

37- Beyond the DNA insert and a selective marker (like antibiotic resistance), what three specific essential components are required for a YAC vector to function like a natural chromosome and be stably maintained in yeast cells?

- A. Promoter, Multiple Cloning Site, Primer Binding Site.
- B. Centromeres (CEN), Telomeres (TEL), and Autonomous Replicating Sequence (ARS).
- C. Restriction sites, DNA ligase, Reverse transcriptase.
- D. loxP sites, Cre recombinase, Dicer.

38- How is artificial competence typically induced in bacterial cells in a laboratory setting to facilitate transformation?

- A. By growing the cells in a nutrient-rich broth at room temperature.
- B. By exposing cells to ultraviolet radiation.
- C. By incubating the cells in a solution containing divalent cations (like calcium chloride) under cold conditions, followed by a heat shock or electroporation.
- D. By mixing the cells directly with the DNA and relying on natural uptake.

39- Gene silencing, specifically using small interfering RNA (siRNA), is presented as a method for gene knockout. How does this method effectively silence a gene?

- A. By preventing the transcription of the gene into mRNA.
- B. By causing the disruption and degradation of the target gene's mRNA, thus blocking protein translation.
- C. By mutating the coding sequence of the gene.
- D. By removing the promoter region of the gene.

40- In the context of DNA cloning using plasmids, what is the main purpose of a selectable marker, such as an antibiotic resistance gene, in a plasmid vector?

- A. To drive the transcription of the inserted gene
- B. To provide a specific location where DNA replication begins.
- C. To allow for the identification and selection of host cells that have successfully taken up the plasmid.
- D. To contain multiple recognition sites for restriction enzymes

(II)- Answer Two of the following questions (10 marks, 5 marks for each):

1-Describe the molecular mechanism of RNA interference (RNAi), detailing the sequential steps, the roles of key enzymes, and important regulatory molecules. You may include illustrative diagrams if needed.

2-Categorize the different types of plasmids based on their functional roles, providing a brief description for each category.

3-Detail the key steps involved in the construction of a genomic library from a large genome, including the roles of restriction enzymes and vectors.

..... انتهت الأسئلة بالتوفيق و النجاح

- 9- The corresponding figure represents homologous recombination in gene knock out, Y refers to.....
 A. HSVtk gene B. neo^r gene
 C. HSVtk D. neo^r
- 10- The corresponding figure represents homologous recombination in gene knock out, Z refers to.....
 A. HSVtk gene B. neo^r
 C. HSVtk D. All answers are incorrect
- 11- In the corresponding figure, what will happen if Y is expressed in ES cells which are cultured in medium containing ganciclovir.
 A. ES cells will survive B. Efficient homologous recombination
 C. ES cells will die D. Non-homologous end joining recombination
- 12- RNA editing means.....
 A. Altering RNA sequence B. Genome diversity
 C. Adds a poly(A) tail to the 3' end D. A and B
- 13- The only coding RNA is.....
 A. siRNAs B. tRNAs
 C. mRNAs D. piRNAs
- 14- RNA editing takes place in cell
 A. nucleus B. cytoplasm
 C. mitochondria D. All answers are correct
- 15- Small non-coding RNAs (sncRNAs) include.....
 A. mRNA B. tRNA
 C. miRNA D. rRNA
- 16- Production of Human Apolipoprotein (ApoB100) and (ApoB40) in liver and intestine, respectively is an example of..... RNA editing
 A. U to C B. C to U
 C. A to I D. I to A
- 17- The modified nucleotide (Inosine) is interpreted as by the translation machinery of the cell.
 A. U B. C
 C. T D. G
- 18- A-to-I RNA editing sites abundantly occur in.....
 A. Intronic regions and 3'-UTRs of mRNA B. Intronic regions only
 C. Exonic regions and 3'-UTRs of mRNA D. Exonic regions only
- 19- When homologous recombination occurs, the negative selection marker should.....
 A. Insert into the genome B. Cut the genome
 C. Inhibit the genome D. Not insert into the genome
- 20- CRISPR-Cas system class 1 type I is.....
 A. CRISPR Cas 9 B. CRISPR Cas3
 C. CRISPR Cas 10 D. CRISPR Cas7
- 21- CRISPR-Cas system class 2 type V is
 A. CRISPR Cas 10 B. CRISPR cpf 3
 C. CRISPR cpf 1 D. CRISPR Cas7
- 22- In modified crispr cas9 system, gRNA is used in gene editing instead of
 A. Single tracrRNA B. Single crRNA
 C. tracrRNA and crRNA D. All answers are incorrect
- 23- The efficiency of homologous recombination iswhen there are base pair similarity between the donor and recipient DNA.
 A. Decreased B. Stable
 C. Increased D. Similar
- 24- Pre-RNA processing to be mRNA includes, capping, poly A tail, splicing and.....
 A. RNA polymerization B. RNA fragmentation
 C. RNA editing D. RNA migration

