Biochemistry Lecture (CHM 338) Exam III Fall 2016 11/16 Wednesday Dr. Hahn Exam # _____

Name Key (print) Name _____ (sign)

Please show work for partial credit and full credit on the Long Answers and in some of the Short Answer Questions. Multiple choice questions have no partial credit. Please write anything you want graded legibly. If you run out of space, please continue on the empty back pages but clearly label where the remaining answer can be found. (If I can't find your answer or cannot read it, I obviously cannot grade it). Return your entire exam including the periodic table. (Please count your exam pages and make sure there are real pages + periodic table + other supplementary sheets)

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. (2 pts each, 24 pts total)

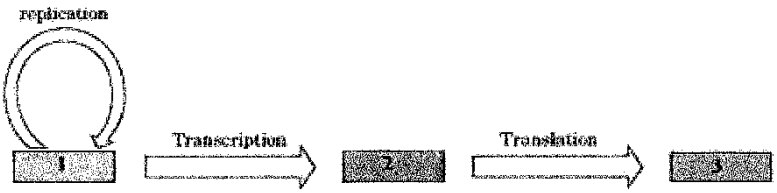
1) Which of the following correctly describes exons and introns? 1) B

A) Both exons and introns code for proteins, but they code for different types of proteins.
B) Exons are coding sections of DNA and introns are noncoding sections.
C) Exons are noncoding sections of DNA and introns are coding sections.
D) In order to code for a protein both an exon and an intron are necessary.

2) The genetic code is associated with which of the following processes? 2) B

A) DNA replication
B) translation
C) transcription
D) none of these

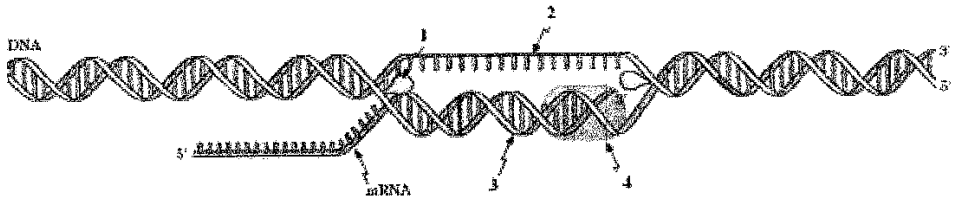
3) The following block diagram is a representation of the general cases of the central dogma of molecular biology. 3) A



Which of the following correctly assigns a name to the numbered boxes?

A) 1- DNA, 2-RNA, 3-Protein
B) 1-Protein, 2-RNA, 3-DNA
C) 1-RNA, 2-DNA, 3-Protein
D) 1-DNA, 2-Protein, 3-RNA

4) Examine the following diagram. The diagram is a representation of _____. 4) A



(A) transcription
B) translation
C) DNA synthesis
D) protein synthesis

5) Which of the following is true of the FAD/$FADH_2$ system? 5) D

A) FAD is the oxidized form and $FADH_2$ is the reduced form.
B) FAD is the reduced form and $FADH_2$ is the oxidized form.
C) The conversion of FAD to $FADH_2$ is an redox reaction.
(D) A & C are correct.

6) Which of the following is true of mutations? 6) D

A) They will always cause a genetic disease.
B) They are always fatal.
C) They are never fatal.
(D) Some are harmless and some quite dangerous.

7) Metabolism is composed of which process(es)? 7) D

A) anabolism
B) catabolism
C) oncologism
(D) both A and B
E) both B and C

8) The biochemical process in which simple molecules are combined to make larger ones and energy is consumed is referred to as 8) A

(A) anabolism.
B) metabolism.
C) respiration.
D) catabolism.
E) digestion.

9) The abbreviation ATP stands for 9) E

A) adenosine tetraphosphate.
B) anabolic triple phosphate.
C) adenine + three phosphates.
D) alanine triphosphate.
(E) adenosine triphosphate.

10) Which statement is true concerning the relationship between FAD and $FADH_2$? 10) A

A) $FADH_2$ is the reduced form of FAD.

