CUET 2026 May 25 Shift 1 Biology

Question Paper (Memory-Based) with Solutions

Conducted by National Testing Agency (NTA)

1. Which of the following hormones is not produced by the placenta?

(A) hCG

(B) hPL

(C) Thyroxine

(D) Estrogen

Correct Answer: (C) Thyroxine

Solution:

Concept: The placenta is a temporary but highly important endocrine organ formed during pregnancy. It develops from fetal tissues and establishes physiological connection between mother and developing fetus. Apart from exchange of nutrients, respiratory gases, and metabolic wastes, the placenta also functions as an endocrine gland by secreting several hormones essential for maintenance of pregnancy and fetal development.

The major hormones secreted by placenta include:

- Human Chorionic Gonadotropin (hCG)
- Human Placental Lactogen (hPL)
- Estrogens
- Progesterone

These hormones help in maintaining uterine lining, supporting fetal growth, preparing mammary glands, and regulating maternal metabolism during pregnancy.

Step 1: Analyze option (A) Human Chorionic Gonadotropin (hCG).

Human Chorionic Gonadotropin (hCG) is one of the earliest hormones secreted by the trophoblastic cells of the placenta after implantation.

The primary function of hCG is to maintain the corpus luteum during early pregnancy so that progesterone secretion continues. Continuous progesterone secretion is essential for maintenance of the uterine endometrium and successful continuation of pregnancy.

Therefore, hCG is definitely produced by the placenta.

Step 2: Analyze option (B) Human Placental Lactogen (hPL).

Human Placental Lactogen (hPL) is another important placental hormone. It is secreted during pregnancy and plays a major role in altering maternal metabolism to ensure adequate nutrient supply to the fetus.

It also contributes to growth and development of mammary glands in preparation for lactation after childbirth.

Hence, hPL is also produced by the placenta.

Step 3: Analyze option (C) Thyroxine.

Thyroxine is a hormone secreted by the thyroid gland located in the neck region. It contains iodine and plays an important role in regulating basal metabolic rate, growth, development, and overall metabolism of the body.

Although thyroid activity may increase during pregnancy to meet metabolic demands, the placenta itself does not synthesize or secrete thyroxine.

Therefore, Thyroxine is not a placental hormone.

Step 4: Analyze option (D) Estrogen.

During pregnancy, the placenta secretes estrogens in increasing amounts. Estrogens help in:

- Growth of uterus
- Development of mammary glands
- Increased vascularization
- Preparation of body for parturition

Hence, Estrogen is produced by the placenta.

Step 5: Determine the correct answer.

Among all the given options, Thyroxine is the only hormone which is not secreted by the placenta.

Therefore, the correct answer is:

Thyroxine

Quick Tip: Placenta mainly secretes hCG, hPL, Estrogens, and Progesterone, whereas Thyroxine is secreted by the thyroid gland.

2. In the following statements, identify the stages of oogenesis in the order in which they occur:

(A) During fertilisation, formation of egg and second polar body.

(B) Meiosis II commences but stops at metaphase II.

(C) Meiosis I commences but stops at prophase I.

(D) Formation of primary oocyte from oogonia.

(E) Meiosis I completes and results in formation of secondary oocyte and first polar body.

(A) (D), (C), (B), (E), (A)
(B) (C), (E), (D), (A), (B)
(C) (D), (C), (E), (B), (A)
(D) (D), (C), (A), (E), (B)

Correct Answer: (C) (D), (C), (E), (B), (A)

Solution:

Concept: Oogenesis is the process of formation of female gametes or ova inside the ovaries. Unlike spermatogenesis, oogenesis begins during fetal development and gets completed only after fertilization. The process involves mitotic multiplication, growth phase, meiotic divisions, and formation of polar bodies.
An important feature of oogenesis is that meiosis remains arrested at two different stages:

- Prophase I arrest
- Metaphase II arrest

Step 1: Formation of primary oocyte from oogonia.
During fetal life, primordial germ cells divide repeatedly by mitosis to form oogonia.
Some oogonia enlarge in size and differentiate into primary oocytes.
Therefore, formation of primary oocyte from oogonia occurs first.
Hence, event (D) is the first step.
Step 2: Initiation and arrest of Meiosis I.
The primary oocyte starts Meiosis I during fetal development. However, this meiotic division

does not complete immediately.

The primary oocyte becomes arrested at Prophase I stage, specifically in diplotene stage, and may remain arrested for many years until puberty.

Therefore, event (C) occurs after formation of primary oocyte.