- 25- The applications of CRISPR/Cas9 include.....
- A. Knockout Animal Generation
 - B. Knock-in Animal Generation
 - C. Gene Activation / Repression
 - D. All answers are correct
- 26- A genomic library is a collection of:
- A. All the mRNA molecules expressed in a cell type.
 - B. The total genomic DNA from a single organism, cloned into vectors.
 - C. The coding sequences of all genes in an organism.
 - D. Plasmids containing genes that confer antibiotic resistance.
- 27- Transformation in the context of DNA cloning refers to the process by which:
- A. Bacteria replicate their DNA.
 - B. Bacteria take up exogenous genetic material (e.g., plasmids) from their surroundings.
 - C. DNA fragments are joined together by DNA ligase.
 - D. Proteins are synthesized from a DNA template.
- 28- The Cre recombinase enzyme recognizes and acts upon:
- A. Restriction enzyme recognition sites
 - B. The origin of replication
 - C. Lox sequences (e.g., LoxP)
 - D. The poly(A) tail of mRNA
- 29- RNA interference (RNAi) is also known by what other term?
- A. Transcriptional Gene Activation
 - B. Post-Transcriptional Gene Silencing (PTGS)
 - C. DNA Replication Inhibition
 - D. Protein Folding Assistance
- 30- If an investigator wishes to study the overall structure of a gene, including potential introns and control sequences responsible for regulating gene expression, what type of DNA source should they clone from?
- A. Genomic DNA
 - B. mRNA
 - C. cDNA
 - D. Plasmid DNA
- 31- Which of the following is a key characteristic of an ideal vector?
- A. It should be larger than 50 KB in size
 - B. It should be replicated autonomously
 - C. It should contain only one restriction site
 - D. It should prevent the incorporation of DNA inserts
- 32- What is the specific function of the enzyme Dicer in the RNA interference (RNAi) pathway?
- A. It binds to the Argonaute protein.
 - B. It synthesizes double-stranded RNA (dsRNA).
 - C. It cleaves double-stranded RNA (dsRNA) and pre-miRNA into short fragments called small interfering RNAs (siRNAs).
 - D. It degrades the target messenger RNA (mRNA).
- 33- Which type of restriction enzyme is most widely used in molecular biology due to its ability to cleave DNA at a specific recognition sequence?
- A. Type I
 - B. Type II
 - C. Type III
 - D. Type IV
- 34- During cloning, after cutting the target gene fragment and the vector with the same restriction enzyme (like EcoRI) to generate complementary sticky ends, what is still missing before DNA ligase can create an unbroken molecule?
- A. Hydrogen bonds between the sticky ends
 - B. The origin of replication sequence
 - C. Intact sugar-phosphate backbones at the junction sites
 - D. The selectable marker gene
- 35- Cosmids are hybrid vectors often used for cloning larger DNA fragments than typical plasmids. What is the main characteristic borrowed from bacteriophage Lambda that allows them to function in this way?
- A. The ability to replicate autonomously
 - B. The presence of cos sequences (cos site).
 - C. The antibiotic resistance gene
 - D. The multiple cloning site.
- 36- Which type of plasmid is primarily involved in helping bacteria transfer genes to other bacterial species through conjugation?
- A. Resistance (R) plasmids
 - B. Degradative plasmids
 - C. Virulence plasmids
 - D. Fertility F-plasmids

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Examiners' Committee: Prof. Dr. Abo Bakr Mohamed El-Tayeb & Dr. Mahmoud S. M. Abdelrasoul

Page 1 of 4

10. Infective stage of *Naegleria fowleri* is

- (a) Cyst stage
- (b) Amoeboid form of trophozoite
- (c) Flagellated form of trophozoite
- (d) Embryonated egg

11. Metacercaria is an infective stage in the following parasites except

- (a) *Fasciola gigantica*
- (b) *Heterophyes heterophyes*
- (c) *Clonorchis sinensis*
- (d) *Diphyllbothrium latum*

12. A temporary union of two organisms for exchange of nuclear material is called

- (a) Sporogony
- (b) Endodyogeny
- (c) Conjugation
- (d) Gametogony

13. In human, malarial parasites multiply in liver cells by

- (a) Binary fission
- (b) Budding
- (c) Gametogony
- (d) Schizogony

14. The diagnostic stage of *Balantidium coli* is

- (a) trophozoite
- (b) quadrinucleated cyst
- (c) cyst
- (d) metacercariae

15. The infective stage of *Ancylostoma duodenale* is

- (a) Rhabditoid larva
- (b) Embryonated egg
- (c) Filariform larva
- (d) Fertilized egg

B- Discuss the life cycle and pathogenesis of *Plasmodium* spp.? (8 marks)

C- Compare between *Taenia saginata* and *Taenia solium* as regards (scolex, gravid proglottids, infective stage, and intermediate stage)? (10 marks)

D- Give an account on fish as a source of helminthic infection? (9 marks)

E- Compare between (8 marks)

1. Cyclophyllidae and pseudophyllidae

2. Different forms of *Trypanosoma* spp.

Good luck..... Prof. Dr., Gamal H. Abed
Dr. Sara S. Abdel-Hakeem



2025

Answer the following question (illustrating your answer with labeled drawings whenever possible)

A- Select the single best answer for each of the following (1 marks/ each)

