



Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Sciences
BMS 3153 – Molecular Biology
3rd Year 1st Semester
Batch 08
End Semester SEQ Examination

Date : 03rd of August 2026

Time : 09.00 am – 11.00 am (Two Hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **FOUR** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

QUESTION 01

(100 marks)

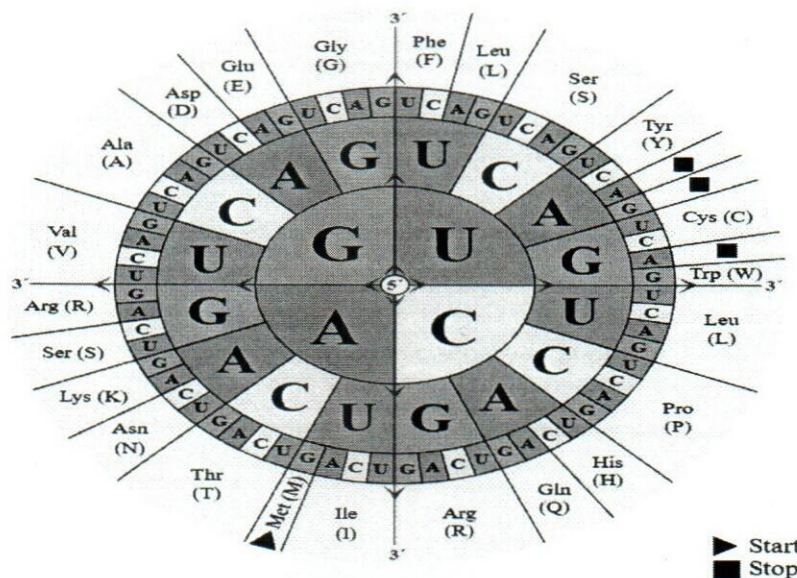
Answer the following questions referring to the given DNA sequence of a human gene.

Normal DNA sequence (5' → 3'): **ATG GAA TTC GCT CCA GTT AAC**

1.1 Identify the type of mutation that has occurred, if a point mutation has changed the 13th nucleotide from Cytosine (C) to Thymine (T). (10 marks)

1.2 Write the corresponding mRNA sequences transcribed from both the normal and mutated DNA sequences. (20 marks)

1.3 Translate both mRNA sequences into amino acid sequences using the standard genetic code. (20 marks)



1.4 Explain the possible effects of this mutation on protein structure and function. (25 marks)

1.5 Illustrate the cellular DNA repair mechanism that would recognize and repair this mutation using a flow chart. (25 marks)

QUESTION 02**(100 marks)**

A molecular diagnostics laboratory has observed an increase in false-positive PCR results during routine pathogen detection. Investigation revealed several issues related to laboratory organization, equipment usage, and personnel practices.

2.1. Explain how the above issues may contribute to contamination in the laboratory. (35 marks)

2.2. Draw a diagram of an improved laboratory layout, indicating separate rooms or workstations for,

- Reagent preparation
- Sample processing
- PCR amplification
- Post-PCR analysis
- Waste disposal

(35 marks)

2.3. Discuss the quality assurance and contamination control measures that should be implemented in a molecular biology laboratory to ensure accurate and reproducible PCR results. (30 marks)

QUESTION 03**(100 marks)**

3.1. Differentiate prokaryotic and eukaryotic transcription processes. (25 marks)

3.2. Explain the regulation of genes using Lac operon as an example. (25 marks)

3.3 Discuss two (02) important considerations during protein extraction for proteomic analysis. (15 marks)

3.4 Describe the applications of genomics and proteomics in personalized medicine, disease diagnosis, and drug discovery. (35 marks)

QUESTION 04**(100 marks)**

4.1. What are the essential characteristics that make a plasmid an effective vector for recombinant DNA technology? (20 marks)

4.2. Explain the function of selectable marker genes in identifying transformed host cells when using the pUC19 vector. (25 marks)

4.3. Compare and contrast the three (03) primary bacterial transformation methods based on their underlying physical and biological working principles. (25 marks)

4.4. Clarify the biochemical and biological principles used in pUC18/pUC19 systems to differentiate recombinants from non-recombinant clones. (30 marks)

FACULTY OF HEALTH SCIENCES
BSC. (HONS) BIOMEDICAL SCIENCES
BMS 3143 – EPIDEMIOLOGY
3rd year 1st semester
END-SEMESTER EXAMINATION – Assignment
8th BATCH

Date: 30th July 2026

Time: 1.30 pm- 2.30 pm (one Hour)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **TWO** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

Question 01

(100 marks)

- 1.1 Describe “necessary causes” and “sufficient causes” by giving examples. (40 marks)
- 1.2 Describe the factors influencing the quality of a laboratory. (60 marks)

Question 02

(100 marks)

- 2.1 Explain the importance of disease surveillance in public health. Discuss the different types of surveillance systems and their role in preventing and controlling infectious disease outbreaks. (100 marks)



FACULTY OF HEALTH SCIENCES
BSC. (HONS) BIOMEDICAL SCIENCES
BMS 3143 – EPIDEMIOLOGY
3rd year 1st semester
END-SEMESTER EXAMINATION – SEQ
8th BATCH

Date: 30th July 2026

Time: 09.00 am – 12.00 pm – Three Hours

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.

Question 01

(100 marks)

In 2026, public health authorities reported an increased number of meningitis cases among children aged 0–14 years in the Deniyaya area of Sri Lanka. An epidemiological investigation was conducted to determine the magnitude of the problem and identify potential risk factors.

The mid-year population of children aged 0–14 years in Deniyaya was 12,000. During 2026, 180 children were diagnosed with meningitis. Among these, 150 were newly diagnosed cases during January to June, while 30 had been diagnosed before January 2026. A case-control study was conducted to investigate the association between overcrowded housing and meningitis. The results were as follows:

Exposure to Overcrowded Housing	Meningitis Cases	Controls
Exposed	120	80
Not Exposed	60	140

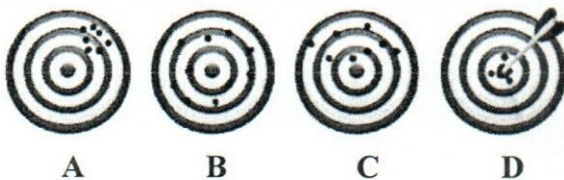
- 1.1 Calculate the prevalence of meningitis among children in Deniyaya during the year 2026. (20 marks)
- 1.2 The researchers used a case-control study to investigate the association between overcrowded housing and meningitis. Calculate the odd ratio (OR). (30 marks)
- 1.3 Interpret the above calculated odd ratio. (25 marks)
- 1.4 Using the Bradford Hill criteria for causation, describe any four (04) criteria that epidemiologists could use to evaluate whether overcrowded housing is a causal factor for meningitis among children in the Deniyaya area. (25 marks)

Question 02

(100 marks)

A cross-sectional study is planned among pregnant mothers ($n=85$) in selected MOH area in Colombo District to assess iron deficiency using serum ferritin levels, and a food-frequency questionnaire on iron-rich diet intake.

