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 4 – Semester I

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

1st Issue Date: 2017.011.30	*Revision No.00*	*Revision Date: 12.01.2023*	*Validated by: Librarian*

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Sciences
BMS 4143 Clinical Microbiology
Batch – 02 & 03
4th Year 1st Semester
End Semester SEQ Examination

Date : **28th of August 2023**
Time : **9.00 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)**

A 40-year-old female patient was admitted to the medical ward with symptoms of dyspnea, pleuritic chest pain, fever with chills, cough, rusty sputum. Sputum culture had resulted gram positive diplococci with short chains and the colonies appear in narrow zone with alpha hemolysis on blood agar plate.

1.1. Identify the potential disease of the patient. (20 marks)
1.2. Mention the potential causative agent. (20 marks)
1.3. State other types of possible pathogenic organisms that would cause above-mentioned disease condition. (20 marks)
1.4. Discuss on microbiological laboratory diagnosis and other identification tests of disease-causing agent that you mentioned in 1.2. (40 marks)

QUESTION 02 **(100 marks)**

A patient with dysuria, suprapubic pain and increased frequency of urine passage was suspected to have a urinary tract infection. The clinician asked to collect a urine sample from him for the laboratory testing.

2.1. Briefly describe the collection technique of a urine sample by this **male** patient. (10 marks)
2.2. State 2 microorganisms that might cause the urinary tract infection in above patient. (20 marks)
2.3. Describe the identification procedure of pathogenic microorganisms available in the urine sample, using microbiological techniques. (40 marks)
2.4. Briefly describe the stages of "development of a disease" by the disease-causing agent within the host body. You may use a graph to show the change of microorganism numbers in body, with time. (30 marks)

QUESTION 03 **(100 marks)**

A 35-year-old male who had a deep wound, presented with tightening of jaw muscles, involuntary muscle spasms, breathing and swallowing difficulty was directed to the hospital for the treatments. The tissue culture results had shown swarming haemolytic colonies at anaerobic conditions with positive indole test during biochemical identification.

3.1. Mention the causative agent. (30 marks)

3.2. Describe the identification techniques of pathogenic microorganisms available in the tissue sample, using culture and biochemical techniques. (70 marks)

QUESTION 04 **(100 marks)**

A 31-year-old male became feverish 4 days after arriving at a vacation resort. During his stay, he ate from two restaurants and many street foods. Then he developed vomiting and blood & mucous diarrhoea. A Gram negative, lactose negative microorganism was isolated from his **stool**.

4.1. State the culture media/s used for the initial isolation of microorganisms from the patient stool sample? (40 marks)

4.2. Describe the procedure of isolation of causative agent from patient sample using culture media that you mentioned in 4.1. (60 marks)

QUESTTION 05 **(100 marks)**

A 18-year-old girl admitted to the hospital with clinical presentations, nausea and vomiting, loss of appetite, muscle aches and jaundice. The patient complained that she suffered with above mentioned symptoms over prolong period. The patient revelled that she had blood transfusion 3 months before and during the examination progressing liver failure was identified. The physician suspected that patient infected with hepatitis viral infection and blood sample was obtained from the patient for the further diagnosis.

5.1 Identify the suspected causative agent of the disease. (30 marks)

5.2 Explain the pathogenesis of the viral infection mentioned in 5.1. (35 marks)

5.3 Explain the laboratory diagnosis techniques that can be used to identify the clinical condition mentioned in 5.1. (35 marks)

QUESTION 06 **(100 marks)**

A 65-year-old male with 8th cranial nerve impairment was directed to hospital with acute high-grade fever and chills, shortness of breath, pleuritic chest pain and heart murmur. During the examination Osler's Nodes on pads of the fingers and toes and Janeway lesions on the palms were identified. Patient's blood samples were obtained for the laboratory diagnosis to identify the bacterial causative agent. Chest x-ray and echocardiography were performed for the further identifications.

6.1 Identify the disease of the patient. (10 marks)

6.2 State the common bacterial agents that cause the disease. (30 marks)

6.3 Discuss the laboratory diagnosis tests perform to identify the disease. (30 marks)

6.4 Explain the antimicrobial treatment that you suggest for the patient. (30 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Sciences
BMS 4133 Molecular Techniques in Life Sciences
Batch – 02 & 03
4th Year 1st Semester
End semester SEQ Examination

Date : **25th of August 2023**
Time : **9.00 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. You have been asked to produce recombinant insulin with the intension of scaling up for commercial purposes.

