

Name:
Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2021

Course: Molecular Biology and Genetics

Semester: II

Program: MSc. Microbiology

Course Code: HSMB 7014

Time : 03 hrs.

Max. Marks: 100

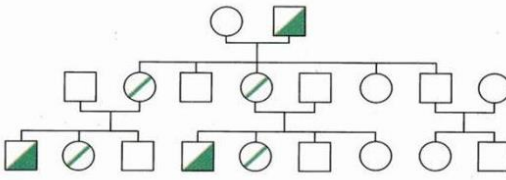
Instructions:

1. Kindly take the examination from Laptop + Mobile or Mobile only with recommended OS & Browser (mentioned in Exam manual)
2. **Section A- Type the Answers**
3. **Section B, Section C and Section D** - Scan and Upload question type.
4. Use Plain paper (A4 sheet) & Black Gel Pen.
5. Kindly note that to avoid connectivity glitches while uploading your answer sheet, please try to finish earlier than the end time to ensure uploading. **To Scan and Upload answers please make sure that when picture is being taken:**
 - ✓ ensure that shadows do not fall on the paper
 - ✓ ensure that the camera is held stably above the answer sheet in parallel to it
 - ✓ ensure the frame of the picture includes the answer sheet and no surroundings
 - ✓ ensure sufficient lighting in the room
 - ✓ If your answer is more than 1 page for particular question, please scan all the pages of answer and then press the upload button
 - ✓ Same questions should be opened on laptop for which you are uploading scanned answer sheet from mobile

Example: If you are scanning answer sheet for Que No. 1 of Section B, C and D from Mobile, then Que No. 1 should be visible on your laptop screen.

SECTION A

| S. No. | MCQs or Fill in the blanks (1.5 marks each) | 30 Marks | CO |
|--------|--|----------|-----|
| 1 | DNA polymerase involved in mitochondrial replication is called | 1.5 | CO1 |
| 2 | Klenow fragment has the ability to do nick translation. True/False | 1.5 | CO1 |

| | | | |
|----|---|-----|-----|
| 3 | Both replication and translation require investment of energy in the form of ATP. True/False | 1.5 | CO2 |
| 4 | In eukaryotes,is the polymerase responsible for leading strand synthesis. | 1.5 | CO1 |
| 5 | In eukaryotes,is the polymerase responsible for lagging strand synthesis. | 1.5 | CO1 |
| 6 | is responsible for sealing nicks in the DNA via formation of an enzyme-AMP complex as an intermediate. | 1.5 | CO1 |
| 7 | RF-C and PCNA of eukaryotes are analogous toand in prokaryotes. | 1.5 | CO2 |
| 8 |is responsible for reversal of UV induced damage. are the lesions formed upon UV exposure of cells. | 1.5 | CO6 |
| 9 |is a DNA alkylating agent. a. Nitrous acid b. Actinomycin D c. Nitrosourea d. All of the above | 1.5 | CO6 |
| 10 | Oxidative deamination of cytosine leads to formation of | 1.5 | CO6 |
| 11 | Oxidative deamination of DNA can happen in presence of mutagen such as a. Nitrous acid b. Actinomycin D c. UV light d. All of the above | 1.5 | CO6 |
| 12 | Regulatory RNA that is perfectly complementary to mRNA is called.....and binding of it to RNA leads to | 1.5 | CO3 |
| 13 | Regulatory RNA that is partially complementary to mRNA is called.....and binding of it to RNA leads to | 1.5 | CO3 |
| 14 | RISC stands for | 1.5 | CO3 |
| 15 | Prokaryotic promoters lie upstream of transcription start site while eukaryotic ones can lie both upstream and downstream. True/False | 1.5 | CO3 |
| 16 | Name at least two chromatin modifying enzymes. | 1.5 | CO1 |
| 17 | Enhancers can lie both upstream and downstream of transcription start site. True/False | 1.5 | CO2 |
| 18 | Give an example of a ribozyme. | 1.5 | CO4 |
| 19 | Look at the pedigree, write what sort of inheritance is reflected.  <p style="text-align: center;">  Heterozygous female without disease (silent carrier) Affected male </p> | 1.5 | CO5 |

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| 20 | Transcription in eukaryotes happens indirection and in prokaryotes happens in direction. | 1.5 | CO3 |
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SECTION B the word limit 20 marks 4 questions 5 marks each

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| Q | Short Answer Type Question (5 marks each) Scan and Upload 4 questions 5 marks each | 20 Marks | CO |
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| 1 | <p>Explain what is the inheritance pattern. What is unusual?</p> <p align="center"> B - dominant black allele C - dominant coat deposition b - recessive brown allele c - recessive coat deposition </p> | 5 | CO5 |
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| 2 | Draw histone octamer and explain how DNA is wrapped around it. Also, explain chromatin organization crisply. | 5 | CO1 |
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| 3 | Explain what is capping? Where does it happen? What is the purpose? | 5 | CO3 |
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| 4 | Explain with suitable illustration initiation of translation in prokaryotes. | 5 | CO4 |
|---|--|---|-----|

SECTION C 30 marks

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| Q | Two case studies 15 marks each subsections | 30 Marks | CO |
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| 1 | <p>1. In a cancerous cell, the ends of chromosome are maintained well. There is no shortening of ends observed while in normal somatic cells, length of these ends progressively decreases with successive cell division. Give reasonable explanation for the following-</p> <ul style="list-style-type: none"> - i. What are these ends called? 1 Mark - ii. What is causing this phenomenon in cancer and somatic cells. Explain preferably with a suitable illustration. 5 Marks - iii. Who discovered it and in which organism? 2Marks - iv. What is the composition of ends of chromosome? 3Marks - v. This phenomenon of end shortening is implicated in ageing too. Can you explain/envisage what happens in ageing, what are the consequences? How can you reverse it assuming you are a molecular biologist? 4 Marks | 15 | CO3 |
|---|--|----|-----|

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| 2 | A human cell line is defective in some stage of translation. It is only able to survive when a particular enzyme and ATP is constantly supplied exogenously. | 15 | CO4 |
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| | <p>There is another cell line where this enzyme is present but is defective such that wrong amino acid is incorporated into protein.</p> <ul style="list-style-type: none"> - i. Which is possibly defective in first cell line? 1 Mark - ii. Why is ATP needed in the process? 1 Mark - iii. What are the roles of this enzyme in translation? You can use appropriate cartoons, equations to support your answer. 5Marks - iv. How many substrates does this enzyme have? 3 Marks - v. What is defective in enzyme of second cell line? 2 Marks - vi. How can you possibly rescue the cell, given that you can add components in the cell culture easily? 2 Marks - vii. How many such enzymes are present in the cell and why? 1 Mark | | |
| | SECTION- D 20 marks | | |
| Q | Long Answer type Questions Scan and Upload (10 marks each) word limit (500 words) | 20 Marks | CO |
| 1 | Explain promoter organization in eukaryotes. Also, write how many types of RNA polymerases exist in eukaryotes? What does each one do? (6+1+3) | 10 | CO3 |
| 2 | <p>How does horizontal transfer happen in bacteria. Explain with suitable illustrations and text. (3+7)</p> <p style="text-align: center;">OR</p> <p>Give an account of initiation of transcription (assembly of TFs) in eukaryotes with suitable diagram/cartoon.</p> | 10 | CO4 |