- 2.1 Identify two (02) possible systematic errors (bias) in this study. (30 marks)
- 2.2 Interpret the validity and reliability of below diagrams.



- 2.3 Briefly describe two (02) factors that may affect generalizability in this study. (30 marks)
- 2.4 Differentiate between meta-analysis and systematic reviews. (20 marks)

Question 03**(100 marks)**

- 3.1 Write two (02) main types of disease surveillance systems used in public health. (20 marks)
- 3.2 List four (04) main functions of a public health laboratory. (20 marks)
- 3.3 Compare two (02) differences between clinical laboratories and public health laboratories. (20 marks)
- 3.4 Differentiate between Biosafety Level 2 (BSL-2) and Biosafety Level 3 (BSL-3). (20 marks)
- 3.5 Explain three (03) strategies to ensure biosecurity in laboratories during the outbreak. (20 marks)

Question 04**(100 marks)**

- 4.1 Describe general guidelines for collecting clinical specimens for Bacteriology. (20 Marks)
- 4.2 Compare and contrast the transport requirements for a viral specimen (e.g., SARS-CoV-2) versus a bacterial culture specimen. (20 marks)
- 4.3 Explain the "triple packaging system". (30 marks)
- 4.4 Describe the 5 C's of laboratory selection. (30 marks)

Question 05**(100 marks)**

- 5.1 State three (03) importances of disease surveillance. (10 marks)
- 5.2 Mention the two (02) categories of notifiable diseases in Sri Lanka with two (02) examples for each. (30 marks)
- 5.3 Explain the preventive measures taken in Sri Lanka to control dengue outbreaks. (20 marks)
- 5.4 State the role of healthcare workers in outbreak investigation and response. (20 marks)
- 5.5 Describe the major sources of data used in the Sri Lanka disease surveillance system (20 marks)

Question 06

A Medical Laboratory Scientist is evaluating a new rapid antigen test for the detection of Disease X. The test was compared with the gold standard laboratory method in a sample of 1,000 individuals. The results are shown below,

	Disease Present	Disease Absent	Total
Test Positive	180	90	270
Test Negative	20	710	730
Total	200	800	1000

- 6.1 Analyze the diagnostic performance of the test by calculating and interpreting, (15 marks)
- 6.1.1. Sensitivity (15 marks)
- 6.1.2. Specificity (15 marks)
- 6.1.3. Positive predictive value (PPV) (15 marks)
- 6.1.4. Negative predictive value (NPV) (15 marks)
- 6.2 Explain the epidemiological significance of disease prevalence when interpreting laboratory test results. (20 marks)
- 6.3 Based on the calculated results, critically evaluate whether the test is more suitable for: (20 marks)
- i. Screening purposes
- ii. Confirmatory diagnosis



Faculty of Health Sciences
BSc (Hons) in Biomedical Sciences
BMS 3124 Pathology – SEQ
8th Batch

End Semester Examination – 3rd Year 1st Semester

Date: 16th July 2026

Time: 09.00 am – 12.00 pm – Three Hours

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX (06)** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

Question 01

(100 Marks)

- 1.1 List **five (05)** chemical mediators in acute inflammation. (15 marks)
- 1.2 Critically evaluate the statement, "Inflammation is an essential physiological response." Support your answer with relevant scientific explanations and examples. (35 marks)
- 1.3 Compare and contrast followings.
 - 1.3.1 Hypertrophy and Atrophy (25 marks)
 - 1.3.2 Coagulative necrosis and Liquefactive necrosis (25 marks)

Question 02

(100 Marks)

- 2.1 Describe dystrophic calcification. (25 marks)
- 2.2 Differentiate regeneration and repair. (25 marks)
- 2.3 Write a brief description about metaplasia. (20 marks)
- 2.4 Define following terms.
 - 2.4.1 Etiology (15 marks)
 - 2.4.2 Apoptosis (15 marks)

Question 03

(100 Marks)

- 3.1 A 62-year-old male was admitted to the cardiology unit. Electrocardiogram revealed an Acute Myocardial Infarction. Briefly explain pathogenesis of this condition. (30 marks)
- 3.2 Name **two (02)** modifiable and **two (02)** non-modifiable risk factors for the above-mentioned condition in 3.1. (20 marks)
- 3.3 Briefly explain the hypovolemic shock. (25 marks)
- 3.4 Discuss the differences between Hyperaemia and Congestion. (25 marks)

Question 04**(100 Marks)**

- 4.1 A 67-year-old man presented to the medical ward with a 5-day history of fever, productive cough with yellowish sputum, shortness of breath, and pleuritic chest pain. Clinical examination and radiological findings showed a dark, branching air-filled bronchi surrounded by dense, white consolidation. (10 marks)
Name the etiological factor for the above condition.
- 4.2 List the **four (04)** stages of developing lobar Pneumonia (20 marks)
- 4.3 Briefly explain the gross pathological features could be seen when developing lobar Pneumonia. (20 marks)
- 4.4 State **four (04)** signs and symptoms of Glomerulonephritis (20 marks)
- 4.5 Briefly explain the **three (03)** core mechanisms of the stone formation (urolithiasis) in the urinary tract. (30 marks)

Question 05**(100 Marks)**

A 59-year-old woman presented to the gynaecological ward with a history of heavy, irregular, and prolonged uterine bleeding associated with lower back pain. Following clinical evaluation and relevant investigations, she was diagnosed with a Uterine Leiomyoma.

