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رُوجع على النص العربى ومطابق للأصل اليدوى ويطبع على مسئولية اللجنة الفنية ،

ARAB REPUBLIC OF EGYPT
Ministry of Education
General Secondary Education Certificate Examination, 2015
〔 New System – First Session 〕

Biology **Time: 3 hours**

〔 باللغة الإنجليزية 〕 الأحيــاء

〔 الأسئلة فى أربع صفحات 〕

تنبيه مهم : ١- يسلم الطالب ورقة امتحانية باللغة العربية مع الورقة المترجمة .
٢- الإجابات المتكررة عن أسئلة الاختيار من متعدد لن تقدر ويتم تقدير الإجابة الأولى فقط .

Answer FOUR QUESTIONS ONLY of the following:

QUESTION ONE: (15 MARKS)

(A) Choose the correct answer for each of the following, and write it only in your answer sheet:

1- The two centrioles existing in neck of human male gamete play a role in the division of the fertilized ovum within the ………….

a) ovary **b)** fallopian tube **c)** uterus **d)** vagina

2- The sequence of nucleotides in mRNA molecule is necessary to determine the sequence of the …………. .

a) amino acid in the protein **b)** codons in DNA
c) nucleotides in the gene **d)** nucleotides in the anticodon of tRNA

3- Parthenogenesis occurs in all of the following organisms **except** the ………. .

a) crustaceans **b)** worms **c)** insects **d)** sponges

4- The theory of **Huxely** states that when the skeletal muscle contracts the adjacent sets of ……. are withdrawn with the help of energy.

a) transverse links **b)** myosin filaments
c) actin filaments **d)** myosin and actin filaments

5- Which of the following represents a recognition sequence for a restriction endonuclease? ………. .

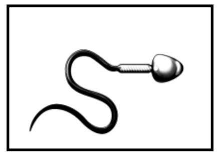
a) 5' …G-G- C- C… 3'
3' …C- C- G- G… 5'

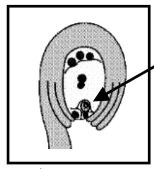
b) 5' …A- G-T- C… 3'
3'… T- C-A- G… 5'

c) 5' …A- C- C-A… 3'
3' …T- G- G-T… 5'

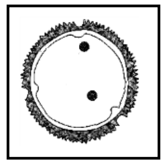
d) 5' …A-A-G- G… 3'
3' …T-T- C- C… 5'

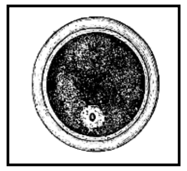
(B) The following figures represent animal and plant gametes; answer the questions that follow them:


(a)



(b)


(c)


(d)

〔 بقية الأسئلة فى الصفحة الثانية 〕

1- What are the cells from which the gametes (a) and (d) are formed?
2- At any stage of gamete (a) formation meiosis takes place?
3- Where meiosis and mitosis occur during gamete (b) formation?
4- Illustrate by a labeled drawing **only** the stages of gamete (c) germination.
5- What is the role of hormones that stimulate the production of gamete (d)?

(C) 1- A man of normal vision and normal hair married a color blinded woman with normal hair, and her mother suffers from hair falling. Explain on genetic bases the phenotype and genotype of the offspring.

2- "Both of **Hershey** and **Chase** depended on the bacteriophage (phage) to prove that DNA is the genetic material and not the protein". Explain this statement.

QUESTION TWO: (15 MARKS)

(A) What would happen in each of the following cases ………?

1- Absence of cholinesterase from the neuromuscular junction.
2- A deaf man married a woman with normal hearing (without genetic analysis).
3- Absence of glenoid cavity from the pectoral girdle.
4- A rich man adopted one of identical twins while the other remained in a poor environment.
5- Separation of a piece of the chromosome during cell division and its rotation 180^{o} around itself then rejoins with the same chromosome again.

(B) Rewrite the following statements after correcting what is underlined:

1- The gene responsible for the formation of haemoglobin is situated on chromosome **no. 9**.
2- **Ligase** is used in PCR machine to clone DNA pieces.
3- **Nucleosomes** are a heterogeneous group of proteins.
4- The individual with the genotype AaBb produces **two types** of gametes.
5- In the eukaryotic cells, ribosomes are produced inside the **cytoplasm**.

(C) 1- How can full plants have desirable strains and more resistance to diseases be obtained in a short time?

2- Illustrate by a fully labeled drawing **only** the asexual reproduction in bread mould fungus.

3- A crossbreeding was conducted between individuals of a strain of long - legged ducks. It was found that a quarter of the eggs do not hatch and 75% of the eggs hatch long - legged ducks. Explain on genetic bases.

