anemia. Zinc is important for immunity, and sodium is for nerve impulses.

Question #45 Key: (A)

KMU 2019

A man has to face interview, but during his first five minutes before the interview he experiences sweating, i...

CORE CONCEPT AND DERIVATION

The "fight-or-flight" response prepares the body for sudden stress by rapidly altering cardiovascular and respiratory rates.

Solution:

- In acutely stressful situations (like a high-stakes interview), the sympathetic nervous system stimulates the adrenal medulla.
- The adrenal medulla instantly dumps **epinephrine (adrenaline) and norepinephrine** into the bloodstream, which collectively cause pupil dilation, sweating, tachycardia (increased heart rate), and hyperventilation.

Why other options are incorrect:

Aldosterone regulates sodium/water balance over hours. Insulin/glucagon regulate glucose slowly. ACTH simply tells the adrenal cortex to release cortisol, which is for long-term stress, not acute panic.

Question #46 Key: (A)

PMDC 2018

Pituitary gland releases hormone and hormone while ovaries produce _ and progesterone.

CORE CONCEPT AND DERIVATION

The reproductive cycle is driven by the Hypothalamic-Pituitary-Gonadal (HPG) axis.

Solution:

- The anterior pituitary synthesizes and releases the gonadotropins: Follicle Stimulating Hormone (**FSH**) and Luteinizing Hormone (**LH**).
- In response to FSH and LH, the maturing follicles and corpus luteum in the ovaries produce the steroid hormones **estrogen** and progesterone.

Why other options are incorrect:

Options B, C, and D misplace estrogen as a pituitary hormone or incorrectly order the gonadal vs pituitary output.

Question #47 Key: (A)

MDCAT 2016

_____ hormone is antagonistic to insulin and causes increase in blood glucose level.

CORE CONCEPT AND DERIVATION

Homeostasis requires opposing pairs of hormones (antagonists) to keep blood levels within a narrow, healthy range.

Solution:

- While insulin drastically forces glucose out of the blood and into cells, its direct antagonist is **glucagon**.
- Glucagon ensures that during fasting or exercise, the liver breaks down glycogen reserves to maintain an adequate supply of blood glucose for the brain.

Why other options are incorrect:

Calcitonin regulates calcium. While thyroxine and norepinephrine influence metabolism and can mobilize energy, glucagon is the primary, direct antagonist to insulin in maintaining standard glucose homeostasis.

Question #48 Key: (A)

MDCAT 2015

[Formula] - cells of pancreas secrete a hormone known as:

CORE CONCEPT AND DERIVATION

The endocrine portion of the pancreas contains distinct cell types that secrete opposing metabolic hormones.

Solution:

- Alpha (α) cells continuously monitor blood glucose and secrete **glucagon** when blood sugar drops too low.
- Glucagon travels to the liver and stimulates glycogenolysis, dumping stored glucose back into the blood.

Why other options are incorrect:

Beta cells secrete insulin. Gastrin is secreted by the stomach lining, and rennin is an enzyme in the stomachs of infants to curdle milk.

Question #49 Key: (A)

PMDC 2014

Destruction of all beta cells in the pancreas would cause:

CORE CONCEPT AND DERIVATION

The Islets of Langerhans in the pancreas contain beta cells, which are exclusively responsible for insulin production.

Solution:

- Insulin is the only hormone capable of lowering blood glucose by facilitating its uptake into skeletal muscle and adipose tissue.
- If all beta cells are destroyed (as occurs in autoimmune Type 1 Diabetes Mellitus), **insulin secretion stops completely**. Consequently, glucose becomes trapped in the bloodstream, leading to a massive **increase in blood glucose**.

Why other options are incorrect:

Alpha cells produce glucagon, so their destruction would affect glucagon, not beta cell destruction.

Question #50 **Key: (D)**

MDCAT 2014

Which one of the following is a steroid hormone?

CORE CONCEPT AND DERIVATION

Steroid hormones are structurally derived from the lipid precursor cholesterol and can easily cross cell membranes.

Solution:

- The five major classes of steroid hormones are glucocorticoids, mineralocorticoids, androgens, progestogens, and estrogens.
- Therefore, **estrogen** is a classical steroid hormone produced primarily by the ovaries.

Why other options are incorrect:

Glucagon is a polypeptide. Epinephrine and thyroxine are both derived from the amino acid tyrosine, not cholesterol.