CINEC CAMPUS
Beyond A Graduate

PAST PAPERS

Faculty	Department / Section/Division
Not Applicable	Learning Resource Centre

Past Papers

Faculty of health science

Bachelor of Science honours in Biomedical Sciences

Year 3 – Semester I

Document Control & Approving Authority	Senior Director – Quality Management & Administration

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CINEC CAMPUS
Beyond A Graduate

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

Date : 20th of November 2023
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 doing spoilage of following food items
1.1.1. Garlic
1.1.2. Pomaceous fruit
1.1.3. Potato
1.1.4. lime (20 Marks)

1.2. Mention the three pasteurization methods with required temperature conditions and timings. (30 Marks)

1.3. Comment on shelf-life of UHT milk compared to pasteurized milk. (20 Marks)

1.4. A milk processing company collects milk from outside farmers for the production of UHT milk and pasteurized milk. One day; they received two batches of milk with 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 other for pasteurized milk. If you are the decision maker how you are going to select the most suitable batch for 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 water borne illnesses according to the "mode of illness" with two example microorganisms per each type. (30 Marks)

2.2. Draw a flow chart to explain the isolation of *Salmonella* from a food/water sample. (40 Marks)

4.3. Briefly describe on laboratory identification of **any three microbes** causing food and water borne illnesses. (30 Marks)

Question 03 **(100 marks)**

3.1. Mention the organism/s used for industrial processing of following products.
3.1.1. Yoghurt
3.1.2. Red wine
3.1.3. Camembert Cheese
3.1.4. Penicillin
3.1.5. Streptomycin
3.1.6. Beer (60 Marks)

3.2. Draw a flow chart to state the main steps in industrial synthesis of yoghurt using microorganisms. (20 Marks)

3.3. Explain on activity of microbes causing food-intoxications (20 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 the incubation of plates for 24 hrs, he got following colony counts for the two replicates that he 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	150
10^{-4}	215	175
10^{-5}	22	30
10^{-6}	45	32

4.2. What are the microbiological techniques available to plate the water sample during APC determination? (20 Marks)

4.3. Compare and contrast the techniques that you mentioned in 4.2. (40 Marks)

Question 05 **(100 marks)**

2.1. Define the microbial culture media types indicated below.
2.1.1. Enrichment media
2.1.2. Selective media
2.1.3. Differential media
2.1.4. Chromogenic media (40 Marks)

2.2. Describe on identifying a pathogenic organism by phage typing (30 Marks)
2.3. Briefly explain the activity of a "fermenter" used in industrial purposes. (20 Marks)
2.4. What is meant by "downstream processing" after industrial fermentation ? (10 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 ± 1^0C 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	4	1	2
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)
6.2. Comment on the suitability of water samples as "potable water". (20 Marks)
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)
6.3.2. How he identified the "positive" tubes for the test ? (20 Marks)
6.3.3. Comment on the results of the test. (20 Marks)

Combination of positives	MPN index per 100 ml	95 % confidence limits		Combination of positives	MPN index per 100 ml	95 % confidence limits	
		Upper	Lower			Upper	Lower
0-0-0	<2	-	-	4-2-0	22	9.0	56
0-0-1	2	1.0	10	4-2-1	26	12	65
0-1-0	2	1.0	10	4-3-0	27	12	67
0-2-0	4	1.0	13	4-3-1 4-4-0	33 34	15 16	77 80
1-0-0	2	1.0	11	5-0-0	23	9.0	86
1-0-1	4	1.0	15	5-0-1	30	10	110
1-1-0	4	1.0	15	5-0-2	40	20	140
1-1-1	6	2.0	18	5-1-0	30	10	120
1-2-0	6	2.0	18	5-1-1 5-1-2	50 60	20 30	150 180
2-0-0	4	1.0	17	5-2-0	50	20	170
2-0-1	7	2.0	20	5-2-1	70	30	210
2-1-0	7	2.0	21	5-2-2	90	40	250
2-1-1	9	3.0	24	5-3-0	80	30	250
2-2-0	9	3.0	25	5-3-1	110	40	300
2-3-0	12	5.0	29	5-3-2	140	60	360
3-0-0	8	3.0	24	5-3-3	170	80	410
3-0-1	11	4.0	29	5-4-0	130	50	390
3-1-0	11	4.0	29	5-4-1	170	70	480
3-1-1	14	6.0	35	5-4-2	220	100	580
3-2-0	14	6.0	35	5-4-3	280	120	690
3-2-1	17	7.0	40	5-4-4	350	160	820
4-0-0	13	5.0	38	5-5-0	240	100	940
4-0-1	17	7.0	45	5-5-1	300	100	1,300
4-1-0	17	7.0	46	5-5-2	500	200	2,000
4-1-1	21	9.0	55	5-5-3	900	300	2,900
4-1-2	26	12.0	63	5-5-4 5-5-5	1,600 >1,600	600 -	5,300 -

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

B.Sc. (Hons) Biomedical Sciences

BMS 3124 - Pathology

3rd year 1st Semester

End Semester Examination - Assignment

INDEX NUMBER: .....

Date: 30th November 2023
Time: 9.00 a.m. – 10.00 a.m.

INSTRUCTIONS TO CANDIDATES

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

Question 1 **(100 marks)**

1.1 Describe the pathological features of Nephrotic syndrome. (50 marks)
1.2 Describe the pathological features of Nephritic syndrome. (50 marks)

Question 2 **(100 marks)**

2.1 Describe the pathological features in Chronic Obstructive Pulmonary diseases (50 marks)
2.2 Describe the pathological features of bronchial asthma. (50 marks)

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Sciences

BMS 3134 – Industrial Microbiology

3rd year 1st semester

End Semester Examination - Assignment

Date : **30th November 2023**
Time : **11.00 a.m. to 12.00 p.m.**

INSTRUCTIONS TO CANDIDATES

- This question paper consists of ONE question.
- You should write answers in lined papers legibly in black or blue ink.
- You are not allowed to take out the examination papers.

Question 01 **(100 marks)**

1.1. A vomitus sample of a patient who is suspecting to have a Staphylococcus food poisoning is provided to you. As a biomedical Scientist, how are you going to confirm this? Justify your answer. (10 marks)

1.2. Draw a flow chart to explain a waste water management system. (10 marks)

1.3. State the three microbiological parameters which are used in water analysis. (15 marks)

1.4. How do you distinguish between the following microorganisms based on laboratory culture methods ?
a. *Salmonella* and *Shigella*
b. *Vibrio parahaemolyticus* and *Vibrio cholerae*

(15 marks)

1.5. What is UHT milk? Comment on shelf-life of UHT milk compared to pasteurized milk. (10 marks)

1.6. Discuss on microbes causing food borne **"infections".**

(40 marks)

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences
B.Sc. (HONS) BIOMEDICAL SCIENCES

BMS 3143 – EPIDEMIOLOGY

3rd Year 1st Semester
END-SEMESTER EXAMINATION – Assignment

Date: 29th November 2023
Time: 01.30 p.m. – 02.30 p.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.

Question 01 **(100 Marks)**

1.1 Explain the following

1.1.1 Function of meta-analysis (35 marks)

1.1.2 Steps in Meta-analysis (35 marks)

1.1.3 Limitations of meta-analysis (30 marks)

Question 02 **(100 Marks)**

2.1 Explain the following

2.1.1 List the importance of biosafety. (20 marks)

2.1.2 The **four (04)** types of biosafety levels. (80 marks)

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Science
BMS 3124 - Pathology
Batch 05
3rd year 1st Semester
End Semester Examination SEQ

Date: 28th November 2023
Time: 9.00 a.m. – 11.00 a.m.

