



## BRAINWARE UNIVERSITY

### Term End Examination 2020 - 21

Programme – Bachelor of Science (Honours) in Microbiology

Course Name – Microbial Physiology and Metabolism

Course Code - BMBC301

Semester / Year - Semester III

Time allotted : 75 Minutes

Full Marks : 60

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

### Group-A

(Multiple Choice Type Question)

1 x 60=60

1. (Answer any Sixty )

(i) The reproduction rate is equal to death rate in which stage

- |                  |                     |
|------------------|---------------------|
| a) Decline phase | b) Stationary phase |
| c) Log phase     | d) Lag phase        |

(ii) Log-phase is also known as:

- |                |                      |
|----------------|----------------------|
| a) Death phase | b) Exponential phase |
| c) Lag-phase   | d) None of these     |

(iii) The most active stage in the sigmoid curve of bacteria in which maximum growth is attained:

- |                |                     |
|----------------|---------------------|
| a) Death phase | b) Stationary phase |
| c) Lag-phase   | d) Log-phase        |

(iv) The time taken by the bacteria to double in number during a specified time period is:

- |                    |                         |
|--------------------|-------------------------|
| a) Growth rate     | b) Generation time      |
| c) Sigmoidal curve | d) Specific growth rate |

(v) “Rock-eaters”:

- |                |                |
|----------------|----------------|
| a) Lithotrophs | b) Prototrophs |
|----------------|----------------|

c) Both Lithotrophs and Prototrophs

d) None of these

(vi) The portion of the growth curve where a rapid growth of bacteria is observed is known as:

a) Lag phase

b) Logarithmic phase

c) Stationary phase

d) Death phase

(vii) In which of the following phase secondary metabolites are produced during growth?

a) Lag phase

b) Logarithmic phase

c) Stationary phase

d) Death phase

(viii) Which of the following is used to grow bacterial culture continuously?

a) Chemostat

b) Hemostat

c) Coulter-Counter

d) Turbidostat

(ix) The average size of the cells in the exponential phase is \_\_\_\_\_.

a) larger than the initial size

b) smaller than the initial size

c) equal to the initial size

d) maybe smaller or larger than the initial size

(x) Growth rate  $>$  death rate is found in

a) Lag phase

b) Logarithmic phase

c) Stationary phase

d) Death phase

(xi) Industrial fermentation require organism of

a) Lag phase

b) Log phase

c) Both Lag phase & Log phase

d) None of these

(xii) During which phase would penicillin, an antibiotic that inhibits cell-wall synthesis, be most effective?

- a) Lag phase
- b) Logarithmic phase
- c) Stationary phase
- d) Death phase

(xiii) Bacteria which can grow at temperature between 20°C and 40°C are known as:

- a) Mesophiles
- b) Psychrophiles
- c) Thermophiles
- d) None of these

(xiv) Which of the following is not an advantage of continuous culture?

- a) Can be used for different reactions every day
- b) Little risk of infection or strain mutation
- c) Long growth periods of substrates/microbes
- d) Eliminating the inherent down time for cleaning and sterilization

(xv) Which of the following is not a disadvantage of continuous culture?

- a) Long growth periods of substrates/microbes
- b) Maintenance of mixed cultures
- c) Requires feed-batch culturing
- d) Viscosity of mixture for filamentous organisms

(xvi) Continuous addition of sugars in “Fed-batch” fermentation is done to

- 
- a) Produce methane
  - b) Purify enzymes
  - c) Degrade sewage
  - d) Obtain antibiotics

(xvii) Name the phase which is a period of adaptation of the cells to the new environment.

- a) Lag phase
- b) Exponential phase
- c) Log phase
- d) Stationary phase

(xviii) The advantage of continuous culture is

- a) Little risk of infection or strain mutation
- b) Can be used for different reactions every

day

c) Eliminating the inherent down time for cleaning and sterilization

d) All of these

(xix) In plug flow bioreactor

a) Back mixing of the culture solution which flows through a tubular reactor

b) The culture solution flows through a tubular reactor without back mixing

c) The composition of the nutrient solution, the number of cells, mass transfer and productivity does not vary at different locations within the system

d) All of these

(xx) Which is not related to the continuous culture?