1.1. Mention two suitable expression systems that could be used for this process. (10 marks)
1.2. Draw a flow chart to denote the procedure of producing the above recombinant protein. (25 marks)
1.3. Describe the procedures to minimize false positives and false negatives in a nuclear based diagnostic assay. (25 marks)
1.4. State three limitations in expressing the above protein in the prokaryotic system. (15 marks)
1.5. Compare and contrast between eukaryotic and prokaryotic expression systems. (25 marks)

QUESTION 02 **(100 marks)**

2.1. Imagine that you are provided with a skin biopsy. Draw a flow chart to denote the steps that you need to carry out to prepare a culture from it. (20 marks)
2.2. Describe the main aseptic conditions that has to be followed in cell culture. (20 marks)
2.3. Mention four methods to check for the growth of cells in a cell culture. (20 marks)
2.4. Write a short notes on the following.
2.4.1. Applications of cell culture. (20 marks)
2.4.2. Finite cell lines. (20 marks)

QUESTION 03 **(100 marks)**

3.1. Mention three properties of a good molecular biomarker. (15 marks)
3.2. Compare and contrast between minisatellites and microsatellites. (25 marks)
3.3. Write short notes on the following.
3.3.1. Applications of molecular biomarkers. (30 marks)
3.3.2. Techniques used for identification of molecular biomarkers. (30 marks)

QUESTION 04 **(100 marks)**

4.1. Mention three applications of DNA sequencing. (15 marks)
4.2. Briefly describe the principle of Sanger sequencing method. (25 marks)
4.3. Draw a flow chart to denote the steps of Sanger sequencing. (25 marks)
4.4. Write a short note on pyrosequencing. (35 marks)

QUESTION 05 **(100 marks)**

5.1. Imagine that you are provided with a DNA sample of a patient. Mention the most suitable blotting technique that could be used to distinguish the presence of Sickle cell anemia in this sample. (05 marks)
5.2. Draw a flow chart to denote the procedure of the technique mentioned in 5.1 above. (20 marks)
5.3. Compare and contrast between Northern and Southern blotting techniques. (25 marks)
5.4. Write short notes on the following.
5.4.1. Applications of Southern blotting. (25 marks)
5.4.2. Limitations of Northern blotting. (25 marks)

QUESTION 06 **(100 marks)**

6.1. Define the term proteomics. (10 marks)
6.2. State three main types of High performance liquid chromatography methods. (15 marks)
6.3. Describe the principle of nuclear magnetic resonance (NMR) technique. (20 marks)
6.4. Discuss the importance of protein microarray technology. (25 marks)
6.5. Write a short note on X-ray crystallography technique. (30 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Sciences
BMS 4123 Medical Informatics
Batch – 02 & 03
4th Year 1st Semester
End Semester SEQ Examination

Date : **23rd of August 2023**
Time : **9.00 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 Bioinformatics. (10 marks)
1.2 What units are used in bioinformatics? (10 marks)
1.3 What are the benefits of using bioinformatics? (20 marks)
1.4 Differentiate Bioinformatics and Computational Biology. (30 marks)
1.5 Discuss the limitations and challenges of bioinformatics. (30 marks)

QUESTION 02 **(100 marks)**

2.1 Write a short note on the components below in a bioinformatic system with examples.

i. Databases (25 marks)
ii. Uncurated data (25 marks)
iii. Curated data (25 marks)
iv. Annotation (25 marks)

QUESTION 03 **(100 marks)**

3.1 Define the term BLAST. (10 marks)
3.2 What are the applications of BLAST? (20 marks)
3.3 Describe the following options of BLAST.

3.3.1 BLASTN (14 marks)
3.3.2 BLASTP (14 marks)
3.3.3 BLASTX (14 marks)
3.3.4 TBLASTN (14 marks)
3.3.5 TBLASTX (14 marks)

QUESTION 04 **(100 marks)**

4.1 What is sequence alignment? (10 marks)

4.2 Differentiate Multiple and Pairwise sequence alignments. (20 marks)

4.3 Describe the below results of sequence alignment and method of obtaining sequence identity and similarity. (70 marks)

```
#
# Length: 6
# Identity:        2/6 (33.3%)
# Similarity:      3/6 (50.0%)
# Gaps:            0/6 ( 0.0%)
# Score: 8.0
#
#
#=====================================

Protein1           1 LMWIPQR       6
                       :|...|
Protein2           1 IMATAR        6
```