B) $FADH_2$ is the oxidized form of FAD.

C) The conversion of $FADH_2$ to FAD is an acid/base reaction.

D) The conversion of $FADH_2$ to FAD is a cyclization reaction.

E) none of the above

11) The process in which information contained in RNA is used to manufacture proteins is called 11) D

A) mutation.

B) replication.

C) transcription.

D) translation.

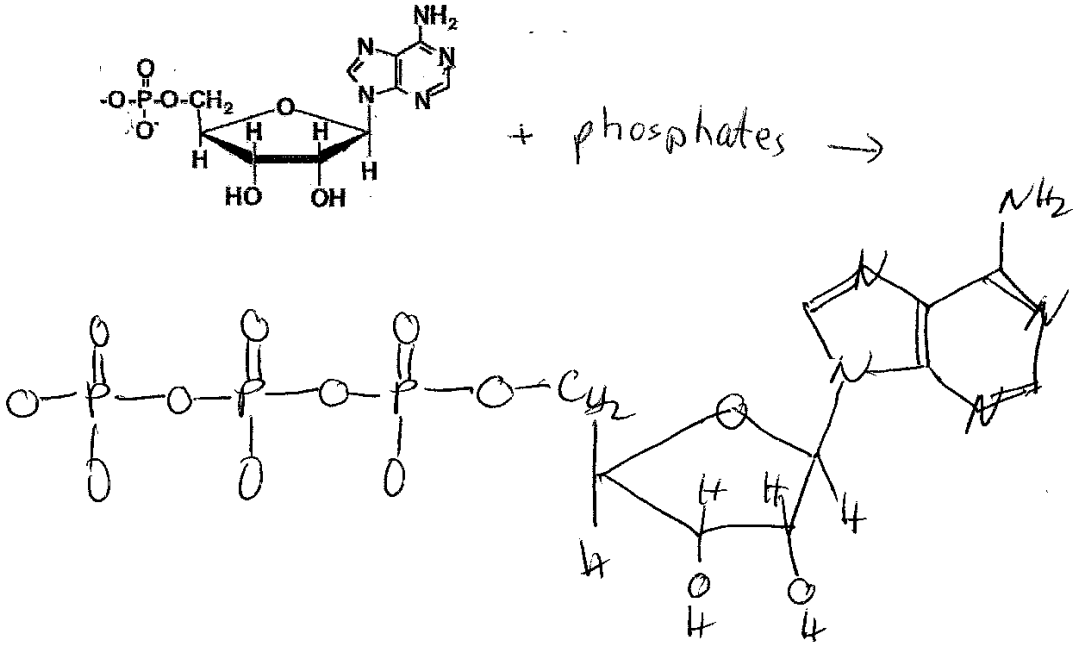
E) translocation.

12) The type of nucleic acid that carries the amino acids to the protein chain that is growing in the ribosome is called 12) A