- 5.1 Mention whether is it a benign or malignant neoplasm. (10 marks)
- 5.2 State the cellular origin of a Leiomyoma. (10 marks)
- 5.3 List **four (04)** risk factors for Breast cancers. (20 marks)
- 5.4 Briefly explain the term neoplasm, giving its essential **five (05)** characteristics. (30 marks)
- 5.5 Differentiate between benign and malignant neoplasms. (30 marks)

Question 06**(100 Marks)**

- 6.1 List **five (05)** different factors affecting tissue processing (20 marks)
- 6.2 Briefly explain the principles of tissue processing (30 marks)
- 6.3 Explain the importance of using fixatives in histopathology (20 marks)
- 6.4 Discuss the use of mordants in histopathology staining (30 marks)



Faculty of Health Sciences
BSc (Hons) in Biomedical Sciences
BMS 3124 Pathology – SEQ
6th Batch
Repeat Examination – 3rd Year 1st Semester

Date: 16th July 2026

Time: 09.00 am – 11.00 pm – Two Hours

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **Four (04)** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

Question 01

(100 Marks)

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|-------|--|------------|
| 1.1 | List five (05) chemical mediators in acute inflammation. | (15 marks) |
| 1.2 | Critically evaluate the statement, "Inflammation is an essential physiological response."
Support your answer with relevant scientific explanations and examples. | (35 marks) |
| 1.3 | Compare and contrast followings. | |
| 1.3.1 | Hypertrophy and Atrophy | (25 marks) |
| 1.3.2 | Coagulative necrosis and Liquefactive necrosis | (25 marks) |

Question 02

(100 Marks)

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|-------|---|------------|
| 2.1 | Describe dystrophic calcification. | (25 marks) |
| 2.2 | Differentiate regeneration and repair. | (25 marks) |
| 2.3 | Write a brief description about metaplasia. | (20 marks) |
| 2.4 | Define following terms. | |
| 2.4.1 | Etiology | (15 marks) |
| 2.4.2 | Apoptosis | (15 marks) |

Question 03

(100 Marks)

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|-----|--|------------|
| 3.1 | Name two (02) modifiable and two (02) non-modifiable risk factors for the myocardial infarction. | (10 marks) |
| 3.2 | Briefly explain the hypovolemic shock. | (20 marks) |
| 3.3 | Discuss the differences between Hyperaemia and Congestion. | (30 marks) |
| 3.4 | State four (04) signs and symptoms of Glomerulonephritis | (20 marks) |
| 3.5 | Explain two (02) core mechanisms of the stone formation (urolithiasis) in the urinary tract. | (20 marks) |

Question 04

(100 Marks)

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|-----|---|------------|
| 4.1 | List four (04) risk factors for Breast cancers. | (20 marks) |
| 4.2 | Differentiate between benign and malignant neoplasms. | (30 marks) |
| 4.3 | Briefly explain the principles of tissue processing | (30 marks) |
| 4.4 | Explain the importance of using fixatives in histopathology | (20 marks) |



Faculty of Health Sciences
BSc (Hons) in Biomedical Sciences
BMS 3134- Industrial Microbiology
Batch – 07
3rd Year 1st Semester
Assignment

Date : 13.02.2026
Time : 1.30 pm. – 2.30 pm. (One Hour)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **TWO** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

QUESTION 01

(100 marks)

1. Write an analytical report on culture media used in food microbiology

QUESTION 02

(100 marks)

2. Relate and discuss the role of a microbiologist in food microbiology



FACULTY OF HEALTH SCIENCES
B.Sc. (HONS) BIOMEDICAL SCIENCES
BMS 3143 – EPIDEMIOLOGY
3rd Year 1st Semester
MID-SEMESTER EXAMINATION – SEQ
6th Batch

INDEX NUMBER:

Date : 31st January 2025
Time : 9.00 a.m. – 10.00 a.m. (One Hour)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **TWO** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.

Question 01

(100 Marks)

1.1 Write **one (01)** achievement of epidemiology.

(10 Marks)

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1.2 List **four (04)** uses of epidemiology.

(20 Marks)

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1.3 List the **five (05)** stages of natural history of disease.

(30 Marks)

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1.4 Write **two (02)** examples for cultural influence on health and illness.

(40 Marks)

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Question 02

(100 marks)

A study was conducted in 2024 to assess the burden of type 2 diabetes mellitus (T2DM) in a rural village in the Polonnaruwa District, with a population of 10,000. At the beginning of the year, 2,000 individuals were already diagnosed with T2DM. During the year, 500 new cases were reported. A cross-sectional study identified obesity, sedentary lifestyle, and family history as major contributing factors for T2DM in this population. Body weight was measured using a weighing scale and fasting blood glucose levels were assessed.

2.1 Calculate the prevalence of type 2 diabetes mellitus (T2DM) at the beginning of 2024. (10 marks)

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2.2 Calculate the incidence rate of T2DM during 2024.

(10 marks)

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2.3 Write **three (03)** factors that could increase the prevalence of T2DM in this population during the study period.

(30 marks)

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2.4 Write **two (02)** types of bias and provide relevant examples from the scenario.

(20 marks)

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2.5 Identify **one (01)** possible confounder in the relationship between obesity and T2DM. State its role as a confounder.

(10 marks)

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2.6. Write **two (02)** relevant criteria from Hill's criteria for causation to explain the relationship between obesity and T2DM.

(20 marks)

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Faculty of Health Sciences
Bachelor of Science Honors in Biomedical Science
Pathology
BMS 3124
3rd year 1st Semester
Special Repeat Examination - Assignment

INDEX NUMBER:

Date: 26th November 2024

Time: 11.00 am – 12.00 pm (One hour)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **one** question.
- Answer **all** questions.
- You should write legibly in black or blue ink.

Question 1

(100 marks)

Discuss the pathogenesis of tuberculosis

Question 2

(100 marks)

Discuss **five (05)** types of cellular adaptations and give examples



Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Sciences
BMS 3153 – Molecular Biology
3rd Year 1st Semester
Batch 05
End Semester Special Repeat SEQ Examination

Date : 21st of November 2024
Time : 09.00 am – 11.00 am (Two Hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **FOUR** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

QUESTION 01

(100 marks)

1.1. Describe the role of mismatch repair in DNA.

(25 marks)

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1.2. State the main steps in the mismatch repair pathway.

