

M. Sc. BIOTECHNOLOGY  
FIRST SEMESTER  
MICROBIOLOGY  
MBT - 103

Duration: 3 Hrs.

Marks: 70

Part : A (Objective) = 20

Part : B (Descriptive) = 50

[ PART-B : Descriptive ]

Duration: 2 Hrs. 40 Mins.

Marks: 50

[ Answer question no. One (1) & any four (4) from the rest ]

1. Describe the mechanism of specialized transduction with a neat diagram. 10
2. Derive mathematically the bacterial growth curve. Find out the rate constant when the population of bacteria increases from  $10^3$  to  $10^6$  in 10 hours. 5+5=10
3. Describe the freeze itching procedure for sample preparation in electron microscopy. Explain the principle of transmission electron microscope with a neat diagram. 5+5=10
4. Explain with a neat diagram the Gram (-)ve bacterial cell wall describing the peptidoglycan layer and composition of lipopolysaccharide. 5+5=10
5. Discuss briefly the role of nitrogenase enzyme complex in the biological nitrogen fixation process showing biochemistry of the process. Draw a detailed diagram showing all the steps of cycling of  $N_2$  involving important microorganisms in each step. 5+5=10
6. Mention the salient features of the members belonging to Kingdom Fungi. Describe the phenomenon of parasexuality in *Deuteromycetes*. 4+6=10
7. Why tertiary treatment is required during waste water treatment process? Add a brief note on water borne diseases in man. 4+6=10
8. Discuss the cultivation of animal viruses using chick embryo technique. 10

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[ PART-A : Objective ]

Choose the correct answer from the following :

1×20=20

1. Differential staining of bacteria on Gram's staining is due to
  - a. difference in the cell wall layer components of Gram (+)ve and Gram (-)ve bacteria.
  - b. difference in the cell structure of Gram (+)ve and Gram (-)ve bacteria.
  - c. difference in the mode of nutrition in Gram (+)ve and Gram (-)ve bacteria.
  - d. None of the above
2. The correct statement(s) regarding botulinal toxin is/are
  - a. it is a neurotoxin.
  - b. it is a water-soluble exotoxin.
  - c. it is produced by *Clostridium botulinum*, a Gram (+)ve aerobic bacteria.
  - d. all of the above
3. Malolactic fermentation is a fermentation of
  - a. ale.
  - b. beer.
  - c. wine.
  - d. all of the above.
4. Surface appendages of bacteria meant for cell-cell attachment during conjugation is
  - a. pili.
  - b. flagella.
  - c. spinae.
  - d. cilia.
5. Bacterial chromosome is
  - a. DS and circular.
  - b. SS and circular.
  - c. DS and linear.
  - d. SS and linear.
6. All of the bacteria fix nitrogen except
  - a. *Rhizobium* sp.
  - b. *E. coli*.
  - c. *Azotobacter* sp.
  - d. Cyanobacteria
7. Iodine used in Gram's staining serves as
  - a. chelator.
  - b. catalyst.
  - c. mordant.
  - d. co-factor.
8. The resolving power of light travelling in oil at 450 nm is
  - a. 250 nm
  - b. 150 nm
  - c. 360 nm
  - d. 460 nm
9. Life cycle in *Chlamydomonas* follows the reproduction pattern of
  - a. heterogamy.
  - b. isogamy.
  - c. asexual.
  - d. none of the above
10. Pasteurization is a
  - a. low temperature treatment.
  - b. high temperature treatment.
  - c. low and high temperature treatment.
  - d. steaming treatment.
11. The functional attributes of acquired immunity is/are
  - a. specificity, diversity, autoimmunity, self and non-self recognition.
  - b. specificity, diversity, inflammation, self and non-self recognition.
  - c. specificity, antigenicity, immunological memory, autoimmunity.
  - d. specificity, diversity, immunological memory, self and non-self recognition.
12. A preserved microbial culture serves the purpose of
  - a. reexamination.
  - b. comparison.
  - c. further reference.
  - d. all of the above.
13. Immunity against hog-cholera in birds is an example of
  - a. racial immunity
  - b. species immunity
  - c. artificial immunity
  - d. innate immunity.
14. The concept of antiseptic surgery to prevent the spread of puerperal fever was introduced by
  - a. Ignaz Semmelweis
  - b. John Snow
  - c. Edward Jenner
  - d. Carl Landsteiner



UNIVERSITY OF SCIENCE & TECHNOLOGY, MEGHALAYA



[PART (A) : OBJECTIVE]

Duration : 20 Minutes

Serial no. of the main Answer sheet

Empty box for serial number

- 15. Naturally acquired active immunity would be most likely acquired through
a. vaccination.
b. natural birth.
c. drinking colostrum.
d. infection with disease causing organism followed by recovery.
16. H2S +2CO2 + H2O -> H2SO4 + 2 (CH2O); this conversion is carried out by photosynthetic autotrophic bacteria like
a. Thiorhodaceae sp.
b. Microspira sp.
c. Baggiatoa sp.
d. Desulfovibrio sp.
17. NH+4 + NO-2 => N2 + 2H2O; an anaerobic process that makes up a major proportion of nitrogen conversion in the oceans, is termed as
a. deamination.
b. denitrification.
c. annamox.
d. N2 assimilation
18. Bioleaching of radioactive metals like uranium, thorium etc. involves the process of
a. heap leaching
b. slope leaching.
c. in situ leaching.
d. All of the above
19. Streptomycin can inhibit bacterial growth by interfering with
a. cell wall synthesis.
b. protein synthesis.
c. DNA synthesis.
d. none of the above.
20. Koch's postulation that established the relationship between microbes and disease was based on Robert Koch's study on
a. Mycobacterium laparae.
b. Mycobacterium tuberculosis.
c. Bacillus anthracis
d. Clostridium diphtherae

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Course : .....

Semester : ..... Roll No : .....

Enrollment No : ..... Course code : .....

Course Title : .....

Session : ..... 2017-18 ..... Date : .....

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Instructions / Guidelines

- > The paper contains twenty (20) / ten (10) questions.
> Students shall tick (✓) the correct answer.
> No marks shall be given for overwrite / erasing.
> Students have to submit the Objective Part (Part-A) to the invigilator just after completion of the allotted time from the starting of examination.

Table with 2 columns: Full Marks, Marks Obtained. Row 1: 20, [ ]

Scrutinizer's Signature

Examiner's Signature

Invigilator's Signature