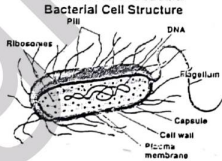


MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION
B.Sc. (Hort.)

Semester	: I (Old)	Academic Year	: 2017-2018
Course No.	: H/ MIBO-111	Title	: Introductory Microbiology
Credits	: 2 (1+1)		
Day & Date	:	Time	Total Marks :40
Note:	1. Solve ANY EIGHT questions from SECTION "A". 2. All questions from SECTION "B" are compulsory. 3. All questions carry equal marks. 4. Draw neat diagrams wherever necessary.		

MODEL ANSWERS

Q.No.1.	Define Microbiology and write its scope in horticultural and allied sciences.
Answer:	<p>Definition: Microbiology is the study of living organisms of microscopic size, which include bacteria, fungi, algae and protozoa, and the infectious agents.</p> <p>Scope: Scope in Agriculture viz. Nitrogen fixation, decomposition, soil fertility.</p> <ul style="list-style-type: none"> • Microorganisms are closely associated with the health and welfare of human beings; some microorganisms are beneficial and others are detrimental. For example, microorganisms are involved in the making of yogurt, cheese, and wine; in the production of penicillin and alcohol; and in the processing of domestic and industrial wastes. • Microorganisms can cause disease, spoil food, and deteriorate materials like iron pipes, glass lenses, and wood pilings. • Scope in dairy technology.
Q.No 2	Draw well labeled diagram of a typical bacterial cell and write the functions of cell wall.
Answer:	<p>a) Bacterial cell diagram</p>  <p>b) Functions of cell wall</p> <ul style="list-style-type: none"> • Nearly every genus of bacteria has a cell wall, which is a rigid, carbohydrate-containing structure that surrounds the bacterial cell • having a cell wall must be a major advantage to the bacteria • This cell wall exoskeleton provides the bacteria with several benefits • The cell wall protects the bacterium from damage by encircling it with a tough, rigid structure • This structure is also porous. Small molecules are able to freely pass through the cell wall to the membrane, but large molecules are excluded. In this way, the cell wall acts as a coarse filter. • The primary function of the cell wall, however, is to maintain the cell shape and prevent bursting from osmotic pressure (called lysis).

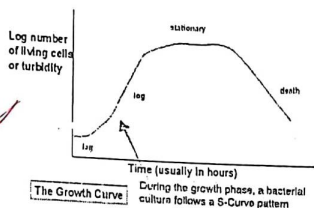
The cell wall maintains its shape and its permeability

Q.No 3.

Enlist growth phases in bacteria and explain bacterial growth curve.

Answer:

1. Lag phase:
2. Logarithmic (log)/Exponential phase:
3. Stationary phase:
4. Decline or death phase:



1. **Lag phase:** When the cells are adjusting to their new environment. During this phase, cellular metabolism is accelerated, resulting in rapid biosynthesis of cellular macromolecules, primarily enzymes, in preparation for the next phase of the cycle. Although the cells are increasing in size, there is no cell division and therefore no increase in numbers.

2. **Logarithmic (log)/Exponential phase:** Under optimum nutritional and physical conditions, the physiologically robust cells reproduce at a uniform and rapid rate by binary fission. Thus there is a rapid exponential increase in population, which doubles regularly until a maximum number of cells is reached. The length of the log phase varies, depending on the organisms and the composition of the medium, although the average may be estimated to last 6 to 12 hours.

3. **Stationary phase:** During this stage, the number of cells undergoing division is equal to the number of cells that are dying. There is no further increase in cell number and the population is maintained at its maximum level for a period of time. The primary factors responsible for this phase are the depletion of some essential metabolites and the accumulation of toxic acidic or alkaline end products in the medium.

4. **Decline or death phase:**

Because of the continuing depletion of nutrients and build up of metabolic wastes, the microorganisms die at a rapid and uniform rate. This decrease in population closely parallels its increase during the log phase. Theoretically, the entire population should die during a time interval equal to that of the log phase. This does not occur, however, since a small number of highly resistant organisms persist for an indeterminate length of time.

Q.No 4. Differentiate between Prokaryotic and Eukaryotic cells.

Answer:

Prokaryotic Cell

Eukaryotic Cell

Small cells

Larger cells

Always unicellular

Often multicellular

No nucleus or membrane bound organelles such as mitochondria

Always have nucleus and other membrane bound organelles

DNA is circular without protein

DNA is linear and associated with proteins to form chromatin.