(25 marks)

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1.3. Define silent mutation and describe its potential effects on gene expression. (50 marks)

[illegible]

QUESTION 02

(100 marks)

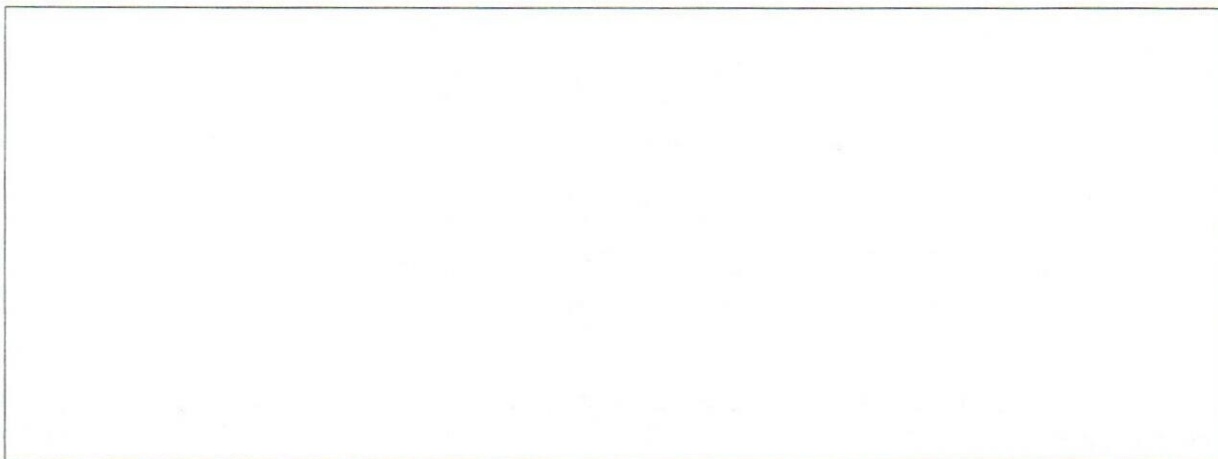
2.1 Name five enzymes involved in the transcription process and state their functions. (20 marks)

[illegible]

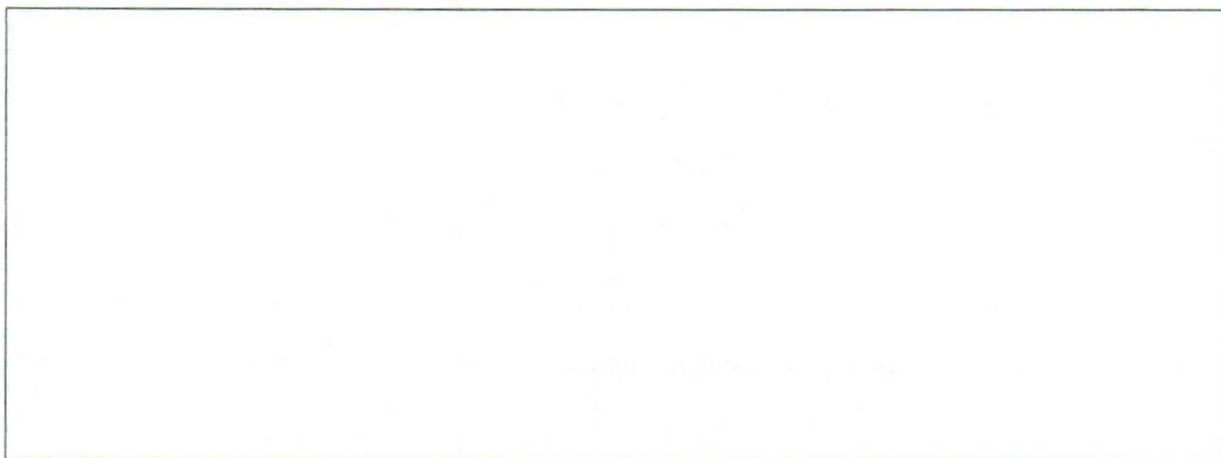
2.2 Compare and contrast transcription in prokaryotes and eukaryotes. (20 marks)

[illegible]

- 2.3. Draw and label a diagram of the transcription initiation complex in eukaryotes. (30 marks)



- 2.4 Imagine that you are supposed to establish a molecular research laboratory, illustrate the lab layout and label key research areas and equipment. (30 marks)



QUESTION 03

(100 marks)

- 3.1. List the RNA secondary structures.

(20 marks)

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3.2 Mention the role of ribosomal RNA (rRNA), transfer RNA (tRNA), and messenger RNA (mRNA) in protein synthesis. (20 marks)

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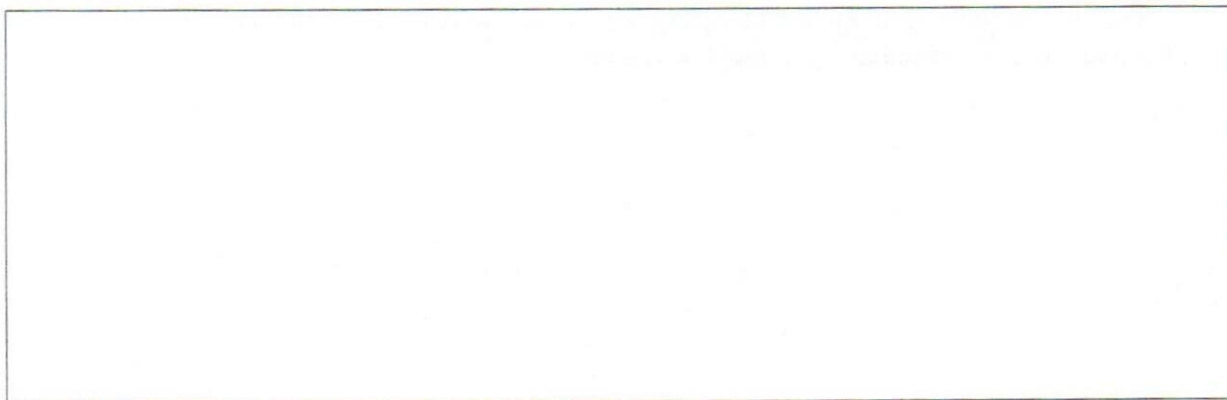
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3.3 Draw a diagram to illustrate the process of splicing in mRNA processing, labeling key components. (30 marks)



3.4. State how alternative splicing contributes to protein diversity in eukaryotes. (30 marks)

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QUESTION 04**(100 marks)**

4.1. Mention the factors that should be present in vectors for used for recombinant DNA technology. (20 marks)

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4.2. State the purpose of using selectable markers in genetic engineering, giving examples of commonly used markers. (40 marks)

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4.3. List three methods of DNA extraction from cells, mentioning any advantages or disadvantages of each. (40 marks)

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Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Sciences
BMS 3134 – Industrial Microbiology
3rd Year 1st Semester
Batch 05
End Semester Special Repeat SEQ Examination

Date : 20th of November 2024

Time : 09.00 a.m. – 12.00 p.m. (Three Hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **FOUR** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

QUESTION 01

(Marks 100)

1.1 Define the term “Food and waterborne pathogens”.

(15 Marks)

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1.2 Name three types of food and water-borne pathogens based on the mode of illnesses.

(15 Marks)

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1.3 Give two examples of foodborne pathogens and two examples of waterborne pathogens.