QUESTION 05 **(100 marks)**

5.1 Describe the Next Generation Sequencing (NGS) workflow. (30 marks)

5.2 Discuss the advantages of NGS. (20 marks)

5.3 Describe the principle of Sangers sequence method. (30 marks)

5.4 Differentiate the Maxam-Gilbert and Sanger Sequencing methods. (20 marks)

QUESTION 06 **(100 marks)**

6.1 Mention the benefits of using BLAST over FASTA. (20 marks)

6.2 Differentiate the PAM vs BLOSUM Matrix. (25 marks)

6.3 Describe the steps of the FASTA algorithm. (35 marks)

6.4 Discuss the importance of E value and Z value. (20 marks)

Library

CINEC CAMPUS
Beyond A Graduate

00045

Faculty of Health Sciences
Bachelor of Science Honours in Biomedical Sciences
BMS 4113 Laboratory parasitology
Batch – 02 & 03
4th Year 1st Semester
End Semester SEQ Examination

Date : **21st of August 2023**
Time : **9.00 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 following. (20 marks)

1.1.1. Ectoparasitism
1.1.2. Endoparasitism
1.1.3. Commensalism
1.1.4. Parasitism

1.2. What is the infective stage of following parasites ? (40 marks)

1.2.1. *Ascaris lumbricoides*
1.2.2. *Brugia malai*
1.2.3. *Necator americanus*
1.2.4. *Giardia lamblia*

1.4. Explain on the life cycle and pathogenesis of *Ascaris lumbricoides* in human body. (40 marks)

QUESTION 02 **(100 marks)**

2.1. What is the mode of infection of *Necator americanus* to human ? (20 marks)
2.2. Describe the life cycle of *Wuchereria bancrofti* with a flow chart. (40 marks)
2.3. How do you **morphologically** identify the *Giardia lamblia* trophozoite stage and cyst stage ? (20 marks)
2.4. Describe the common laboratory diagnosis method of filarial worms. (20 marks)

QUESTION 03 **(100 marks)**

3.1. Briefly describe the "erythrocytic cycle" of malaria parasite within human body (40 marks)
3.2. What are "malaria pigments'? Where you can see malaria pigments ? (20 marks)

3.3. What are the laboratory diagnosis techniques available to diagnose malaria parasites ?
(10 marks)

3.4. How do you differentiate *Plasmodium vivax* from *Plasmodium falciparum* at laboratory diagnosis ?
(30 marks)

QUESTION 04 **(100 marks)**

4.1. What is the mode of infection of following helminths to human ?
a. *Fasciola hepatica*
b. Taenia saginata (30 marks)

4.2. What is the pathogenesis of scabies mites to human ? (20 marks)

4.4. Write the **diagnostic stage** found in infected human. State the **patient sample** used for diagnosing each parasite separately.

a. *Strongiloides stercoralis*
b. *Trichuris trichuira*
c. *Balantidium coli*
d. *Brugia malayi*
e. *Paragonimus westermani*

(50 marks)

QUESTION 05 **(100 marks)**

5.1. State the scientific name of causative parasite for Intestinal Amoebiasis (20 marks)
5.2. Describe the pathogenesis of protozoan amoeboid parasite that you mentioned in 5.1.
(40 marks)
5.3. Describe the laboratory identification of the parasite that you mentioned in 5.1.
(20 marks)
5.4. Mention two treatments that can be taken for a lice infection (20 marks)

QUESTION 06 **(100 marks)**

6.1. State the medically important mosquito genera/species in which transmits the following disease conditions **in Sri Lanka**.
a. Malaria
b. Filariasis
c. Dengue (30 marks)

6.2. State the clinical symptoms of following parasitic diseases.
a. Malaria
b. Filariasis (40 marks)

6.3. Explain the types of enzymes present in snake venom (30 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Sciences

BMS 4143 Clinical Microbiology

Batch – 01

4th Year 1st Semester

End semester SEQ Examination

INDEX NUMBER:

.....

Date : **10.02.2023**
Time : **9.00 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.
- You are not allowed to take out the examination papers.

QUESTION 01 **(100 marks)**

1.1. 45 year old patient presented with high fever, cough and yellow sputum for 3 days. On examination, he was febrile, ill and chest X-ray showed consolidated areas in both lungs. He was admitted to the medical casualty ward and patient sputum sample was subjected for gram staining. Under microscope, Gram positive, short chains of a bacteria was observed.