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 Briefly describe the gross morphology of Autosomal Dominant (Adult) Polycystic Kidney Disease. (15 marks)

1.2 Describe the difference between Nephrotic syndrome and Nephritic syndrome. (40 marks)

1.3 Describe the difference between small cell carcinoma and adenocarcinoma (Lung cancer) (25 marks)

1.4 List the clinical features of Systemic lupus erythematous (20 marks)

Question 02 **(100 Marks)**

2.1 Explain the pathogenesis of tuberculosis. (15 marks)

2.2 Describe the Ridley-Jopling classification of leprosy (20 marks)

2.3 Describe the pathology of the following breast diseases (25 marks)

- 2.3.1 Acute mastitis
- 2.3.2 Fat necrosis
- 2.3.3 Fibroadenoma

2.4 Describe the types of shock. (40 marks)

Question 03 **(100 Marks)**

3.1 List five main types of cellular adaptations. (20 marks)
3.2 Compare hypertrophy and atrophy. (25 marks)
3.3 Compare acute and chronic inflammation. (30 marks)
3.4 Compare coagulative necrosis and liquefaction necrosis. (25 marks)

Question 04 **(100 Marks)**

4.1 List 05 main characters you have to considered in macroscopic assessment or gross examination of a specimen or lesion. (20 marks)
4.2 List 05 characters of an ideal fixative agent. (20 marks)
4.3 Write a short note on followings.
4.3.1 Surgical biopsy (20 marks)
4.3.2 Core biopsy (20 marks)
4.4 Briefly describe the aim of tissue processing. (20 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences
BSC. (HONS) BIOMEDICAL SCIENCES

BMS 3143 – EPIDEMIOLOGY

3rd Year 1st Semester
END-SEMESTER EXAMINATION – SEQ
5th Batch

Date: 24th November 2023
Time: 09.00 am – 12.00 pm – 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 Define the terms 'Prevalence' and 'Incidence'. (10 marks)

1.2 A study starts with 5,000 people. Of these, 125 have the disease in question. Describe the prevalence of disease. (20 marks)

1.3 A study starts with 4,875 healthy people. Over the next 2 years, 75 develop the disease. What is the incidence rate of disease over the study period? (30 marks)

1.4 The table below shows the results obtained in a screening test for Hyperlipidemia used on 1000 persons. The cutoff level for diagnosis of hyperlipidemia was a blood cholesterol of 180mg/dl or above. Use the table to answer the questions. Describe all formulae and calculations.

Results of screening test for Hyperlipidemia

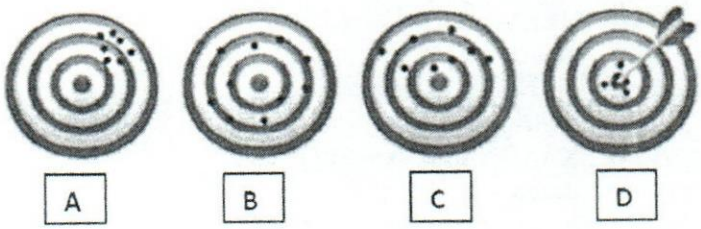
	has Hyperlipidemia	No Hyperlipidemia	Total
Positive	34	20	54
Negative	116	830	946
Total	150	850	1000

1.4.1 Calculate the sensitivity of this screening test. (20 marks)

1.4.2 Calculate the specificity of this screening test. (20 marks)

Question 02 **(100 Marks)**

2.1 Define the terms 'random error' and 'systemic error'. (20 marks)
2.2 Describe the **three (03)** types of bias. (60 marks)
2.3 Describe A to D in the following diagram in relation to validity and reliability. (20 marks)



Question 03 **(100 Marks)**

3.1 Describe the advantages and disadvantages of the types of surveillance (30 marks)
3.2 List **four (04)** activities or services performed by public health laboratories. (20 marks)
3.3 Define 'necessary causes' from the causality chapter and give **one (01)** example. (20 marks)
3.4 Describe the **four (04)** factors influencing causation. (30 marks)

Question 04 **(100 Marks)**

4.1 Define the term 'meta-analysis'. (20 marks)
4.2 List **four (04)** functions of meta-analysis. (40 marks)
4.3 Briefly describe the differences between systemic review and meta-analysis. (40 marks)

Question 05 **(100 Marks)**

5.1 Define the term 'Biosafety'. (20 marks)
5.2 Describe the **four (04)** types of Biosafety levels. (40 marks)
5.3 Describe **four (04)** 'Rules of safe transport'. (40 marks)

Question 06 **(100 Marks)**

6.1 List **four (04)** types of probability sampling methods and **one (01)** non-probability sampling method. (25 marks)
6.2 Describe **three (03)** types of principles of Quality Control. (35 marks)
6.3 Describe how to ensure that the corresponding laboratory has the highest possible level of quality assurance. (List **seven (07)** ways) (40 marks)

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CINEC CAMPUS
Beyond A Graduate

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

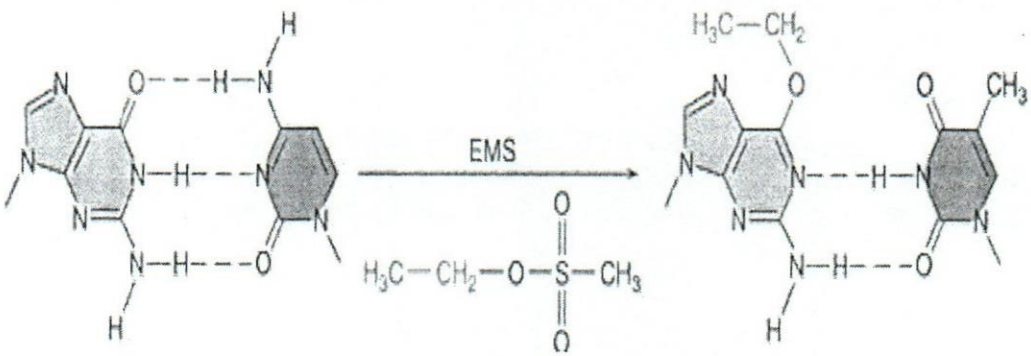
Date : 22nd of November 2023
Time : 09.00 am – 11.00 am (Two Hours)

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)
1.1.2. Discuss the reasons for the occurrence of the above DNA damage. (20 marks)
1.1.3. Describe the type of repair mechanism that has to be activated to repair this damage. (20 marks)

1.2. Write short notes on following.
1.2.1. Nucleotide excision repair mechanism (25 marks)
1.2.2. Induced DNA damage (25 marks)

QUESTION 02 **(100 marks)**

2.1. Imagine that you are about to initiate a molecular biology laboratory at your hometown.
2.1.1. Mention five factors that should be considered when initiating the laboratory.(10 marks)
2.1.2. Draw a laboratory floor plan to set up the laboratory. (20 marks)
2.1.3. Describe the process of maintaining sterility in the molecular biology laboratory. (20 marks)
2.2. State the subunits in RNA Polymerase **core-enzyme**. (10 marks)
2.3. Briefly describe the DNA replication process within a prokaryotic cell. Use an appropriate diagram to support your answer. (40 marks)

QUESTION 03 **(100 marks)**

3.1. List the RNA secondary structures. (10 marks)
3.2. Mention three types of RNA seen in eukaryotic cells and their functions. (20 marks)
3.3. Differentiate the cis-acting and trans-acting elements present in gene expression regulation. (30 marks)
3.4. Trp operon is a major gene regulation system present in prokaryotic cells. Describe the components and the functions of the Trp operon system. (40 marks)

QUESTION 04 **(100 marks)**

4.1. What are the marker genes in following plasmids commonly used in Recombinant DNA Technology ?
4.1.1. PUC18/PUC 19
4.1.2. PBR 322 (10 marks)
4.2. Explain 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)
4.3. Explain on protein purification methods which could separate extracted proteins **based on size**. (50 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

BSC. (HONS) BIOMEDICAL SCIENCES

BMS 3143 – EPIDEMIOLOGY

3rd Year 1st Semester

MID-SEMESTER EXAMINATION – SEQ

5th Batch

Date: 14th September 2023
Time: 09.00 am – 10.00 am – 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 Define the term 'Disease Surveillance'. (20 marks)

1.2 Write down **two (02)** conditions that needed to be met by a variable to be considered **confounding**. (20 marks)

1.3 List **three (03)** factors affecting the 'power' of studies. (30 marks)

1.4 You are in charge of a study, what are the aspects you need to fulfil in order for the study to be reliable? Elaborate on each aspect. (30 marks)

Question 02 **(100 Marks)**

2.1 What is the scientific definition of 'Epidemiology'? (20 marks)

2.2 List the modes of transmission with one example of disease for each mode. (20 marks)

2.3 Name the **three (03)** types of Observation study. (30 marks)

2.4 The population statistics of Sydney in 2001 revealed that there were 3,000 women aged 20-49 years who were sex workers. Based on the record of CHAS, among those women, 30 were HIV +ve during 2002 - to 2005. (30 marks)

Calculate the cumulative incidence of HIV +ve among those women during a period of 4 years.