1. Parasitic infection which is most common in children

- | | |
|------------------------------------|------------------------------------|
| (a) <i>Fasciola gigantica</i> | (b) <i>Heterophyes heterophyes</i> |
| (c) <i>Enterobius vermicularis</i> | (d) <i>Ancylostoma duodenale</i> |

2. Human acts as intermediate host of

- | | |
|-----------------------------|------------------------------|
| (a) <i>Taenia solium</i> | (b) <i>Fasciolepis buski</i> |
| (c) <i>Balantidium coli</i> | (d) <i>Trypanosoma</i> spp. |

3. The ootype in trematodes connect with

- | | |
|-------------|---------------------|
| (a) Oviduct | (b) Vitelline canal |
| (c) Uterus | (d) all the above |

4. Definitive host is one

- (a) In which sexual multiplication takes place and harbors adult form
- (b) In which asexual multiplication takes place and harbors adult form
- (c) In which sexual multiplication takes place and harbors larval form
- (d) In which asexual multiplication takes place and harbors larval form

5. Which of the following nematodes lays eggs containing larvae?

- | | |
|---------------------------------|------------------------------------|
| (a) <i>Trichenilla spiralis</i> | (b) <i>Enterobius vermicularis</i> |
| (c) <i>Ascaris lumbricoides</i> | (d) <i>Brugia malayi</i> |

6. All the following lead to bloody diarrhea except

- | | |
|--------------------------------|----------------------------------|
| (a) <i>Schistosoma mansoni</i> | (b) <i>Entamoeba histolytica</i> |
| (c) <i>Trypanosoma</i> spp. | (d) <i>Balantidium coli</i> |

7. Which of the following parasites can cause deficiency in vitamin B12

- | | |
|-----------------------------------|------------------------------------|
| (a) <i>Ascaris lumbricoides</i> | (b) <i>Loa Loa</i> |
| (c) <i>Diphyllobothrium latum</i> | (d) <i>Schistosoma haematobium</i> |

8. Cercariae of *Schistosoma* and *Fasciola* are different in the following except

- | | |
|-----------|------------------------|
| (a) Tail | (b) Penetrating glands |
| (c) a & b | (d) Alimentary canal |

9. Consumption of uncooked meat is likely to cause infection with

- | | |
|----------------------------------|------------------------------------|
| (a) <i>Entamoeba histolytica</i> | (b) <i>Taenia saginata</i> |
| (c) <i>Ascaris lumbricoides</i> | (d) <i>Schistosoma haematobium</i> |

3-

4-

C- Why mitochondrial DNA is injured at a much greater rate than nuclear DNA?

1-

2-

D- What role HSPs play in the aging process?

1-

2-

E- Why yeast, nematodes and fruit flies have attracted a lot of attention from gerontologists?

1-

2-

IV-Write on two only of the following:

(10 Marks)

1- Heat shock protein.

2- Hormone replacement.

3- Apoptosis and AIDS.

II. Choose the correct answer:

(11 Marks)

1- The hormone that chemical messengers that speed the activity of the parathyroid gland cells is called: a) histamine b) histidine c) histamine d) histamine

2- Cellular immunity is mediated by: a) B lymphocytes b) T lymphocytes c) Phagocytes

3- The immunoglobulin that crosses the placental barrier is: a) IgG b) IgA c) IgD

4- Which one of the following statements regarding B-lymphocytes is TRUE.

- a) represent 75% of circulating lymphocytes b) represent 55% of circulating lymphocytes
c) represent 65% of circulating lymphocytes.

- 5- The stimulation and differentiation of B-cells into plasma cells is completed by:
a) Killer cells b) Helper cells c) Suppressor cells
- 6- In cell population growth cycle, the phase in which the number of cells in the population no longer increase and may even decrease known as:
a) death phase
b) lag phase c) stationary phase
- 7- The sequence of activities exhibited by cells is called:
a) mitosis
b) cell division c) the cell cycle
- 8- The immunoglobulin that disappear immediately after its secretion is:
a) IgA b) IgE c) IgG
- 9- Epstein-Barr Virus (EBV) which associated with some lymphomas produces a protein similar to:
a) Bcl-2 b) Apaf-1 c) Bax
- 10- The lymphocytes that open holes in the foreign cells and lysis them are:
a) Killer cells
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- 11- The enzymes that do the unwinding the double-helical structure that makes up DNA called:
a) dublicases b) helicases c) deameras
- 12- Depending on its species, the animal's ability to repair certain types of DNA damage is directly related to:
a) telomers b) genes c) the lifespan

1	2	3	4	5	6	7	8	9	10	11	12

III- Write the following data

(13 Marks)

A- Cells that are damaged by injury undergo a characteristic series of changes such as:

- 1-
- 2-
- 3-

B- Crosslinking interests gerontologists for several reasons these are:

- 1-
- 2-

Final Exam. of Cell Biology (312Z) for Zoology Students

June 2025

Time 2 hours

I- Fill in the spaces

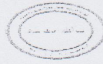
(15 Marks)