1.1.1. What is the suspected disease of the patient ? (20 marks)

1.1.2. What is the causative agent ? (20 marks)

1.1.3. What is the mode of transmission of causative agent? (20 marks)

1.2. Briefly describe the stages of "development of a disease" by the disease causing agent within the host body. You may use a graph to show the change of microorganism numbers in body, with time. (40 marks)

QUESTION 02 **(100 marks)**

2.1. What are the characteristic features of a bacterial "food intoxication"?
(20 marks)

2.2. State two example microorganisms that can cause a food intoxication.
(20 marks)

2.3. A 31 year old male became feverish 4 days after arriving at a vacation resort. During his stay, he ate from two restaurants and many street foods. Then he developed vomiting and blood & mucous diarrhoea. A Gram negative microorganism was isolated from his **stool.**
2.3.1. State the culture media/s used for the initial isolation of microorganisms from the patient stool sample ? (20 marks)
2.3.2. Briefly describe the procedure of isolation of causative agent from patient sample using culture media that you mentioned in 2.3.1.
(40 marks)

QUESTION 03 **(100 marks)**

3.1. A patient who had dysuria, suprapubic pain, abdominal cramps and increased frequency of urine passage was suspected to have a urinary tract infection. The clinician asked to collect a urine sample from him for the laboratory testing.
3.1.1. Briefly describe the collection technique of a urine sample by this **female** patient.
(20 marks)
3.1.2. State 2 microorganisms that might cause the urinary tract infection in above patient.
(20 marks)
3.1.3. Describe the identification procedure of pathogenic microorganisms available in the urine sample, using microbiological techniques. (40 marks)

3.2. A patient has been diagnosed as having pneumonia. Is this sufficient information to begin treatments with antimicrobial agents? Briefly discuss why or why not. (20 marks)

QUESTION 04 **(100 marks)**

4.1. A one year old **infant** was lethargic and had fever, stiff neck, nausea and vomiting. When admitted to the hospital and a CSF sample showed a gram-negative diplococci.

2.2.1. What is the causative agent ? (20 marks)
2.2.2. What are the microbiological culture media/s that you can use to culture the disease causing agent that you mentioned in 2.1.1.? (20 marks)

4.2. 50 year old male patient admitted to the medical ward with a history of evening pyrexia, nocturnal sweating, productive cough and generalized malaise for 4 weeks. On examination, he was cachectic. Chest X-ray shows cavitatory lesion in the left upper lobe. Sputum was positive for AFB.

4.2.1. What is the suspected disease of the patient? (10 marks)

4.2.2. What is the disease causing agent ? (10 marks)
4.2.3. Discuss on laboratory diagnosis of disease causing agent that you mentioned in 4.2.2. (20 marks)

4.4. Describe how microorganisms are naturally prevented from entering the upper respiratory system. (10 marks)

QUESTION 05 **(100 marks)**

A 35-year-old male patient was admitted to the hospital after suffering from fevers, committing and fatigue, that were thought to be related to a viral illness by the physicians. Furthermore, he had an irregular heart rate and rhythm, and the echocardiogram of this patient's heart showed vegetation. A blood culture was submitted to the laboratory. A biomedical scientist who performed a gram stain from the positive blood culture observed gram positive cocci presented in chains.

5.1 State the aetiology of this disease. (15 marks)
5.2 What is the suspected disease condition of this patient? (5 marks)
5.3 Discuss the laboratory diagnosis of this disease which carried out by the Biomedical Scientist in the clinical microbiology laboratory settings. (30 marks)
5.4 State the factors resulting bacteraemia. (20 marks)
5.5 Discuss the characteristics of this disease (30 marks)

QUESTION 06 **(100 marks)**

A 30-year-old female reported having painful joints, fatigue, fever, and chest pain. After examination physicians suspected that the patient was suffering from rheumatic fever.

6.1 Write a short note on rheumatic fever. (20 marks)
6.2 State the causative agent for rheumatic fever. (10 marks)
6.3 Discuss the pathogenesis of this disease. (30 marks)
6.4 Mention other clinical presentations that can be observed in this patient. (10 marks)
6.5 Discuss the laboratory diagnosis of rheumatic fever within clinical microbiology laboratory. (30 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Sciences

BMS 4133 Molecular Techniques in Life Sciences

Batch – 01

4th Year 1st Semester

End semester Repeat SEQ Examination

Date : **08th of February 2023**
Time : **9.00 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.
- You are not allowed to take out the examination papers.

