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Answers Key:

IV.Answer the following in detail.

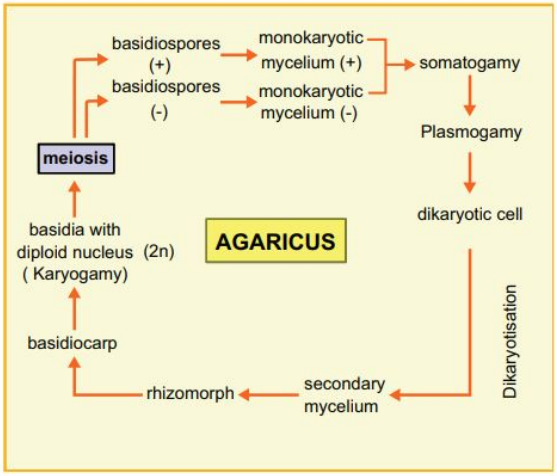
1. (i) R.H.Whittaker, an American taxonomist proposed five kingdom classification in the year 1969.
(ii) The Kingdoms include Monera, Protista, Fungi, Plantae and Animalia.
(iii) The criteria adopted for the classification include cell structure, thallus organization, mode of nutrition, reproduction and phylogenetic relationship. The merits and demerits are as follows:
Merits:
(i) The classification is based on the complexity of cell structure and organization of thallus.
(ii) It is based on the mode of nutrition.
(iii) Separation of fungi from plants.
(iv) It shows the phylogeny of the organisms.
Demerits:
(i) The kingdom Monera and Protista accommodate both autotrophic and heterotrophic organisms, cell wall lacking and cell wall bearing organisms thus making these two groups more heterogeneous.
(ii) Viruses were not included in the system.

2. (i) The symbiotic association between algae and fungi is called lichens.
(ii) The algal partner is called Phycobiont or Photobiont and the fungal partner is called Mycobiont.
(iii) Algae provide nutrition for fungal partner in turn fungi provide protection and also help to fix the thallus to the substratum through rhizinae.
(iv) Asexual reproduction takes place through fragmentation, Soredia and Isidia. Phycobionts reproduce by akinetes, hormogonia, aplanospore, etc., Mycobionts undergo sexual reproduction and produce ascocarps.
Classification:
(i) Based on the habitat lichens are classified into following types: Corticolous (on Bark) Lignicolous (on Wood) Saxicolous (on rocks) Terricolous (on ground) Marine (on siliceous rocks of sea) Fresh water(on siliceous rock of fresh water).
(ii) On the basis of morphology of the thallus they are divided into Leprose (a distinct fungal layer is absent) Crustose-crust like; Foliose-leaf like; Fruticose-branched pendulous shrub like.
(iii) The distribution of algal cells distinguishes lichens into two forms namely Homoiomerous (Algal cells evenly distributed in the thallus) and Heteromerous (a distinct layer of algae and fungi present)
(iv) If the fungal partner of lichen belongs to ascomycetes, it is called Ascolichen and if it is basidiomycetes it is called Basidiolichen.

3.

S.No	Characteristics	Gram positive Bacteria	Gram negative Bacteria
1.	Cell wall	Thick layered with 0.015μm - 0.02 μm.	Thin layered with 0.0075 μm - 0.012 μm
2.	Rigidity of cell wall	Rigid due to presence of Peptidoglycans.	Elastic due to presence of lipoprotein - polysaccharide mixture.
3.	Chemical composition	Peptidoglycans - 80% Polysaccharide - 20% Teichoic acid present	Peptidoglycans - 3 to 12% rest is polysaccharides and lipoproteins.Teichoic acid absent.
4.	Outer membrane	Absent	Present
5.	Periplasmic space	Absent	Present
6.	Susceptibility to penicillin	Highly susceptible	Low susceptible
7.	Nutritional requirements	Relatively complex	Relatively simple
8.	Flagella	Contain 2 basal body rings	Contain 4 basal body rings.
9.	Lipid and lipoproteins	Low	High
10.	Lipopolysaccharides	Absent	Present

4.



III. Answer any 2 of the following

5.

S.No	Criteria	Monera
1.	Cell type	Prokaryotic
2.	Level of organization	Mostly unicellular, rarely Multicellular
3.	Cell wall	Present (made up of peptidoglycan and mucopeptides)
4.	Nutrition	Autotrophic (Phototrophic, Chemoautotrophic) Heterotrophic (Parasitic and Saprophytic)
5.	Motility	Motile or non-motile
6.	Organisms	Archaebacteria, Eubacteria, Cyanobacteria, Actinomycetes and Mycoplasma

6. During crop rotations and mixed cropping. Farmers plant leguminous crops to increase the soil fertility.

S.No	Beneficial aspects	Bacteria	Role
1.	Ammonification	1. Bacillus ramosus 2.Bacillus mycoides	Convert complex proteins in the dead bodies of plants and animals into ammonia which is later converted into ammonium salt
2.	Nitrification	1. Nitrobacter 2. Nitrosomonas	Convert ammonium salts into nitrites and nitrates
3.	Nitrogen fixation	1. Azotobacter 2. Clostridium 3. Rhizobium	(i) Converting atmospheric nitrogen into organic nitrogen
			(ii) The nitrogenous compounds are also oxidized to nitrogen
			(iii) All these activities of bacteria increase soil fertility

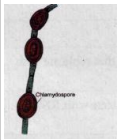
7. 1. Lichens secrete organic acids like Oxalic acids which corrodes the rock surface and helps in weathering of rocks, acting as pioneers in Xerosere.
   2. Lichens are sensitive to air pollutants and are considered as pollution indicators.
   3. Cladonia rangiferina (Reindeer moss) is used as food for animals living in Tundra regions.
   4. Usnic acid produced from lichens show antibiotic properties.

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8.

	ANABOLISM	CATABOLISM
1.	Building up process	Breaking down process
2.	Smaller molecules combine together to form larger molecule	Larger molecule break into smaller units
3.	Chemical energy is formed and stored	The stored chemical energy is released and used
4.	Eg: Synthesis of proteins from amino acids	Eg: Breaking down of glucose to CO_2 and water

9.

Oidium	Chlamydospore
(i) (Thallospores / Arthrospores) The hyphae divide and develop into spores . (ii) eg. Erysiphe	(i) Thick walled resting spores. (ii) eg. Fusarium
	

II. Answer any 3 of the following

10.

Homoiomerous	Heteromerous
Algal cells evenly distributed in the thallus	A distinct layer of algae and fungi present

11. In the lysogenic cycle of a phage, the integrated phage DNA is called prophage.

12. Archaebacteria are primitive prokaryotes and are adapted to thrive in extreme environments like hot springs, high salinity and low pH.
    E.g. Thermoplasma.

13. i) Ectomycorrhizae
    eg. Pisolithus tinctorius
    ii) Ecdomycorrhizae
    iii) Arbuscular mycorrhizae
    eg. Gigaspora

14. (i) Lichens are sensitive to air pollutants especially to sulphur-di-oxide.
    (ii) Therefore, they are considered as pollution indicators.

I Choose the best answer.

15. (d) Methanobacterium
16. (a) lack of motile structures
17. (c) Bacteria - Crown gall

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