- 1- Growth factors include substances whichmany of the actions of hormones.
- 2- The most efficient DNA repair going on in.....
- 3- The immune system usesto destroy bacteria and other pathogens.
- 4- SOD converts an oxygen radical known as superoxide anion into
- 5- In a process called, glucose molecules attach themselves to proteins.
- 6- Melanoma cells avoid apoptosis by inhibiting the expression of the gene encoding
- 7- Every chromosome has tails at its ends that get as a cell divides.
- 8- The progressive deterioration of many bodily functions over time is called:
- 9- One of the genes that control a special stage in the worm's development called dauer formation known as:
- 10- The senescent cells continue to respond to hormones and other outside stimuli, but can't
- 11- The proliferative gene is thought to regulate the expression of other genes important in cell division.
- 12 - Filtration and sedimentation are used in:
- 13- Apoptosis-inducing factor (AIF) is a protein that is normally located in
- 14- Testosterone supplementation might trigger excessive red blood cell production in some men which can increase a man's risk of.....
- 15- In some tissues, such as, cell division ceases sometime after birth.

II- Choose the correct answer:

(12 Marks)

- 1- The hormone like chemical messengers that control the activities of the immunologic reaction cells is called: a) Interleukins b) Interferons c) Immunoglobulins
- 2- Cellular immunity is mediated by: a) B-lymphocytes b) T-lymphocytes c) Phagocytes
- 3- The immunoglobulin that crosses the placental barrier is: a) IgG b) IgA c) IgD
- 4- Which one of the following statements regarding B-lymphocytes is **TRUE**:



Assiut University	Final Exam of Principles of	June, 1 st 2025
Faculty of Science	Embryology (Z 334) for Chemistry-	Time: 2 hours
Department of Zoology	Zoology & Zoology students	Total marks: 50

Answer the following questions using labeled drawings when it is possible:

- 1- A) Draw and give labels for different parts of: (a) sperm (b) chick egg. (4 marks)
- B) Compare between mesodermal somite in *Amphioxus* and toad. Use labeled drawings (6 marks)
- 2- A) State true or false: (5 marks)
- i- Chordamesoderm is located at the floor of archenteron.
 - ii- Proximal centriole functions for the union of male and female nuclei.
 - iii- Fertilization cone helps to prevent entry of new sperms into the ovum.
 - iv- The value of pH is important factor during fertilization.
 - v- Type of cleavage in chick embryo is discoidal meroblastic one.
- B) Choose the right-answer: (5 marks)
- i- In crocodiles, yolk is synthesized in
- a) oocyte b) liver of mother c) fat bodies d) a and b
- ii- The surface of human oocyte is covered by an area called
- a) corona radiate b) zona radiate c) zona pellucida d) vitelline membrane
- iii- An example of oviparous animals is
- a) lion b) pig c) duck d) human
- iv- Cleavage type in the amphioxus is
- a) equal holoblastic b) unequal holoblastic c) meroblastic d) superficial
- v- If nondisjunction occurs in the second meiosis, trisomy probable percentage is
- a) 100% b) 75% c) 50% d) 25%
- 3- A) Compare between ovum and sperm. (5 marks)
- B) Account the factors that control successful external fertilization. (5 marks)
- 4- What are the different types and functions of placenta? (10 marks)
- 5 - Write on the advantages and disadvantages of testosterone. (10 marks)
- End of questions.....Best of Luck

Dr. Reda A. Ali

Prof. Experimental Embryology

4-

C- Why mitochondrial DNA is injured at a much greater rate than nuclear DNA?

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- 4- Which one of the following statements regarding B-lymphocytes is **TRUE**:

9. Consumption of raw vegetables is likely to cause the following protozoan disease except

- (a) *Entamoeba histolytica*
- (b) *Giardia lamblia*
- (c) *Balantidium coli*
- (d) *Trichomonas vaginalis*

10. Infective stage of *Naegleria fowleri* is

- (a) Cyst stage
- (b) Amoeboid form of trophozoite
- (c) Flagellated form of trophozoite
- (d) Embryonated egg

11. The intermediate host of *Toxoplasma gondii* is

- (a) Fish
- (b) Cats
- (c) Man
- (d) Snail

12. A temporary union of two organisms for exchange of nuclear material is called

- (a) Sporogony
- (b) Endodyogeny
- (c) Conjugation
- (d) Gametogony

13. In human, malarial parasites multiply in liver cells by

- (a) Binary fission
- (b) Budding
- (c) Gametogony
- (d) Schizogony

14. In order pseudophyllidea, the anchor organ is

- (a) Scolex
- (b) Rostellum
- (c) Hooks
- (d) Bothria

15. The infective stage of *Ancylostoma duodenale* is

- (a) Rhabdoid larva
- (b) Embryonated egg
- (c) Filariform larva
- (d) Fertilized egg

B- In a table form differentiate between Trematoda (flukes) as regards (method of infection, habitat, intermediate hosts)? (10 marks)

C- From your study, make a labeled diagrams of the parasites that may be seen in blood smear, mention their vectors and infective stage? (10 marks)

D- Enumerate the protozoa that may affect human eye? Mention the stage that may be found? (3 marks)

E- Compare between

1. *Taenia saginata* and *Diphyllobothrium latum* in the following items (scolex, intermediate host, infective stage, and eggs)? (12 marks)