Step 3: Completion of Meiosis I.

After puberty, during every menstrual cycle, one primary oocyte resumes Meiosis I.

Completion of Meiosis I produces:

- One large secondary oocyte
- One small first polar body

This unequal cytokinesis ensures that most cytoplasm remains within secondary oocyte.

Hence, event (E) occurs next.

Step 4: Initiation and arrest of Meiosis II.

The secondary oocyte immediately begins Meiosis II after its formation.

However, Meiosis II again gets arrested, this time at Metaphase II stage.

The secondary oocyte is ovulated at this arrested stage.

Thus, event (B) occurs after completion of Meiosis I.

Step 5: Completion of Meiosis II during fertilization.

Meiosis II completes only if fertilization occurs.

Entry of sperm into secondary oocyte stimulates completion of Meiosis II, resulting in:

- Formation of mature ovum
- Formation of second polar body

Hence, event (A) occurs last.

Step 6: Write the final correct sequence.

Therefore, the correct order of events is:

$$(D) \rightarrow (C) \rightarrow (E) \rightarrow (B) \rightarrow (A)$$

Hence, the correct option is:

$$\boxed{(C)}$$

Quick Tip: Oogenesis shows two meiotic arrests:

- Prophase I arrest during fetal stage
- Metaphase II arrest at ovulation

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3. Select the correct statement/s from the following:

A. Spermatogonia always undergo meiotic cell division.

B. Primary spermatocytes divide by mitotic cell division.

C. Secondary spermatocytes have 23 chromosomes and undergo second meiotic division.

D. Spermatozoa are transformed into spermatids.

(A) A and C only
(B) C only
(C) D only
(D) B and C only

Correct Answer: (B) C only

Solution:

Concept: Spermatogenesis is the process of sperm formation inside seminiferous tubules of testes. It involves three major phases:

- Multiplication phase
- Meiotic phase
- Spermiogenesis

Different stages of spermatogenesis involve different types of cell divisions and chromosome numbers.
Step 1: Analyze statement A carefully.
Spermatogonia are diploid germ cells present at the basal region of seminiferous tubules.
Their primary role is to multiply by mitotic divisions to maintain germ cell population.
Only some spermatogonia differentiate into primary spermatocytes which later undergo meiosis.

Therefore, spermatogonia do not always undergo meiotic division.

Hence, statement A is incorrect.

Step 2: Analyze statement B carefully.

Primary spermatocytes are diploid cells formed from spermatogonia.

These cells undergo Meiosis I, not mitosis.

The first meiotic division reduces chromosome number from diploid to haploid and produces secondary spermatocytes.

Hence, statement B is incorrect.

Step 3: Analyze statement C carefully.

Secondary spermatocytes are haploid cells containing 23 chromosomes.

These cells undergo Meiosis II to produce spermatids.

Since this statement correctly describes chromosome number and type of division, statement C is correct.

Step 4: Analyze statement D carefully.

Spermatids transform into spermatozoa through a differentiation process called spermiogenesis.

The statement given in the question reverses the process incorrectly.

Therefore, statement D is incorrect.

Step 5: Determine the correct answer.

Only statement C is correct.

Hence, the correct answer is:

C only

Quick Tip: The haploid phase of spermatogenesis begins from secondary spermatocyte stage.

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4. Arrange the following events in correct sequence:

A. Formation of zygote

B. Formation of blastocyst

C. Implantation

D. Formation of morula

(A) A, D, B, C

(B) A, B, D, C

(C) A, B, C, D

(D) C, D, B, A

Correct Answer: (A) A, D, B, C

Solution:

Concept: Human embryonic development begins immediately after fertilization. The fertilized egg undergoes a series of mitotic divisions known as cleavage while moving through the fallopian tube toward the uterus. During this journey, the developing embryo passes through several important stages before implantation occurs inside the uterine wall.
The major stages involved are:

$$\text{Zygote} \rightarrow \text{Morula} \rightarrow \text{Blastocyst} \rightarrow \text{Implantation}$$

Each stage is structurally and functionally important for successful establishment of pregnancy.
Step 1: Formation of zygote.
Fertilization occurs when the male gamete (sperm) fuses with the female gamete (ovum).
As a result of this fusion:

- Male and female pronuclei unite
- Diploid chromosome number is restored
- A single-celled structure called zygote is formed

The zygote is therefore the first cell of the new individual.
Hence, event (A) occurs first.
Step 2: Formation of morula.
After formation of zygote, rapid mitotic divisions called cleavage begin.
During cleavage:

- Cell number increases rapidly
- Overall size of embryo remains nearly same
- Smaller cells called blastomeres are formed

When the embryo reaches approximately 8–16 blastomeres, it forms a solid ball-like structure known as morula.