(20 Marks)

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1.4. State the techniques which can be used to identify waterborne pathogens and explain two of them.

(25 marks)

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1.5. State the mode of infection on how food and waterborne pathogens infect humans and provide two examples for each type.

(25 Marks)

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QUESTION 02**(Marks 100)**

2.1 Define the term "Fermentation".

(10 Marks)

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2.2 Write the principle of the industrial fermentation process.

(15 Marks)

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2.3 List down raw materials used in industrial media production.

(25 Marks)

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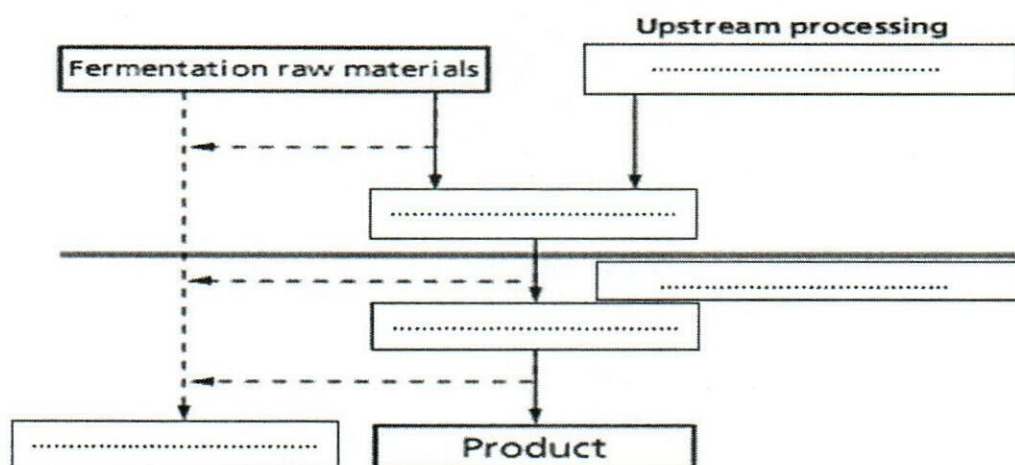
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2.4 Complete the given outline of the fermentation process.

(50 Marks)

QUESTION 03**(Marks 100)**

3.1. State the importance of preparing sample dilutions in order to conduct the Aerobic plate count. (10 marks)

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3.2. State the parameters of water quality standards and explain one of them using appropriate examples. (20 Marks)

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3.3. State the importance of indicator bacteria to detect the water quality and describe the features that should be present in indicator bacteria. (20 Marks)

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3.4. State the procedure of water sample collection for the test of water quality and explain the precautions that needs to be taken while obtaining samples. (20 Marks)

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3.5. State the steps of drinking water treatments.

(30 Marks)

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QUESTION 04

(Marks 100)

4.1. What is the role of the International Organization for Standardization (ISO)?

(10 Marks)

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4.2. What are the differences between two-class and three-class sampling plans as defined by the International Commission for Microbiological Specifications for Food (ICMSF)?

(25 Marks)

(25 Marks)

[illegible]

(30 Marks)

[illegible]



Faculty of Health Sciences
Bachelor of Science Honors in Industrial Pharmaceutical Science
IPS 3133 – Advanced Medicinal Chemistry I

Batch – 05
3rd year 1st semester
End Semester SEQ Examination (Resit)

Date : 20th of November 2024
Time : 09.00 a.m. – 12.00 p.m. (Three hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are allowed to use non-programmable calculators.

Question 01

(100 marks)

1.1. State the impact of temperature and pH on the stability of insulin.

(30 marks)

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1.2. Show by means of a chemical equation, how you would synthesize Propylthiouracil.

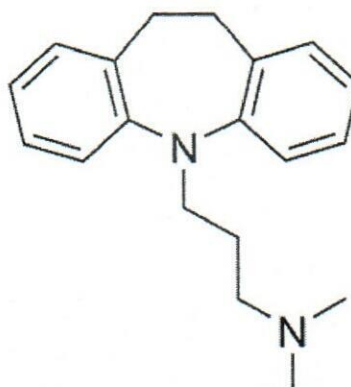
(40 marks)

(30 marks)

[illegible]

(100 marks)

(20 marks)



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2.2. Mention the structure activity relationship of the above-mentioned drug group in 2.1.

(30 marks)

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2.3. State how therapeutic efficacy enhanced in diflunisal.

(20 marks)

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2.4. Heroin is a strong μ agonist developed by altering the morphine structure. Justify this statement.

(30 marks)

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Question 03**(100 marks)**

3.1. State the mechanism of irreversible receptor antagonist.

(20 marks)

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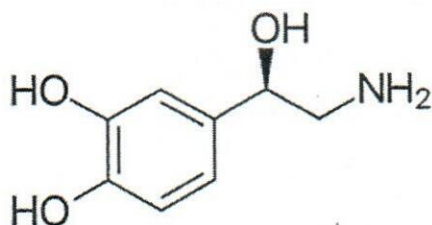
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3.2. The structure of the norepinephrine is given below.



3.2.1. Draw the chemical structure of salbutamol by using the given structure.

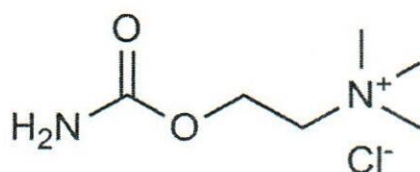
(20 marks)

3.2.2. What is the chemical modification in salbutamol to increase the beta 2 selectivity?
(20 marks)

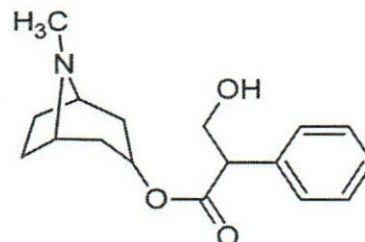
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3.3. Identify the chemical structures given below. (40 marks)

3.3.1.



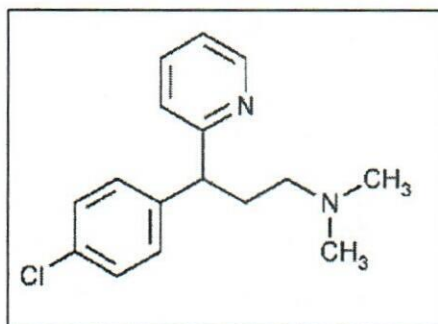
3.3.2.



Question 04

(100 marks)

4.1.