2. Coracidium and miracidium

3. Rhabditiform and filariform larvae

4. Different forms of *Trypanosoma* spp.

Good luck..... Prof. Dr., Gamal H. Abed
Dr. Sara S. Abdel-Hakeem



Answer the following question (illustrating your answer with labeled drawings whenever possible)

A- Select the single best answer for each of the following (1 marks/ each)

1. Parasites which enter unusual host are called

- | | |
|-------------------------|---------------------------|
| (a) permanent parasites | (b) accidental parasites |
| (c) erratic parasites | (d) facultative parasites |

2. *Lymnaea truncatula* is intermediate host of

- | | |
|-------------------------------|--------------------------------|
| (a) <i>Fasciola gigantica</i> | (b) <i>Fasciolepis buski</i> |
| (c) <i>Fasciola hepatica</i> | (d) <i>Schistosoma mansoni</i> |

3. Autoinfection, could be propagated by

- | | |
|------------------------------------|------------------------------------|
| (a) <i>Taenia saginata</i> | (b) <i>Enterobius vermicularis</i> |
| (c) <i>Heterophyes heterophyes</i> | (d) <i>Ascaris lumbricoides</i> |

4. Which one of the following is a good general statement about the life cycle of digenetic trematodes?

- (a) A snail intermediate host is required.
- (b) The infective (metacercarial) stage always encysts on aquatic vegetation.
- (c) The second intermediate host is always a vertebrate.
- (d) The adult fluke is always found in the small intestine of the definitive host.

5. Which of the following parasites can be transmitted congenitally

- | | |
|---------------------------------|------------------------------------|
| (a) <i>Acanthamoeba</i> spp. | (b) <i>Schistosoma haematobium</i> |
| (c) <i>Ascaris lumbricoides</i> | (d) <i>Toxoplasma gondii</i> |

6. Humans get infected with the hydatid cyst of *Echinococcus granulosus* when they ingest

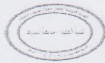
- (a) a flea that contains the larval tapeworm.
- (b) the tapeworm egg from dog feces.
- (c) the tapeworm cysticercus from raw beef.
- (d) the tapeworm proceroid stage in a freshwater-copepod.

7. Which of the following parasites can cause deficiency in vitamin B12

- | | |
|-----------------------------------|------------------------------------|
| (a) <i>Ascaris lumbricoides</i> | (b) <i>Loa Loa</i> |
| (c) <i>Diphyllobothrium latum</i> | (d) <i>Schistosoma haematobium</i> |

8. Cercariae of *Schistosoma* and *Fasciola* are different in the following except

- | | |
|-----------|------------------------|
| (a) Tail | (b) Penetrating glands |
| (c) a & b | (d) Alimentary canal |



Assiut University	Final Exam of Principles of	June, 1 st 2025
Faculty of Science	Embryology (Z 334) for Chemistry-	Time: 2 hours
Department of Zoology	Zoology & Zoology students	Total marks: 50

Answer the following questions using labeled drawings when it is possible:

- 1- A) Draw and give labels for different parts of: (a) sperm (b) chick egg. (4 marks)
B) Compare between mesodermal somite in *Amphioxus* and toad. Use labeled drawings (6 marks)
- 2- A) State true or false: (5 marks)
i- Chordamesoderm is located at the floor of archenteron.
ii- Proximal centriole functions for the union of male and female nuclei.
iii- Fertilization cone helps to prevent entry of new sperms into the ovum.
iv- The value of pH is important factor during fertilization.
v- Type of cleavage in chick embryo is discoidal meroblastic one.
- B) Choose the right answer: (5 marks)
i- In crocodiles, yolk is synthesized in
a) oocyte b) liver of mother c) fat bodies d) a and b
ii- The surface of human oocyte is covered by an area called
a) corona radiate b) zona radiate c) zona pellucida d) vitelline membrane
iii- An example of oviparous animals is
a) lion b) pig c) duck d) human
iv- Cleavage type in the amphioxus is
a) equal holoblastic b) unequal holoblastic c) meroblastic d) superficial
v- If nondisjunction occurs in the second meiosis, trisomy probable percentage is
a) 100% b) 75% c) 50% d) 25%
- 3- A) Compare between ovum and sperm. (5 marks)
B) Account the factors that control successful external fertilization. (5 marks)
- 4- What are the different types and functions of placenta? (10 marks)
- 5 - Write on the advantages and disadvantages of testosterone. (10 marks)
- End of questions.....Best of Luck

Dr. Reda A. Ali
Prof. Experimental Embryology

34- Which of the following represents RNA nucleotide

- A) dATP B) dUTP C) TTP D) none of the mentioned

35- The complementary nitrogenous bases in DNA double strands are held by.....bond

- A) Phosphodiester B) hydrogen C) ester D) nitrogen

36- The hair pin secondary structure of nucleic acids is known as.....

- A) Bulge loop B) multibranched junction C) stem loop D) internal loop

37- How many writhing found in a plasmid which has L= (10) and T= (11)

- A) (0) B) (-1) C) (1) D) (-11)

38- The primase makes a primer which has.....in 5' end.

- A) Monophosphate B) diphosphate C) triphosphate D) none of the mentioned

39- Eukaryotic primase is intrinsic to.....