〔 بقية الأسئلة فى الصفحة الثالثة 〕

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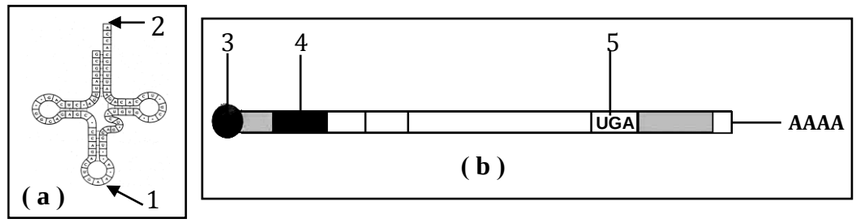
QUESTION THREE: (15 MARKS)

(A) Write the scientific term that indicates each of the following statements:

1- The organ through which the urethra passes.
2- A method of sexual reproduction in primitive organisms in which the contents of a cell fuse with the contents of another cell.
3- The plant portion that if it does not find what it sticks to during its movement, it wilts and dies.
4- The distance between each successive two Z-lines in the skeletal muscle.
5- Proteins produced by virus- infected cells and work to protect neighboring cells inside the human body.

(B) The following two figures represent two RNA types, answer the questions that follow them:



1- What is the role of the two sites (1) and (2) in the process of translation?
2- Explain the role RNA-polymerase in the process of transcription of the nucleic acid shown in figure (b).
3- What do the two numbers (3) and (4) indicate?
4- What is the importance of the part no. (5)?

(C) 1- "There are different types of ligases, some of them have a role in DNA replication and other some have a role in DNA repairing ". Explain this statement.

2- Mention the use of each of the following:
a) DNA hybridization **b)** Recombinant DNA in agriculture
c) Colchicine

QUESTION FOUR: (15 MARKS)

(A) Give reasons for each of the following:

1- Crossing over may occur and its effect does not appear.
2- The second fetus of a Rh^+ father and a Rh^- mother can live.
3- Cessation of menstrual cycle during pregnancy.

[بقية الأسئلة فى الصفحة الرابعة]

4- Obviousness of alternation of generation phenomenon in life cycle of *Plasmodium.*
5- Presence of some genetic cases that contradict with the constancy of the transmission of traits from one generation to another, as **Mendel** postulated.

(B) 1- When a red bull was crossed with a grey cow, the resulting individuals in several births were as the following: a black male, a black female, a white male and a white female. Explain on genetic bases and state the genetic cases.
2- Illustrate with a labeled drawing **only** the gametophyte of *Polypodium*.

(C) 1- What is the importance of each of the following……?
a) The endosperm tissue **b)** The pulling roots
c) The chromosomal maps **d)** The test cross
2- How can the sex of the newborns of farm animals be controlled?

QUESTION FIVE: (15 MARKS)

(A) Explain each of the following:

1- In the human male, the gamete causing Klinefelter's syndrome differs from the gamete causing Down's syndrome.
2- In complete dominance, the phenotype doesn't always indicate the genotype.
3- Unlimited numbers of proteins are formed in the bodies of living organisms although the number of amino acids does not exceed twenty.
4- When cloning DNA sequences, it is better to use cells in which the gene required to deal is active as pancreas cells.
5- The ability to adapt with environment is reduced in the individuals that reproduce asexually.

(B) What is the difference between each pair of the following …….. ?

1- The structure of the cerebral part and facial part of the human skull.
2- Budding in the yeast and sponge.
3- The components of the nucleotide and nucleosome.

(C) 1- How can the blood group of a person be determined?
2- Mention the site and function of each of the following:
a) Sepals **b)** Vagina **c)** Sertoli cells

[انتـهت الأسـئلـة]

الدرجة العظمى (٦٠) الدرجة الصغرى (٣٠) عدد الصفحات(٦)	جمهورية مصر العربية وزارة التربية والتعليم امتحان شهادة إتمام الدراسة الثانوية العامة لعام ٢٠١٥ م نموذج إجابة مادة [الأحياء " بالإنجليزية "]	[٥٢] الدور الأول (نظام حديث)

Answer of Question One: 15 Marks (5 + 5 + 5)

(A) 5 marks (5 X 1)

1- **(b)** fallopian tube **P. 242**

2- **(a)** amino acids in the protein **P. 363**

3- **(d)** sponges **P. 218**

4- **(c)** actin filaments **P. 205**

5- **(a)** 5'…G-G-C-C… 3' **P. 369**
3'…C-C-G-G… 5'