Ribosomes are small (70S)

Ribosomes are large (80S)

No cytoskeleton

Always have cytoskeleton

Mobility by rigid rotating flagellum

Mobility by flexible waving cilia or flagelle

	Cell division by Binary fission	Cell division by mitosis or meiosis
	Reproduction is always asexual	Reproduction is sexual or asexual
	Huge variety of metabolic pathways	Common metabolic pathways
Q.No 5.	Define fungus. Explain general characters of fungi.	
Answer:	<ul style="list-style-type: none"> Fungi are eukaryotic lower plants devoid of chlorophyll. They are usually multicellular but are not differentiated into roots, stems and leaves. They range in size and shape from single celled microscopic yeasts to giant multicellular mushrooms and puffballs. We are particularly interested in those organisms commonly called molds, the mildews, the yeasts and the plant pathogens known as rusts. True fungi are composed of filaments and masses of cells which make up the body of the organism known as mycelium. Fungi reproduce by fission by budding or by means of spores borne on fruiting structures that are quite distinctive for certain species. 	
Q.No.6	Enlist the methods of reproduction in bacteria and explain in details sexual methods of reproduction.	
	<p>Different methods of reproduction:</p> <p>Asexual: i Binary fission ii Budding iii Spore formation</p> <p>Sexual : Conjugation ii Transduction iii Transformation</p> <p>Sexual Methods of Reproduction:</p> <ul style="list-style-type: none"> i) Conjugation :cell mating ii) Transduction: through bacteriophage infection iii) Transformation: absorption of foreign DNA 	
Q.No 7	Write short notes on (Any Two)	
	<p>1) Bacteriophages: Definition: Viruses which attacks bacteria are called as bacteriophages</p> <p>Characters:</p> <p>1) Morphology 2) Cytology 3) Genetic characters 4) Filterable nature 5) Multiplication</p> <p>2) Microscope Microscopes are of two categories, light (or optical) and electron, depending upon the principle on which magnifications based.</p> <p>Light microscopy, in which magnification is obtained by a system of optical lenses using light waves, includes</p> <ul style="list-style-type: none"> 1) Bright field. 2) Dark field. 3) Fluorescence and 4) Phase-contrast microscopy. <p>The electron microscope, as the name suggests, uses a beam of electrons in place of light waves to produce the image. Specimens can be examined by either transmission or scanning electron microscopy.</p>	

	3) Symbiosis: Definition, Rhizobium –legume symbiosis, algae-Frankia symbiosis	
Q.No 8	Write the important contribution of following scientists (Any Four) 1) Anton Leeuwenhock : He has developed first simple microscope and observation of unicellular microorganisms. 2) Robert Koch : He has given Koch's postulates 3) Louis Pasteur: Fermentation techniques as biochemical and organic process, pasteurization techniques. 4) P.A. Millardet : Use of Bordeaux mixture for control of Downy Mildew of Grapes 5) E.F.Smith: Father of Phytobacteriology.	
Q. No 9	Classify the bacteria on the basis of temperature requirement of cells in arrangement of cocci. Temperature: 1) Psychrophiles 2) Mesophiles 3) Thermophiles Arrangement of cocci: 1) Diplococci 2) Streptococci 3) Tetrads 4) Staphylococci 5) Sarcinae	
Q.No 10	What are the general properties of viruses. Non cellular, Ultramicroscopic organism, Size, Needs living host for growth, Lack metabolic machinery for replication, depend on higher organism for replication	
SECTION "B"		
Q.No.11	Define the following terms. 1) Symbiosis 2) Parasitism 3) Mutation 4) Commensalism 1) Symbiosis : Close association or relationship between two or more living organisms, where at least one receives some sort of benefit from the relationship. 2) Parasitism : Parasitism is a relationship between two different organisms where the parasite harms the host. 3) Mutation : A mutation is a permanent change of the nucleotide sequence of the genome of an organism. 4) Commensalism : A relationship between individuals of two species in which one species obtains food or other benefits from the other without either harming or benefiting the latter.	
Q.No.12	Fill in the blanks. 1. The unit used for measurement of viruses is Nanometer . 2. The cell wall of bacteria is chemically composed of Peptidoglycan . 3. The first compound microscope was invented by Robert Hook . 4. The science which deals with the study of fungi is called as Mycology .	

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