

**KABARAK**



**UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**2009/2010 ACADEMIC YEAR**

**FOR THE DEGREE OF BACHELOR OF EDUCATION**

**SCIENCE**

**COURSE CODE: BOTA 426**

**COURSE TITLE: CELL AND MOLECULAR BIOLOGY**

**STREAM: SESSION IV**

**DAY:**

**TIME:**

**DATE:**

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**INSTRUCTIONS:**

Answer **All** questions in SECTION (A) and any two (2) questions in SECTION (B)

**PLEASE TURN OVER**

**SECTION A: Answer All Questions (40 Marks)**

1. a) Distinguish between the following terms:
  - i) Nucleosome and nucleolema
  - ii) Terminal and initial meiosis
  - iii) Frameshift mutation and non-sense mutation (6 mks)b) Describe functions of the Golgi apparatus (4 mks)
  
2. a) List five differences between prokaryotic and eukaryotic cells. (5 mks)  
b) Give the structure of Guanosine 5'-monophosphate (2 mks)  
c) Describe three food species with genetically modified versions, and state the new property in them. (3 mks)
  
3. a) Describe the significance of mitosis (2 mks)  
b) Explain how rate of cell cycle is regulated. (4 mks)  
b) Discuss the lines of evidence to show that cellular ageing is a genetically programmed event. (4 mks)
  
4. a) Draw a well labeled diagram of a plant cell. (5 mks)  
b) Discuss regulation of gene expression. (10 mks)

**SECTION B: Answer Two (2) Questions Only (30 Marks)**

5. a) Describe the key steps in gene expression. (12 mks)  
b) Given the genetic code, draw out the polypeptide formed from the DNA copy below: 5'-AGG TTG CGT TAG TAC-3' (3 mks)
  
6. Differentiate between mitosis and meiosis and describe the process of meiosis during oogenesis in humans. (15 mks)

7. a) Describe five similarities between mitochondrion and chloroplast. (5 mks)  
 b) Describe the process of energy production in mitochondrion. (10 mks)

|                   |   | 2nd base in codon        |                          |                            |                           |                  |                   |
|-------------------|---|--------------------------|--------------------------|----------------------------|---------------------------|------------------|-------------------|
|                   |   | U                        | C                        | A                          | G                         |                  |                   |
| 1st base in codon | U | Phe<br>Phe<br>Leu<br>Leu | Ser<br>Ser<br>Ser<br>Ser | Tyr<br>Tyr<br>STOP<br>STOP | Cys<br>Cys<br>STOP<br>Trp | U<br>C<br>A<br>G | 3rd base in codon |
|                   | C | Leu<br>Leu<br>Leu<br>Leu | Pro<br>Pro<br>Pro<br>Pro | His<br>His<br>Gln<br>Gln   | Arg<br>Arg<br>Arg<br>Arg  | U<br>C<br>A<br>G |                   |
|                   | A | Ile<br>Ile<br>Ile<br>Met | Thr<br>Thr<br>Thr<br>Thr | Asn<br>Asn<br>Lys<br>Lys   | Ser<br>Ser<br>Arg<br>Arg  | U<br>C<br>A<br>G |                   |
|                   | G | Val<br>Val<br>Val<br>Val | Ala<br>Ala<br>Ala<br>Ala | Asp<br>Asp<br>Glu<br>Glu   | Gly<br>Gly<br>Gly<br>Gly  | U<br>C<br>A<br>G |                   |

The mRNA genetic code