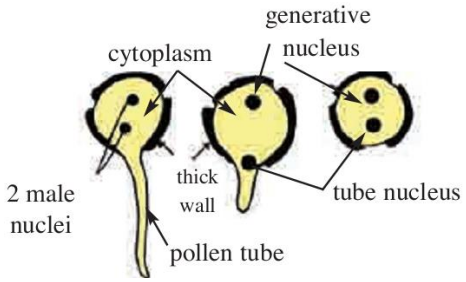
(B) 5 Marks **P. 232 -242 – 247- 249**

1- Primary germ cells (2N) **Mark**

2- Maturation phase **242** **(0.5)**

3- Meiosis occurs to spore mother cell within the ovule **(0.5) -** Mitosis occurs to nucleus of embryo sac. **(0.5)**

4- The stages of gamete (c) germination. **(1.5 marks)**



5- The hormones are**: FSH** that stimulates the ovary to form the mature Graafian follicle **(0.5),** and **L.H.** that stimulates the gamete (d) to liberate from the Graafian follicle. **(0.5)**

(C) 5 Marks (3 + 2)

1- **3Marks** • Genotype of the man with normal vision and normal hair is $X^{C}Y$ BB
• Genotype of the woman with normal hair and colour blindness is $X^{c}X^{c}B^{+}B$

P: **(0.5)** $X^{C}Y$ BB **X** $X^{c}X^{c}B^{+}B$ **(0.5)**

G: X^{C} B, Y B, $X^{c}B^{+}$, X^{c}B

F: $X^{C}X^{c}B^{+}B$ **Carrier, normal haired female** | $X^{C}X^{c}BB$ **Carrier, normal haired female** | $X^{c}YB^{+}B$ **Diseased, bald headed male** | $X^{c}YBB$ **Diseased, normal haired male** | **Mark Mark**

2- **2Marks (1 + 1)**

Both Hershey and Chase depended on that DNA contains phosphorus in its structure whereas proteins do not and proteins contain sulphur in its structure whereas DNA does not. **Mark**

In carrying out an important experiment, they labeled the phage protein with radioactive sulpher and phage DNA with radioactive phosphorus. When bacteria were infected with the labeled phages, the phages radioactive phosphorus always entered the bacterium whereas most of the sulpher was remained outside. This was strong evidence that the phage genetic material contained only DNA and not protein. **Mark** **P. 334**

Answer of Question Two : 15 Marks (5 + 5 + 5)

(A) 5 marks (5 X 1)

1- Acetylcholine action is continued, so the membrane permeability to ions does not return to the resting state and it becomes not ready to be stimulated and respond again**. P. 205**

2- They give birth a deafness child (aa) if the mother's hearing trait is heterozygous (Aa) **OR** they give birth a normal child (Aa) if the mother's hearing trait is homozygous (AA) **P. 280**

3- The humerus bone cannot be attached to the scapula bone and shoulder joint doesn't form, leading to difficulty in the movement of upper limb. **P. 194**

4- Variable changes will occur between them in behavioural and physical characteristics such as weight and height. But the colour of the hair, skin, eyes and other traits will not be affected. **P. 322**

5- A chromosomal mutation occurs. **P. 350**

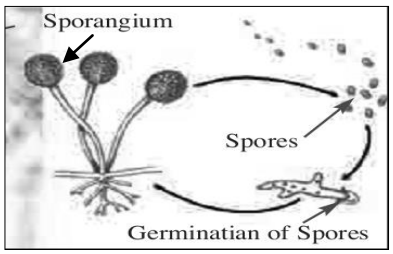
(B) 5 marks (5 X 1)

1- no. 11 **P. 377** **2-** Taq polymerase **P. 372** **3-** Non histone protein **P. 344**
4- four types **P. 291** **5-** nucleolus **P. 358**

(C) 5 Marks (1 + 1 + 3)

1- By tissue culture where small pieces of the plant are separated into conical flasks containing coconut milk which comprises all plant hormones and nutrient elements. Each piece will begin to grow and develop into a full plant. **Mark P. 219**

2- 1 Mark 218



3- 3 Marks

- One fourth of eggs does not hatch indicating presence of a recessive lethal gene.