- A) Pol ϵ . B) Pol δ C) Pol β D) Pol α

40- Telomeres form a T-loop with some proteins to protect itself fromactivity.

- A) endonuclease B) exonuclease C) polymerase D) telomerase

Q2: Choose (T) for the correct statement and (F) for the false one on the provided bubble sheet. (10 marks, one mark for each)

41- Cyclins and CDKs are external regulators that speed up or slow down the cell cycle.

42- The microtubules play a role in cell differentiation and determination of polarity.

43- The size of ribosomes is measured in "Angstrom units".

44- Mitochondria has the ability for self-replication.

45- The cells stop dividing after they came into contact with other cells.

46- B form of DNA is left-handed helix.

47- Okazaki fragments length in Eukaryotes are shorter than that in prokaryotes.

48- The folded wrapped DNA forming euchromatin (active genes).

49- During DNA replication, primers are made by DNA primase.

50- The newly synthesized DNA strand always extends in 5'-to-3' direction.

End of Questions, With Our Best Wishes!

Prof. Dr. Abo Bakr M. El-Tayeb

Dr. Ahmad U. M. Mahmoud

21- In prokaryotes, the RNA primer is replaced by DNA one by enzyme.

- A) Polymerase III B) polymerase II C) Polymerase I D) primase

22- Most human somatic cells lack telomerase activity, so they have....

- A) Telomere shortening B) Senescence C) end-to-end chromosome fusion D) all answers are correct

23- The name of the RNA nucleoside containing Cytosine base.....

- A) Cytosine B) Cytidine C) Cytidine -5' monophosphate D) deoxycytidine

24- Eukaryotic topoisomerase 1b is characterized by....

- A) Binding to 3' end and requires ATP B) binding to 5' end and requires ATP
C) binding to 5' ends and does not require ATP D) binding to 3' end and does not require ATP

25- During replication, DNA strands are unwound by enzymes called....

- A) Topoisomerase I B) Topoisomerase II C) helicase D) RNA polymerase II

26- Telomerase is a complex enzyme, where..... binds to the sequences in the single strand form

- A) TRF1 B) TRF2 C) POT1 D) TPP1

27- In DNA replication of prokaryotes, the enzyme DNA..... Is a proofreading enzyme

- A) Polymerase I B) Polymerase II C) Polymerase III D) primase

28- Primase is belonging to.....

- A) DNA polymerase B) RNA polymerases C) helicases D) exonucleases

29- DNA replication begin at..... rich regions

- A) AC B) GC C) AT D) AG

30-is the DNA polymerase responsible for mitochondrial DNA synthesis

- A) Pol ϵ . B) Pol δ C) Pol γ D) Pol α

31- The nitrogenous bas Adenine belongs to.....

- A) Purines B) pyrimidines C) double rings nitrogenous bases D) A and C

32- In DNA, nitrogen base is linked tosugar

- A) C 1' ribose B) C 3' deoxyribose C) C 1' deoxyribose D) C 5' deoxyribose

33- The RNA nucleotide containing Adenine base is known as

- A) adenosine B) deoxyadenosine
C) deoxyadenosine 5'-monophosphate D) adenosine 5'-monophosphate

9- What is the primary cause of uncontrolled cell growth in cancer?

- A) Excessive nutrient intake
- B) Defects in cell cycle regulation
- C) Overproduction of growth factors
- D) Lack of cellular organelles

10- Glycocalyx in the plasma membrane is primarily composed of (.....).

- A) Proteins
- B) Lipids
- C) Carbohydrates
- D) Nucleic acids

11- (.....) is the division of the cytoplasm that completes the M phase of the cell cycle.

- A) Meiosis
- B) Mitosis
- C) Cytokinesis
- D) DNA replication

12- Nuclear sap is a colloidal clear solution containing enzymes involved in (.....).

- A) Glycolysis
- B) DNA and RNA synthesis
- C) Protein degradation
- D) Lipid synthesis

13- Which process is NOT associated with the Golgi apparatus?

- A) Protein modification
- B) Lipid metabolism
- C) Secretion of proteins and lipids
- D) DNA replication

14- The accumulation of residual bodies in long-lived cells is known as (.....).

- A) Autophagosomes
- B) Lipofuscin
- C) Ribosomes
- D) Lysosomes

15- Which of the following substances requires a transport protein to pass through the plasma membrane?

- A) CO₂
- B) Urea
- C) Na⁺
- D) H₂O

16- What is the organization of microtubules within centrioles?

- A) Singlets
- B) Doublets
- C) Triplets
- D) Quadruplets

17- What is the term for the movement of phospholipids within the bilayer where they move sideways along the membrane?

- A) Lateral diffusion
- B) Flip-flop
- C) Flexion
- D) Rotation

18- Which of the following is a characteristic specific to prokaryotic organisms and not found in eukaryotic organisms?

- A) Presence of membrane-bound organelles
- B) Cell division by binary fission
- C) Having cytoplasm
- D) Possessing linear DNA

19- Which cells in the human body do not divide after development?

- A) Skin Cells
- B) Bone marrow cells
- C) Digestive tract cells
- D) Nerve cells

20- In the structure of the plasma membrane, the head of a phospholipid linked to its tail by (.....).