The term morula is derived from the Latin word meaning “mulberry,” because of its appearance.

Thus, event (D) occurs after zygote formation.

Step 3: Formation of blastocyst.

As cleavage continues further, the morula develops a fluid-filled cavity called blastocoel.

At this stage, the embryo becomes a blastocyst.

The blastocyst consists of:

- Outer trophoblast cells
- Inner cell mass

The trophoblast later contributes to placenta formation, while the inner cell mass develops into the embryo proper.

Hence, event (B) occurs after morula formation.

Step 4: Implantation of blastocyst.

The blastocyst reaches the uterus and attaches itself to the endometrial lining.

The trophoblast cells invade the uterine wall and embed the blastocyst inside the endometrium.

This process is known as implantation.

Implantation is extremely important because:

- It establishes pregnancy
- It allows nourishment from mother
- It initiates placental development

Thus, implantation occurs after blastocyst formation.

Hence, event (C) occurs last.

Step 5: Determine the final correct sequence.

Combining all stages in proper order:

$$\text{Zygote} \rightarrow \text{Morula} \rightarrow \text{Blastocyst} \rightarrow \text{Implantation}$$

Therefore, the correct sequence is:

$$A \rightarrow D \rightarrow B \rightarrow C$$

Hence, the correct answer is:

$$\boxed{(A)\ A, D, B, C}$$

Quick Tip: Remember the embryonic developmental order:

Zygote → Morula → Blastocyst → Implantation

Morula is solid, while blastocyst contains a fluid-filled cavity called blastocoel.

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5. Which among the following hormones is not produced by placenta?

(A) Human Chorionic Gonadotropin (hCG)

(B) Human Placental Lactogen (hPL)

(C) Estrogens

(D) Relaxin

Correct Answer: (D) Relaxin

Solution:

Concept: The placenta is a temporary endocrine structure formed during pregnancy. It establishes physiological connection between mother and fetus and performs several important functions such as:

- Exchange of nutrients
- Exchange of respiratory gases
- Removal of fetal wastes
- Secretion of hormones

Placental hormones are extremely important for maintenance of pregnancy, fetal growth, maternal metabolic regulation, and preparation for childbirth.
The major hormones secreted by placenta include:

- Human Chorionic Gonadotropin (hCG)
- Human Placental Lactogen (hPL)

- Estrogens
- Progesterone

Step 1: Analyze option (A) Human Chorionic Gonadotropin (hCG).

Human Chorionic Gonadotropin (hCG) is secreted by trophoblastic cells of placenta during early pregnancy.

Its major functions include:

- Maintenance of corpus luteum
- Continued secretion of progesterone
- Maintenance of uterine endometrium

Since hCG is produced by placenta, this option is incorrect.

Step 2: Analyze option (B) Human Placental Lactogen (hPL).

Human Placental Lactogen (hPL) is another important placental hormone.

It helps in:

- Altering maternal metabolism
- Ensuring nutrient supply to fetus
- Promoting mammary gland development

Thus, hPL is produced by placenta.

Hence, this option is also incorrect.

Step 3: Analyze option (C) Estrogens.

During pregnancy, placenta secretes increasing amounts of estrogens.

Functions of estrogens include:

- Growth of uterus
- Increased blood supply to reproductive organs
- Development of mammary glands
- Preparation for childbirth

Therefore, estrogens are also produced by placenta.

Step 4: Analyze option (D) Relaxin.

Relaxin is mainly secreted by the corpus luteum of ovary in humans.

Its functions include:

- Relaxation of pelvic ligaments
- Softening of cervix
- Facilitation of childbirth

Although relaxin is associated with pregnancy, it is not considered a principal hormone secreted by placenta in standard NCERT classification.

Therefore, Relaxin is the correct answer.

Step 5: Determine the final answer.

Among all the given hormones, Relaxin is not produced by placenta.

Hence, the correct answer is:

Relaxin

Quick Tip: Important placental hormones:

hCG, hPL, Estrogens, Progesterone

Relaxin is mainly secreted by the corpus luteum.

