



**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**FACULTY OF APPLIED SCIENCE**  
**DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY**  
**MASTER OF SCIENCE DEGREE IN APPLIED MICROBIOLOGY AND**  
**BIOTECHNOLOGY**  
**MEDICAL MICROBIOLOGY AND BIOTECHNOLOGY (SBB5213)**

**Main Examination Paper**

**MARCH 2025**

This examination paper consists of 2 pages

Time Allowed : 3 hours  
Total Marks : 100  
Special Requirements : Colour Micrographs  
Examiner's Name : DR E. ZUMBIKA

**INSTRUCTIONS**

1. Answer **Four (4)** questions.
2. Answer **Question** number **One** and choose any other **Three** questions. Each question carries 25 marks.
3. Where a question contains subdivisions, the mark value for each subdivision is given in brackets.
4. Illustrate your answer where appropriate with large, clearly labelled diagrams.

**MARK ALLOCATION**

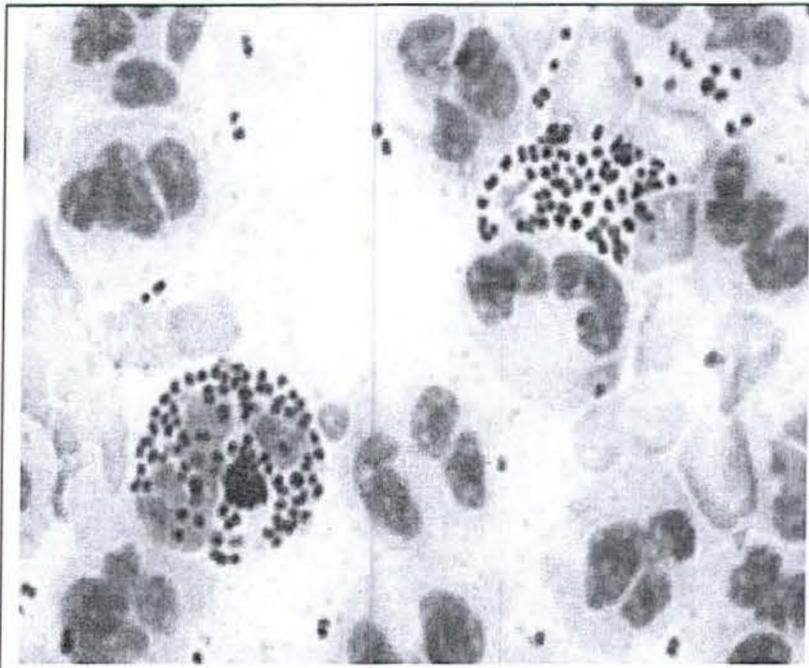
<b>QUESTION</b>	<b>MARKS</b>
1.	<b>25</b>
2.	<b>25</b>
3.	<b>25</b>
4.	<b>25</b>
5.	<b>25</b>
6.	<b>25</b>
<b>TOTAL</b>	<b>100</b>

1. Discuss traditional and new generation diagnostic methods, highlighting their applications in clinical microbiology and genetic diseases. In your answer indicate their merits and shortcomings.
2. (a) Write short notes on key aspects of the aetiology, pathogenesis and chemotherapy of the pelvic inflammatory disease. (12 marks)  
(b) Give an account of the manifestations, pathogenesis and therapeutic management of parasitic dysentery. (13 marks)
3. Write a review on the application of gene therapy in genetic disorders.
4. (a) Describe the mechanism of action of the Diphtheria toxin. (8 marks)  
(b) From the genus *Staphylococcus*, identify three candidate species of clinical significance, and using diagnostic microbiology of key cellular, colonial, cultural morphology and selective media characteristics, differentiate the pathogens. Include, in your answer, an outline of their clinical manifestation and pathogenesis. (17 marks)
5. (a) Explain the mechanisms of action of any two antifungals employed in cryptococcosis therapy. (7 marks)  
(b) Describe the epidemiology, predisposing and virulence factors, pathogenesis and diagnosis of *Cryptococcus neoformans* and *Cryptococcus gattii* infections. (18 marks)
6. (a) Identify the pathogen on the colour compound micrographs (provided), and outline and briefly explain its immune evasion and dismantling mechanisms. (10 marks)  
(b) Give an account of the biology, infections and pathogenesis of *Chlamydia trachomatis*. (15 marks)