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Science
Epidemiology - BMS 3143
Batch 04

3rd Year 1st Semester
End Semester Examination SEQ

Date: 07/03/2023 (Tuesday)
Time: 9.00 am – 12.00 pm

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **All** questions.
- The paper will be for three hours (9.00am-12.00pm).
- You should write the answers in the given answer sheets legibly in black or blue ink.

Question 01

1.1 Define epidemiology. (20 marks)

1.2 State five (5) uses of epidemiology. (20 marks)

1.3

1.3.1 Describe the epidemiological triangle. (10 marks)

1.3.2 Illustrate the epidemiological triangle with an example of dengue. (10 marks)

1.3.3 Describe 'environmental factors' in the epidemiological triad of dengue. (15 marks)

1.3.4 Briefly describe the importance of studying the epidemiological triad in controlling dengue. (25marks)

Question 02

2.1 Define the following terms.

2.1.1. Epidemic (10 marks)

2.1.2. Pandemic (10 marks)

2.2 List ~~five~~ three (3) sources of epidemiological information. (15 marks)

2.3 Briefly describe the levels of disease prevention. (20 marks)

2.4 Regarding the disease notification system,

2.4.1. List out the records/registers used in the disease notification system in Sri Lanka. (20 marks)

2.4.2. Briefly describe the role of the public health inspectors (PHI) who are involved in the disease notification system at the Medical Officer of Health (MOH) level. (25 marks)

Question 03

Following data received from a cohort study conducted to find out the relative risk of a certain exposure.

Exposure Status	Disease	
	Positive	Negative
Positive	20	30
Negative	10	40

3.1 Calculate the incidence among exposure. (20 marks)
3.2 Calculate the incidence among non-exposure. (20 marks)
3.3 Calculate the relative risk (RR). (30 marks)
3.4 Interpret your relative risk. (30 marks)

Question 04

4.1 Some of the blood samples collected for serological tests have been rejected at the laboratory. Mention three (3) reasons for rejection. (20 Marks)
4.2 Name two microbes that should not be refrigerated (20 Marks)
4.3 Golden era of antibiotics commenced with the introduction of penicillin in the 1960s. However, three decades after that, Antibiotic Resistance is widely spreading globally.
Briefly describe three (3) steps that should be taken to the prevention of Antibiotic Resistance. (30 Marks)
4.4 Briefly describe the two (2) methods of measuring Antimicrobial Sensitivity. (30 Marks)

Question 05

5.1 Identify four (4) features of a typing technique that has an excellent Typeability. (20 Marks)
5.2 State three (3) types of phenotypic techniques. (20 Marks)
5.3 Mention three (3) types of commonly used genotyping methods. (30 Marks)
5.4 Describe three (3) reasons why bacterial typing is important? (30 Marks)

Question 06

6.1 Write short notes on followings.
6.1.1 Systematic sampling (25 marks)
6.1.2 Stratified sampling (25 marks)

6.2 Following shows a result obtained from a cohort study.

	Develop Chronic Heart Disease	Do not Develop Chronic Heart Disease
Smoke cigarettes	84	2916
Do not smoke cigarettes	87	4913

6.2.1 Find the Incidence in smoke cigarettes. (15 marks)
6.2.2 Find the incidence in not smoke cigarettes. (15 marks)
6.2.3 Explain the epidemiologic triad. (20 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Science
BMS 3134 – Industrial Microbiology
3rd Year 1st Semester – Batch 4
End Semester Examination - SEQ

Date : **02nd March 2023**
Time : **9.00 a.m. to 12.00 p.m.**

INSTRUCTIONS TO CANDIDATES

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

Question 01 **(100 marks)**

1.1. What are the properties of an ideal indicator bacteria which are using for microbiological water analysis? (20 Marks)
1.2. Describe on indicator bacteria which are using for microbiological water analysis. (20 Marks)
1.3. Mention the basic steps of a "sewage water treatment process" with a diagrammatic representation. (20 Marks)

1.4. 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 the incubation of plates for 24 hrs, he got following colony counts for the two replicates that he 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}	Uncountable with merged colonies	Uncountable with merged colonies
10^{-2}	530	Uncountable with merged colonies
10^{-3}	95	150
10^{-4}	15	7
10^{-5}	0	2

Question 02 **(100 marks)**

2.1. State an example for each culture media type indicated below.
2.1.1. Enrichment media
2.1.2. Selective media
2.1.3. Differential media
2.1.4. Broth media (40 Marks)

2.2. What is meant by "phage typing" in microbial identification? (20 Marks)
2.3. Compare and contrast the "pour plate technique", "spread plate technique" and "membrane filtration technique" for APC determination. Consider procedure of technique, advantages, disadvantages and final appearance of colonies on culture plate. (40 Marks)

Question 03 **(100 marks)**

3.1. Mention the organism/s used for industrial processing of following products.
3.1.1. Yoghurt
3.1.2. Red wine
3.1.3. Blue Cheese
3.1.4. Penicillin
3.1.5. Streptomycin
3.1.6. Beer (60 Marks)

3.2. State the factors affecting for microbial food spoilage (40 Marks)

Question 04 **(100 marks)**

4.1. State three types of food and water borne illnesses according to the "mode of illness" (15 Marks)

4.2. State scientific names of two example microorganisms per each type that you mentioned in 4.1 (30 Marks)

4.3. Describe on basic steps of identifying a pathogenic organism from a food/ water sample. (30 Marks)

4.4. Briefly describe on beneficial aspects of microbes in food microbiology. (25 Marks)

Question 05 **(100 marks)**

A scientist wanted to check the quality of a tap water sample 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 ± 1^{0}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.

Dilution	10^0	10^{-1}	10^{-2}
No. of Positive tubes	4	1	2

5.1. What was the color change that he observed in positive tubes of MacConkey broth after the incubation period? (20 Marks)
5.2. Calculate the Presumptive Coliform Count in tap water sample. (30 Marks)
5.3. The scientist further wanted to check the Thermotolerant Coliform Count and *E.coli* Count separately for the same tap water sample. Explain how he can perform these. (50 Marks)

Question 06 **(100 marks)**

6.1. What is meant by fermentation? (20 Marks)
6.2. What are the main steps in industrial synthesis of wine using microorganisms? (40 Marks)
6.3. State two types of fermenters which are extensively using for industrial purposes. (20 Marks)
6.4. What is meant by "downstream processing" after industrial fermentation? (20 Marks)

Combination of positives	MPN index per 100 ml	95 % confidence limits		Combination of positives	MPN index per 100 ml	95 % confidence limits	
		Upper	Lower			Upper	Lower
0-0-0	<2	-	-	4-2-0	22	9.0	56
0-0-1	2	1.0	10	4-2-1	26	12	65
0-1-0	2	1.0	10	4-3-0	27	12	67
0-2-0	4	1.0	13	4-3-1 4-4-0	33 34	15 16	77 80
1-0-0	2	1.0	11	5-0-0	23	9.0	86
1-0-1	4	1.0	15	5-0-1	30	10	110
1-1-0	4	1.0	15	5-0-2	40	20	140
1-1-1	6	2.0	18	5-1-0	30	10	120
1-2-0	6	2.0	18	5-1-1 5-1-2	50 60	20 30	150 180
2-0-0	4	1.0	17	5-2-0	50	20	170
2-0-1	7	2.0	20	5-2-1	70	30	210
2-1-0	7	2.0	21	5-2-2	90	40	250
2-1-1	9	3.0	24	5-3-0	80	30	250
2-2-0	9	3.0	25	5-3-1	110	40	300
2-3-0	12	5.0	29	5-3-2	140	60	360
3-0-0	8	3.0	24	5-3-3	170	80	410
3-0-1	11	4.0	29	5-4-0	130	50	390
3-1-0	11	4.0	29	5-4-1	170	70	480
3-1-1	14	6.0	35	5-4-2	220	100	580
3-2-0	14	6.0	35	5-4-3	280	120	690
3-2-1	17	7.0	40	5-4-4	350	160	820
4-0-0	13	5.0	38	5-5-0	240	100	940
4-0-1	17	7.0	45	5-5-1	300	100	1,300
4-1-0	17	7.0	46	5-5-2	500	200	2,000
4-1-1	21	9.0	55	5-5-3	900	300	2,900
4-1-2	26	12.0	63	5-5-4 5-5-5	1,600 >1,600	600 -	5,300 -

Library

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Science
BMS 3134 – Industrial Microbiology
3rd Year 1st Semester – Batch 4
End Semester Examination - SEQ

Date : 02nd March 2023
Time : 9.00 a.m. to 12.00 p.m.