4.1.1. Identify the given chemical structure of the drug. (10 marks)

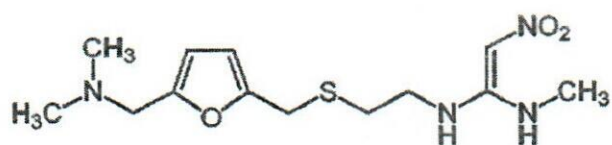
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4.1.2. What is the group of this drug? (10 marks)

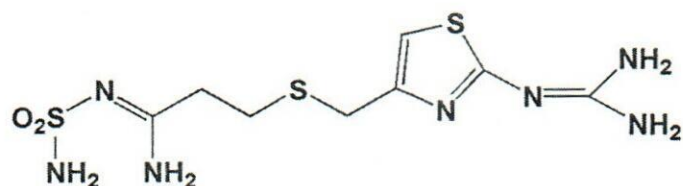
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4.2. Identify the chemical structures given below. (40 marks)

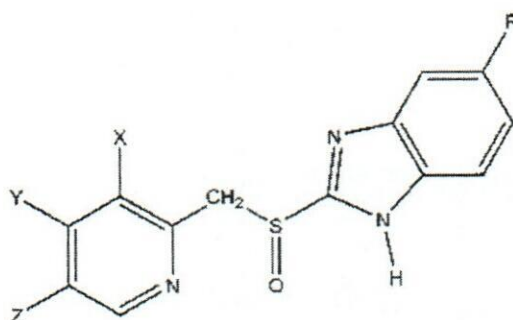
4.3.1



4.3.2

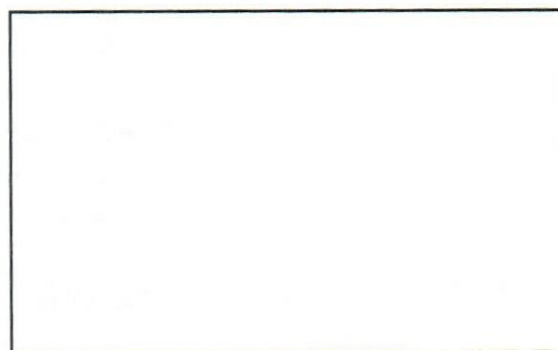
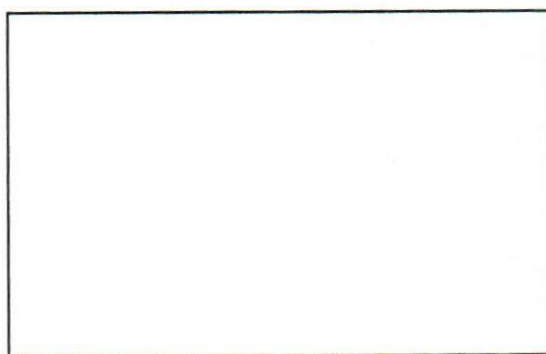


4.3. Draw the following chemical structures by using the given pharmacophore. (40 marks)



4.3.1. Omeprazole

4.3.2. Pantoprazole

**Question 05****(100 marks)**

5.1. Define the term partition coefficient (P).

(20 marks)

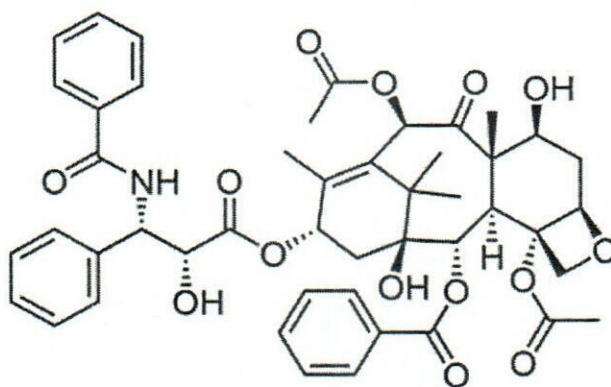
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5.2. State the importance of Lipinski's *Rule of Five* in drug design.

(30 marks)

5.3. Giving reasons identify whether the following drug is considered as a satisfactory drug candidate of potential bioavailability. (50 marks)



$C_{47}H_{51}NO_{13}$
MW= 837

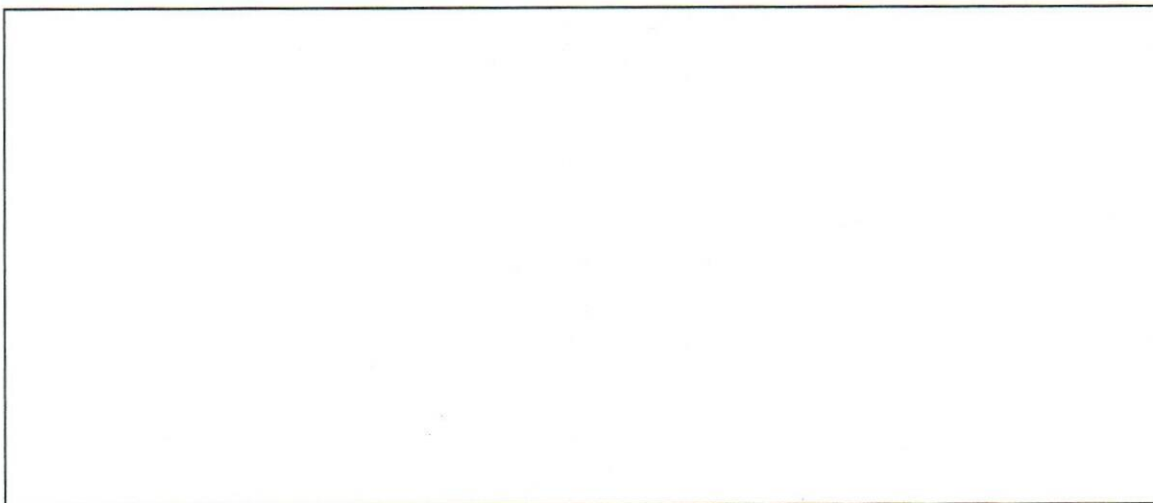
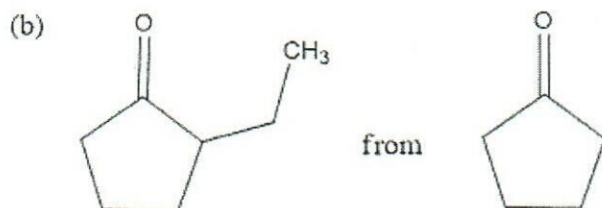
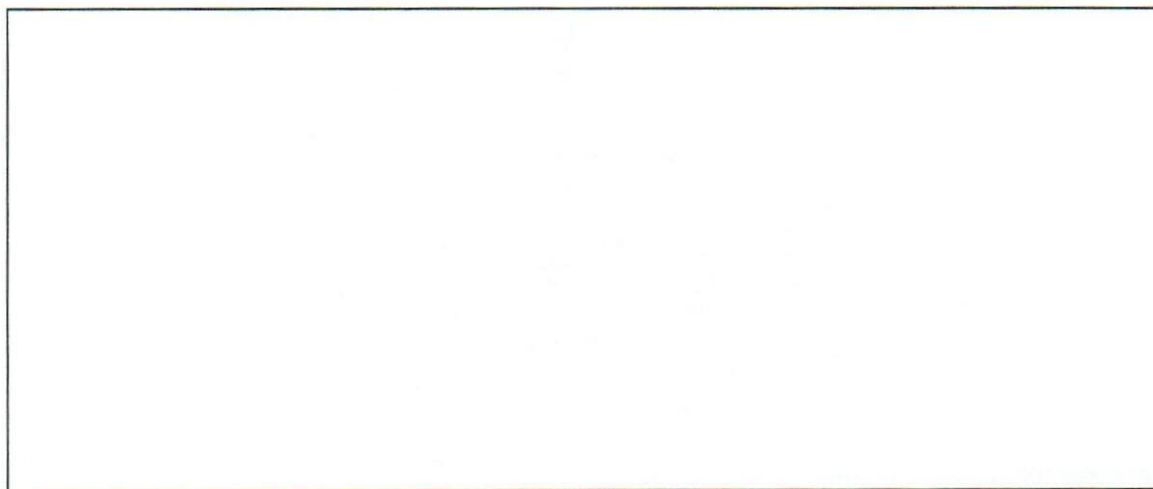
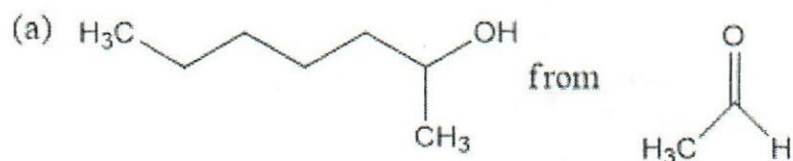
Question 06