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6. A primary spermatocyte after first meiotic division leads to the formation of secondary spermatocytes. These are:

(A) Two equal haploid cells

(B) Two unequal haploid cells

(C) Two diploid cells

(D) Four diploid cells

Correct Answer: (A) Two equal haploid cells

Solution:

Concept: Spermatogenesis is the process of formation of male gametes (sperms) inside the seminiferous tubules of testes. During this process, diploid germ cells undergo meiotic divisions to produce haploid cells. Meiosis-I is called reductional division because it reduces the chromosome number from diploid ($2n$) to haploid (n).

Step 1: Understanding the nature of primary spermatocyte.

A primary spermatocyte is formed from spermatogonia. It is diploid in nature, which means it contains $2n$ chromosomes. These cells are specifically meant to undergo meiotic divisions for gamete formation.

Step 2: Analyzing the first meiotic division.

The primary spermatocyte undergoes Meiosis-I. During this division, homologous chromosomes separate from each other and move to opposite poles of the cell. Since chromosome number becomes half after this division, the resulting daughter cells become haploid.

Step 3: Determining the number and nature of daughter cells formed.

One primary spermatocyte divides to produce two daughter cells known as secondary spermatocytes. Each secondary spermatocyte contains haploid number of chromosomes (n).

Step 4: Understanding cytokinesis during spermatogenesis.

In males, cytokinesis during spermatogenesis is equal. This means the cytoplasm divides equally between the two daughter cells. Therefore, both secondary spermatocytes are nearly equal in size.

Step 5: Eliminating incorrect options.

- Option (B) is incorrect because unequal division occurs in oogenesis, not spermatogenesis.
- Option (C) is incorrect because secondary spermatocytes are haploid, not diploid.
- Option (D) is incorrect because Meiosis-I produces only two cells, not four.

Hence, the correct answer is two equal haploid cells.

Quick Tip: In spermatogenesis, one primary spermatocyte ultimately forms four equal-sized sperms, whereas in oogenesis only one functional ovum is produced.

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7. A pregnant female was admitted to the labour room. Mild uterine contractions started, but further strong uterine contractions were not taking place. Which of these could a doctor inject to induce delivery?

(A) Oxytocin

(B) Vasopressin

(C) Relaxin

(D) Prolactin

Correct Answer: (A) Oxytocin

Solution:

Concept: Parturition or childbirth is controlled by a complex neuroendocrine mechanism involving hormones and uterine muscular contractions. Oxytocin plays the most important role in stimulating strong uterine contractions during labour.

Step 1: Understanding the beginning of labour pain.

At the end of pregnancy, mild uterine contractions begin due to signals from the fully developed foetus and placenta. These initial contractions indicate the onset of labour.

Step 2: Identifying the hormone responsible for strong contractions.

Oxytocin is secreted by the posterior pituitary gland. It acts directly on the smooth muscles of the uterus and stimulates powerful rhythmic contractions.

Step 3: Understanding the positive feedback mechanism.

When oxytocin causes uterine contraction, these contractions further stimulate release of more oxytocin. This creates a positive feedback cycle that intensifies labour pain and helps in delivery of the baby.

Step 4: Applying the concept to the given situation.

In the question, mild contractions have started but strong contractions are absent. Therefore, doctors inject synthetic oxytocin to induce or strengthen labour contractions and facilitate childbirth.

Step 5: Eliminating incorrect options.

- Vasopressin regulates water balance and blood pressure.
- Relaxin helps relax pelvic ligaments and cervix.
- Prolactin stimulates milk production after childbirth.

None of these hormones induce powerful uterine contractions like oxytocin.

Therefore, oxytocin is the correct answer.

Quick Tip: Oxytocin is known as the "birth hormone" because it stimulates uterine contractions during childbirth and also helps in milk ejection after delivery.

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8. Spermatogenesis starts at the age of puberty due to a significant increase in secretion of Gonadotropin Releasing Hormone (GnRH). Increased levels of GnRH stimulate the secretion of two gonadotropins which are:

(A) Luteinising Hormone and Androgens

(B) Follicle Stimulating Hormone and Androgens

(C) Luteinising Hormone and Follicle Stimulating Hormone

(D) Luteinising Hormone and Testosterone

Correct Answer: (C) Luteinising Hormone and Follicle Stimulating Hormone

Solution:

Concept: The male reproductive system is regulated by the Hypothalamic–Pituitary–Gonadal (HPG) axis. Hormonal interactions between hypothalamus, pituitary gland, and testes control spermatogenesis.

Step 1: Understanding the role of hypothalamus at puberty.

At puberty, hypothalamus becomes more active and begins secreting Gonadotropin Releasing Hormone (GnRH) in larger amounts.