INSTRUCTIONS TO CANDIDATES

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

Question 01 **(100 marks)**

1.1. What are the properties of an ideal indicator bacteria which are using for microbiological water analysis? (20 Marks)
1.2. Describe on indicator bacteria which are using for microbiological water analysis. (20 Marks)
1.3. Mention the basic steps of a "sewage water treatment process" with a diagrammatic representation. (20 Marks)

1.4. 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 the incubation of plates for 24 hrs, he got following colony counts for the two replicates that he 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}	Uncountable with merged colonies	Uncountable with merged colonies
10^{-2}	530	Uncountable with merged colonies
10^{-3}	95	150
10^{-4}	15	7
10^{-5}	0	2

Question 02 **(100 marks)**

2.1. State an example for each culture media type indicated below.
2.1.1. Enrichment media
2.1.2. Selective media
2.1.3. Differential media
2.1.4. Broth media (40 Marks)

2.2. What is meant by "phage typing" in microbial identification? (20 Marks)
2.3. Compare and contrast the "pour plate technique", "spread plate technique" and "membrane filtration technique" for APC determination. Consider procedure of technique, advantages, disadvantages and final appearance of colonies on culture plate. (40 Marks)

Question 03 **(100 marks)**

3.1. Mention the organism/s used for industrial processing of following products.
3.1.1. Yoghurt
3.1.2. Red wine
3.1.3. Blue Cheese
3.1.4. Penicillin
3.1.5. Streptomycin
3.1.6. Beer (60 Marks)

3.2. State the factors affecting for microbial food spoilage (40 Marks)

Question 04 **(100 marks)**

4.1. State three types of food and water borne illnesses according to the "mode of illness" (15 Marks)

4.2. State scientific names of two example microorganisms per each type that you mentioned in 4.1 (30 Marks)

4.3. Describe on basic steps of identifying a pathogenic organism from a food/ water sample. (30 Marks)

4.4. Briefly describe on beneficial aspects of microbes in food microbiology. (25 Marks)

Question 05 **(100 marks)**

A scientist wanted to check the quality of a tap water sample 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 ± 1^0C for 24-48 hours.
He recorded the tubes showing gas production and color change after 24-48 hours and his observations were as follows.

Dilution	10^0	10^{-1}	10^{-2}
No. of Positive tubes	4	1	2

5.1. What was the color change that he observed in positive tubes of MacConkey broth after the incubation period? (20 Marks)
5.2. Calculate the Presumptive Coliform Count in tap water sample. (30 Marks)
5.3. The scientist further wanted to check the Thermotolerant Coliform Count and *E.coli* Count separately for the same tap water sample. Explain how he can perform these. (50 Marks)

Question 06 **(100 marks)**

6.1. What is meant by fermentation? (20 Marks)
6.2. What are the main steps in industrial synthesis of wine using microorganisms? (40 Marks)
6.3. State two types of fermenters which are extensively using for industrial purposes. (20 Marks)
6.4. What is meant by "downstream processing" after industrial fermentation? (20 Marks)

Combination of positives	MPN index per 100 ml	95 % confidence limits		Combination of positives	MPN index per 100 ml	95 % confidence limits	
		Upper	Lower			Upper	Lower
0-0-0	<2	-	-	4-2-0	22	9.0	56
0-0-1	2	1.0	10	4-2-1	26	12	65
0-1-0	2	1.0	10	4-3-0	27	12	67
0-2-0	4	1.0	13	4-3-1 4-4-0	33 34	15 16	77 80
1-0-0	2	1.0	11	5-0-0	23	9.0	86
1-0-1	4	1.0	15	5-0-1	30	10	110
1-1-0	4	1.0	15	5-0-2	40	20	140
1-1-1	6	2.0	18	5-1-0	30	10	120
1-2-0	6	2.0	18	5-1-1 5-1-2	50 60	20 30	150 180
2-0-0	4	1.0	17	5-2-0	50	20	170
2-0-1	7	2.0	20	5-2-1	70	30	210
2-1-0	7	2.0	21	5-2-2	90	40	250
2-1-1	9	3.0	24	5-3-0	80	30	250
2-2-0	9	3.0	25	5-3-1	110	40	300
2-3-0	12	5.0	29	5-3-2	140	60	360
3-0-0	8	3.0	24	5-3-3	170	80	410
3-0-1	11	4.0	29	5-4-0	130	50	390
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4-1-0	17	7.0	46	5-5-2	500	200	2,000
4-1-1	21	9.0	55	5-5-3	900	300	2,900
4-1-2	26	12.0	63	5-5-4 5-5-5	1,600 >1,600	600 -	5,300 -

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Science
Pathology BMS3124
Batch 04
3rd year 1st Semester
End Semester Examination SEQ

Date: 28th February 2023
Time: 9.00 a. m. – 11.00 a. m.

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. List five main types of cellular adaptations. (15 marks)
1.2 Write short notes on followings.
1.2.1 Coagulative necrosis (25 marks)
1.2.2 Liquefaction (colliquative) necrosis (25 marks)
1.3 Describe the stages of lobar pneumonia. (35 marks)

Question 02 (100 marks)

2.1 Describe the importance of inflammation. (25 marks)
2.2 Compare acute and chronic inflammation. (25 marks)
2.3 Compare dry gangrene and wet gangrene. (25 marks)
2.4 Describe causes for inflammation. (25 marks)

Question 03 **(100 marks)**

3.1 List five characters of an ideal fixative (5 X 4 marks = 20 marks)
3.2 Define the term pathological calcification. (10 marks)
3.3 Compare dystrophic calcification and metastatic calcification. (30 marks)
3.4 List the stages of atherosclerosis. (20 marks)
3.5 Describe the process of dissemination of a malignancy. (20marks)

Question 04 (100 marks)

4.1 What is congestive heart failure? (20 marks)
4.2 What is infarct? (20 marks)
4.3 Describe the effects which can be occurred on storing urine sample. (30 marks)
4.4 Describe different types of biopsies. (30 marks)

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Science

Pathology - BMS 3124

Batch 04

3rd Year 1st Semester

End Semester Examination Assignment

INDEX NUMBER: .....

Date: 28/02/2023

Time: 02.00 pm – 03.00 pm

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **TWO** questions.
- Answer **All** questions.
- The paper will be for one hour (02.00 pm – 03.00 pm).
- You should write the answers in the given answer sheets legibly in black or blue ink.

Question 01 **(100 Marks)**

1.1.Define following terms. (10 marks)

1.1.1 Etiology

1.1.2 Signs of a disease

1.2.List five main types of cellular adaptations. (10 marks)

1.3.Compare hypertrophy and atrophy. (25 marks)

1.4.Describe compensatory hypertrophy with an example. (25 marks)

1.5. Compare dry gangrene and wet gangrene. (30 marks)

Question 02 **(100 Marks)**

2.1 List outcomes of chronic inflammation. (15 marks)

2.2 List three differences between benign and malignant tumours. (20 marks)

2.3 List three main pathways of disseminate the malignant neoplasms. (10 marks)

2.4 Describe cardinal features of acute inflammation. (25 marks)

2.5 Compare acute and chronic inflammation. (30 marks)

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Science
Pathology BMS3124
Batch 04
3rd year 1st Semester
End Semester Examination SEQ

Date: 28th February 2023
Time: 9.00 a. m. – 11.00 a. m.