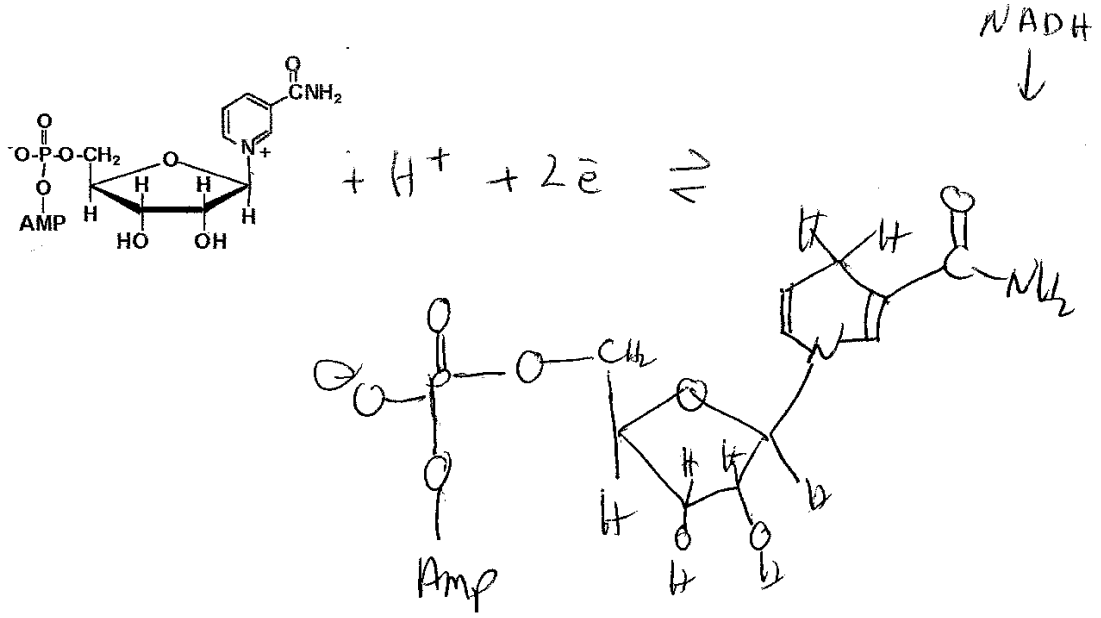
A) tRNA. B) RNA. C) rRNA. D) mRNA. E) DNA.

Part II: Short Answers (36 pts)

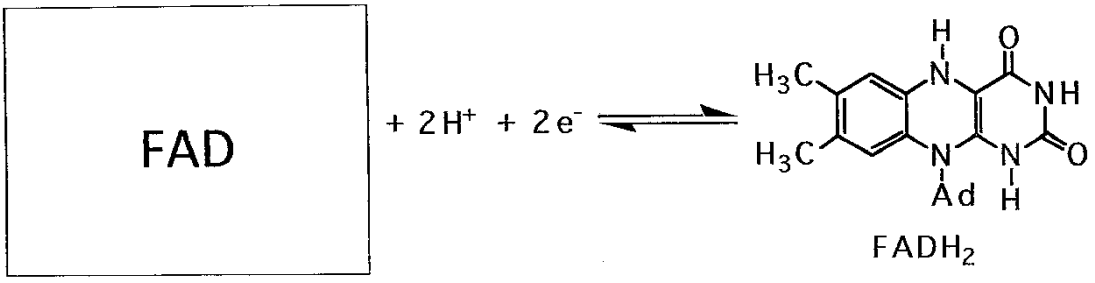
1. Given the following structure of AMP, show the structure of ATP. (10 pts)



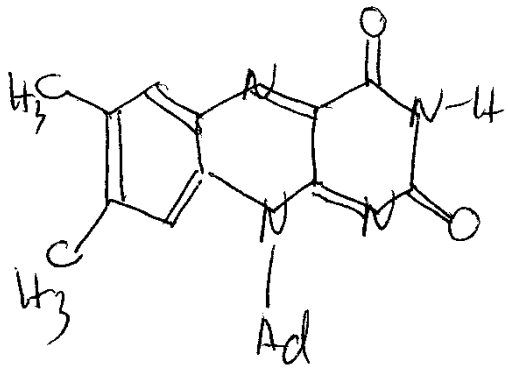
2. Given the structure of NAD+, show the structure of NADH in the following reaction (10 pts)



3. Given the structure of FADH2 show the structure of the product FAD given the following reaction. (10 pts) (can draw answer anywhere but answer belongs inside the box)



FADH2



4. Which of the above reactions (in the Short Answer part of this exam) is a redox reaction which acts as a part of the biological electron transport mechanism ? (may circle one or as many as 3 of the following)

[(reaction 1)(reaction 2)(reaction 3)(none of the reactions)] (circle correct choice) (6 pts)

Part III: Long Answers (40 pts)

1. Given the following genetic sequence, give the sequence of amino acids using the full name of the amino acid. (20 pts)