QUESTION 01 **(100 marks)**

1.1. Define "Organ culture". (15 marks)

1.2. State three limitations of organ culture. (15 marks)

1.3. Describe the main aseptic conditions that has to be followed in cell culture. (35 marks)

1.4. Discuss the applications of cell culture. (35 marks)

QUESTION 02 **(100 marks)**

2.1. Define the term "Blotting technique". (15 marks)

2.2. Draw a flow chart to denote the steps involved in Southern blotting technique. (25 marks)

2.3. Write short notes on the following.

a) Applications of Southern blotting technique. (30 marks)
b) Advantages of Northern blotting technique. (30 marks)

QUESTION 03 **(100 marks)**

3.1. Mention three characteristics of an ideal biomarker. (15 marks)

3.2. Describe the difficulties faced in biomarker sample processing, storage and shipping. (25 marks)

3.3. Write short notes on the following.

a) Applications of Biomarkers. (30 marks)
b) Techniques used for detection and identification of biomarkers. (30 marks)

QUESTION 04 **(100 marks)**

4.1. Mention three applications of DNA sequencing. (15 marks)

4.2. Briefly describe the principle of Sanger sequencing method. (25 marks)

4.3. Write a short note on applications of DNA sequencing. (35 marks)

4.4. Draw a flow chart to denote the steps of Sanger sequencing. (25 marks)

QUESTION 05 **(100 marks)**

5.1. State five Immunological diagnostic techniques. (20 marks)

5.2. Briefly describe the steps used in ELISA (Enzyme Linked Immunosorbent Assay) technique. (40 marks)

5.3. Differentiate the different techniques used to diagnose parasitic infections. (40 marks)

QUESTION 06 **(100 marks)**

6.1. State five limitations of multiplex PCR. (25 marks)

6.2. Discuss the steps necessary for a restriction fragment length polymorphism (RFLP). (35 marks)

6.3. Compare and contrast real time PCR and nested PCR. (40 marks)

Library

00007

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Sciences

BMS 4123 Medical Informatics- Batch – 01

4th Year 1st Semester - End semester Repeat SEQ Examination

Date : **06th of February 2023**

Time : **9.00 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.
- You are not allowed to take out the examination papers.

QUESTION 01 **(100 marks)**

1.1. State three common sequence methods. (15 marks)

1.2. Mention five uses of DNA sequencing. (25 marks)

1.3. Write a short note on the following.

a) Principles of DNA sequencing. (30 marks)
b) Sanger DNA sequencing method. (30 marks)

QUESTION 02 **(100 marks)**

2.1. State five applications of sequence alignment. (25 marks)

2.2. Describe on Multiple Sequence Alignment. (35 marks)

2.3. Differentiate PAM and BLOSM scoring systems. (40 marks)

QUESTION 03 **(100 marks)**

3.1. Write short note on the following.

a) Global sequence alignment. (30 marks)
b) Local sequence alignment. (30 marks)
c) BLAST tool. (40 marks)

QUESTION 04 **(100 marks)**

4.1. What is known as bioinformatics? (15 marks)

4.2. Mention three GenBank primary databases. (15 marks)

4.3. Write a short note on Secondary databases. (40 marks)

4.4. Compare and contrast primary and secondary databases. (30 marks)

QUESTION 05 **(100 marks)**

5.1. What are the common data formats used in the biological databases? (10 marks)

5.2. State the difference between the FASTA format and PLAIN TEXT format. (20 marks)

5.3. List the information appear in the NCBI GENBANK format. (30 marks)

5.4. Mention the uses of regression analysis in statistics. (40 marks)

QUESTION 06 **(100 marks)**

6.1. State different types of taxonomical units in a phylogenetic tree. (25 marks)

6.2. Write a short note on phylogenetic trees. (35 marks)

6.3. Compare and contrast Cladogram and Phylogenetic trees. (40 marks)

00007

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Sciences

BMS 4123 Medical Informatics - Batch – 01

4th Year 1st Semester - End semester Repeat Assignment Examination

---

Date : 06th of February 2023

Time : 01.30 pm. – 02.30 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.
- You are not allowed to take out the examination papers.

QUESTION 01 (100 marks)

1.1.Mention the information and the main components of the following file.

Display Settings: GenBank

Calyptogena nautilei Hb-IV mRNA for hemoglobin IV, complete cds

GenBank: AB186050.1

FASTA Graphics

Go to:

```
LOCUS       AB186050                1116 bp    mRNA    linear   INV 03-AUG-2004
DEFINITION  Calyptogena nautilei Hb-IV mRNA for hemoglobin IV, complete cds.
ACCESSION   AB186050
VERSION     AB186050.1  GI:50897144
```

1.2.Answer the following questions referring to the given NCBI file.