(100 marks)

6.1. What is retrosynthetic analysis?

(20 marks)

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6.2. Show how you would carry out retrosynthetic analysis on each of the following molecules using provided starting materials. (80 marks)





Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Sciences
BMS 3134 – Industrial Microbiology
3rd Year 1st Semester- 2nd and 3rd batch
End Semester SEQ Examination- Repeat

Date : 24/06/2024

Time : 09.00 am – 12.00 am (Three Hours)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

Question 01

(100 marks)

1.1. State the organisms responsible for the spoilage of the following food items. (40 marks)

1.1.1. Garlic

1.1.2. Pomaceous fruit

1.1.3. Potato

1.1.4. lime

1.2. State the three pasteurization methods, including the required temperature conditions and timings. (30 Marks)

1.3. A milk processing company collects milk from farmers to produce UHT milk and pasteurized milk. On one day, they received two batches of milk with the following conditions:

- **A:** Total bacterial count is high at the receiving point.
- **B:** Total bacterial count is low at the receiving point.

One batch should be used for UHT milk and the other batch for pasteurized milk. If you are the decision maker, how are you going to select the most suitable batch for the production of pasteurized milk and UHT milk? Give reasons for your selection. (30 marks)

Question 02**(100 marks)**

2.1. State three types of food and waterborne disease conditions according to the 'mode of illness', providing two examples of microorganisms for each type. (30 marks)

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2.2. Draw a flow chart to explain the isolation of *Salmonella* from a food/water sample.

(40 Marks)

2.3. What is the process of identifying a pathogenic organism by phage typing? (30 Marks)

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Question 03**(100 marks)**

3.1. State the factors affecting microbial food spoilage.

(10 Marks)

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3.2. Mention the organism/s used for industrial processing of following products.

(50 marks)

3.1.1. Red wine

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3.1.2. Camembert Cheese

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3.1.3. Penicillin

3.1.4. Streptomycin

3.1.5. Beer

3.3. Draw a flow chart to state the main steps in industrial synthesis of penicillin using microorganisms.

(40 Marks)

Question 04

(100 marks)

4.1. A scientist performed Aerobic Plate Count (APC) for the analysis of a pond-water sample. He prepared a dilution series from 10^{-1} to 10^{-5} from the original pond-water sample. Then, he 'plated' 0.1 mL from each dilution on Plate Count Agar. After incubating the plates for 24 hours, he recorded the colony counts for the two replicates performed per each dilution. Calculate the APC for the pond water sample.

(40 Marks)

Dilution of pond water sample	Colony count in replicate 1	Colony count in replicate 2
10^{-1}	contaminated	Uncountable with merged colonies
10^{-2}	530	Uncountable with merged colonies
10^{-3}	355	140
10^{-4}	215	185
10^{-5}	22	31
10^{-6}	45	30

4.2. State the microbiological techniques used to plate the water sample during APC determination.

(20 Marks)

Question 06

(100 marks)

A scientist wanted to check the quality of three drinking water samples using MPN method. First, with the ambition of performing Presumptive test, he inoculated 5 tubes of double strength of MacConkey broth (containing inverted Durham tubes) with 10 ml of tap water sample (10^0). Then he inoculated 5 tubes of single strength of MacConkey broth (containing inverted Durham tubes) with 1 ml of water sample (10^{-1}). After that he inoculated 5 tubes of single strength of MacConkey broth (containing inverted Durham tubes) with 0.1 ml of the water sample (10^{-2}). All the tubes he incubated at $37 \pm 1^\circ\text{C}$ for 24-48 hours.

He recorded the tubes showing gas production and color change after 24-48 hours and his observations were as follows.

Water Sample	Dilution	10^0	10^{-1}	10^{-2}
01	No. of Positive tubes	5	2	1
02	No. of Positive tubes	0	0	1
03	No. of Positive tubes	2	0	0

6.1. Calculate the Presumptive coliform count in water samples.

(30 Marks)

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6.2. Comment on the suitability of water samples as "potable water".

(20 Marks)

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6.3. The scientist further wanted to check the **Thermotolerant Coliform Count**. For that he inoculated a loopful from the positive tubes of Presumptive test into the broth media "X" and observed for the positive tubes by incubating it at "Y" Celsius temperature. His observations for "positive tubes" were as follows.