AUG-AGU-GCA-AUU-AAU-GAU-UAU-UAA

start methionine – Ser – Ala – Ile – Asn – Asp – Tyr – stop

GCA AUU AAU GAU UAU UAA

methionine – serine – alanine – Isoleucine – Asparagine – Aspartate – Tyrosine – stop

start

2. Explain the process of translation using the following terms. (20 pts)

30s ribosome, 50s ribosome, 70s ribosome, Shine-Dalgarno sequence, f-met-tRNA, initiation, elongation, termination, E site, P site, A site, formation of peptide bond, mRNA, tRNA, amino acid

initiation

① 30s ribosome combines with shine Delgarno sequence part of mRNA with the start genetic code AUG

② the matching t-RNA – fmet tRNA attaches to mRNA AUG

③ 50s ribosome attaches to above complex to form 70s ribosome initiation complex with f-met tRNA at P part of 70s ribosome

70s
E P A

elongation

① next tRNA matching mRNA attaches at A site & amino acid at P site attaches to amino acid at A site & forms peptide bond

② empty t-RNA moves to A dipeptide moves to P site-new tRNA attaches to A site & repeat until t-RNA signals termination

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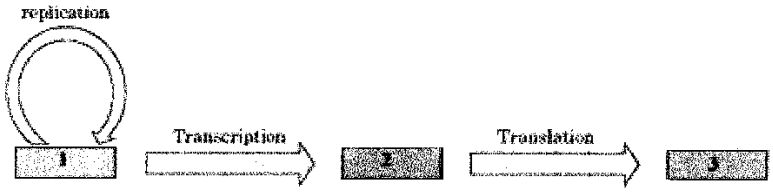

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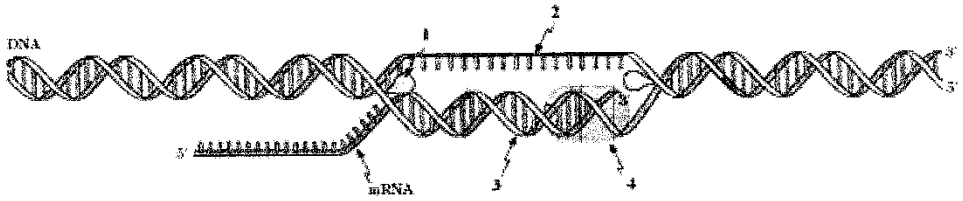

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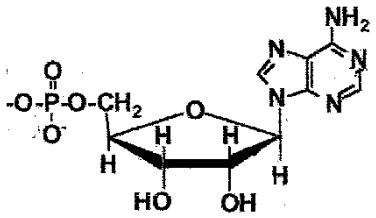
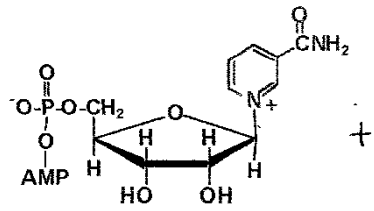


+ phosphates →

2. Given the structure of NAD+, show the structure of NADH in the following reaction (10 pts)

NADH
↓



+ H^+ + $2\bar{e}$ ⇌

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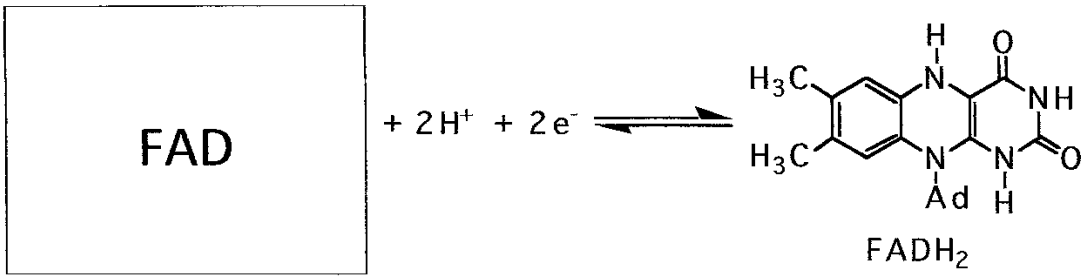

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