

Total Pages : 8

H-6823

M.Sc. (Semester-II) Examination, July 2022

MICROBIOLOGY

(Microbial Physiology and Metabolism)

Time Allowed : Three Hours

Maximum Marks : 70

Minimum Marks : 28

Note : Question paper is divided into four sections. Attempt questions of all four sections as per direction. Distribution of marks is given in each section.

SECTION-A

(Objective Type Questions)

Note : Attempt **any ten** questions. Each question carries **one** mark [1x10=10]

H-6823/1000

(1)

[P.T.O.]

1. (A) Fill in the blanks :

- (i) For organisms that are Facultative anaerobes, the efficiency of growth increase when the organism is shifted from an-aerobic environment to aerobic environment, while anaerobes show no change in growth efficiency when the same shift occur.
- (ii) Special slides with chambers of known depth and an etched grid that are designed for direct count of bacteria are called counting chambers.
- (iii) The two most important hypotheses about the mechanism of oxidative phosphorylation are the chemiosmotic hypothesis and the hypothesis.
- (iv) Green and purple photosynthetic bacteria do not use water as electron source and do not produce oxygen. Therefore, they are said to be bacteria in contrast with cyanobacteria and eukaryotic photosynthesizers.

- (v) The reduction of pyruvate to lactate is called..... fermentation.
- (vi) Spore formation in *Bacillus subtilis* is very typical process in bacteria. At the time of stage VI, the final stage of maturation, spore is visible as whitening under the phase contrast microscopy. This process is associated with the synthesis of and uptake into the mature spore.
- (B) Multiple choice questions :
- (vii) Which of the following does not affect the growth are observed during the exponential (log) growth phase?
- (a) The genetic potential of the organism.
- (b) The inoculum potential
- (c) Composition of medium
- (d) Condition for incubation

(viii) The following may be the reason for cell entering the stationary phase :

- (a) Depletion of an essential nutrients
- (b) Lack of available oxygen
- (c) Accumulation of toxic waste product
- (d) All of the above

(ix) Which of the following does not represent a major function of carbohydrate and other nutrients ?

- (a) Use, without modification as cellular constituents
- (b) Use, with modification as cellular constituents
- (c) Oxidation to provide energy
- (d) All the above are the major function of carbohydrates and other nutrients

(x) To reduce one molecule of Carbon dioxide into carbohydrate it take :

- (a) Three molecules of ATP
- (b) Two molecules of NADPH
- (c) 10 to 12 quanta of light
- (d) All of the above are correct

(xi) The primary and most accurate function of endospore formation appear to be the :

- (a) Tolerate starvation
- (b) Survival and dissemination of the species
- (c) Increase efficiency for reproduction
- (d) Accumulate and store more food material

- (xii) Which method consumed less energy out of de-nova and salvage ?
- (a) Salvage pathway
 - (b) De-nova pathway
 - (c) Both (a) and (b)
 - (d) None of the above is correct

SECTION-B

(Very Short Answer Type Questions)

Note : Attempt **any five** questions. Each question carries **02** marks. (Word limit : 25-30 words) [5x2=10]

- 2.
- (i) Define ABC transporter.
 - (ii) What are polyamines?
 - (iii) Explain lipid accumulation in yeast.
 - (iv) Explain hydrocarbon utilization by micro-organism.
 - (v) Importance of pentose-phosphate pathway.

- (vi) What is reverse TCA?
- (vii) What is quorum sensing?

SECTION-C

(Short Answer Type Questions)

Note : Attempt **any five** questions. Each question carries **04** marks. (Word limit : 250 words) [5x4=20]

- 3.
 - (i) Explain drug export system.
 - (ii) Explain biosynthesis of amino acids in pyruvate family.
 - (iii) Explain FNR regulon.
 - (iv) Describe heat shock response.
 - (v) PHA biosynthesis in microbes.
 - (vi) Explain endospore formation.
 - (vii) Describe growth kinetics.

SECTION-D

(Essay Type Questions)

Note : Attempt **any three** questions. Each question carries **10** marks. (Word limit : 500 words) [3x10=30]

4. Describe microbial growth and their measurement.
5. Describe ED Pathway.
6. Describe sporulation in *Bacillus Subtilis*.
7. Describe Purine and pyridine biosynthesis in brief.

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