Water Sample	Dilution	10^0	10^{-1}	10^{-2}
01	No. of Positive tubes	2	1	0
02	No. of Positive tubes	-	-	0
03	No. of Positive tubes	0	-	-

6.3.1. Identify "X" and "Y"

(10 Marks)

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6.3.2. Mention how he had identified the "positive" tubes for the test ?

(20 Marks)

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(20 Marks)

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(40 marks)

[illegible]



Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Sciences
BMS 3153 – Molecular Biology
3rd Year 1st Semester
Batch 02/03
End Semester Special Repeat SEQ Examination

Date : 25th of June 2024

Time : 09.00 am – 11.00 am (Two Hours)

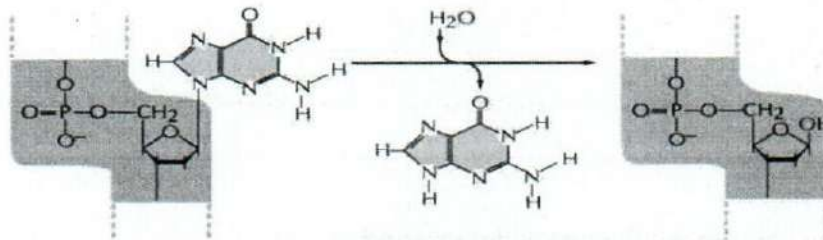
INSTRUCTIONS TO CANDIDATES

- This question paper consists of **FOUR** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.

QUESTION 01

(100 marks)

1.1. Answer the following questions referring to the given diagram.



1.1.1. Identify the DNA damage depicted in the above diagram.

(10 marks)

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1.1.2. State the reasons for the occurrence of the above DNA damage.

(20 marks)

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1.1.3. Mention the type of repair mechanism that need to be activated to repair this damage.

(20 marks)

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1.2. What is known as Nonsense mutation?

(25 marks)

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1.3. What is known as Deamination DNA damage?

(25 marks)

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QUESTION 02

(100 marks)

2.1. State five enzymes involved in DNA replication process.

(15 marks)

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2.2. Differentiate between replication and transcription.

(25 marks)

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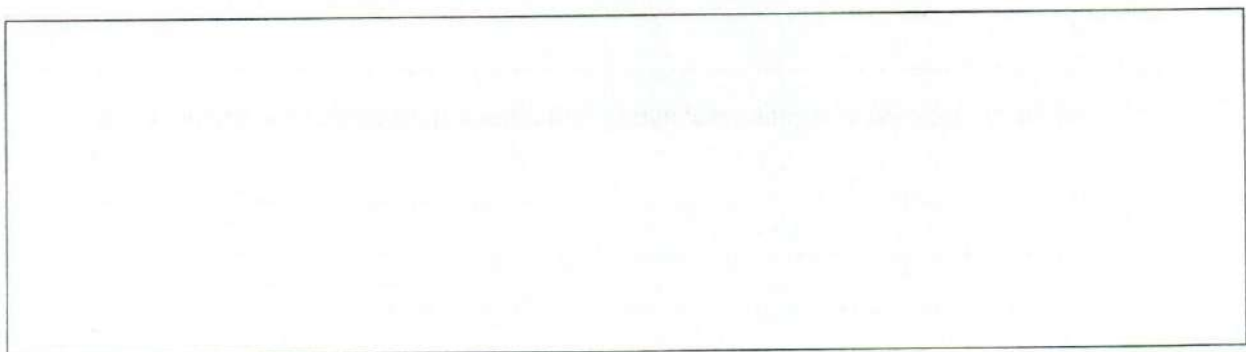
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2.3. Draw a diagram to illustrate the DNA replication of prokaryotes.

(30 marks)



2.4. Imagine that you are about to initiate a molecular biology laboratory at your hometown. Draw a laboratory floor plan to set up the laboratory. (30 marks)



QUESTION 03

(100 marks)

3.1. List the RNA secondary structures.

(20 marks)

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3.2. Mention three types of RNA seen in eukaryotic cells and their functions.

(20 marks)

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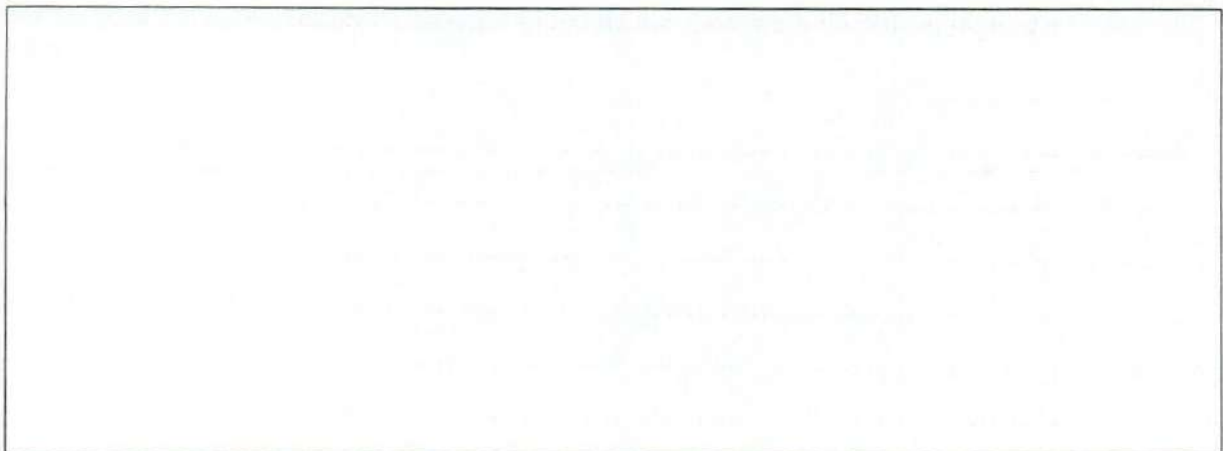
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3.3. Draw a diagrammatic representation of *Lac operon* and label the different regions of the operon.

(30 marks)



3.4. State the role of *Lac operon* under the presence of Lactose within the cell. (30 marks)

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QUESTION 04

(100 marks)

4.1. Mention the marker genes used for the following plasmids in Recombinant DNA Technology.

4.1.1. PUC18/PUC 19 (10 marks)

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4.1.2. PBR 322 (10 marks)

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4.2. Discuss the “**Selection**” step for PUC18/PUC 19 and PBR 322 plasmids using suitable media/s, if you have used them for recombinant DNA technology. (40 marks)

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4.3. State the protein purification methods which could separate extracted proteins **based on size**. (40 marks)

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