(0.5)

- **(A)** is gene for long – legs and **(a)** is the gene for short – legs

(Notice: any other letters are correct)

P:	**Aa**	**X**	**Aa**		**Mark**
G:	**(A)**	**(a)**	**(A)**	**(a)**	**(0.5)**
F:	**AA**	**A a**	**Aa**	**aa**	**(0.5)**
	Long-legged	**Long-legged**	**Long-legged**	**Short-legged (Die)**	**(0.5)**

Answer of Question Three: 15 Marks (5 + 5 + 5)

(A) 5 marks (5 X 1)

1- Penis **P. 240** **2-** Conjugation **P. 222** **3-** Tendril **P. 198**

4- Sarcomere **P. 203** **5-** Interferons **P. 373**

(B) 5 Marks

1- **Site number (1):** The anticodon site which base-pairs with the appropriate mRNA codon at the mRNA ribosome complex. This temporarily binds the tRNA to the mRNA, allowing the amino acid carried by the tRNA to be incorporated into the polypeptide in its proper place**. (Mark) P.359**

- Site number (2): At which the amino acid is attached to its proper tRNA molecule**.**

(0.5) P. 359

2- RNA polymerase binds to the promoter, then the two strands of DNA are separated, and one strand of them serves as a template for the formation of a complementary strand of RNA **(Mark)**.

RNA polymerase moves along the DNA and joins the complementary nucleotides to the growing RNA strand one by one. The enzyme works only in the 3` to the 5` direction on its DNA template, assembling RNA in the 5` to 3` direction. **(Mark) P. 356**

3- **Number (3):** Ribosome binding site **(0.5) – Number (3):** Start codon (AUG)

(0.5) P. 357

4- **The importance of the part number (5**): It terminates protein synthesis process.

(0.5) P. 361

(C) 5 Marks (2 + 3)

1- DNA ligase joins the short pieces of nucleotides together for building up a new DNA strand in direction (5`to 3`). **(Mark)**

Also, DNA - repair enzyme (DNA-ligases), working in harmony can recognize and remove a damaged area of DNA, replacing it with nucleotides complementary to those on the strand opposite the damaged portion. **(Mark) P. 341- 342. (Mark)**.

2- **3marks (3 X 1)**

a) **DNA hybridization:** is used to detect the presence of a particular gene and its amount in the genome **(0.5)** and determine evolutionary relationships between different species. **(0.5) P. 367**

b) **Recombinant DNA in agriculture:** is used to produce crop plants genes for resistance to herbicides and important diseases **(0.5)**, isolate and transplant the genes that enable members of legumes to house nitrogen fixing bacteria in their roots then transplant the relevant genes into other crop plants and set them up with bacteria, would eliminate the need for nitrogen fertilizers. **(0.5) P. 374**

c) **Colchicine:** is used to induce a desired mutation by causing atrophy and death of the growing tip cells in plants. New tissues are regenerated underneath the dead cells. These new tissues may contain some polyploidy cells. **(Mark)**. **P. 351**

Answer of Question Four: 15 Marks (5 + 5 + 5)

(A) 5 marks (5 X 1)

1- Because crossing over occurs between two chromatids having the same alleles as in the case with homozygous dominant or recessive genes, no change will occur in the resulting ratios. **P. 304**

2- Because it is possible that the father may be heterozygous ($Rh^+ Rh^-$), and it is possible that the fetus may be Rh^- like its mother so it is not affected and born in a normal state, or the mother was injected with a protective serum after the first birth. **P. 298-299**

3- Because during pregnancy, the corpus luteum or placenta secretes progesterone hormone which inhibits ovulation. **P. 250**

4- Because life cycle of *Plasmodium* has a sexual generation that reproduces by gametes (in mosquito) followed by an asexual generations that reproduces by sporogony (in mosquito) and by schizogony (in man). **P. 226-227**

5- Because as the research continued and experiments carried out on other plants and animals, it became clear that some of their characteristics were not inherited according to Mendel or in other words, it contradicts his laws, for example, lack of dominance. **P.288**

(B) 5 Marks (4+1)

1- 4 Marks (1.5 + 0.5 + 1 + 1)

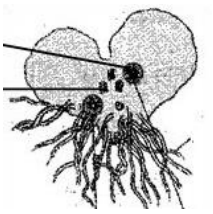
- It is a case of sex-linked genes **(0.5) -** Grey colour represents a case of lack of dominance between white and black colours **(0.5) -** Red color represents a recessive allele to white and black colours **(0.5)**
- Gene of black colour is symbolized by **B -** Gene of white colour is symbolized by **W -** Gene of grey colour is symbolized by **BW-** Gene of red color symbolized by **a** **(0.5)**

	Red bull	**X**	**Grey cow**		
P:	$X^B X^W$	**X**	$X^a Y$		**Mark**
G:	X^B X^W		X^a Y		
F:	$X^B X^a$	$X^B Y$	$X^W X^a$	$X^W Y$	**Mark**
	Black female	**Black male**	**White female**	**White male**	

2- 1 Mark P. 227

Archegoniu

Antheridiu



(C) 5 Marks (4+1)