Escherichia coli O25b:H4 chromosome, complete genome

GenBank: CP015085.1

FASTA Graphics

```
LOCUS       CP015085            5289898 bp    DNA     circular BCT 15-JUN-2016
DEFINITION  Escherichia coli O25b:H4 chromosome, complete sequence.
ACCESSION   CP015085
VERSION     CP015085.1
DBLINK      BioProject: PRJNA316859
            BioSample: SAMN04605558
KEYWORDS    .
SOURCE      Escherichia coli O25b:H4
  ORGANISM  Escherichia coli O25b:H4
            Bacteria; Proteobacteria; Gammaproteobacteria; Enterobacterales;
            Enterobacteriaceae; Escherichia.
```

a) Type of the biomolecule
b) Size of the Biomolecule
c) Accession number
d) Organism

1.3. Answer the following questions referring to the given NCBI flat file.

Escherichia coli O25b:H4 chromosome, complete genome

GenBank: CP015085.1

GenBank Graphics

```
>CP015085.1 Escherichia coli O25b:H4 chromosome, complete sequence
CTCCACGGAACTGGTGGAAGACCCGGAAGCCATACTGCGCTACGGACGCAACCTGCTGAAGATGGACGCG
TTCGGCTGTACCAGCCGCGGTCAGGCCCCACCGTGCCGGACTGTGGGTGATAAAGACCGAACTGCTGGAA
ACGCAGACGGTGGATTTCACGCTCGGGTCTCAGGGGCTGCGGCACACACCCGGTGACATTATTGAAATCT
GTGATAATGACTATGCCGGGACCCTGACCGGCGGACGTGTCCTGTCCATTGATGCTGCCACCCGCACCCT
GACGCTGGACCGTGAGGTTACCCTGCCGGAGACAGGTACATCGGCGGTGAACCTGATTAACGGCAGCGGT
AAGCCGGTGAGTGTGGACATCACCGCACACCCCGCGCCGGACCGGATACAGGTCAGTACCCCTGCCTGAT
GGTGTGGAGACATACGGGGTGTGGGGACTCTCCCTGCCGTCACTGCGCCGTCGCCTGTTCCGCTGTGTCT
CCATCCGGGAAAACACGGACGGCACCTTTGCCATCACGGCGGTGCAGCACGTACCGGAAAAAGAAGCCAT
CGTGGATAACGGTGCCCGCTTTGAGCCGCAGTCAGGTTCCCTGAACAGCGTCATCCCACCGGCAGTGCAG
CACCTGACGGTGGAGGTGAGCGCAGCTGACGGCCAGTATCTGGCGCAGGCGAAATGGGACACGCCGCGGG
TGGTGAAGGGTGTGCGCTTCAGTCTGCGCCTGACCAGTGGTAAGGGAACGGATGCCAGACTGGTGACCAC
CGCCATCACCGCAGACACGGAGCACCGTTTCAGCGGCCTGCCGCTCGGGGAATACACCCTGACGGTGCGG
GCGATAAACAGCTATGGCCAGCAGGGTGAACCTGCCACCACCACCTTCCGGATTGCCGCACCGGCAGCAC
```

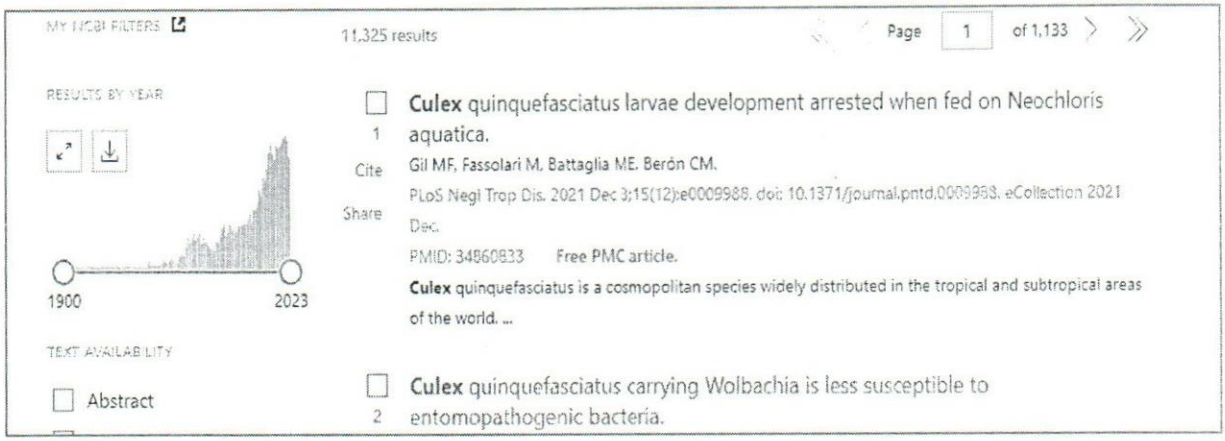
a) Mention the format of the sequence mentioned below.
b) Mention the organism related to the above DNA sequence.

