

Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech/BT(O)/SEM-3/BT-302/2012-13

2012

MICROBIOLOGY

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A

(Multiple Choice Type Questions)

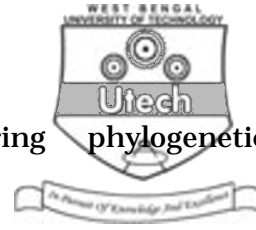
1. Choose the correct alternatives for any *ten* of the following :
10 × 1 = 10

i) Which of the following organisms belongs to archaeobacteria ?

- a) Nitrosomonas
- b) Streptococcus
- c) Mycoplasma
- d) Thermoplasma.

ii) Which is sequenced during the study of phylogenetic classification ?

- a) mRNA
- b) rRNA
- c) tRNA
- d) DNA.



iii) A family tree constructed during phylogenetic classification is

- a) Dendogram
- b) Histogram
- c) Hologram
- d) Cladogram.

iv) The bacterial species Nitrobacter converts

- a) ammonia to nitrite
- b) nitrite to nitrate
- c) nitrate to atmospheric nitrogen
- d) atmospheric nitrogen to amino acids.

v) Which of the following organisms belongs to hyperthermophiles ?

- a) *Bacillus subtilis*
- b) Pyrobaculum
- c) Thermococcus
- d) Pseudomonas.



vi) The metal ion required for enzymatic activities of nitrogenase and nitrate reductase is

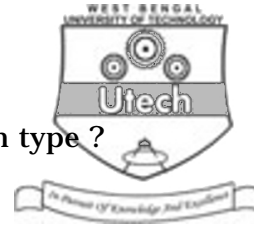
- a) molybdenum
- b) iron
- c) copper
- d) zinc.

vii) A bacterium which can grow only in the total absence of oxygen is described as

- a) facultative anaerobe
- b) anaerobe
- c) obligate aerobe
- d) obligate anaerobe.

viii) In which of the following group of micro-organisms does the phospho ketolase pathway operate ?

- a) *E. coli*
- b) *Lactobacillus* species
- c) *Saccharomyces cerevisiae*
- d) *Acetobacter*.



ix) MacConkey's agar is a media of which type ?

- a) Selective
- b) Differential
- c) Enrichment
- d) Both (a) and (b).

x) Cryopreservation of bacterial cultures is done at which temperature ?

- a) -70°C
- b) 0°C
- c) 4°C
- d) -196°C .

xi) Which of the following viruses carries out reverse transcription ?

- a) Human Immunodeficiency Virus
- b) Herpes virus
- c) Influenza virus
- d) Bacteriophage lambda
- e) All of these.



xii) A plasmid

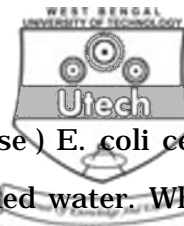
- a) has a replication origin different from that of the chromosome
- b) can have a higher copy number than the chromosome
- c) can be separated from chromosomal DNA by a chemical procedure
- d) usually carries genes that are needed only under some conditions, not genes essential under all conditions
- e) all are correct.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Why is the bacterial spore heat resistant ?
3. A bacterium grows with a generation time of 2 hours. If you inoculate 1000 cells/ml at noon on Monday, when would you expect to the culture to reach, 1,000,000 cells/ml ?
4. Identify 3 structural differences between Archaea (A) and Bacteria (B).



5. A suspension of non-growing (stationary phase) *E. coli* cells is treated with pencillin, then placed in distilled water. What will happen ?
6. What is the major function of each of the following ?
- Poly-beta-hydroxybutyric acid
 - Fimbriae
 - Gas vacuoles.

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. Briefly describe the *Bergey's Manual of Systematic Bacteriology*.
8. Describe the Entner-Doudoroff pathway of glucose dissimilation with a schematic outline. In which group of microorganisms does this pathway operate ? What is Pasteur Effect ?
9. Briefly discuss and illustrate with suitable diagram the process of non-symbiotic nitrogen fixation. What role does Leg hemoglobin play in N_2 fixation ? Name two non-legume plants producing nodule with their endosymbiont.



10. a) Explain how would you isolate a pure culture of a soil bacterium. 5
- b) What is enrichment of a culture ? 3
- c) Differentiate between psychrophiles and thermophiles with examples. 3
- d) Differentiate between a selective and a differential media with examples. 4
11. a) Write about five-kingdom classification in short. 3
- b) What are the basic differences between prokaryotes and eucaryotes ? (Write any *three* points) 3
- c) What is 16 S rRNA sequencing ? How is it helpful in taxonomy ? 2 + 2
- d) Write about Numerical Taxonomy in short. 5
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