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. List five main types of cellular adaptations. (15 marks)
1.2 Write short notes on followings.
1.2.1 Coagulative necrosis (25 marks)
1.2.2 Liquefaction (colliquative) necrosis (25 marks)
1.3 Describe the stages of lobar pneumonia. (35 marks)

Question 02 (100 marks)

2.1 Describe the importance of inflammation. (25 marks)
2.2 Compare acute and chronic inflammation. (25 marks)
2.3 Compare dry gangrene and wet gangrene. (25 marks)
2.4 Describe causes for inflammation. (25 marks)

Question 03 **(100 marks)**

3.1 List five characters of an ideal fixative (5 X 4 marks = 20 marks)
3.2 Define the term pathological calcification. (10 marks)
3.3 Compare dystrophic calcification and metastatic calcification. (30 marks)
3.4 List the stages of atherosclerosis. (20 marks)
3.5 Describe the process of dissemination of a malignancy. (20marks)

Question 04 (100 marks)

4.1 What is congestive heart failure? (20 marks)
4.2 What is infarct? (20 marks)
4.3 Describe the effects which can be occurred on storing urine sample. (30 marks)
4.4 Describe different types of biopsies. (30 marks)

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CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Science/ Bachelor of Science Honours in Industrial Pharmaceutical Science/ Bachelor of Science Honours in Cosmetic Science

BMS3113 / IPS 3113 / BCS 3113 Pharmacology I

3rd Year 1st Semester

End Semester SEQ Examination

4th Batch

Date : **23rd February 2023**
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 not allowed to take out the examination papers~~.

Question 01

1.1. Describe briefly the mode of action and clinical uses of,

1.1.1. Penicillin (25 marks)
1.1.2. Erythromycin (25 marks)
1.1.3. Tetracycline (25 marks)
1.1.4. Gentamicin (25 marks)

Question 02

2.1. Briefly describe types of Beta blockers (25 marks)
2.2. List the clinical uses of beta blockers (25 marks)
2.3. Name examples for cholinergic drugs (10 marks)
2.4. Name two anticholinergic drugs and clinical indication (15 marks)
2.5. Briefly describe the drugs used for hyperlipidemia (25 marks)

Question 03

3.1. Briefly describe clinical uses of

3.1.1. Streptokinase (25 marks)
3.1.2. Warfarin (25 marks)
3.1.3. Clopidogrel (25 marks)
3.1.4. Heparin (25 marks)

Question 04

4.1. Describe,

4.1.1. Firstline drugs for the treatment of primary tuberculosis (25 marks)
4.1.2. Side effects of two of the drugs mentioned in 4.1. (25 marks)
4.1.3. Drugs used for leprosy (25 marks)
4.1.4. Phases of Clinical trials (25 marks)

Question 05

5.1. List the drugs used for,

5.1.1. Peptic ulcers (30 marks)
5.1.2. Constipation (30 marks)
5.2. List the drugs used as diuretics and give examples (40 marks)

Question 06

6.1. Briefly describe,

6.1.1. first pass metabolism (30 marks)
6.1.2. half-life of a drug (30 marks)
6.1.3. first order kinetics excretion of a drug (40 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Sciences

BMS 3153 – Molecular Biology

3rd Year 1st Semester

Batch 04

End Semester SEQ Examination

Date : 21st of February 2023
Time : 09.00 am – 12.00 pm (Three Hours)

INSTRUCTIONS TO CANDIDATES

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

QUESTION 01 **(100 marks)**

1.1. Mention the parts of a nucleotide. (10 marks)
1.2. Explain the three types of spontaneous DNA damages. (30 marks)
1.3. Briefly explain the termination step of the bacterial transcription. (20 marks)
1.4. Write the short notes on following.

1.4.1. Base excision repair mechanism. (20 marks)
1.4.2. Deaminating agents. (20 marks)

QUESTION 02 **(100 marks)**

2.1. Explain the "**Selection**" step for PUC 18/PUC 19 plasmids using a media containing X-gal, if you have used them for recombinant DNA technology. (40 marks)

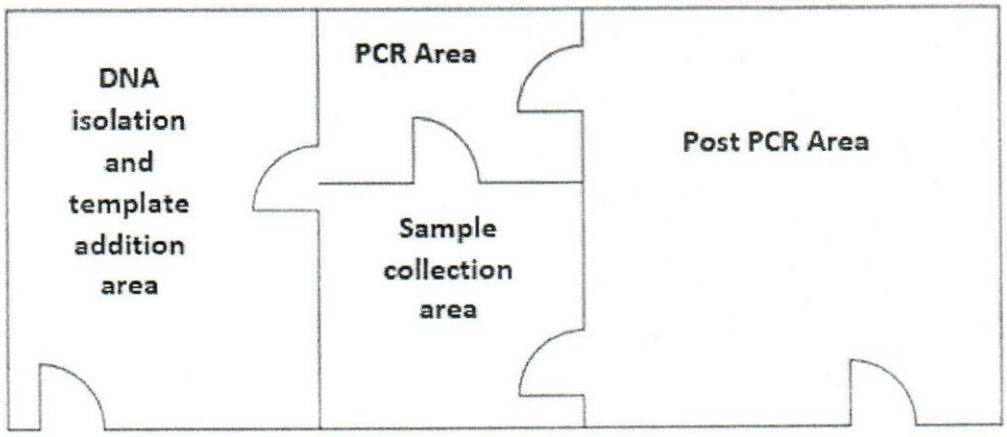
2.2. What are the criteria should be present in a suitable vector using for recombinant DNA technology? (20 marks)

2.3. Draw a diagrammatic representation of ***Lac* operon** and label the different regions of the operon. (20 marks)

2.4. Briefly explain the regulation of *Lac operon* under the presence of Lactose within the cell. (20 marks)

QUESTION 03 **(100 marks)**

Answer the questions considering the given molecular biology laboratory floor plan drawn by an undergraduate student.



3.1. Outline the common draw backs of the above laboratory plan. Provide reasons to support your answer. (25 marks)

3.2. Considering the identified draw backs, draw an accurate floor plan to set up a molecular biology laboratory. (25 marks)

3.3. Discuss the common decontamination procedures that should be followed in the molecular biology laboratory. (25 marks)

3.4. Relate the importance of following accurate waste disposal practices in the molecular biology laboratory. (25 marks)

QUESTION 04 **(100 marks)**

4.1. Imagine that you are provided with 250ml of a TAE buffer (10X) solution. Perform the calculation and mention the process of preparing 1L of TAE buffer (50X) from the above buffer solution. (25 marks)

4.2. Comment on the importance of maintaining sterility in the molecular biology laboratory for successful RNA extractions. (25 marks)

4.3. Differentiate between the use of manual methods and commercial kits for the isolation of DNA. (25 marks)

4.4. Ethidium bromide is a carcinogen which is used during gel electrophoresis procedure. Outline the safety precautions that should be used when handling ethidium bromide. (25 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Science
Pathology BMS3124
Batch 02 & Batch 03

3rd year 1st Semester

End Semester Examination SEQ

INDEX NUMBER: .....

Date: 07th September 2022
Time: 9.00 a.m. – 11.00 a. m.

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **FOUR** 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. Define following terms.

1.1.1 Necrosis (15 marks)

1.1.2 Apoptosis (15 marks)

1.2. Compare hypertrophy and hyperplasia. (20 marks)

1.3. Describe compensatory hypertrophy with an example. (20 marks)

1.4. Compare dry gangrene and wet gangrene. (30 marks)

Question 02 **(100 marks)**

2.1 Describe cardinal features of acute inflammation. (20 marks)

2.2 Compare acute and chronic inflammation. (30 marks)

2.3 List outcomes of chronic inflammation. (10 marks)

2.4 Define the term pathological calcification. (10 marks)

2.5 Compare dystrophic calcification and metastatic calcification. (30 marks)

Question 03 **(100 marks)**

3.1 List three differences between benign and malignant tumours. (20 marks)

3.2 List three main pathways of disseminate the malignant neoplasms. (20 marks)

3.3 Describe one of the pathways mentioned in 3.1 (25 marks)

3.4 List five main characters you must considered in macroscopic assessment or gross examination ofa specimen or lesion. (5 X 3 marks = 15 marks)

3.5 List five characters of an ideal fixative. (5X4 marks = 20 marks)

Question 04 **(100 marks)**

4.1 List the stages of atherosclerosis. (15 marks)

4.2 Describe the stages of lobar pneumonia. (35 marks)

4.3 Write a short note on renal stones. (20 marks)

4.4 Describe the Virchow's Triad of thrombosis. (30 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Science

Pharmacology 1 BMS 3113

Batch 02

3rd Year 1st Semester

End Semester Examination SEQ

INDEX NUMBER: .....