QUESTION 02 (100 marks)

2.1. How do you search for the following literature from the PubMed database? Clearly mention the keywords that you use to retrieve the best match.

a) *Escherichia coli* in the rain water of Sri Lanka
b) Dengue incidence in Sri Lanka
c) *Culex* spp. Larvae
d) Star fruit varieties in district of Galle

2.2. If you need to narrow down the following search results to the ***Culex quinquefasciatus adult mosquitoes*** in a pubmed search, how do you search them using the appropriate keywords on the pubmed search bar?



2.3. Mention the components of the header line in the following figure.

```
>AB000263 |acc=AB000263|descr=Homo sapiens mRNA for prepro cortistatin like peptide, complete cds.|len=368
ACAAGATGCCATTGTCCCCCGGCCTCCTGCTGCTGCTGCTCTCCGGGGCCACGGCCACCGCTGCCCTGCC
CCTGGAGGGTGGCCCCACCGGCCGAGACAGCGAGCATATGCAGGAAGCGGCAGGAATAAGGAAAAGCAGC
CTCCTGACTTTCCTCGCTTGGTGGTTTGAGTGGACCTCCCAGGCCAGTGCCGGGCCCCTCATAGGAGAGG
AAGCTCGGGAGGTGGCCAGGCGGCAGGAAGGCGCACCCCCCCAGCAATCCGCGCGCCGGGACAGAATGCC
CTGCAGGAACTTCTTCTGGAAGACCTTCTCCTCCTGCAAATAAAACCTCACCCATGAATGCTCACGCAAG
TTTAATTACAGACCTGAA
```

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Sciences

BMS 4143 Clinical Microbiology

Batch – 01

4th Year 1st Semester

End semester SEQ Examination

INDEX NUMBER:

.....

Date : **17th of August 2022**
Time : **9.00 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.
- You are not allowed to take out the examination papers.

QUESTION 01 **(100 marks)**

1.1. 50 year old male patient admitted to the medical ward with a history of evening pyrexia, nocturnal sweating, productive cough and generalized malaise for 4 weeks. On examination, he was cachectic. Chest X-ray shows cavitatory lesion in the left upper lobe. Patient sputum was positive for an acid-fast bacteria (AFB) under microscopic observations.

1.1.1. What is the suspected disease of the patient ? (10 marks)
1.1.2. What is the disease causing agent ? (10 marks)
1.1.3. Briefly explain the host-invading and pathogenesis mechanism of disease causing agent that you mentioned in 1.1.2. (30 marks)
1.1.4. Discuss on microbiological laboratory diagnosis of disease causing agent that you mentioned in 1.1.2. (30 marks)

1.2. Briefly explain the stages of "development of a disease" by the disease causing agent within host body. You may use a graph to show the change of microorganism numbers in body, with time. (20 marks)

QUESTION 02 **(100 marks)**

2.1. A one year old infant was lethargic and had fever, stiff neck, nausea and vomiting. When admitted to the hospital and a Cerebrospinal fluid (CSF) sample was taken and a gram-negative diplococci was identified from the sample.

2.1.1. What is the disease causing agent found from patient sample? (10 marks)
2.1.2. What are the microbiological culture media/s that you can use to culture the disease causing agent that you mentioned in 2.1.1.? (10 marks)

2.2. A male patient who had dysuria, suprapubic pain and increased frequency of urine passage was suspected to have a urinary tract infection. The clinician asked to collect a urine sample from him for the laboratory testing.

2.1.1. Briefly explain the collection technique of a urine sample by this male patient. (10 marks)
2.1.2. State 2 microorganisms that might cause the urinary tract infection in above patient. (20 marks)
2.1.3. Explain the identification procedure of pathogenic microorganisms available in the urine sample, using microbiological techniques. (50 marks)

QUESTION 03 **(100 marks)**

3.1. 12 year boy presented with high fever, red throat with white or grey patches and unusual taste in the mouth came for treatments. On history, patient has had tonsillitis two weeks before and has not been treated for it. Throat swab was done, and gram staining found positive chains of cocci. Culture plate showed gray tiny colonies with clear large zone around colonies in blood agar.