- A) Carbohydrate group
- B) Phosphate (PO₄) group
- C) Protein group
- D) Fatty acid group



Zoology &
Entomology
Department

Final-term exam, 2nd semester, 2024/2025

Cell and Molecular Biology (Z 318)

Time limit: 2 hours

Date: Saturday, May 24th, 2025

Total score: 50 marks

The test consists of 4 pages



Q1: Choose the correct answer from "A, B, C, or D" on the provided bubble sheet.

(40 marks, one mark for each)

- 1- The cell death process caused by injury, toxins, or nutritional deprivation is called (.....).
A) Swelling B) Apoptosis C) Digestion D) Necrosis
- 2- What type of granules are Zymogen granules an example of?
A) Secretory granules B) Mitochondrial granules C) Peroxisomal granules D) Lysosomal granules
- 3- The purpose of the S phase in the cell cycle is (.....).
A) Chromosome alignment B) DNA replication C) Cell division D) Chromosome condensation
- 4- Which type of nucleus contains a large amount of nuclear sap, as seen in hepatocytes?
A) Open face nucleus B) Closed face nucleus C) Condensed nucleus D) Expanded nucleus
- 5- Which type of intermediate filaments are abundant in mesenchymal cells?
A) Cytokeratin B) Desmin C) Neurofilaments D) Vimentin
- 6- In the cell cycle, sister chromatids undergo separation and move towards opposite poles during (.....).
A) Prophase B) Metaphase C) Anaphase D) Telophase
- 7- (.....) is a structure in mitochondria that contains enzymes involved in oxidative phosphorylation and electron transport systems.
A) Outer membrane B) Intermembrane space C) Matrix D) Cristae
- 8- In liver cells, the smooth endoplasmic reticulum plays a crucial role in (.....).
A) Protein folding B) Photosynthesis C) Detoxification processes D) Chromosome segregation

d. Describe characters of positive feedback regulation of hormone secretion and give an example.

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e. Explain how insulin decrease blood glucose level?

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f. Explain how cortisol stimulates gluconeogenesis.

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Good luck

Q4: Answer only FOUR questions from the following (10 marks):

a. Functions of testosterone.

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b. Factors inhibit growth hormone secretion.

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c. Site of secretion and functions of estrogen.

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2. The adrenal medulla is stimulated by the
- a. Blood concentration of calcium ions b. Posterior pituitary gland
- c. Hypothalamus d. Preganglionic sympathetic fibers of the nervous system
3. Sam stands over eight feet tall, and exhibits gigantism. He must experienceof growth hormone.
- a. Hypersecretion b. Hyposecretion c. No secretion d. Irregular intervals of secretion
4. For women, what is the role of luteinizing hormone?
- a. Produce a fatty acid called lutein b. Trigger ovulation of egg from ovary
- c. Stimulate testosterone production d. Inhibit the menstrual cycle
5. Calcitonin is made by
- a. Parafollicular cells b. Follicle cells c. Calcitonal cells d. Bone cells
6. Corticosteroids are steroid hormones produced by the adrenal cortex. Which is not a corticosteroid?
- a. Vitaminocorticoids b. Mineralocorticoids c. Glucocorticoids d. Sex hormones
7. Ahmed's blood pressure drops dramatically. Which enzyme will be produced by her kidneys, in order to release aldosterone?
- a. Atrial natriuretic peptide b. Angiotensin II c. Renin d. Cortisone
8. During pregnancy, the placenta takes on the role of producing estrogen and progesterone. The placenta is assuming the role of which organ?
- a. Testes b. Ovaries c. Fallopian tubes d. None of the above
9. The body's major metabolic hormone is released from the:
- a. Pituitary b. Thyroid c. Thymus d. Hypothalamus
10. Being lipid soluble, steroids can do all the following **EXCEPT**:
- a. catalyzes cyclic AMP b. diffuse through the plasma membranes of target cells
- c. enter the nucleus d. activate genes to transcribe mRNA for protein synthesis

Part 2: Endocrinology (25 marks)

Q1: Complete the following sentences (5 marks):

1. Hormones travel through the
2. The hypothalamus secretes hormones that activate.....
3. Oxytocin and antidiuretic hormone are both made by the
4. Calcitonin willblood calcium levels, while parathyroid hormone will blood calcium levels.
5. The adrenal medulla secretes, includingand
6. One of the two hormones made by the pituitary that help regulate reproductive cells is luteinizing hormone. The other hormone is
7. Target cells for hypothalamic releasing hormones are in the

Q2: Mark True (T) or False (F) (5 marks)

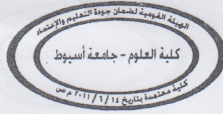
1. While the nervous system functions very slowly, the endocrine system works very quickly.
2. Follicle-stimulating hormone plays an identical role in males and females.
3. Most of the endocrine system is regulated by positive feedback mechanisms.
4. The alpha cells of the pancreas secrete glucagon which targets the kidney.
5. The growth hormone produced by the pituitary gland is known as somatotropin.
6. The two regulatory systems of the body are the endocrine system and the circulatory system.
7. The release of cortisol is stimulated by ACTH.
8. Androgens are produced by the hypothalamus.
9. TRH is a type of releasing hormone secreted by the hypothalamus.
10. Oxytocin is released by neurosecretory cells extending from the hypothalamus.