Date: 25/07/2022 (Thursday)
Time: 9.00 am – 12.00 pm

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **All** questions.
- The paper will be for three hours (9.00am-12.00pm).
- You should write the answers in the given answer sheets legibly in black or blue ink.

Question 01

1. Describe the action and the clinical uses of
   a. Losartan (25 marks)
   b. Nifedipine (25 marks)
   c. Warfarin (25 marks)
   d. Aspirin (25 marks)

Question 02

2.1.
   2.1.1. What is atropine? (10 marks)
   2.1.2. Describe the mode of action (20 marks)
   2.1.3. Name two clinical indications (10 marks)

2.2.
   2.2.1. Indicate examples for sympathomimetics (20 marks)
   2.2.2. What is catecholamine? (15 marks)
   2.2.3. Name the types of receptors in sympathetic system (10 marks)
   2.2.4. List three clinical uses of sympathomimetics (15 marks)

Question 03

3.1. List the groups of penicillin with examples (25 marks)
3.2. What the the pecinillins used for
   3.2.1 Penicillinase resistant organisms (20 marks)
   3.2.2 Psudomonas bacteria (20 marks)

3.3. Briefly mention the mode of action of penicillin (10 marks)
3.4 24 years old girl was diagnosed with rheumatic fever and medical officer decided to give her benzathine penicillin in long term management.
Why the medical officer specifically selected the benzathine penicillin out of the other types of penicillin? Justify your answer. (25 marks)

Question 04

4. 55 years old female patient was diagnosed as essential hypertension.
   4.1. List the drugs groups which can be used for this patient (25 marks)
   4.2 Describe the mode of action of one of the groups you mention in 4.1. (25 marks)
   4.3. Give examples for the group mentioned in 4.1. (20 marks)
   4.4. List the common organ complications of essential hypertension (30 marks)

Question 5

5.1. Compare CAT 1 and CAT 2 treatment regimes of tuberculosis (40 marks)
5.2. What is DOT treatment? briefly describe (20 marks)
5.3. After the treatment for tuberculosis, one patient complained of getting red colored urine and tears. What is the reason for this development? (20 marks)

5.4. Another patient came to the clinic with vision disturbances, after three months of the CAT I treatment regime.
What is the most possible reason for this vision disturbances? (20 marks)

Question 6

6. Briefly describe

6.1 First pass metabolism (20 marks)
6.2 Categories of ADR (20 marks)
6.3 Volume of distribution (20 marks)
6.4 Plasma half-life (20 marks)
6.5 First order kinetics (20 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Sciences

BMS 3153 – Molecular Biology

3rd Year 1st Semester

Batch 01

End Semester SEQ Examination

INDEX NUMBER: .....

Date : 23rd of September 2021
Time : 09.00 am – 12.00 pm (Three Hours) - To answer the questions
12.00 pm – 12.30 pm (30 minutes) - To upload & email the compiled answer script

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INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- The paper will be for three hours (9.00 am – 12.00 pm). You will be given an extra 30 minutes for submission.
- You should write **answers in lined papers** legibly in black or blue ink.
- You MUST write **your index number in the top right corner** of each answer script.
- **Answer script should be numbered** (right bottom) clearly.
- Photograph of your answer scripts must be taken by keeping them on a clear platform (e.g. table).
- Arrange the photographs of your answer script in a word document in an orderly manner, then convert the word document to a **PDF**.
- **Label the PDF: Your Index No – Molecular Biology SEQ**
- **Upload** the labelled **PDF to LMS AND** also **email** the PDF to Fohs.exams@cinec.edu

Question 01 **(100 marks)**

The following is the DNA sequence of Gene X that you want to amplify using the polymerase chain reaction (PCR).

5'CTCGAGGTGAATATGAAAG----------CATTTGGCGCGTAATCGATA3'

3'GAGCTCCACTTATACTTTC----------GTAAACCGCGCATTAGCTAT5'

1.1 If you amplify this DNA sequence using PCR what are the reaction components that you would need? State the function of each of these components. (20 marks)

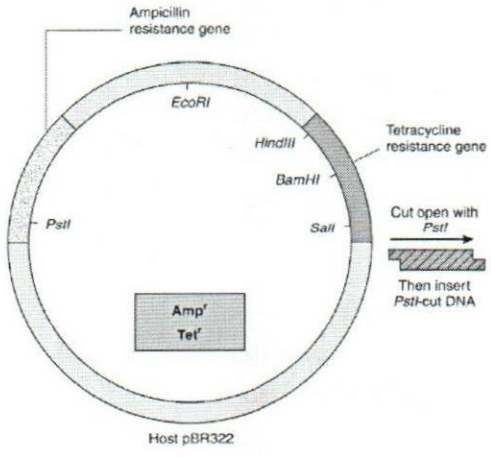
1.2 Identify the set of primers which you would use for PCR? (20 marks)

Primer set 1: 5'TACACTTATACTTTC3' and 3'GTAAACCGCGCATTAG5'
Primer set 2: 5'CTCGAGGTGAATAT3' and 3'CCGCGCATTAGCTAT5'
Primer set 3: 5'GAGTTACACTTATAC3' and 3'TGGCGAGTAATCGATA5'

1.3 Each step of a PCR reaction cycle is performed at a specific temperature i.e. step 1 at 95 °C, step 2 at 55 °C and step 3 at 70 °C. Justify why these three steps are performed under different temperatures. (15 marks)

1.4 If 30 reaction cycles were used in the amplification, calculate the DNA yield (number of copies of DNA). (20 marks)

1.5 Amplified Gene X will be inserted to following pBR322 plasmid digested with PstI restriction enzyme. Describe how you are going to screen the recombinant plasmid. (25 marks)



Question 02 **(100 marks)**

Refer the following figures and answer the questions.

Figure 1 shows the size of each of the fragments/bands produced when λ phage DNA is cut with restriction enzymes EcoR1, HindIII and BamH1.

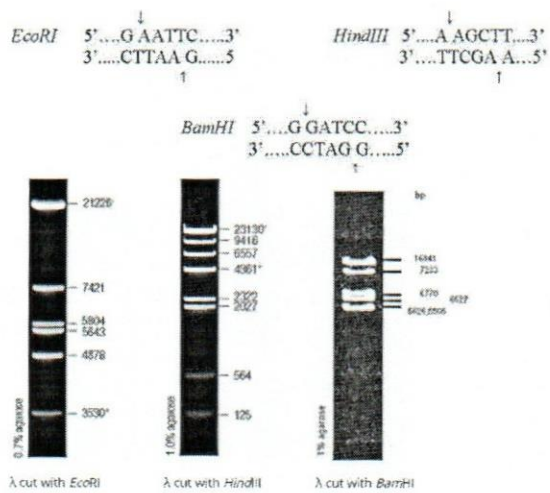


Figure 1

Figure 2 shows the restriction digestion maps of each 3 restriction endonucleases (labelled as A, B and C). Each map shows the sites at each enzyme cuts the λ phage DNA.