a) Substrate concentration and other conditions remain constant

b) Cells grow at a constant fully acclimatized exponential rate

c) It has four phase, these are lag, log, stationary and death phase

d) All of these

(xxi) In Turbidostat:

a) Cell growth is controlled by adjusting the concentration of one substrate

b) Any required substrate like carbohydrate can be used as a limiting factor

c) Cell growth is kept constant by using turbidity to monitor the biomass concentration

d) both Cell growth is controlled by adjusting the concentration of one substrate and Cell growth is kept constant by using turbidity to monitor the biomass concentration

(xxii) Which microorganisms require oxygen?

a) Obligate aerobes

b) Facultative anaerobes

c) Obligate anaerobes

d) Free radicals

(xxiii) A \_\_\_\_\_ is composed of population of cell that at the same stage of their cell cycle

- a) Chemostat
- c) Continuous

- b) Turbidostat
- d) Synchronous culture

(xxiv) The exponential phase may be described by the equation \_\_\_\_\_

- a)  $dx/dt = \mu x$
- c)  $dx/dt = \mu t$
- b)  $dt/dx = \mu$
- d)  $dx^2/dt^2 = \mu$

(xxv) Which of the following organisms represent the highest specific growth rate,  $\mu_{max}$ ?

- a) *Penicillium chrysogenum*
- c) *Vibrio natriegens*
- b) *Aspergillus nidulans*
- d) *Methylomonas methanolytica*

(xxvi) The Yield Factor (Y) does not vary upon which of the following?

- a) pH
- c) Growth rate
- b) Temperature
- d) Amount of enzyme

(xxvii) What is Idiophase?

- a) Production of secondary metabolites
- c) Production of tertiary metabolites
- b) Production of primary metabolites
- d) Production of quaternary metabolites

(xxviii) The batch culture or fermentation can be used to produce \_\_\_\_\_

- a) Organic acids
- c) Amino acids
- b) Antibiotics
- d) Single Cell Protein

(xxix) The temperature that allows for most rapid growth during a short period of time is known as \_\_\_\_\_.

- a) Minimum Temperature
- c) Optimum Temperature
- b) Maximum Temperature
- d) Growth Temperature

(xxx) Mesophiles are group of bacteria that grow within the temperature range of?

- a) 0-20 degree Celsius
- b) 25-40 degree Celsius
- c) 45-60 degree Celsius
- d) more than 60 degree Celsius

(xxxii) Which of the following factors are responsible for the stability of thermophiles at high temperatures?

- a) increased leakage of cell components
- b) presence of large no. of polar amino acids and alpha-helix protein
- c) thermal stability of ribosomes
- d) presence of Inositol diphosphate and thermal stability of ribosomes

(xxxiii) The GasPak system is suitable for which of the following?

- a) Aerobic bacteria
- b) Facultatively anaerobic bacteria
- c) Anaerobic bacteria
- d) Microaerophilic bacteria

(xxxiv) The optimum pH for the growth of most bacteria lies between\_\_\_\_\_.

- a) 5-9
- b) 6.5-7.5
- c) 2-3.5
- d) 9-9.5

(xxxv) Nitrifying bacteria belongs to the nutritional class of\_\_\_\_\_.

- a) Chemoorganoautotrophy
- b) Photolithoautotrophy
- c) Chemolithoautotrophy
- d) Photoorganoheterotrophy

(xxxvi) Purple and green non-sulfur bacteria belongs to which of the following classes?

- a) Photolithoautotrophy
- b) Photoorganoheterotrophy
- c) Chemolithoautotrophy
- d) Chemoorganoheterotrophy

(xxxvii) Name the type of bacteria which uses reduced inorganic substances as an electron source?

- a) Autotrophs
- b) Chemotrophs
- c) Organotrophs
- d) Lithotrophs

(xxxvii) Name the type of bacteria which uses  $\text{CO}_2$  as a sole source of carbon for growth.

- a) Organotrophs
- b) Heterotrophs
- c) Autotrophs
- d) Lithotrophs

(xxxviii) What factors affect water activity?

- a) Drying
- b) Solutes
- c) Freezing
- d) All of these

(xxxix) Water activity can act as:

- a) an intrinsic factor determining the likelihood of microbial proliferation
- b) a processing factor
- c) an extrinsic factor
- d) all of these

(xl) In passive transport, substances move:

- a) from high to low concentration
- b) with the use of energy
- c) from low to high concentration
- d) up the concentration gradient

(xli) Which of the following would use energy to transport molecules across the membrane?