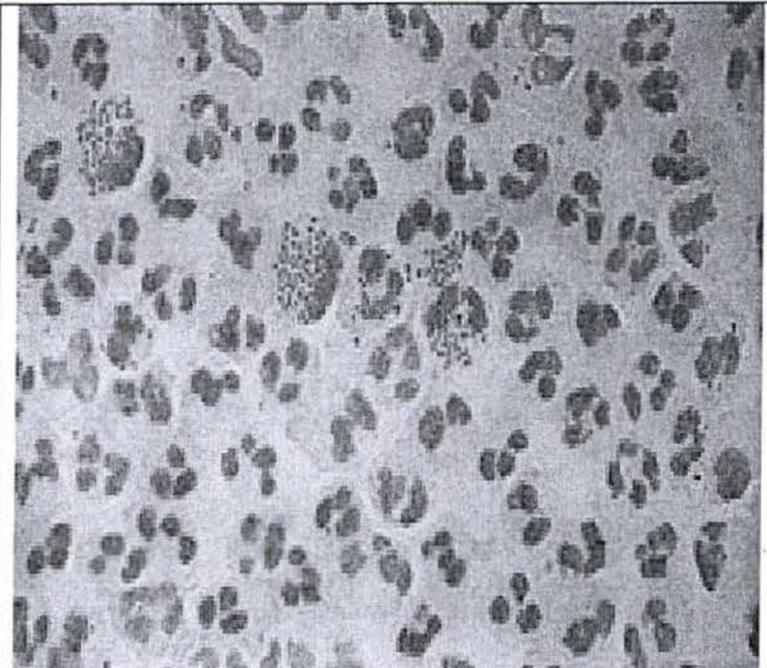
**END OF EXAMINATION**

**MEDICAL MICROBIOLOGY MICROGRAPHS OF A PATHOGENIC BACTERIUM**

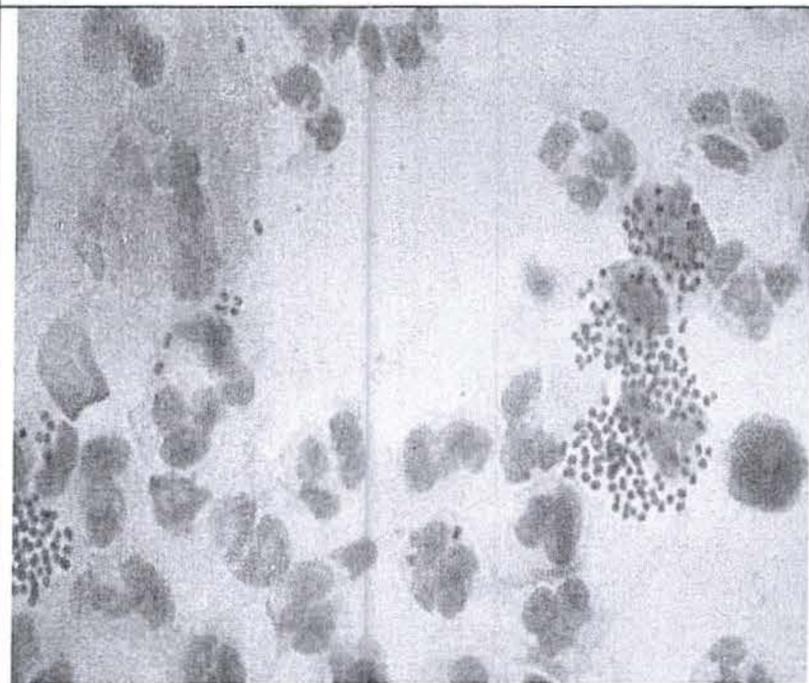
**QUESTION 6 (a):** Figures: Photomicrographs of *Pathogenic* species X (NOTE: Identify the Genus and species)



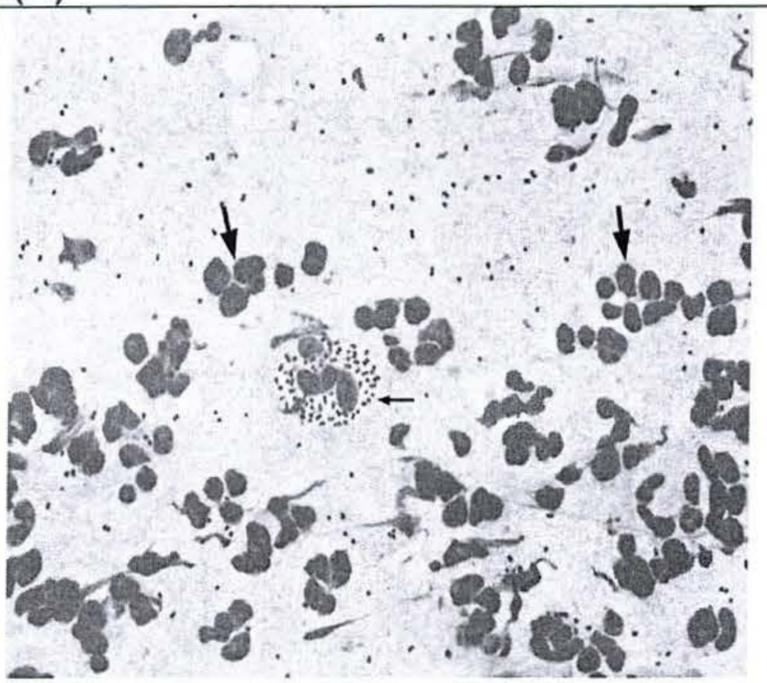
(A)



(B)



(C)



(D)