UNIVERSITY OF EMBU

2016/2017 ACADEMIC YEAR

FIRST SEMESTER EXAMINATION

FIRST YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE (AGRICULTURE) AND BACHELOR OF SCIENCE (HORTICULTURE)

### ACS 408: MOLECULAR GENETICS

DATE: DECEMBER 7, 2016   **TIME: 2:00-4:00PM**

INSTRUCTIONS:

Answer Question ONE and ANY other TWO Questions

QUESTION ONE (30 MARKS)

a) Biological molecules includes DNA, RNA, protein and polysaccharides. Explain how to proof that DNA or RNA is the inherited material and not others. Use Hershey - Chase experiment to illustrate.   (3 marks)

b) Differentiate DNA from RNA   (3 marks)

c) The thickness of double strand DNA is uniform while that of single strand is not. Explain the reason.   (3 marks)

b) Using the diagram given below, explain the polarity nature of DNA.   (3 marks)
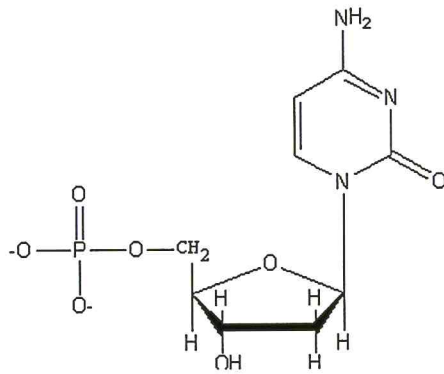
c) Using diagram below to represent DNA strands illustrate bidirectional replication.

(3 marks)
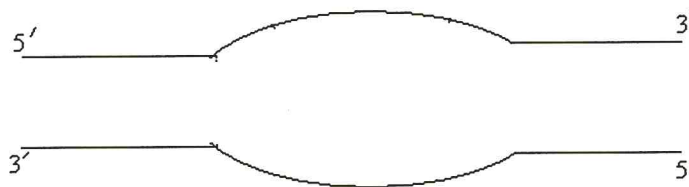
d) With help of diagram show the relationship between the sense, anti-sense DNA strands and mRNA transcript. (3 marks)
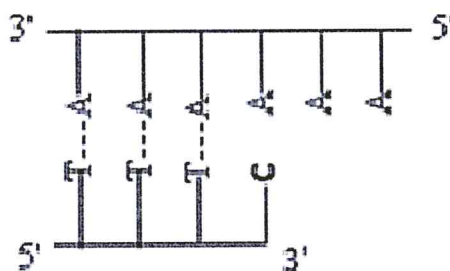
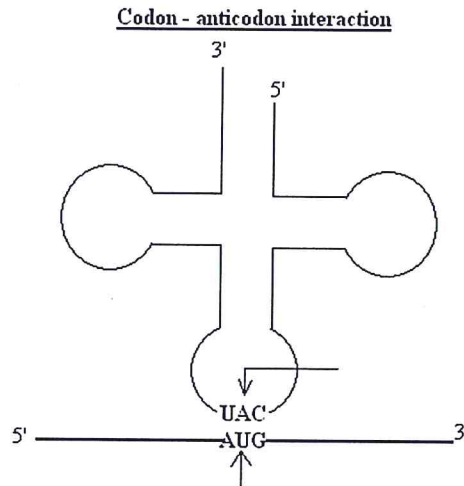e) Differentiate DNA polymerase from RNA polymerase (3 marks)

f) Identify the defect in the following duplicating DNA and how it (defect) can be removed. (3 marks)

g) Label the diagram below and use it to explain interaction of RNAs in translation process.

(3 marks)

Codon - anticodon interaction

j) In gene expression, explain why it is not necessary to transcribe all DNA to mRNA.

(3 marks)

QUESTION TWO (20 MARKS)

The diagram below shows phases a cell undergoes during cell division cycle. Given a human cell discuss how the amount of chromosomes and DNA changes in each stage of the cycle.

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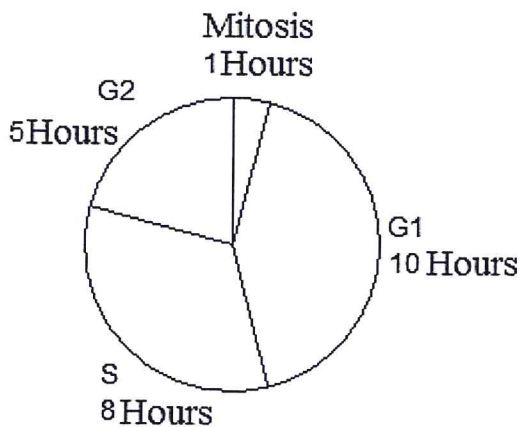
QUESTION THREE (20 MARKS)

If you are an entrepreneur in molecular biology industry and you will require to synthesis DNA sequence like primers for polymerase chain reaction (PCR). Describe the ingredients and their functions needed to do the work.

QUESTION FOUR (20 MARKS)

With help of a diagram, describe how the **Lactose operon** works to control gene regulation.

QUESTION FIVE (20 MARKS)

The following DNA transcript has introns marked in lower case letters and a PolyA tail at the end.

a) Process it to a mature RNA   (4 marks)

b) Using the RNA code below translate it into protein   (16 marks)

AGUUGC*agcu*ACAGGAUUA*uugc*CAAUUUAGA*uuuu*CCCUUCCUU
AAAAAAAAAAAA

(Use mRNA coding table given below)

1st position (5' end)	2nd position (middle)				3rd position (3' end)
	U	C	A	G	
U	Phe F	Ser S	Tyr Y	Cys C	U
	Phe F	Ser S	Tyr Y	Cys C	C
	Leu L	Ser S	STOP	STOP	A
	Leu L	Ser S	STOP	Trp W	G
C	Leu L	Pro P	His H	Arg R	U
	Leu L	Pro P	His H	Arg R	C
	Leu L	Pro P	Gln Q	Arg R	A
	Leu L	Pro P	Gln Q	Arg R	G
A	Ile I	Thr T	Asn N	Ser S	U
	Ile I	Thr T	Asn N	Ser S	C
	Ile I	Thr T	Lys K	Arg R	A
	Met M	Thr T	Lys K	Arg R	G
G	Val V	Ala A	Asp D	Gly G	U
	Val V	Ala A	Asp D	Gly G	C
	Val V	Ala A	Glu E	Gly G	A
	Val V	Ala A	Glu E	Gly G	G

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