UNIVERSITY OF JOHANNESBURG

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| **PROGRAM** | : | *BIOMEDICAL TECHNOLOGY* |
| **MODULE** | : | **Microbiology IIA** |
| **CODE** | : | **GTM 2111** |
| **DATE** | : | MAIN EXAMINATION<br>1 JUNE 2019 |
| **DURATION** | : | 175 MINUTES |
| **WEIGHT** | : | 50: 50 |
| **TOTAL MARKS** | : | 175 |

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| **EXAMINER** | : | P. MALAKA |
| **MODERATOR** | : | S. MODIMOLA |
| **NUMBER OF PAGES** | : | 5 PAGES |

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| **INSTRUCTIONS** | : | QUESTION PAPER MUST BE HANDED IN |

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| **REQUIREMENTS** | : | 1 X EXAMINATION SCRIPT |

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**INSTRUCTIONS TO CANDIDATES:**

1. THIS PAPER CONSISTS OF 2 SECTIONS.
2. EVERY SECTION MUST BE ANSWERED IN THE EXAMINATION ANSWER SCRIPT WHICH ARE PROVIDED.
3. THIS QUESTION PAPER MUST BE RETURNED WITH YOUR EXAMINATION ANSWER SCRIPT.

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## SECTION A: Choose the correct answer

## QUESTION 1

1.1 Which of the following best represents the hierarchy of levels of biological classification? (1)

a) Phylum, kingdom, class, order, genus, species, family
b) Kingdom, phylum, class, order, family, genus, species
c) Kingdom, phylum, family, class, order, genus, species
d) Class, order, kingdom, phylum, family, genus, species

1.2 Organisms that are capable of overcoming the body's defences and cause diseases are termed: (1)

a) True pathogens
b) Opportunistic pathogens
c) Strict parasites
d) Commensals

1.3 Organisms that can cause disease only under certain circumstances are termed: (1)

a) True pathogens
b) Opportunistic pathogens
c) Strict parasites
d) Commensals

1.4 Bacterial nutrition: (1)

a) Takes place by osmosis
b) Require nutrients in solutions
c) May involve enzymatic hydrolysis
d) all of the above

1.5 Bacterial spores: (1)

a) Are stained by gram stain
b) Require methods employing the use of heat
c) May be single or multiple
d) Are not important for survival

1.6 Nucleic acids contains (1)

a) Alanine
b) Adenine
c) Lysine
d) Arginine

1.7 The two strands of DNA are joined non-covalently by (1)

a) Ionic bonds
b) Covalent bonds
c) Hydrogen bonds between bases
d) Polar charge

**[7]**

**QUESTION 2: Briefly define the terms below**

2.1 Antigen (1)
2.2 Aseptic (1)
2.3 Hemolysis (1)
2.4 Transduction (1)
2.5 Pathogen (1)
2.6 Parasite (1)
2.7 Lyophilization (1)
2.8 Aero- tolerant (1)
2.9 ELISA (1)
2.10 Conjugation (1)
2.11 Transcription (1)
2.12 Hilicases (1)
2.13 Invasiveness (1)
2.14 Cross resistance (1)
2.15 Transformation (1)
2.16 Thermophiles (1)
2.17 Immune system (1)
2.18 Indicator media (1)
2.19 Synthetic media (1)
2.20 Chocolate agar (1)

**[20]**

**SECTION A SUBTOTAL: 27**

## SECTION B:

### QUESTION 1

| | | |
|---|---|---|
| 1.1 | What is a Bacteria? | (1) |
| 1.2 | Elaborate on Koch's postulates. | (4) |
| 1.3 | Elaborate on Hieronymus Fracastorius (1483-1553) study. | (4) |
| 1.4 | Draw, label and explain an example of a typical bacterial growth curve in a closed system | (23) |

**[33]**

### QUESTION 2

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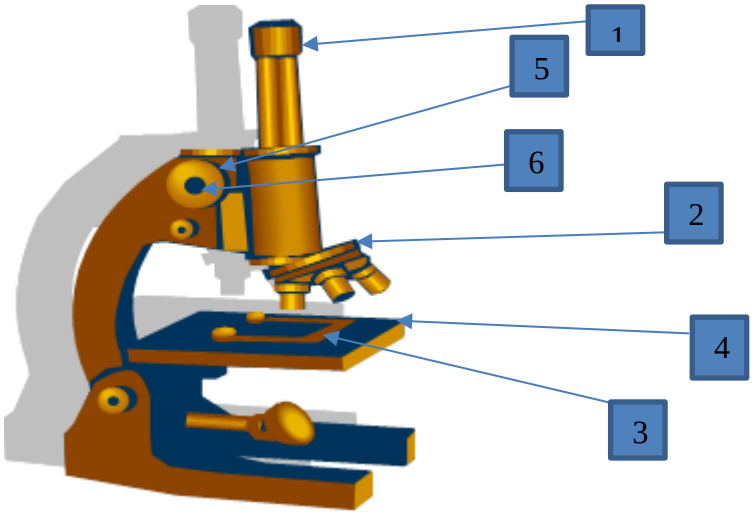
|---|---|---|
| 2.1 | Who invented the microscope? | (1) |
| 2.2 | Who devised the methods for isolating bacteria in pure culture? | (1) |
| 2.3 | Who first isolated the causative agent of TB? | (1) |
| 2.4 | Explain the significance of Koch's postulates. | (1) |
| 2.5 | What is the meaning of PPE and its function? | (2) |

**Refer to the Microscope above to answer question 2.6 and 2.7**

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|---|---|---|
| 2.6 | Label 1 up to 6 parts of microscope indicated above. | (6) |
| 2.7 | Mention one function of each parts 1 to 6 labelled in Question 2.6 | (6) |

**[18]**

**QUESTION 3**

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|---|---|---|
| 3.1 | Name two methods that can be used to test for bacterial motility | (2) |
| 3.2 | Explain the principles of the two methods in Question 2.1 | (2) |
| 3.3 | Explain what true motility of bacteria mean | (1) |
| 3.4 | Explain the principles of the staining below | |
| a. | Gram's, | (7) |
| b. | Albert's, | (6) |
| c. | Malachite green and | (5) |
| d. | Zhiel Neelson's | (6) |
| | | **[29]** |

**QUESTION 4**

| | | |
|---|---|---|
| 4.1 | Name 3 methods that are used for antibiotic sensitivity testing | (3) |
| 4.2 | Explain the principles of each methods used for sensitivity testing | (12) |
| 4.3 | Give 3 examples of Penicillins antibiotics | (3) |
| 4.4 | List 4 modes of action of antibiotics | (4) |
| | | **[22]** |

**QUESTION 5**

| | | |
|---|---|---|
| 5.1 | List and explain each 6 mechanisms of transmission of infection | (12) |
| 5.2 | List and explain 5 factors that contribute to a microbe's pathogenicity | (5) |
| 5.3 | Why microbes are capable of causing disease? | (5) |
| 5.4 | Explain the different between disinfection and sterilisation | (4) |
| 5.5 | Differentiate between virulent gene and vaccination | (4) |
| | | **[30]** |

**QUESTION 6**

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|---|---|---|
| 6.1 | Describe the principle and the application of indirect immunofluorescence techniques | (5) |
| 6.2 | Name and pair 2 purines with 3 pyrimidines according to the rules of DNA and RNA base pairing | (6) |
| 6.3 | Explain 6 factors that affects the effectiveness of antibiotics | (6) |
| | | **[17]** |

**SECTION B SUBTOTAL: 148**

**TOTAL MARKS: 175**