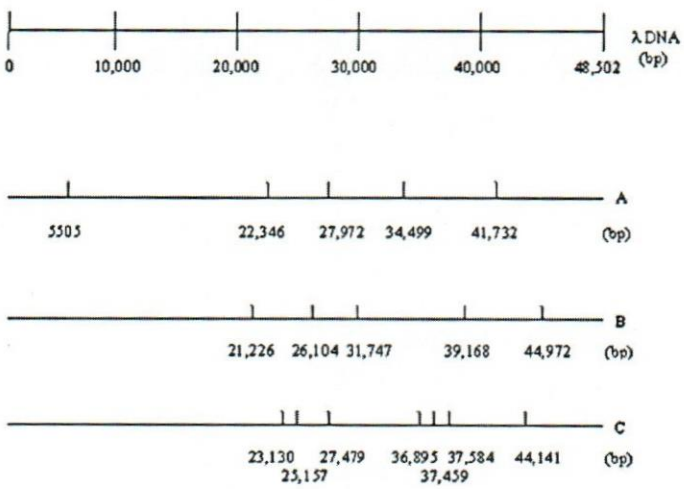


Figure 2

2.1 Calculate the sizes of the fragments that results after digestion by each restriction enzyme and write the sizes of each fragment on each map (map A, map B and map C of figure 2). (25 marks)

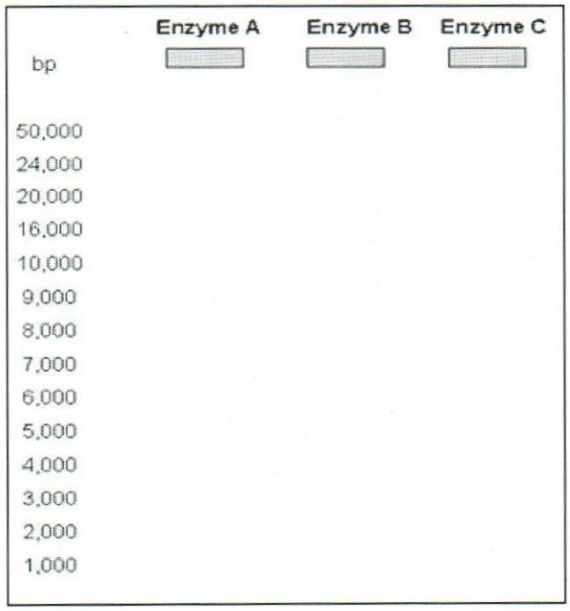
2.2 How many fragments would you expect to see for each of the maps A, B and C? (15 marks)

A-

B-

C-

2.3 Draw these fragments on the graph below. (30 marks)



2.4 Compare the size of the fragments that you have calculated with the bands shown in the agarose gel images (figure 1) and determine which of the enzymes are *Bam*HI, *Eco*RI and *Hind*III. (15 marks)

Enzyme A-

Enzyme B-

Enzyme C-

2.5 How many times do GAATTC (EcoRI), AAGCTT (HindIII) and GGATCC (BamHI) restrictions sites occur in the λ DNA sequence? (15 marks)

GAATC-

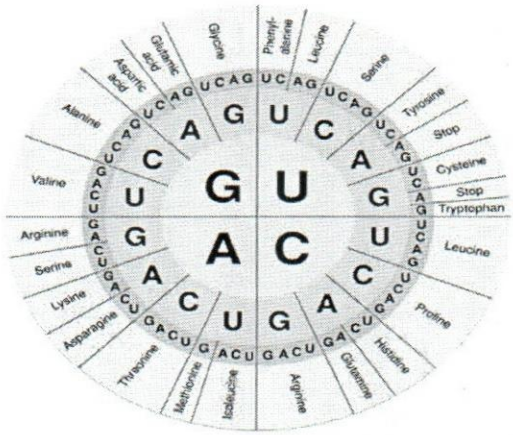
AAGCTT-

GGATCC-

Question 03 **(100 marks)**

The DNA sequence of gene 'A' of a eukaryotic cell and genetic code are given below. Answer the following questions.

Gene A - 5' AATGAATGG*GAGCCTGAAGGA 3'



3.1 If there is a G to A base change at the position marked with an asterisk;

3.1.1 How will this base change alter the DNA replication? Draw the sequence obtained after replication. (20 marks)

3.1.2 How will this base change alter the transcription? Draw the mRNA sequence and describe (20 marks)

3.1.3 How will this base change alter the translation? Draw the protein sequence and describe. (20 marks)

3.2. Ethylmethane sulfonate (EMS) is an alkylating agent which is commonly used as a mutagenic agent in molecular laboratories.

3.2.1. Discuss the common DNA damage caused by EMS. (20 marks)

3.3. Mismatch repair pathway need to be activated soon after replication. Justify this statement.

(20 marks)

Question 04 **(100 marks)**

Consider a hypothetical Gene Z in a given cell. This gene codes for protein Z. This means that Gene Z is expressed and is translated to make protein Z.

4.1 If you insert a synthetic siRNA to the cell that targets that Gene Z's mRNA, what will happen? Describe it in detail using figures. (20 marks)

4.2 You have extracted the crude protein lysate from the cell producing protein Z. Along with the protein Z, the crude lysate contains 5 other proteins. You need to purify protein Z. Some characteristics of the proteins of the crude lysate are given in the following table. Answer the following questions.

Protein	Concentration of Ammonium sulfate required for precipitation (%)	Isoelectric point (pI)	Molecular weight (kDa)
A	45	3.7	38
B	80	4.8	22
C	65	5.3	45
D	20	8.8	115
E	30	9.5	55
Z	45	2.3	115

4.2.1 If you use ammonium sulfate to precipitate your protein of interest (protein Z), what is the concentration of ammonium sulfate that you need to add to the lysate? (10 marks)

4.2.2 After adding that concentration of ammonium sulfate, which proteins will be in the pellet and supernatant? (20 marks)

In pellet - .....

In supernatant- .....

4.2.3 How do you remove the excess ammonium sulfate salt from your protein precipitate? (20 marks)

4.2.4 Now you want to further purify protein Z from the pellet obtained from ammonium sulfate precipitation. State another purification method that you can use to purify protein Z from the rest of the proteins in the pellet based on molecular weight. Which protein/s will elute first?

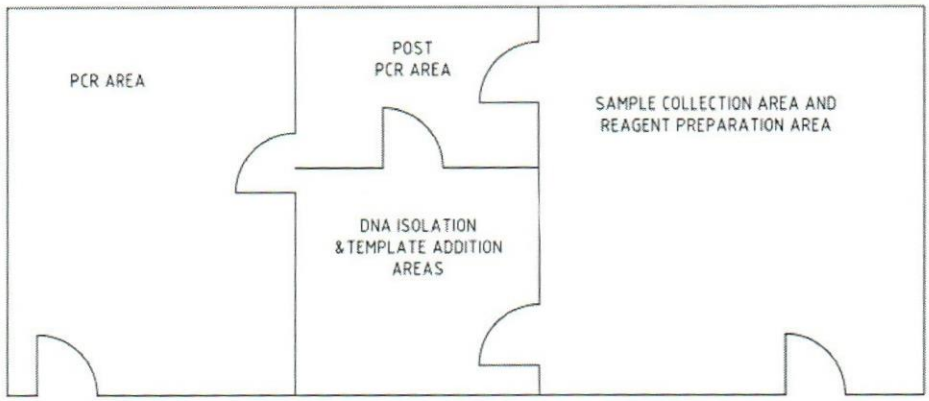
(10 marks)

4.2.5 What is the next purification technique you would employ to purify protein Z?

(20 marks)

Question 05 **(100 marks)**

5.1 Answer the questions considering the given molecular biology laboratory floor plan drawn by an undergraduate student.



5.1.1. Outline the common draw backs of the above laboratory plan. Provide reasons to support your answer. (20 marks)

5.1.2. Considering the identified draw backs, draw an accurate floor plan to set up a molecular biology laboratory. (20 marks)

5.2. Discuss the processes of maintaining sterility in the molecular biology laboratory. (20 marks)

5.3. Compare and contrast biosafety class two and class three safety cabinets with regard to structural features relevant to safety. (20 marks)

5.4. Relate the importance of following accurate waste disposal practices in the molecular biology laboratory. (20 marks)

Question 06 **(100 marks)**

6.1. Imagine that you are provided with 500ml of a TAE buffer (50X) solution. Perform the calculation and mention the process of preparing 1L of TAE buffer (5X) from the above buffer solution. (20 marks)

6.2. Draw a flow chart to denote the basic steps of a protocol used to manually extract DNA from blood. (20 marks)

6.3. Compare and contrast between the use of manual methods and commercial kits for the isolation of DNA. (20 marks)

6.4. "Extraction of RNA is extremely crucial compared to DNA". Do you agree with this statement? Give reasons to support your answer. (25 marks)

6.5. Ethidium bromide is a carcinogen which is used during gel electrophoresis procedure. Outline the safety precautions that should be used when handling ethidium bromide. (15 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Sciences

BMS 3134 – Industrial Microbiology

3rd Year 1st Semester

Batch 01

End Semester SEQ Examination

INDEX NUMBER: .....