1- a) Endosperm tissue: Supplies the early developing embryo with food.**(Mark) P. 235**

b) Pulling roots: Pull the subterranean storing stem downwards to a suitable distance from the soil surface to support the aerial parts against wind effects. **(Mark) P. 199**

c) Chromosomal maps: Determine the location of genes on the chromosomes of some plants and animals. **(Mark) P. 306**

d) Test cross: Identifies the pair of factors of any allelomorphic character found in an individual, or in other words it determines if the dominant character is pure (homozygous) or hybrid (heterozygous). **(Mark) P. 285**

2- Sperms with (X) chromosome are separated from sperms with (Y) chromosome by laboratory means such as centrifugation or exposure to a limited electric field, so it can be possible to produce only males or females. **Mark P. 259**

Answer of Question Five: 15 Marks (5 + 5 + 5)

(A) 5 marks (5 X 1)

1- The gamete causing Klinefelter's syndrome (the ovum) contains two X chromosomes, i.e. it contains an extra X chromosome that leads to a disturbance in the balance of the sex determining genes, whereas the gamete causing Down's syndrome (the sperm or the ovum) contains an extra autosome (no. 21) that leads to disturbance in the chromosome balance. **P. 313-315**

2- The allelomorphic characters exist in pairs in each individual. When both factors are exactly alike for a given character, the organism is homozygous (pure) for that character. When the two factors are different (a dominant factor and a recessive factor) the organism is heterozygous or hybrid (impure) for the same character. **P. 275**

3- Due to the differences between different proteins in the numbers, kinds and arrangements of amino acids in polymers. It is also attributed to the number of polymers that form the protein, beside the weak hydrogen bonds that may give the protein molecule its special shape. **P. 355**

4- In these cells there is great deal of mRNA carrying the message necessary to make the proteins where this nucleic acid is isolated and used as a template to make complementary DNA by using the reverse transcriptase. This enzyme is produced a single strand of DNA its complement can be synthesized by DNA polymerase. **P. 372**

5- Because the individuals resulted from asexual reproduction resembles the original individual from which they were resulted. So the features of the following generations remain the same, even if the surrounding conditions change. At any change in the environment, most of the offspring become exposed to destruction unless their parents had been adapted for that change. **P. 214**

(B) 5 Marks (2 + 2 +1)

(1) Skull's cerebral part P. 193	**Skull's facial part P. 193**
Consists of 8 serrated bones attached firmly to each other. Its posterior contains a foramen magnum through which the spinal cord is connected to the brain. **Mark**	Includes face bones, the two jaws and the positions of sense organs (ears, eyes and nose) . **Mark**

(2) Budding in the yeast P. 215	**Budding in sponge P. 215**
The bud arises as a lateral projection from the original cell while the nucleus divides mitotically into 2 nuclei; one of them remains in the mother cell while the other moves towards the bud. It grows gradually and may remains connected with the mother cell till its full growth. Then it separates or continues in connection with the mother cell forming cellular colonies with the other growing buds. **Mark**	The bud grows as a cellular protrusion from one side of the body due to division of interstitial cells and their differentiation to a bud. This bud grows gradually to resemble the mother entirely. It usually separates to start its independent live. **Mark**

(3) Components of the nucleotide P. 336	Components of the nucleosome P. 345
A five-carbon sugar, a phosphate group and a nitrogenous base. **(0.5)**	DNA is wound around clusters of histones, forming a string of particles. **(0.5)**

(C) 5 Marks (2 + 3)

1- Two drops of person's blood required to determine his blood group are placed on both sides of a glass slide. By adding a drop of anti (a) serum on one of the two blood drops and anti (b) serum on the other drop, we observe what happens after stirring them separately **(Mark).** If agglutination occurs with anti (a) serum only then the blood group is (A). If agglutination occurs with anti (b) serum only then the blood group is (B). If agglutination occurs with both sera, the blood group is (AB). If agglutination does not occur in any of the two drops then the blood group is (O). **(Mark) P. 296**

2- **3 marks (6 X 0.5)**

	Site	Function
Sepals P. 230	The outer whorl of the flower **(0.5)**	They protect the inner parts of the flower against drought, rain or wind. **(0.5)**
Vagina P. 245	Starts from the cervix to the genital opening. **(0.5)**	It secretes mucous fluid to moisten. It has folds to allow its expansion during birth. **(0.5)**
Sertoli cells P. 240	Inside each seminiferous tubule**. (0.5)**	They secrete a fluid to nourish the sperms inside the testis. It is supposed that, they gave also immunization function. **(0.5)**

انتهى نموذج الإجابة