Q3: Choose the correct answer (5 marks)

1. The anterior pituitary gland secretes hormones that activate different glands. Which gland is not activated by the anterior pituitary gland?
a. Thyroid b. Gonad c. Adrenal cortex d. Parathyroid



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3- Compare the somatic and autonomic nervous system.

4- Write on the resting membrane potential of the neuronal soma.

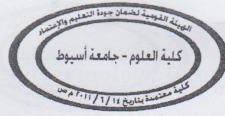
5- Write the neurotransmitter serotonin.

Good luck

Dr. Hossam El-Din M Omar, Prof. of Physiology



Zoology Department



قسم علم الحيوان

20- Monosodium glutamate, added to many foods to enhance taste.
a- Bitter b- Umami c- Sweet d- Salt

21- Sound is transmitted by waves which are characterized by.....
a- frequency b- wavelength , c- velocity d- All are True

22- Conduction hearing loss is caused by.....
a- Damage to the ossicles b- Blockage of the outer ear c- Middle ear infection d- All are True

23- Absence of smell is known as.....
a- Anosmia b- Hyposmia c- Hyposmia

24- The neuron of retina is.....
a- unipolar b- bipolar c- multipolar

25- Visual area is found in the of the brain.
a- occipital lobe b- frontal lobe c- parietal lobe d- temporal lobe

26- Sound frequencies which heard by humans are called
a- audio or sonic b- ultrasonic c- infrasonic

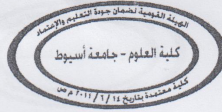
II- Answer on FOUR ONLY of the following questions (12 Marks)

1- Write on the components of ascending tracts

2- Compare between the two stages of brain activity.



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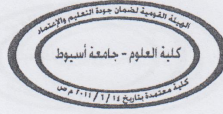


قسم علم الحيوان

- 9- Most complex part of the brain with the most evolutionary history is.....
a- Medulla oblongata b- Cerebral Cortex c- Pons d- Cerebellum
- 10- Functional center for emotional memory includes the following parts EXCEPT one is named.....
a-thalamus b-hypothalamus c-cerebral cortex d- pons
- 11-CSF which is found in brain ventricles and central canal of the spinal cord is formed by
a- choroid plexus b- arachnoid villi c- ependymal cells d-astrocytes
- 12-Trauma of can result in double vision.
a- trochlear nerve b-optic nerve c- oculomotor nerve d- vagus nerve
- 13- The nerve that formed by union of a cranial root and a spinal root is.....
a- accessory nerve b- Facial nerve c-vagus nerve d-trigeminal nerve
- 14-Dorsal root ganglion is a collection of.....neurons forming dorsal root.
a- unipolar b-bipolar c-multipolar d- All are True
- 15- Upper motor neuron (UMN) originates in nuclei deep in
a- cerebrum b- cerebellum d-pons d-medulla oblongata.
- 16-Lateral horns located ONLY in..... region which contains visceral motor cell bodies.
a- thoracic b-lumbar c-thoracic and lumbar d- Sacral
- 17- The mediators of pain receptors which enhance the sensitivity of pain endings includes
a- bradykinin b- histamine c- proteolytic enzymes d-All are True.
- 18- The brain perceives main tastes
a- One b-two c-three d-four
- 19-contain microvilli, appear to secrete substances into lumen of taste bud.
a- supporting cell b-sensory cell c- basal cell d-All are True



Zoology Department



قسم علم الحيوان

Final Exam: Physiology 2 (310Z)
Zoology Students
Total Marks: 50

Time: Two Hours
Second Semester 2024/2025
Date of Exam: 23/5/2025

Part One: Nervous coordination and sensory organs

1-Choose the correct answer: (13 marks)

1-Tyrosine is produced in the from phenylalanine through the action of phenylalanine hydroxylase.

- a-liver b-kidney c-brain d- blood

2-The cholinergic agonists that excited autonomic effector cells that innervated by postganglionic neurons include

- a- choline esters b- alkaloid-based compounds c- cholinesterase inhibitor d- All are True

3-Almost all the synapses used for signal transmission in the CNS are

- a- chemical synapses b-electrical synapses b- Both a& b

4- The function of sodium-potassium pump includes.....

- a- provide energy for the co-transport of molecules e.g. glucose.
b- regulate the basal metabolic rate of the body by thyroid gland.
c- produce electrical impulses. d- All are True.

5- The non-neural cells that can help repair damaged peripheral nerves is.....

- a- Schwann cell b- oligodendrocyte c-ependymal cell d-microglial cell

6-In Phylumthe NS is consisting of nervous ring around the mouth and get out from hem radial nerves.

- a- Echinodermata b-Mollusca c-Annelida d- Arthropoda

7- The part of brain which sorts and relays information from all senses to higher level brain centers is.....

- a- epithalamus b-thalamus c-hypothalamus d- cerebellum

8-Tyrosine is converted in rate-limiting step into dopamine, the main neurotransmitter in that pathway that's involved in Parkinson's disease.

- a- basal ganglia cells b- corpus callosum c- basal nuclei d- brain stem