Date : 17th of September 2021
Time : 09.00 am – 12.00 pm (Three Hours) - To answer the questions
12.00 pm – 12.30 pm (30 minutes) - To upload & email the compiled answer script

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INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- The paper will be for three hours (9.00 am – 12.00 pm). You will be given an extra 30 minutes for submission.
- You should write **answers in lined papers** legibly in black or blue ink.
- You MUST write **your index number in the top right corner** of each answer script.
- **Answer script should be numbered** (right bottom) clearly.
- Photograph of your answer scripts must be taken by keeping them on a clear platform (e.g. table).
- Arrange the photographs of your answer script in a word document in an orderly manner, then convert the word document to a **PDF**.
- **Label the PDF: Your Index No – Industrial Microbiology SEQ**
- **Upload** the labelled **PDF to LMS AND** also **email** the PDF to Fohs.exams@cinec.edu

Question 01 **(100 marks)**

1.

1.1. Define "indicator organism". (15 marks)
1.2. Name a common indicator organism used for detection of water quality. (15 marks)
1.3. List the characteristics of above mentioned organism which used to select as indicator. (20 marks)
1.4. Design a procedure to measure water treatment efficiency in a water treatment plant using above indicator organism. (20 marks)
1.5. Activated sludge system is more economical than trickling filter method for waste water treatment plant for country like Sri Lanka. Give three reasons to prove this statement. (30 marks)

Question 02 **(100 marks)**

2.

2.1. What is food fermentation? (15 marks)
2.2. Write the principle/s behind following food preservation technique (15 marks)
  2.2.1. Refrigeration
  2.2.2. Pasteurization
  2.2.3. Aseptic packaging
2.3. Write the food preservation technique used in following food production. (20 marks)
  2.3.1. Canned fish
  2.3.2. Powdered milk
  2.3.3. Strawberry jam
  2.3.4. Kimchi-
  2.3.5. Desiccated coconut
2.4. Write the organism/s used for processing of following products. (20 marks)
  2.4.1. Yoghurt
  2.4.2. Swiss cheese
  2.4.3. Red wine
  2.4.4. Marmite
  2.4.5. Ajinomoto
2.5. A milk processing company collects milk from outside farmers for production of pasteurized milk and UHT milk. One day; they received two batches of milk with following conditions.

  A- Total bacterial count is high at the receiving point

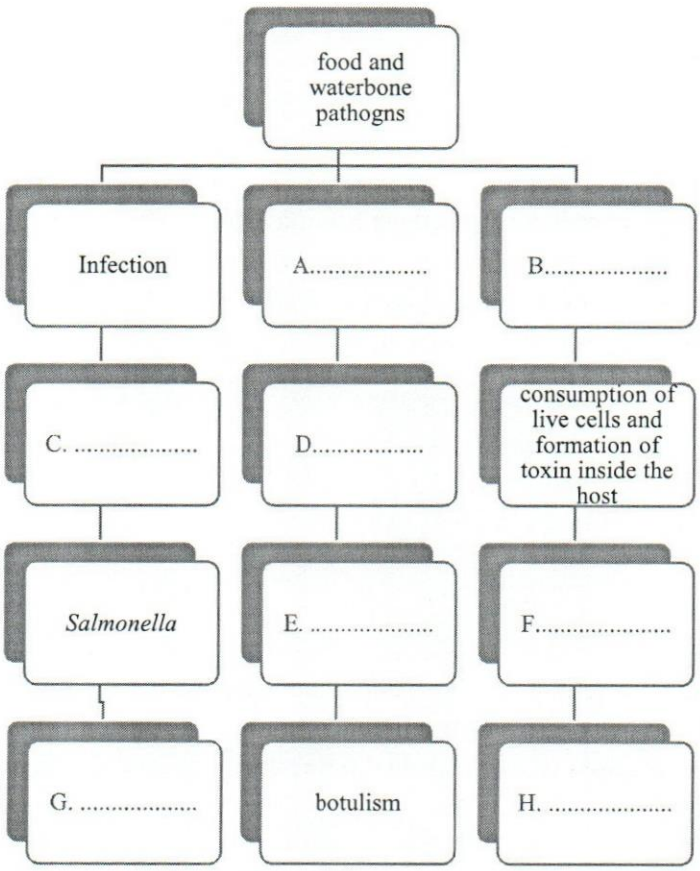
  B- Total bacterial count is law at the receiving point

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

Question 03 **(100 marks)**

3.

3.1. Fill the blanks using the knowledge of food and waterborne pathogens. (40 marks)



3.2. Fill the blanks using your knowledge of detection method of food and waterborne pathogens and indicators. (60 marks)

Pathogen name	Solid enrichment medium use for detection	Identification test
Escherichia coli	i. ……..	ii……..
Vibrio cholerae	iii……..	iv……..

Bacillus cereus	v.....	vi.....
Listeria monocytogenes	vii.....	viii.....
Campylobacter	ix.....	x.....
Salmonella	xi.....	xii.....

Question 04 **(100 marks)**

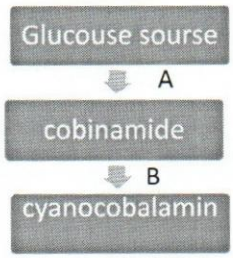
4.

4.1. Define the term "vitamin". (15 marks)

4.2. Write 2 organisms that can produce Riboflavin. (10 marks)

4.3. Following schematic diagram shows two phase production process of cyanocobalamin from glucose forming intermediate of cobinamide.

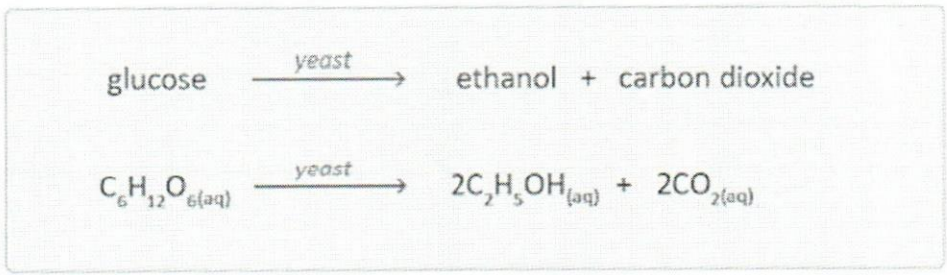
4.3.1. Write the conditions used in A, B (10 marks)



4.3.2. Give the reason for above condition adjustment. (10 marks)

4.3.3. Write two organisms use in this method. (10 marks)

4.4. Following diagram shows microbial fermentation of glucose to ethanol.



4.4.1. Write the scientific name of the common yeast type use in this process. (5 marks)

4.4.2. How this process is used in different way for alcoholic beverages production and commercial ethanol production ? (20 marks)

4.5. Write the role of *Aspergillus niger* in enzyme production. (20 marks)

Question 05 **(100 marks)**

5.

5.1. Define "antibiotic". (10 marks)

5.2. What is fermenter? (20 marks)

5.3. Fill the blanks using the knowledge of following antibiotic production by submerged fermentation process. (30 marks)

Antibiotic	inoculum	Fermentation method	Fermenter type
Penicillin	A.....	B.	C.....
Streptomycin	D.....	E.	F.....

5.4. List 3 different ways that can be operated in fermentation method that you mentioned under letter "E". (15 marks)

5.5. List the characteristics of the organism considered when selecting an inoculum. (25 marks)

Question 06 **(100 marks)**

6.

6.1. Briefly describe difference between quality assurance and quality control. (10 marks)

6.2. Write ISO standard related to following systems. (15 marks)

6.2.1. standard is related to quality management system-

6.2.2. standard related to environmental management –

6.2.3. Food safety standard which is linked to the presence of food-borne hazards in food at the point of consumption –

6.3. How ISO certifications obtain for Sri Lankan products? (20 marks)

6.4. What is HACCP implies? (20 marks)

6.5. List the seven principle of HACCP. (35 marks)