Step 2: Identifying the target organ of GnRH.

GnRH travels to the anterior pituitary gland through blood circulation and stimulates pituitary cells.

Step 3: Determining the hormones released by anterior pituitary.

In response to GnRH stimulation, anterior pituitary secretes two gonadotropins:

- Luteinising Hormone (LH)
- Follicle Stimulating Hormone (FSH)

Step 4: Understanding the functions of LH and FSH.

LH acts on Leydig cells present in testes and stimulates secretion of testosterone and other androgens.

FSH acts on Sertoli cells and supports the process of spermatogenesis.

Step 5: Eliminating incorrect options carefully.

- Androgens and testosterone are steroid hormones, not gonadotropins.

- Only LH and FSH are classified as gonadotropins secreted by anterior pituitary.

Thus, the correct answer is Luteinising Hormone and Follicle Stimulating Hormone.

Quick Tip: Remember the sequence: GnRH → Anterior Pituitary → LH + FSH → Testosterone production and spermatogenesis.

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9. Select the correct sequence of events in human spermatogenesis:

(A) Spermatid

(B) Spermatogonia

(C) Spermatozoa

(D) Secondary Spermatocytes

(E) Primary Spermatocytes

(A) (B), (E), (D), (A), (C)

(B) (E), (D), (B), (C), (A)

(C) (B), (E), (D), (C), (A)

(D) (B), (D), (E), (A), (C)

Correct Answer: (A) (B), (E), (D), (A), (C)

Solution:

Concept: Spermatogenesis is a sequential developmental process in which primitive germ cells transform into mature spermatozoa through mitosis, meiosis, and differentiation.

Step 1: Identifying the first stage of spermatogenesis.

The process begins with spermatogonia. These are diploid germ cells present on the inner lining of seminiferous tubules. They divide repeatedly by mitosis to maintain germ cell population.

Step 2: Formation of primary spermatocytes.

Some spermatogonia enlarge and differentiate into primary spermatocytes. These cells are diploid and are prepared for meiotic division.

Step 3: Understanding Meiosis-I.

Each primary spermatocyte undergoes first meiotic division and forms two haploid secondary spermatocytes.

Step 4: Understanding Meiosis-II.

Each secondary spermatocyte undergoes second meiotic division to produce spermatids. Spermatids are haploid cells but are still non-motile and immature.

Step 5: Final maturation process.

Spermatids undergo a transformation process called spermiogenesis. During this process, they develop tail, middle piece, and acrosome to become mature spermatozoa.

Step 6: Writing the correct sequence carefully.

Therefore, the correct sequence is:

Spermatogonia → Primary Spermatocytes → Secondary Spermatocytes → Spermatids → Spermatozoa

Hence, the correct option is:

$$(B), (E), (D), (A), (C)$$

Quick Tip: The conversion of spermatids into spermatozoa is called spermiogenesis, while release of sperms from Sertoli cells is called spermiation.

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10. Which of the following statements are correct about the structure of a sperm?

A. It is composed of head, thorax, neck and tail.

B. The neck region contains a lot of mitochondria.

C. The mitochondria produce energy for the movement of the tail.

D. The tail facilitates sperm motility essential for fertilization.

(A) A and B only
(B) B and C only
(C) C and D only
(D) B and D only

Correct Answer: (C) C and D only

Solution:

Concept: Human sperm is a highly specialized microscopic male gamete adapted for movement and fertilization. Structurally, it contains head, neck, middle piece, and tail.

Step 1: Analyzing statement A carefully.

Statement A is incorrect because sperm does not contain a thorax. The correct structural parts are:

$$\text{Head} + \text{Neck} + \text{Middle Piece} + \text{Tail}$$

Step 2: Analyzing statement B carefully.

Statement B is also incorrect because mitochondria are not concentrated in the neck region. Numerous mitochondria are tightly packed in the middle piece of sperm.

Step 3: Understanding the function of mitochondria.

The mitochondria present in middle piece generate ATP through cellular respiration. This ATP provides energy required for beating movement of tail.

Step 4: Understanding the importance of tail.

The tail performs whip-like lashing movements that help sperm swim through the female reproductive tract toward the ovum. Therefore, sperm motility depends greatly on the tail.

Step 5: Determining the correct statements.

- Statement C is correct because mitochondria provide energy for movement.
- Statement D is correct because tail enables motility essential for fertilization.

Hence, only statements C and D are correct.

Quick Tip: The acrosome present at the tip of sperm head contains enzymes that help the sperm penetrate the ovum during fertilization.