3.1.1. What is the disease causing agent isolated from the patient sample? (20 marks)
3.2.1. Briefly explain the procedure with the technique of culturing the patient swab sample on blood agar plate using microbiological techniques. (30 marks)
3.1.2. What is the reason for the clear large zone around the colonies in blood agar? (10 marks)

3.2. 45 year old patient presented with high fever, cough and yellow sputum for 3 days. On examination he was febrile, ill and chest X-ray showed consolidated areas in both lungs. He was admitted to the medical casualty ward and patient sputum sample was subjected for gram staining. Under microscope, Gram positive, short chains of a bacteria was observed.

3.2.1. What is the suspected disease condition of the patient? (20 marks)
3.1.2. What is the organism identified in the direct microscopy (10 marks)
3.1.3. How does the disease causing organism is transmitted from one person to another? (10 marks)

QUESTION 04 **(100 marks)**

4.1. A 31 year old male became feverish 4 days after arriving at a vacation resort. During his stay, he ate at two restaurants that were not associated with the resort and had many street foods also. He went to the hospital when he developed vomiting and diarrhoea. A Gram negative microorganism was isolated from his stool.

4.1.1. What are the culture media/s used for the initial steps of isolating microorganisms from the patient stool sample? (20 marks)
4.1.2. Later on, the microorganism had streaked on SS agar plate and after 24 hours of incubation, the MLT had observed a microorganism developing as blackish colour colonies on culture plate. What is the disease causing agent infected to his body? (20 marks)
4.1.3. Explain the pathogenesis of disease causing agent that you mentioned in 4.1.2. (30 marks)

4.2. What are the characteristic features of a bacterial "**food intoxication**"? State two example microorganisms that can cause a food intoxication. (30 marks)

QUESTION 05 **(100 marks)**

A 25-year-old female patient presented with headache, low-grade fever, nausea, loss of appetite, yellow eyes and malaise. Based on her history, travel, and exposure history, she stated that she is an intravenous (IV) drug user. After examination clinician said that this patient is possibly infected with hepatitis A.

5.1 What are the laboratory diagnosis methods to prove clinician's statement? (15 marks)
5.2 Mention the pathogenesis of hepatitis A disease. (20 marks)
5.3 Discuss the complications of hepatitis A. (30 marks)
5.4 State the prevention measures for spreading of hepatitis disease. (15 marks)
5.5 What are the different ways of transmission of hepatitis A to this patient? (20 marks)

QUESTION 06 **(100 marks)**

A 10-year-old girl presented to the hospital with bacteraemia. The patient was suffering from fevers, vomiting and fatigue that were thought to be related to a viral illness. She had a regular heart rate and rhythm, but there was a large vegetation in her echocardiogram of heart. The blood culture which was submitted for the laboratory got positive and showed gram positive cocci in chains when evaluating microscopic evaluation.

6.1 What are the factors causing bacteraemia? (20 marks)
6.2 Mention the aetiology of this disease. (10 marks)
6.3 What is the suspected disease condition of this patient? (10 marks)
6.4 State the causative agents for this patient's disease. (20 marks)
6.5 Discuss the laboratory diagnosis of this suspected disease and expected results by the Biomedical scientist. (40 marks)

CINEC CAMPUS
Beyond A Graduate

Faculty of Health Sciences

Bachelor of Science Honours in Biomedical Sciences

BMS 4123 – Medical Informatics

4th Year 1st Semester

Batch 01

End Semester SEQ Examination

INDEX NUMBER: .....

Date : 10th of August 2022
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.
- You are not allowed to take out the examination papers.

QUESTION 01 **(100 marks)**

1.1 What are the common sequencing methods available? (30 marks)

1.2 write short notes on principles of DNA sequencing (70 marks)

QUESTION 02 **(100 marks)**

2.1 List 5 applications of sequence alignment (25 marks)

2.2 Write short note on Quantitative global alignment and use of scoring system (75 marks)

QUESTION 03 **(100 marks)**

3.1 Compare and contrast Global sequence alignment and local sequence alignment (40 marks)

3.2 Write short note on BLAST tool (60 marks)

QUESTION 04 **(100 marks)**

4.1 What are the types of biological databases? (give at least one example for each type) (40 marks)

4.2 Write short note on one of the primary databases (30 marks)

4.3 Write short note on one of the specialized databases (30 marks)

QUESTION 05 **(100 marks)**

5.1 What are observed and hypothetical taxonomical units in phylogenetic tree? (50 marks)

5.2 What are the similarities and differences between Cladogram and Phylogenetic tree? (50 marks)

QUESTION 06 **(100 marks)**

6.1 Define the term "Bioinformatics" (25 marks)

6.2 State five units of information deal within bioinformatics (25 marks)

6.3 Mention three applications of bioinformatics in biological sciences (25 marks)

6.4 Mention three limitations of bioinformatics (25 marks)