- a) Simple diffusion
- b) Facilitated diffusion
- c) osmosis
- d) sodium –potassium pump

(xlii) An example of facilitated diffusion would be:

- a) Proteins moving by vesicle into the cell
- b) Water moving through an aquaporin channel
- c) Glucose using a carrier protein to move into the cell
- d) Oxygen moving into the blood cells

(xliii) A cell in a hypertonic solution will

- a) Swell
- b) Shrink

c) Stay the same size

d) None of these

(xlv) Erythrocyte glucose transporter is an example of:

a) Ion driven active transport

b) Facilitated diffusion

c) Active transport

d) Simple diffusion

(xlv) What is the difference between diffusion and facilitated diffusion?

a) Active transport

b) Primary active transport

c) Secondary active transport

d) Passive transport

(xlv) Which of the following transports only one kind of substrate?

a) Uniport carriers

b) Symport carriers

c) Antiport carriers

d) Membrane proteins

(xlv)  $\text{Na}^+$  glucose transporter is an example of:

a) Facilitated diffusion

b) ATP driven active transport

c) Symport

d) Antiport

(xlv) Siderophores are:

a) high-affinity iron-chelating compounds

b) secreted by microorganisms

c) transport iron across cell membranes

d) all of these

(xlix) The TCA Cycle is an \_\_\_\_\_ pathway

a) catabolic

b) anabolic

c) amphibolic

d) respiratory

(l) Which of the following intermediates of TCA cycle act as amino acid precursors?

a) oxaloacetic acid

b) succinic acid

c) citric acid

d) acetyl CoA



(li) Which pathway will result in the production of four carbon dioxide molecules, two ATP molecules, NADH<sub>2</sub> and FADH<sub>2</sub>?

- a) glycolysis
- b) Krebs cycle
- c) Calvin cycle
- d) electron transport system

(lii) The TCA cycle is regulated by which of the following enzymes?

- a) citrate synthase
- b) isocitrate dehydrogenase
- c) malate dehydrogenase
- d) succinate dehydrogenase

(liii) Which molecule will combine with the four-carbon oxaloacetate in the TCA cycle to form the six-carbon citrate?

- a) lactic acid
- b) NADH
- c) ATP
- d) acetyl-CoA

(liv) Glycolysis can occur in \_\_\_\_\_.

- a) aerobic cells
- b) anaerobic cells
- c) both aerobic and anaerobic cells
- d) neither aerobic and anaerobic cells

(lv) How many molecules of glucose-6-phosphate are regenerated in pentose-phosphate pathway?

- a) 2
- b) 4
- c) 3
- d) 5

(lvi) Which of the following enzyme catalyzes the first step of glycolysis?

- a) Hexokinase
- b) Pyruvate kinase
- c) Glucokinase
- d) Phosphofructokinase-1

(lvii) Which statement about glycolysis is correct?

- a) Resulting pyruvate molecules are always directly incorporated into the Krebs cycle
- b) A proton gradient is established across the mitochondrial membrane
- c) Three molecules of NADH<sub>2</sub> and one
- d) Two net molecules of ATP are produced

molecule of FADH<sub>2</sub> are produced

through substrate-level phosphorylation

(lviii) Which of the following biological processes will occur under both aerobic and anaerobic conditions in humans?

- a) Citric acid cycle
- c) Glycolysis

- b) Fermentation
- d) All of these processes occur in both environments

(lix) Which of the following step is common in glycolysis and pentose phosphate pathway?

- a) Conversion of glucose to glucose-6-phosphate
- c) Conversion of glucose-6-phosphate to fructose-6-phosphate

- b) Conversion of glucose-6-phosphate to ribose-5-phosphate
- d) Conversion of glucose to glucose-1-phosphate

(lx) Which of the following statements about the electron transport chain is correct?

- a) The electron transport chain is made up of a chain of electron carriers with decreasing electron affinity.
- c) The electron transport chain is made up of a chain of electron carriers with decreasing oxidizing power

- b) The electron transport chain is made up of a chain of electron carriers with increasing redox potential
- d) The electrons transferred from carrier to carrier in the electron transport chain gain energy.